OSAWA

DRILLS & END MILLS

2018 CATALOGUE

	MATERIALS	HARDNESS/Rm
P1	Free cutting steel and structural steel	< 500 N/mm²
P2	Carbon steel and low alloy steel	500-700 N/mm²
P3	Medium alloy steel and heat treated steel	600-800 N/mm²
P4	High alloy steel	800-1000 N/mm²
P5	Tool steel	900-1200 N/mm²
P6	High tensile strength steel	1200-1600 N/mm²
M1	Ferritic stainless steel	400-700 N/mm²
M2	Austenitic stainless steel (good machinability)	500-750 N/mm²
M3	Austenitic stainless steel (medium machinability)	550-850 N/mm²
M4	Martensitic stainless steel	650-950 N/mm²
M5	PH stainless steel	800-1250 N/mm²
K1	Grey cast iron	150-250 HB
K2	Nodular cast iron	150-350 HB
K3	Austenitic cast iron	120-260 HB
K4	ADI cast iron	250-500 HB
N1	Aluminium alloys ≤ 12% Si	
N2	Aluminium alloys > 12% Si	
N3	Copper	
N4	Bronze and brass	
N5	Plastic materials	
N6	Fiber and composites	
S1	Heat resistant super alloys (HRSA) - good machinability	< 25 HRC
S2	Heat resistant super alloys (HRSA) - medium machinability	25-35 HRC
S3	Heat resistant super alloys (HRSA) - low machinability	35-45 HRC
S4	Low alloy titanium (good machinability)	
S5	High alloy titanium (medium machinability)	
H1	Hardened steel	50-56 HRC
H2	Hardened bearing steel	54-62 HRC
H3	Hardened tool steel	60-65 HRC
H4	Hardened martensitic stainless steel	50-56 HRC
H5	Hardened white cast iron	48-55 HRC

REFER TO PAGES 15-39 FOR THE COMPLETE LIST OF WORKPIECE MATERIALS.
CONSULTARE PAGG. 15-39 PER LA LISTA COMPLETA DEI MATERIALI
AUF DEN SEITEN 15 BIS 39 FÜR DIE VOLLSTÄNDIGE LISTE VON WERKSTOFFMATERIALIEN
CONSULTER DE LA PAGE 15 À LA PAGE 39 POUR LA LISTE COMPLÈTE DES MATÉRIAUX
CONSULTAR DESDE PÁG. 15 A PÁG. 39 PARA LA LISTA COMPLETA DE LOS MATERIALES
ПОЛНЫЙ СПИСОК ОБРАБАТЫВАЕМЫХ МАТЕРИАЛОВ СМОТРИ НА СТР. 15-39.

2018 CATALOGUE

Osawa is a trademark owned by Sorma S.p.A. which is on a mission to provide the cutting tool market with solid tools for milling and drilling. Based on the well-established know how of Sorma S.p.A., coming from Japanese and European best technologies, the brand Osawa was launched in 2001 and groups different tools manifacturers located worldwide (Europe, Far East and USA). To keep up with the evolution of production systems and costs, Sorma is increasing its investments in China, Taiwan and Korea, always putting quality first: Osawa producers are strictly selected on the strength of their tools' performances and they are all certified ISO 9001. Such structure makes Osawa able to meet a very wide spectrum of customers' requests, even on most critical applications. Its production flexibility together with the highly qualified direction of Sorma gives Osawa the possibility to have high profile tools in any item of the range.

Arturo Sorgato
President - Sorma S.p.A.

Osawa è un marchio registrato da Sorma S.p.A. che ha la mission di offrire al mercato dell'industria meccanica utensili integrali per foratura e fresatura. Basato sull'esperienza maturata da Sorma con le migliori tecnologie giapponesi ed europee, il marchio Osawa è stato lanciato nel 2001 e raggruppa diversi produttori di utensili collocati in varie parti del mondo (Europa, Estremo Oriente e USA). Per far fronte all'evoluzione dei sistemi e dei costi di produzione, Sorma sta incrementando i propri investimenti in Cina, Taiwan e Corea, facendo sempre della qualità il proprio baluardo: i produttori Osawa sono selezionati severamente sulla base delle prestazioni dei loro utensili e sono tutti certificati ISO 9001. Questa struttura permette ad Osawa di far fronte ad un ampio quadro di richieste da parte dei clienti, anche nelle applicazioni più critiche. La sua flessibilità produttiva, insieme alla direzione altamente qualificata di Sorma, danno la possibilità ad Osawa di offrire utensili di alto profilo in ogni componente della gamma.

Arturo Sorgato
Presidente - Sorma S.p.A.

Osawa ist eine geschützte Handelsmarke der Firma Sorma S.p.A., die als Ziel, ein umfangreiches Angebot von Bohr- und Fräswerkzeugen für den Maschinenbau anbieten soll. Dank der langen Erfahrung, die Sorma während der Jahrzehnte sammeln konnte, und der besten japanischen und europäischen Technologien, wurde im Jahre 2001 die Handelsmarke Osawa gegründet. Osawa enthält hochwertige Werkzeuge von verschiedenen ausgelesenen Herstellern aus aller Welt (Europa, Ferner Osten, USA). Um den Schritt der ständigen Entwicklung der Fertigungsprozesse und Produktionskosten halten zu können, hat Sorma seine Investionen in China, Taiwan und Korea erhöht, ohne selbstverständlich auf die Qualität zu verzichten, die seit immer im Mittelpunkt steht. Die Osawa Lieferanten sind auf sehr sorgfältiger Weise ausgewählt, verfügen alle über eine ISO 9001 Zertifizierung, und müssen die streng angeforderten Leistungsverhältnisse der Werkzeuge einhalten können. Dieser Hintergrund ermöglicht Osawa ein sehr breites Spektrum von Anfragen zu befriedigen, auch für die kritischsten Anwendungsfälle. Seine Flexibilität bei den verschiedenen Fertigungsprozesse, in Verbindung mit einer hochqualifizierten Führung der Firma Sorma, gibt Osawa die Möglichkeit hochwertige Werkzeuge in den verschiedenen Produktsegmente anzubieten.

Arturo Sorgato
Präsident - Sorma S.p.A.

Osawa est une marque déposée par Sorma S.p.A. qui a la mission d'offrir au marché de l'industrie mécanique des outils monobloc pour le perçage et le fraisage. Basée sur l'expérience acquise par Sorma avec les meilleures technologies japonaises et européennes, la marque Osawa a été lancée en 2001 et elle regroupe plusieurs producteurs d'outils qui se trouvent partout dans le monde (Europe, Extrême Orient et USA). Pour faire face à l'évolution des procédés de fabrication et des couts de production, Sorma est en train d'augmenter ses propres investissements en Chine, à Taiwan et en Corée, en faisant toujours de la qualité son point de force : les producteurs Osawa sont sélectionnés sévèrement en fonction de la performance de leurs outils, et sont tous certifiés ISO 9001. Cette structure permet à Osawa de faire face à un large cadre de demandes de la part des clients, aussi dans les applications les plus critiques. Sa flexibilité productive, sous la direction hautement qualifiée de Sorma, donne à Osawa la possibilité d'offrir des outils de haut profil pour chaque composant de la gamme.

Arturo Sorgato
Président - Sorma S.p.A.

Osawa es una marca registrada de Sorma S.p.A. cuya misión es ofrecer al mercado de la industria mecánica herramientas integrales para el taladrado y el fresado. Basada en la experiencia adquirida por Sorma con las mejores tecnologías Japonesas y Europeas, la marca Osawa fue lanzada en el 2001 y reúne a diferentes fabricantes de herramientas ubicados en varias partes del mundo (Europa, Extremo Oriente y EE.UU.). Para hacer frente a la evolución de los sistemas y de los costes de producción, Sorma está aumentando su inversión en China, Taiwán y Corea, haciendo siempre de la calidad el propio baluarte: los productores Osawa se seleccionan basándose en el rendimiento de sus herramientas y son todos certificados ISO 9001. Esta estructura permite a Osawa de hacer frente a un panorama amplio de peticiones por parte de los clientes, incluso en las aplicaciones más críticas. Su flexibilidad productiva, junto a la dirección de profesionales altamente calificados de Sorma, dan la posibilidad a Osawa de ofrecer herramientas de alto perfil en cada componente de la gama.

Arturo Sorgato
Presidente - Sorma S.p.A.

Osawa – это марка зарегистрированная ЗАО «Sorma S.p.A.», которая включает в себя широкую гамму продукции интегрального осевого инструмента для сверления и фрезерования, применяемого в металлообрабатывающей промышленности. Компания «Sorma» обладает передовыми технологиями, накопленными благодаря многолетнему опыту работы с лучшими японскими и европейскими производителями. Марка Osawa появилась в 2001 году и объединила ведущих производителей инструментов, расположенных в разных частях мира (Европе, Дальнем Востоке и США). Следуя требованиям современного рынка по оптимизации стоимости и качества продукции, компания «Sorma» увеличила свои инвестиции в производство в таких странах как Китай, Тайвань и Корея, при условии соблюдения высочайших стандартов качества: все производители Osawa проходят строгий контроль качества продукции и высоких производственных стандартов. Всё производство сертифицировано согласно стандартам ISO 9001. Благодаря этому, продукция Osawa может быть применена для решения широкого спектра даже самых сложных задач и в состоянии удовлетворить требования потребителя возникающих при металлообработке. Гибкое производство Osawa, совместно с высококвалифицированным специалистами компании «Sorma», позволяют предложить качественный инструмент по всем направлениям продукции.

Arturo Sorgato
Президент ЗАО «Sorma S.p.A.»

WARNING

read carefully before using our products

- Tools may chatter if broken. The wearing of eye protection is strongly advised in the vicinity of the working area.
- The correct using condition and handling of our tools is essential to ensure maximum life and hazard-free operation.
- Cutting tools have sharp edges and care must be taken when handling to avoid cuts/lacerations to unprotected hands.
- The wearing of gloves is forbidden as the gloves may entangle with turning tools.
- Tools may hurt the user's feet when falling off. Safety shoes should be put on at all time.
- While fitting the tools to machine spindles and/or sleeves, care should be taken to avoid subjecting them to shock or impact.
- Check that the workpieces are properly seated and securely held in the chuck before switching on machine power.
- Do not use a tool which cutting edges are worn-out or chipped severely.
- Grinding operations may produce potentially hazardous dust particles or vapour. Adequate ventilation equipment should be provided.

VORSICHT

bitte sorgfältig durchlesen, bevor Sie unsere Produkte gebrauchen

- Beschädigte Werkzeuge können vibrieren, es wird daher dringend empfohlen Schutzbrillen in der Nähe der Arbeitstelle zu tragen.
- Ordnungsgemäße Handhabung und Arbeitsvoraussetzung sind Grundbedingungen für lange Lebensdauer und Sicherheit.
- Die Schneidkanten der Werkzeuge sind sehr scharf und können ungeschützte Hände verletzen. Vorsicht bei der Handhabung.
- Handschuhe können sich mit drehenden Werkzeugen verfangen, sie sind daher verboten.
- Unfallschutzschuhe ständig anziehen: beim Hinunterfallen können die Werkzeuge die Füße verletzten.
- Beim Einsetzen der Werkzeuge auf die Maschinen ist darauf zu achten, Stöße zu vermeiden.
- Prüfen Sie vor Inbetriebnahme der Maschine die genaue Befestigung der Werkstücke.
- Werkzeuge mit beschädigten Schneiden nicht mehr verwenden.
- Beim Schleifen können gefährliche Partikel oder Gase enstehen. Angemessene Entlüftung muß gewährleistet sein.

ADVERTENCIAS

leer atentamente antes de comenzar a utilizar nuestros productos

- Si las herramientas están rotas, pueden vibrar. Se aconseja absolutamente el uso de gafas de protección cuando se está cerca del área de trabajo.
- El uso correcto de nuestras herramientas es esencial para asegurarse la mayor duración y para evitar operaciones peligrosas.
- Las herramientas de corte poseen bordes muy afilados que pueden causar heridas en las manos si no están debidamente protegidas.
- Está prohibido el uso de guantes. El tejido puede pegarse al filo y ser arrastrado por la herramienta en rotación.
- Las herramientas que caen pueden dañar los pies del operador. El calzado de protección contra accidentes debe usarse en todo momento.
- Si se fija una herramienta a la máquina tener la precaución de no averiarla.
- Controlar el posicionamiento perfecto y la fijación de la pieza a mecanizar antes de accionar la máquina.
- No utilizar herramientas muy gastadas o averiadas.
- Cuando se afila una herramienta pueden formarse polvos y vapores peligrosos. Disponer un sistema de ventilación adecuado.

AVVERTENZE

leggere attentamente prima dell'utilizzo dei nostri prodotti

- Gli utensili, se rotti, possono vibrare. L'uso di occhiali protettivi è assolutamente consigliato in prossimità dell' area di lavoro.
- Il corretto utilizzo dei nostri utensili è essenziale al fine di assicurarne la miglior durata ed evitare operazioni pericolose.
- Gli utensili da taglio hanno un tagliente molto affilato che può procurare ferite alle mani se non protette adeguatamente.
- L'uso di guanti è vietato. Il tessuto può legarsi al tagliente ed essere trascinato dall'utensile in rotazione.
- Gli utensili che cadono possono danneggiare i piedi dell'operatore. Le scarpe antinfortunistiche devono essere indossate in qualsiasi momento
- Nel fissare l'utensile alla macchina fare sempre attenzione a non danneggiarlo.
- Controllare il perfetto posizionamento e fissaggio del pezzo da lavorare prima di azionare la macchina.
- Non riutilizzare utensili fortemente usurati o danneggiati.
- La riaffilatura può generare polveri e vapori pericolosi. Attrezzarsi con un sistema di ventilazione adeguato.

AVERTISSEMENT

à lire attentivement avant utilisation de nos produits

- Les outils si cassés peuvent vibrer. Le port de lunettes de sécurité près de la zone de travail est vivement recommandé.
- Des conditions d'emploi correctes de nos produits sont essentielles pour assurer une durée de vie maximum et éviter des accidents.
- Les outils ont des arêtes vives et peuvent blesser les mains non protégées.
- Le port de gants près d'outils en rotation est interdit car ils peuvent être happés par l'outil.
- Des outils tombant à terre peuvent blesser les pieds de l'opérateur : le port de chaussures de sécurité est conseillé.
- En montant les outils sur le porte-outils, veiller à éviter les chocs.
- S'assurer que la pièce soit parfaitement fixée avant de mettre la machine en route.
- Ne pas utiliser des outils usés ou endommagés.
- Le réaffûtage des outils peut provoquer des vapeurs et des poussières dangereuses qui devront être convenablement aspirées.

ПРЕДУПРЕЖДЕНИЕ

внимательно прочитайте перед использованием нашей продукции

- Повреждённый инструмент подвержен вибрациям. Настоятельно рекомендуется использование средств защиты глаз, в непосредственной близости от рабочей зоны.
- Правильное использование нашего инструмента обеспечит максимальный срок его службы и безопасность работы.
- Режущий инструмент, имеет острые кромки, поэтому необходимо соблюдать осторожность при его использовании.
- Использование перчаток запрещено, так как ткань перчатки может зацепиться за части инструмента, что может привести к травмам при вращении инструмента.
- При падении инструмент может повредить ноги пользователя. Во время работы с инструментом должна быть использована специальная защитная обувь.
- Устанавливать инструмент в станок необходимо с осторожностью, во избежание его повреждения.
- Необходимо проверить надёжность крепления заготовки до включения станка.
- Не использовать повторно повреждённый или пришедший в негодность инструмент.
- Переточка инструмента может привести к образованию опасных испарений и пыли. Строго рекомендуется использование соответствующих вентиляционных систем.

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18 ..... Workpiece materials
40 ..... Hardness
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43. CARBIDE DRILLS

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81 ..... TYPHOON PU - HPU universal application
103 ..... TYPHOON SUH stainless steel
117 ..... TYPHOON ALH non-ferrous materials
127 ..... TYPHOON HRC hardened steel 45÷62 HRC
133 ..... TYPHOON SUH MINI short, long and extra long
165 ..... TYPHOON HL long and extra-long
199 ..... C-SD-TA NC spotting

203. HSS DRILLS

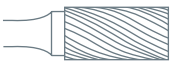
213 ..... LFTA high performance
223 ..... SUTA high performance
233 ..... HSS - HSS/Co general purpose

299. CARBIDE END MILLS

317 ..... G2 general purpose
363 ..... MDTA general purpose
387 ..... HF VH/UP universal and multi-purpose
483 ..... MEF stainless steel and super alloys
497 ..... ALU non ferrous materials
523 ..... MEX steel and hardened steel 30÷55 HRC
583 ..... UH steel and hardened steel < 70 HRC

645. HSS END MILLS

657 ..... HSS/Co - HSSP general purpose

699. CARBIDE BURRS 

701 ..... Carbide burrs

CATALOGUE STRUCTURE

SUDDIVISIONE DEL CATALOGO
AUFTEILUNG DES KATALOGS
STRUCTURE DU CATALOGUE
SUBDIVISIÓN DEL CATÁLOGO
СТРУКТУРА КАТАЛОГА

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4 645. HSS END MILLS
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5 699. CARBIDE BURRS
701 ..... Carbide burrs

5 MAIN SECTIONS
1 carbide drills
2 HSS drills
3 micrograin carbide end mills
4 HSS end mills
5 carbide burrs

5 MACRO SEZIONI
1 punte in metallo duro
2 punte in HSS
3 frese in metallo duro micrograna
4 frese in HSSCo e HSSP
5 lime rotative in metallo duro

5 HAUBTABSCHNITTE
1 VHM Bohrer
2 HSS Bohrer
3 VHM Fräser Mikrokörnung
4 Fräser aus HSSCo und HSSP
5 Hartmetall-Rotierfeilen

5 CHAPITRES
1 forets en carbure
2 forets en HSS
3 fraises en carbure micrograin
4 fraises en HSSCo et HSSP
5 limes rotatives en carbure

5 MACRO SECCIONES
1 brocas en metal duro
2 brocas en HSS
3 fresas en metal duro micrograno
4 fresas en HSS/Co y HSSP
5 limas rotativas en metal duro

5 ПОДРАЗДЕЛОВ
1 твёрдосплавные свёрла
2 свёрла из быстрорежущей стали
3 фрезы из мелкозернистого твёрдого сплава
4 фрезы из порошковой и легированной Co быстрорежущей стали
5 борфрезы твёрдосплавные

PRODUCT SEARCH

RICERCA PRODOTTI
PRODUKTSUCHE
RECHERCHE PRODUITS
BÚSQUEDA PRODUCTOS
ПОДБОР ИНСТРУМЕНТА

1

Alphanumeric index

Indice alfanumerico Alphanumerischer I

ITEM No.	PAGE	ITEM
118N	234	G2211
134N (234NVA)	272	G2212
1385NTI (1386STI)	243	G2250
1386STI	243	G2251
1386STI SET	246	G2310
138HB	254	G2311

ALPHANUMERIC INDEX
If product code (e.g. ITEM No. 118N) is known, check the alphanumeric index at page 12.

INDICE ALFANUMERICO
Conoscendo il codice prodotto (es. ITEM No. 118N), consultare l'indice alfanumerico a pag. 12.

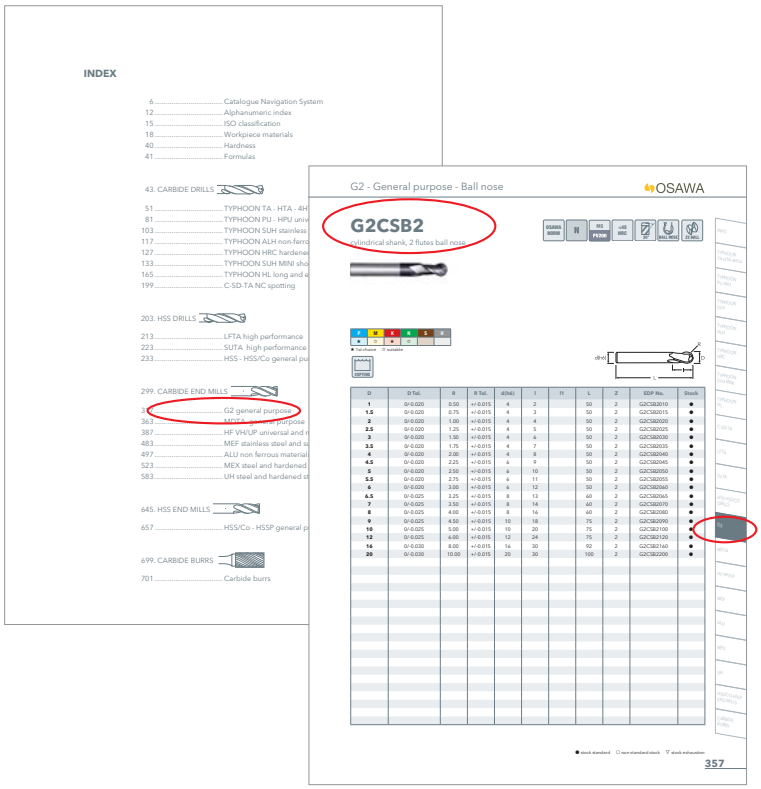
ALPHANUMERISCHER INDEX
Wenn Sie die Art.Nr kennen (z.B. ART.Nr 118N), können Sie die entsprechende Seite durch den Alphanumerischen Index – Seite 12 - finden.

INDEX ALPHANUMÉRIQUE
En connaissant le code produit (ex. ITEM No. 118N), consulter l'index alphanumérique à la page 12.

ÍNDICE ALFANUMÉRICO
Conociendo el producto (ej. ITEM No. 118N), consultar el índice alfanumérico en pág. 12.

АЛФАВИТНЫЙ УКАЗАТЕЛЬ
Если артикул (т.е. код № 118n) известен, смотрите алфавитный указатель на стр. 12.

2



GENERAL AND THUMB INDEX
If product series (e.g. G2) is known, check general index at page 5 or follow the thumb index.

INDICE E RUBRICATURA
Conoscendo la serie prodotto (es. G2), consultare l'indice generale a pag. 5 o seguire la rubricatura.

INDEX UND DAUMEN INDEX
Wenn die Produktgruppe bekannt ist (z.B G2), schlagen Sie im Index -Seite 5- nach, oder folgend Sie dem Daumen Index.

INDEX ET RUBRIQUE
En connaissant la référence du produit (ex. G2), consulter l'index général à la page 5 ou suivre la rubrique.

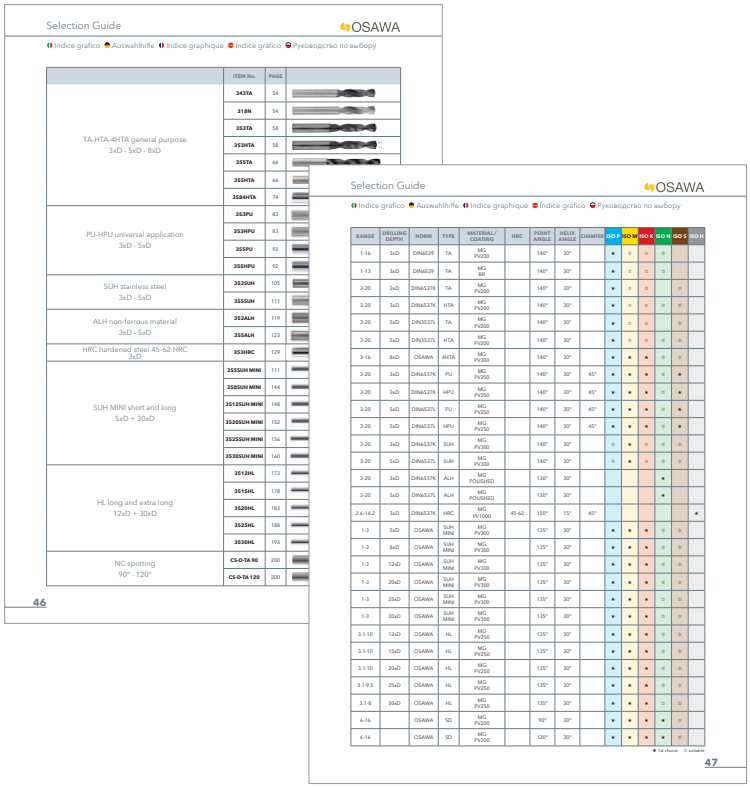
ÍNDICE Y DIRECTORIO
Conociendo la serie de producto (ej. G2), consultar el índice general en pág. 5 o seguir el directorio.

ОГЛАВЛЕНИЕ И РУБРИКАТОР
Если известна серия продукции (т.е. g2), смотри общее оглавление на стр. 5 или используйте рубрикатор.

PRODUCT SEARCH

RICERCA PRODOTTI
PRODUKTSUCHE
RECHERCHE PRODUITS
BÚSQUEDA PRODUCTOS
ПОДБОР ИНСТРУМЕНТА

3



SELECTION GUIDE

An easy graphic index with tool and application information is available at the beginning of each section.

GUIDA ALLA SELEZIONE

All'inizio di ogni macro sezione è disponibile un indice grafico con informazioni relative all'utensile e alle sue applicazioni.

AUSWAHLHILFE

Am Anfang von jedem Hauptabschnitt ist ein grafischer Index, mit Infos bezüglich des Werkzeugs und seinem Anwendungsfeld, vorhanden.

GUIDE DE SÉLECTION

Un index graphique avec les informations relatives à l'outil et à ses applications est disponible au début de chaque chapitre.

GUÍA DE SELECCIÓN

Al inicio de cada macro sección está disponible un índice gráfico con informaciones relativas a la herramienta y a sus aplicaciones.

ПОМОЩНИК ПО ПОДБОРУ

В начале каждого подраздела находиться простой графический индекс инструмента, который даёт информацию об инструменте и его применении.

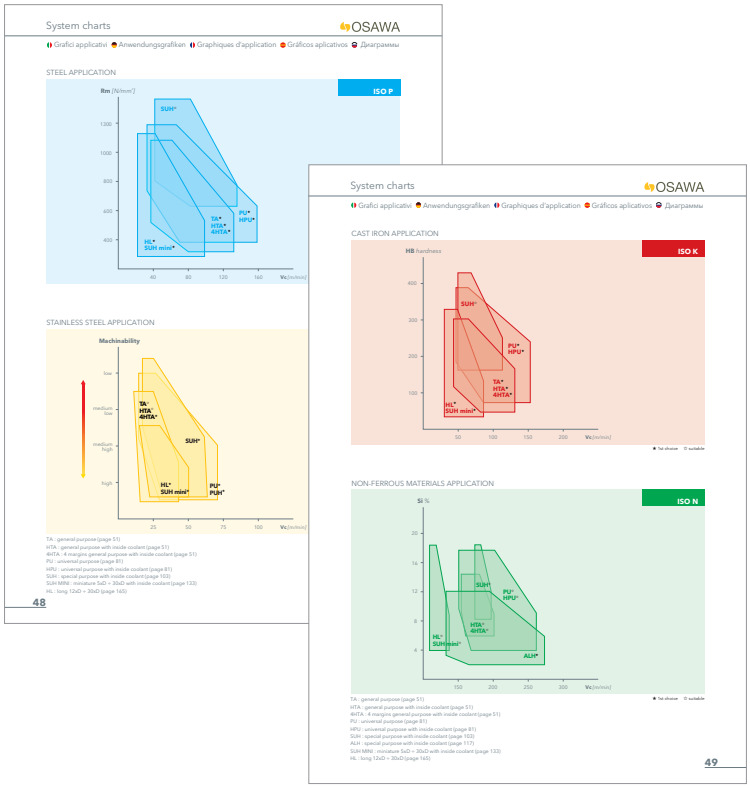
SELECTION GUIDE INDEX

CARBIDE DRILLS page 46
HSS DRILLS page 208
CARBIDE END MILLS page 304
HSS END MILLS page 650
CARBIDE BURRS page 700

PRODUCT SEARCH

RICERCA PRODOTTI
PRODUKTSUCHE
RECHERCHE PRODUITS
BÚSQUEDA PRODUCTOS
ПОДБОР ИНСТРУМЕНТА

4



SYSTEM CHART
An easy guide to the application range by work-piece material, for each tool series is available at the beginning of each section.

SYSTEM CHART
All'inizio di ogni macro sezione per ogni famiglia di utensili è disponibile un sistema di grafici applicativi in base al materiale da lavorare.

SYSTEM CHART
Am Anfang von jedem Hauptabschnitt stehen Diagramme für die verschiedenen Werkzeuge, die je nach zu bearbeitendem Material erstellt sind, zur Verfügung.

SYSTEM CHART
Au début de chaque chapitre, pour chaque famille d'outils, un système graphique d'application est disponible sur la base de la matière à usiner.

SYSTEM CHART
Al inicio de cada macro sección para cada família de herramientas está disponible un sistema de tablas aplicativas en base al material a mecanizar.

SYSTEM CHART
В начале каждого подраздела, для каждой группы инструмента находиться система графических диаграмм соответствующих типу обрабатываемого материала.

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PRODUCT PAGE

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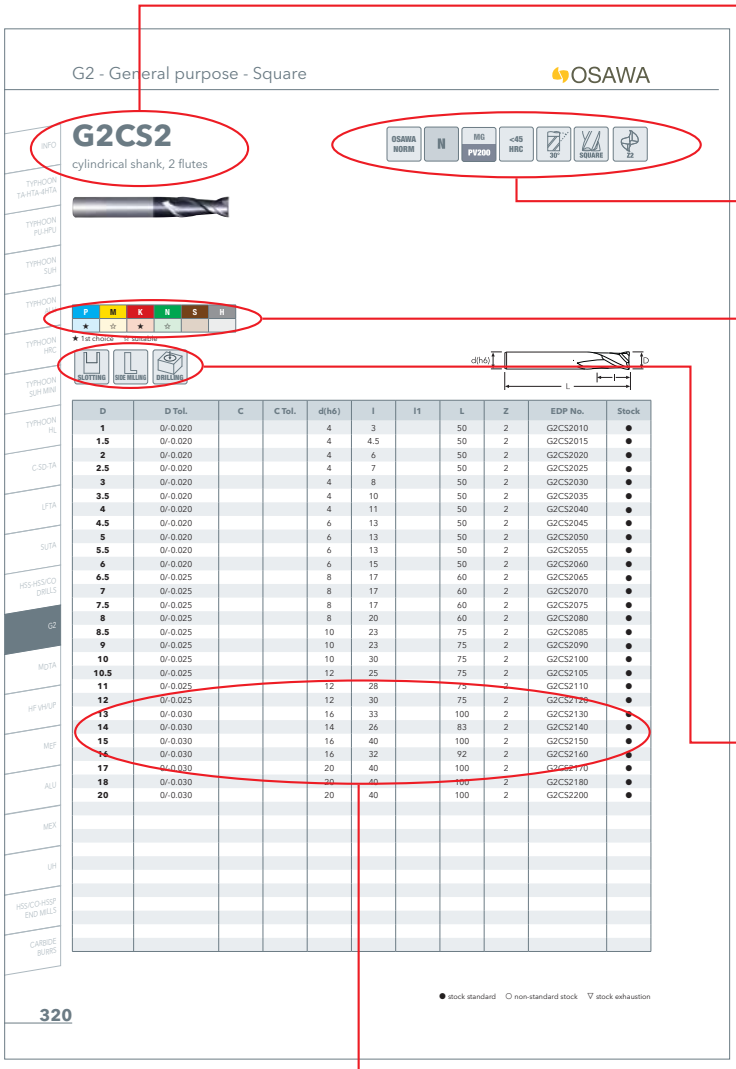
СТРАНИЦА АРТИКУЛА



Product code or ITEM nr.
Codice prodotto o ITEM No.
Name des Produkts oder Artikelnummer
Code produit ou ITEM No.
Código producto o ITEM No.
Артикул или КОД №

Icons
Icone descrittive
Beschreibende Symbole
Icônes descriptives
Iconos descriptivos
Икона

ISO Materials table with black or white stars to indicate applicability
Tabella materiali ISO con stellina nera o bianca per indicazione applicabilità
ISO Materialtabelle, mit weissem oder schwarzem Stern je nach Anwendbarkeit
Tableau des matières ISO avec étoile noire ou blanche pour indiquer l'application
Tabla materiales ISO con estrella negra y blanca para indicar aplicabilidad
Таблица материалов ISO с чёрными или белыми звёздочками обозначающие применяемость

Machining icons available also in the parameters tables (Only for milling)
Icone di lavorazione, riportate anche nelle tabelle parametri (solo per fresatura)
Bearbeitungssymbole, sind auch bei der Tabelle der Parameter vorhanden (nur für Fräsen)
Icônes d'usinage, reportées également dans le tableau des paramètres (seulement pour le fraisage).
Iconos de mecanizado, indicados también en la tabla de parámetros (solo para fresado)
Иконки обработки обозначенные также в таблицах с рабочими параметрами (Только для фрезерования)

Dimensions table with EDP Nr. and stock classification
Tabella dimensionale con codice prodotto (EDP No.) e classificazione stock
Tabelle mit Abmessungen, Art.Nummer (EDP Nr.), Verfügbarkeit
Tableau des dimensions avec code produit (EDP No.) et classification du stock
Tabla de dimensiones con código producto (EDP No.) y clasificación de stock
Таблица размеров с кодом артикула и складской классификацией

PRODUCT PAGE

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PARAMETERS TABLE

Cutting parameters table is available next to each product page for easier and faster consultation.

TABELLA PARAMETRI

La tabella dei parametri di lavorazione è riportata di seguito ad ogni pagina prodotto per una consultazione più semplice e rapida.

TABELLE DER PARAMETER

Die Tabelle der Parameter folgt nach jeder Seite der Produkte, um auf dieser Weise sofort griffbereit zu sein.

TABLEAU DES PARAMÈTRES

Le tableau des paramètres d'usinage se trouve après chaque page produit pour une consultation plus facile et rapide.

TABLA DE PARÁMETROS

La tabla de parámetros de corte está disponible al lado de cada página producto para una consulta más rápida y simple.

ТАБЛИЦА РАБОЧИХ ПАРАМЕТРОВ

Для лёгкого и быстрого поиска рабочих параметров обработки таблица с их указанием находится на следующей странице соответствующего артикула.

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	MATERIALS		HARDNESS/Rm
P1	Free cutting steel and structural steel Acciai automatici e acciai strutturali Automatenstähle und Baustähle	Aciers pour décolletage et aciers structurels Aceros de fácil mecanización y aceros de construcción Автоматные и конструкционные стали	< 500 N/mm²
P2	Carbon steel and low alloy steel Acciai al carbonio e acciai basso legati Kohlenstoff-Stähle und niedriglegierte Stähle	Aciers au carbone et aciers faiblement alliés Aceros al carbono y aceros de baja aleación Углеродистые и низколегированные стали	500-700 N/mm²
P3	Medium alloy steel and heat treated steel Acciai medio legati e acciai di bonifica Mittellegierte Stähle und Vergütungsstähle	Aciers moyennement alliés et aciers trempés et recuits Aceros de media aleación y aceros bonificados Среднелегированные и отоженные стали	600-800 N/mm²
P4	High alloy steel Acciai alto legati Hochlegierte Stähle	Aciers fortement alliés Aceros de alta aleación Высоколегированные стали	800-1000 N/mm²
P5	Tool steel Acciai per utensili Werkzeugstähle	Aciers pour outils Aceros para herramientas Инструментальные стали	900-1200 N/mm²
P6	High tensile strength steel Acciai ad alta resistenza HSLA-Stähle	Aciers haute résistance Aceros de alta resistencia Высокопрочная сталь	1200-1600 N/mm²
M1	Ferritic stainless steel Acciai inossidabili ferritici Ferritische Edelstähle	Aciers inoxydables ferritiques Aceros inoxidables ferríticos Ферритные нержавеющие стали	400-700 N/mm²
M2	Austenitic stainless steel (good machinability) Acciai inossidabili austenitici - buona lavorabilità Austenitische Edelstähle - gute Verarbeitbarkeit	Aciers inoxydables austénitiques - bonne usinabilité Aceros inoxidables austeníticos - fácil mecanización Аустенитные нержавеющие стали (хорошая обрабатываемость)	500-750 N/mm²
M3	Austenitic stainless steel (medium machinability) Acciai inossidabili austenitici - media lavorabilità Austenitische Edelstähle - mittlere Verarbeitbarkeit	Aciers inoxydables austénitiques - moyenne usinabilité Aceros inoxidables austeníticos - maquinabilidad media Аустенитные нержавеющие стали (средняя обрабатываемость)	550-850 N/mm²
M4	Martensitic stainless steel Acciai inossidabili martensitici Martensitische Edelstähle	Aciers inoxydables martensitiques Aceros inoxidables martensíticos Мартенситные нержавеющие стали	650-950 N/mm²
M5	PH stainless steel Acciai inossidabili PH - indurenti per precipitazione Ausscheidungshärtbare Edelstähle	Aciers inoxydables à durcissement par précipitation Aceros inoxidables PH Нержавеющие стали PH	800-1250 N/mm²

	MATERIALS		HARDNESS/Rm
K1	Grey cast iron Ghise grigie Grauguss	Fonte grise Fundición gris Серый чугун	150-250 HB
K2	Nodular cast iron Ghise sferoidali Sphäroguss	Fonte nodulaire Fundición nodular Чугун с шаровидным графитом	150-350 HB
K3	Austenitic cast iron Ghise austenitiche Austenitischer Guss	Fonte austénitique Fundición austenítica Аустенитный чугун	120-260 HB
K4	ADI cast iron Ghise ADI ADI Guss	Fonte ADI Fundición ADI Отпущенный ковкий чугун	250-500 HB
N1	Aluminium alloys ≤ 12% Si Leghe di alluminio ≤ 12% Si Aluminiumlegierungen ≤ 12% Si	Alliages d'aluminium ≤ 12 % Si Aleación de aluminio ≤ 12% Si Алюминиевое литье ≤ 12% Si	
N2	Aluminium alloys > 12% Si Leghe di alluminio > 12% Si Aluminiumlegierungen > 12% Si	Alliages d'aluminium > 12 % Si Aleación de aluminio > 12% Si Алюминиевое литье > 12% Si	
N3	Copper Rame Kupfer	Cuivre Cobre Медные сплавы	
N4	Bronze and brass Bronzo e ottone Bronze und Messing	Bronze et laiton Bronce y latón Бронзы и Латуни	
N5	Plastic materials Materiali plastici Kunstoffmaterialien	Matériaux plastiques Materiales plásticos Пластические материалы	
N6	Fiber and composites Fibre e compositi Faserwerkstoffe und Verbundwerkstoffe	Fibres et composites Fibras y compuestos Композитные материалы	

	MATERIALS		HARDNESS/Rm
S1	Heat resistant super alloys (HRSA) - good machinability Leghe resistenti al calore - buona lavorabilità Warmfeste Legierungen - gute Verarbeitbarkeit	Alliages résistants à la chaleur - bonne usinabilité Aleaciones resistentes al calor de facil mecanización Жаропрочные суперсплавы (хорошая обрабатываемость)	< 25 HRC
S2	Heat resistant super alloys (HRSA) - medium machinability Leghe resistenti al calore - media lavorabilità Warmfeste Legierungen - mittlere Verarbeitbarkeit	Alliages résistants à la chaleur - moyenne usinabilité Aleaciones resistentes al calor de media mecanización Жаропрочные суперсплавы (средняя обрабатываемость)	25-35 HRC
S3	Heat resistant super alloys (HRSA) - low machinability Leghe resistenti al calore - difficile lavorabilità Warmfeste Legierungen - schwere Verarbeitbarkeit	Alliages résistants à la chaleur - faible usinabilité Aleaciones resistentes al calor de difícil mecanización Жаропрочные суперсплавы (плохая обрабатываемость)	35-45 HRC
S4	Low alloy titanium (good machinability) Leghe di titanio basso legate e medio legate Niedriglegierte und mittellegierte Titanlegierungen	Alliages de titane faiblement alliés et moyennement alliés Aleaciones de titanio de fácil mecanización Низколегированные титановые сплавы (хорошая обрабатываемость)	
S5	High alloy titanium (medium machinability) Leghe di titanio medio legate e alto legate Mittellegierte und hochlegierte Titanlegierungen	Alliages de titane moyennement alliés et fortement alliés Aleaciones de titanio de media mecanización Высоколегированные титановые сплавы (средняя обрабатываемость)	

H1	Hardened steel Acciai temprati generali Allgemeine gehärtete Stähle	Aciers trempés Aceros templados Закаленные стали	50-56 HRC
H2	Hardened bearing steel Acciai temprati per cuscinetti Gehärtete Kugellagerstähle	Aciers trempés pour roulements Aceros templados para rodamientos Закаленные подшипниковые стали	54-62 HRC
H3	Hardened tool steel Acciai temprati per utensili Gehärtete Werkzeugstähle	Aciers trempés pour outils Aceros templados para herramientas Закаленные инструментальные стали	60-65 HRC
H4	Hardened martensitic stainless steel Acciai inossidabili martensitici temprati Gehärtete martensitische Edelstähle	Aciers inoxydables martensitiques trempés Aceros inoxidables martensíticos templados Закаленные мартенситные нержавеющие стали	50-56 HRC
H5	Hardened white cast iron Ghise bianche temprate Gehärteter Weißguss	Fonte blanche trempée Fundición blanca templada Закаленный белый чугун	48-55 HRC

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

	MATERIALS	TRADE MARK	AISI-ASTM	W.-Nr	DIN	BS
P1	**< 500 N/mm²** Free cutting steel and structural steel Acciai automatici e acciai strutturali Automatenstähle und Baustähle Aciers pour décolletage et aciers structurels Aceros de fácil mecanización y aceros de construcción Автоматные и конструкционные стали	AVP	1213	1.0715	9 SMn 28	230 M 07
			12 L 13	1.0718	9 SMnPb 28	
			1108	1.0721	10 S 20	210 M 15
			11 L 08	1.0722	10 SPb 20	
				1.0723	15 S 20	210 A 15
			1140	1.0726	35 S 20	212 M 36
			1146	1.0727	46 S 20	212 M 44
		AVZ	1215	1.0736	9 SMn 36	240 M 07
			12 L 14	1.0737	9 SMnPb 36	
				1.0037	St 37-2	
		PR80	A29	1.0765	36 SMnPb 14	
			A 573 Gr. 58	1.0116	St 37-3	4360-40 C
			A 573 Gr. 70	1.0144	St 44-3 N	4360-43 C
			1010	1.0301	C 10	045 M 10
			1015	1.0401	C 15	080 M 15
			1023	1.0402	C 22	050 A 20
				1.0570	St 52-3	4360-50 C
			1015	1.1141	Ck 15	080 M 15
			1025	1.1158	Ck 25	060 A 25
P2	**500-700 N/mm²** Carbon steel and low alloy steel Acciai al carbonio e acciai basso legati Kohlenstoff-Stähle und niedriglegierte Stähle Aciers au carbone et aciers faiblement alliés Aceros al carbono y aceros de baja aleación Углеродистые и низколегированные стали			1.2162	21 MnCr 5	
			A 204 Gr. A	1.5415	15 Mo 3	1501-240
			4520	1.5423	16 Mo 5	1503-245-420
			3310, 9314	1.5752	14 NiCr 14	655 M 13
			4320	1.5919	15 CrNi 6	S 107
				1.6587	18 CrNiMo 7 6	820 A 16
			5115	1.7131	16 MnCr 5	527 M 17
				1.7139	16 MnCrS 5	
			5120	1.7147	20 MnCr 5	
			5120 H	1.7149	20 MnCrS 5	
			A 182-F11, F12	1.7335	13 CrMo 4 4	1501-620 Gr. 27
			A 387 Gr. 12 Cl. 2	1.7337	16 CrMo 4 4	1501-620 Gr. 27
			A 182-F22	1.7380	10 CrMo 9 10	1501-622 Gr. 31
			1035	1.0501	C 35	060 A 35
			1045	1.0503	C 45	80 M 46
			1040	1.0511	C 40	080 M 40
			1055	1.0535	St 70-2	
			1060	1.0601	C 60	080 A 62
			1039	1.1157	40 Mn 4	150 M 36
			1330	1.1165	30 Mn 5	120 M 36
			1335	1.1167	36 Mn 5	150 M 36
			1035	1.1181	Ck 35	080 M 36
			1045	1.1191	Ck 45	080 M 46
			1064	1.1221	Ck 60	080 A 62
			1060	1.1740	C 60 W	
P3	**600-800 N/mm²** Medium alloy steel and heat treated steel Acciai medio legati e acciai di bonifica Mittellegierte Stähle und Vergütungsstähle Aciers moyennement alliés et aciers trempés et recuits Aceros de media aleación y aceros bonificados Среднелегированные и отоженные стали		9255	1.0904	55 Si 7	250 A 53
			4142, 4140	1.1201	42 CrMo 4	708 M 40
			4142, 4140	1.7225	42 CrMo 4	708 M 40
			4135	1.2330	35 CrMo 4	708 A 37
			S1	1.2542	45 WCrV 7	BS 1
			L6	1.2714	56 NiCrMoV 7	BH 224-5
			5045	1.5121	46 MnSi 4	
			3135	1.5710	36 NiCr 6	640 A 35
			3435	1.5736	36 NiCr 10	
			9840	1.6511	36 CrNiMo 4	816 M 40
			4340	1.6582	34 CrNiMo 6	817 M 40
			5132	1.7033	34 Cr 4	530 A 32
			5140	1.7035	41 Cr 4	530 M 40
			4130	1.7218	25 CrMo 4	708 M 25
				1.7361	32 CrMo 12	722 M 24
			6150	1.8159	50 CrV 4	735 A 50
			A 355 Cl. A	1.8509	41 CrAlMo 7	905 M 39

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
1912	S 250	11SMn28	SUM 22	CF 9 SMn 28	11 SMn30	G12130	
1914	S 250 Pb	11SMnPb28	SUM 22 L	CF 9 SMnPb 28	11 SMnPb30	G12134	
	10 F 1			CF 10 S 20	10 S 20		
	10 PbF 2	10 SPb 20		CF 10 SPb 20			
1922		F.210.F	SUM 32		15 SMn13		
1957	35 MF 4	F.210.G			35 S20	G11400	40
1973	45 MF 4				46 S20	G11460	
	S 300	12 SMn 35		CF 9 SMn 36	11 SMn37	G12150	
1926	S 300 Pb	F.2114-12		CF 9 SMnPb 36	11 SMnPb 37	G12144	
1311	E 24-2		STKM 12 C	Fe 360 B	S235JR		16D
			Cf 35 SMnPb 10	36SMnPb14			
1312, 1313	E 24-3, E 24-4			Fe 360 D FF	S235JRG2		18kp
1412, 1414	E 28-3, E 28-4		SM 41 C	Fe 430 D FF	S275J2G3		St14kP
	AF 34 C 10, XC 10	F.110	S 10 C	C 10	C 10	G10100	10
1350	AF3 7 C 12, XC 18	F.111		C 15, C 16		G10170	15
1450	C 20	F.112		C 20, C 21	C22+N	G10200	20
2172, 2132	E 36-3, E 36-4		SM 50 YA	Fe 510 B	S355JR		17G1S
1370	XC 15, XC 18	F.1511	S 15 C, S 15 CK	C 15, C 16	C 15R	G10170	15
	XC 25	F.1120	S 25 C	C 25		G10250	25
	20 NC 5		SCR 420 H				
2912	15 D 3	16 Mo3		16 Mo 3	16 Mo 3		
			SB 450 M	16 Mo 5		G45200	
	12 NC 15		SNC 815 (H)		14 NiCr 14	G33106	20X2H4A
	16 NC 6			16 CrNi 4			
	18 NCD 6			18 NiCrMo 7	18 NiCrMo 7 6		
2511	16 MC 5	F.1516	SCR 415	16 MnCr 5	16 MnCr 5	G51170	12KHN2
					16 MnCrS 5		18HG
	20 MC 5		SMnC 420 (H)	20 MnCr 5	20 MnCr 5	G51200	20KH
	20 MnCrS 5		SMnC 21 H		20 MnCrS 5		20KH
2216	15 CD 3.5			14 CrMo 4 5	13 CrMo 4 5		12KHM
2216	15 CD 4.5			14 CrMo 4 5			
2218	10 CD 9.10			12 CrMo 9 10	10 CrMo 9 10	J21890	12KH8
1550	AF 55 C 35	F.113		C 35	C35+N	G10350	35
1650	AF 65 C 45	F.114	S 45 C	C 45	E 335	G10430	45
	AF 60 C 40	F.114.A	S 40 C	C 40	C40+N		40
1655	A 70-2			Fe 690	E 360		55
	CC 55			C 60	C60+N	G10600	60
	35 M 5					G10390	40G
			SMn 1 H, SCMn 2		G 28 Mn6	G13300	30G2
2120	40 M 5	F.411	SMn 438 (H), SCMn 3		G 28 Mn6+QT	G13350	35G2
1572	XC 38 H1	F.1130	S 35 C	C 35	C 35E	G10340	35
1672	XC 42	F.1140	S 45 C	C 45	C 45E	G10420	45
1665, 1678	XC 60	F.1150	S 58 C	C 60	C 60E	G10640	60
	Y3 55		SK 7				60
2085, 2090	55 S 7			55 Si 8	55 SiCr7		55S2
2244	42 CD 4		SCM 440 (H)	42 CrMo 4	42 CrMo 4	G41400	38HM
2244	42 CD 4	F.1252	SCM 440 (H)	42 CrMo 4	42 CrMo 4	G41400	38HM
2234	34 CD 4	F.1250		35 CrMo 4		T51620	35KHM
2710				45 WCrV 8 KU		T41901	5KHV2S
			SKT 4	56 NiCrMoV7-KU		T61206	5KHNV
	35 NC 6		SNC 236				
	35 NC 11		SNC 631 (H)	35 NiCr 9			
	40 NCD 3			38 NiCrMo 4 (KB)	36CrNiMo4+TA	G98400	
2541	35 NCD 6	F.1280	SNCM 447	35 NiCrMo 6 (KW)	34 CrNiMo 6		38H2N2MA
	32 C 4	35Cr4	SCr 430 (H)	34 Cr 4 (KB)	34 Cr 4	G51320	35KH
	42 C 4	42 Cr 4	SCr 440 (H)	41 Cr 4	41 Cr 4	G51400	40H
2225	25 CD 4 S	F.1251/55Cr3	SCM 425	25 CrMo 4 (KB)	25 CrMo 4	G41300	20KHM
2240	30 CD 12	F.124.A		32 CrMo 12			
2230	50 CV 4	F.143	SUP 10	51 CrV 4	50 CrV 4	H61500	50KHFA
2940	40 CAD 6.12	F.1740	SACM 645	41 CrAlMo 7	41 CrAlMo 7 10	K24065	

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

	MATERIALS	TRADE MARK	AISI-ASTM	W.-Nr	DIN	BS
P4	**800-1000 N/mm²** High alloy steel Acciai alto legati Hochlegierte Stähle Aciers fortement alliés Aceros de alta aleación Высоколегированные стали		1070	1.1231	Ck 67	060 A 67
			1095	1.1274	Ck 101	060 A 96
			W1	1.1545	C 105 W1	
				1.1645	C 105 W2	
			W1	1.1663	C 125 W	
			L2	1.2210	115 CrV 3	
			O1	1.2510	100 MnCrW 4	BO 1
		K720	O2	1.2842	90 MnCrV 8	BO 2
		HARDOX HiTuf				
			52100	1.3505	100 Cr 6	534 A 99
		TOOLOX 33				
P5	**900-1200 N/mm²** Tool steel Acciai per utensili Werkzeugstähle Aciers pour outils Aceros para herramientas Инструментальные стали	K100	D3	1.2080	X 210 Cr 12	BD 3
		M310		1.2083	X 42 Cr 13	
		M201		1.2311	40 CrMnMo 7	
		M200-HOLDAX		1.2312	40 CrMnMoS 86	
				1.2316	X 36 CrMo 17	
		W300	H11	1.2343	X 38 CrMoV 5 1	BH 11
		W302	H13	1.2344	X 40 CrMoV 5 1	BH 13
			A2	1.2363	X 100 CrMoV 5 1	BA 2
		W320	H10	1.2365	X 32 CrMoV 3 3	BH 10
		K110		1.2379	X 155 CrVMo 12 1	
				1.2436	X 210 CrW 12	
				1.2601	X 165 CrMoV 12	
			L6	1.2713	55 NiCrMoV 6	
		W500		1.2714	56 NiCrMoV 7	
		M238		1.2738	40 CrMnNiMo8 6 4	
			M35	1.3243	S 6-5-2-5	
			M42	1.3247	S 2-10-1-8	BM 42
			T4	1.3255	S 18-1-2-5	BT 4
		S600	M2	1.3343	S 6-5-2	BM 2
			M7	1.3348	S 2-9-2	
		TOOLOX 40				
			T1	1.3355	S 18-0-1	BT 1
		VANADIS 4				
		VANADIS 10				
P6	**1200-1600 N/mm²** High tensile strength steel Acciai ad alta resistenza HSLA-Stähle Aciers haute résistance Aceros de alta resistencia Высокопрочная сталь	TOOLOX 44				
		HARDOX 400				
		HARDOX 450				
		HARDOX 500				
		WELDOX 1100				
		CREUSABRO DUAL				
		CREUSABRO 8000				
		W720		1.6358	X 2 NiCrMo 18 9 5	
		MARAGING		1.2706	X 3 NiCrMo 18 8 5	

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SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
1770	XC 68	F.5103		C 70	C 67S	G10700	70
1870		F.5117	SUP 4		C 100S	G10950	
1880	Y1 105	F.5118		C 100 KU	C 105U		U10A
	Y1 105		SK 3	C 100 KU			U10
	Y2 120		SK 2	C 120 KU			U13
	100 C 3			107 CrV 3 KU	107 CrV 3	T61202	11KHF
2140	90 MWCV 5	F.5220	SKS 3	95 MnWCr 5 KU		T31501	9KHVG
	90 MV 8			90 MnVCr 8 KU	90 MnCrV 8	T31502	9G2F
2258	100 C 6	F.131	SUJ 2	100 Cr 6	100 Cr 6	G51986	SHKH15
	Z 200 C 12	F.5212	SKD 1	X 210 Cr 13 KU	X 210 Cr 12	T30403	KH12
				X 41 Cr 13 KU			
		F.5263					
		X210CrW12					
				X 38 CrMo 16 1 KU			
	Z 38 CDV 5		SKD 6	X 37 CrMoV 5 1 KU		T20811	4KH5MFS
2242	Z 40 CDV 5	F.5318	SKD 61	X 40 CrMo 5 1 1 KU	X 40 CrMoV 5 1	T20813	4KH5MF1S
2260	Z 100 CDV 5	F.5227	SKD 12	X 100 CrMoV 5 1 KU	X 100 CrMoV 5	T30102	9KH5VF
	32 DCV 28		SKD 7	30 CrMoV 12 27 KU		T20810	3KH3M3F
		F.520.A		X 155 CrMo 12 KU			
2312		F.5213	SKD 2	X 215 CrW 12 1 KU			KH12
2310		F.5211		X 165 CrMoW 12 KU			KH12MF
	55 NCDV 7	F.520.S	SKT 4			T61206	5KHNM
				56 NiCrMoV 7 KU			
2723	Z 85 WDKCV 06-05-05-04-02	F.5613	SKH 55	HS 6-5-2-5	HS 6-5-2-5		R6M5K5
	Z 110 DKCWV 09-08-04		SKH 51	HS 2-9-1-8	HS 2-10-1-8	T11342	R2AM9K5
	Z 80 WKCV 18-05-04-01		SKH 3	HS 18-1-1-5	HS 18-1-2-5	T12004	R18K5F2
2722	Z 85 WDCV 06-05-04-02	F.5603	SKH 9, SKH 51	HS 6-5-2	HS 6-5-2	T11302	R6M5
2782	Z 100 DCWV 09-04-02-02		SKH 58	HS 2-9-2	HS 2-9-2	T11307	
	Z 80 WCV 18-04-01		SKH 2	HS 18-0-1	HS 18-0-1	T12001	R18
						K93120	

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

	MATERIALS	TRADE MARK	AISI-ASTM	W.-Nr	DIN	BS
M1	**400-700 N/mm²** Ferritic stainless steel Acciai inossidabili ferritici Ferritische Edelstähle Aciers inoxydables ferritiques Aceros inoxidables ferríticos Ферритные нержавеющие стали		405	1.4002	X 6 CrAl 13	405 S 17
			430	1.4016	X 6 Cr 17	430 S 15
			430 F	1.4104	X 12 CrMoS 17	
			434	1.4113	X 6 CrMo 17	434 S 17
			CA-6NM	1.4313	X 5 CrNi 13 4	425 C 11
			430 Ti	1.4510	X 6 CrTi 17	
			409	1.4512	X 5 CrTi 12	409 S 17
			446	1.4749	X 18 CrN 28	
M2	**500-750 N/mm²** Austenitic stainless steel (good machinability) Acciai inossidabili austenitici - buona lavorabilità Austenitische Edelstähle - gute Verarbeitbarkeit Aciers inoxydables austénitiques - bonne usinabilité Aceros inoxidables austeníticos - fácil mecanización Аустенитные нержавеющие стали (хорошая обрабатываемость)		303	1.4305	X 10 CrNiS 18 9	303 S 31
			302	1.4300	X 12 CrNi 18 8	302 S 25
			304, 304 H	1.4301	X 6 CrNi 18 10	304 S 31
			305	1.4303	X5 CrNi 18 12	305 S 19
			304 L	1.4306	X 2 CrNi 19 11	304 S 12
			301	1.4310	X 12 CrNi 17 7	301 S 21
			304	1.4350	X5 CrNi 18 9	304 S 31
			347	1.4550	X 6 CrNiNb 18 10	347 S 31
			304 LN	1.4311	X 2 CrNiN 19 11	304 S 62
M3	**550-850 N/mm²** Austenitic stainless steel (medium machinability) Acciai inossidabili austenitici - media lavorabilità Austenitische Edelstähle - mittlere Verarbeitbarkeit Aciers inoxydables austénitiques - moyenne usinabilité Aceros inoxidables austeníticos - maquinabilidad media Аустенитные нержавеющие стали (средняя обрабатываемость)		310 S	1.4335	X 12 CrNi 25 21	310 S 24
			316	1.4401	X 5 CrNiMo 17 12 2	316 S 31
			316 LN	1.4429	X 2 CrNiMoN 17 13 3	316 S 62
			316 L	1.4435	X 2 CrNiMo 18 14 3	316 S 12
			317 L	1.4438	X2 CrNiMo 18 16	317 S 12
			329	1.4460	X 4 CrNiMo 27 5 2	
		DUPLEX	F 51-329 A	1.4462	X 2 CrNiMoN 22 5	332 S 15
			317	1.4466	X 5 CrNi 18 15	317 S 16
			321	1.4541	X10 CrNiTi 18 9	321 S 12
			347	1.4550	X10 CrNiNb 18 9	347 S 17
			316 Ti	1.4571	X10 CrNiMoTi 18 10	320 S 17
			309	1.4828	X15 CrNiSi 20 12	309 S 24
			330	1.4864	X12 NiCrSi 36 16	
		253 MA		1.4893	X 9 CrNiSiNCe 21 11 2	310 S 31
		3RE60		1.4417	X 2 CrNiMoSi 19 5	
M4	**650-950 N/mm²** Martensitic stainless steel Acciai inossidabili martensitici Martensitische Edelstähle Aciers inoxydables martensitiques Aceros inoxidables martensíticos Мартенситные нержавеющие стали		403	1.4000	X 6 Cr 13	403 S 17
			416	1.4005	X 12 CrS 13	416 S 21
			410, CA-15	1.4006	X 10 Cr 13	410 S 21
			420	1.4021	X 20 Cr 13	420 S 37
			420F	1.4028	X 30 Cr 13	420 S 45
			420	1.4031	X 40 Cr 13	420 S 45
			431	1.4057	X 20 CrNi 17 2	
			440 A	1.4109	X 65 CrMo 14	
			440 B	1.4112	X 90 CrMoV 18	409 S 19
			440 C	1.4125	X 105 CrMo 17	
		SUPER DUPLEX	F 53-329 S1	1.4410	X 2 CrNiMoN 25 7 4	
		SUPER DUPLEX	F 55-329 S	1.4501	X 2 CrNiMoCuWN 15 7 4	
			904L	1.4539	X 2 NiCrMoCu 25 20 5	904 S 13
			329 A			
		254 SMO		1.4529	X 1 CrNiMoN 20 18 7	
		PH13-8Mo	XM-13	1.4534	X 3 CrNiMoAl 13 8 2	
		654 SMO		1.4652	X 2 CrNiMoN 25 22 7	
		Alloy 800		1.4876	X 10 NiCrAlTi 32 20	
M5	**800-1250 N/mm²** PH stainless steel Acciai inossidabili PH - indurenti per precipitazione Ausscheidungshärtbare Edelstähle Aciers inoxydables à durcissement par précipitation Aceros inoxidables PH Нержавеющие стали PH	15-5-PH	XM-12	1.4540	X 4 CrNiCuNb 16 4	
		17-4-PH	630	1.4542	X 5 CrNiNb 16 4	
		17-7-PH	631	1.4568	X 7 CrNiAl 17 7	301 S 81
		A286	660	1.4943	X 4 NiCrTi 25 15	HR 51

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SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
	Z 8 CA 12	F.3111	SUS 405	X 6 CrAl 13			
2320	Z 8 C 17	F.3113	SUS 430	X 8 Cr 17	X 6 Cr 17	S43000	12KH17
2383	Z 10 CF 17	F.3117	SUS 430 F	X 10 CrS 17			
2325	Z 8 CD 17.01		SUS 434	X 8 CrMo 17			
2385	Z 5 CN 13.4		SCS 5	X 6 CrNi 13 04	X 3 CrNIMo 13 3	J91540	
	Z 4 CT 17		SUS 430 LX	X 6 CrTi 17			
	Z 6 CT 12		SUH 409	X 5 CrTi 12			
2322	Z 18 C 25				X 18 CrN 28	S44600	15KH28
2346	Z 10 CNF 18.09	F.3508	SUS 303	X 10 CrNi 18 09	X 10 CrNiS 18 9	S30300	12KH19N9
2331	Z 12 CN 18		SUS 302		X 12 CrNi 18 8	S30200	12KH18N9
2333	Z 6 CN 18.09	F.3551	SUS 304	X 5 CrNi 18 11	X 5 CrNi 18 9	S30400	08KH18N10
	Z 8 CN 18.12		SUS 305	X 8 CrNi 19 10			
2352	Z 2 CN 18.10	F.3503	SUS 304 L	X 3 Cr Ni 18 11	X 2 CrNi 19 11	S30403	03KH18N11
(2331)	Z 12 CN 17.07	F.3517	SUS 301	X 12 CrNi 17 07	X 9 CrNi 18 8	S30100	07KH16N6
2333	Z 6 CN 18.09	F.3551	SUS 304	X 5 CrNi 18 10			
2338	Z 6 CNNb 18.10		SUS 347	X 6 CrNiNb 18 11	X 6 CrNiNb 18 10	S34700	08KH18N12B
2371	Z 2 CN 18 .10 Az		SUS 304 LN	X 2 CrNiN 18 11	X 2 CrNiN 18 10	S30453	03KH18N11
2361	Z 12 CN 25.20		SUH 310, SUS 310 S	X 6 CrNi 26 20	X 12 CrNi 25 21	S31008	12KH25N20
2347	Z 3 CND 17.11.1	F.3543	SUS 316	X 5 CrNiMo 17 12	X 5 CrNiMo 17 12 2	S31600	08KH17H13M2T
2375	Z 2 CND 17.13 Az		SUS 316 LN	X 2 CrNiMoN 17 13 3	X 2 CrNiMoN 17 13 3	S31653	03KH16N15M3
2353	Z 2 CND 17.13		SCS 16, SUS 316 L	X 2 CrNiMo 17 13 2	X 2 CrNiMo 18 14 3	S31603	03KH17N14M3
2367	Z 2 CND 19.15		SUS 317 L	X2CrNiMo18 16			
2324	Z 3 CND 25.7 Az	F.3309	SUS 329 J 1	X 3 CrNiMo 27 5 2	X 3 CrNiMo 27 5 2	S32900	
2377	Z 2 CND 22.05 Az			X 2 CrNiMoN 22 5	X 2 CrNiMoN 22 5 3	S31803	
2366			SUS 317	X 5 CrNi 18 15	X 3 CrNiMo 18 12 3	S31700	08KH17H15M3T
2337	Z 6 CND 18.10	F.3553	SUS 321	X6CrNiTi18 11			
2338	Z 6 CNNb 18.10	F.3552	SUS 347	X6CrNiNb18 11			
2350	Z 6 CNDT 17.12	F.3535	–	X6CrNiMoTi 17 12			
	Z 15 CN 24.13		SUS 309	X16 CrNi 24 14			
	Z 12 NCS 35.16		SUH 330				
2368					X 9 CrNiSiNCe 21 11 2	S30815	
2376	Z 2 CND 18.05.03				X 2 CrNiMoSi 19 5	S31500	
2301	Z 6 C 12	F.3110	SUS 403	X 6 Cr 13	X 6 Cr 13	S41008	08KH13
	Z 11 CF 13	F.3411	SUS 416	X 12 CrS 13			
2302	Z 10 C 13	F.3401	SUS 410	X 12 Cr 13	X 12 Cr 13	S41000	12KH13, 08KH13
2303	Z 20 C 13	F.3402	SUS 420 J1	X 20 Cr 13	X 20 Cr 13	S42000	20KH13
2304	Z 30 C 13	F.3403	SUS 420 J2	X 30 Cr 13			
2304	Z 40 C 14	F.3404	SUS 420	X 40 Cr 14	X 39 Cr 13	S40280	40KH13
2321	Z 15 CNi 16.02	F.3427	SUS 431	X 16 CrNi 16			
	Z 70 D 14		SUS 440 A		X 70 CrMo 15	S44002	
2327	Z 2 CND 18 05		SUS 440 B	X CrTi 12	X 90 CrMoV 18	S44003	95KH18
	Z 100 CD 17		SUS 440 C	X 105 CrMo 17	X 105 CrMo 17	S44004	95KH18
2328	Z 3 CND 25.07 Az			X 2 CrNiMoN 25 7 4	X 2 CrNiMoN 25 7 4	S32750	
				X 2 CrNiMoCuWN 15 7 4		S32760	
2562	Z 2 NCDU 25 20				X 2 NiCrMoCu 25 20 5	N08904	
2778	Z 1 CNDU 20.18.05 Az			X 1 CrNiMoN 20 18 7	X 1 CrNiMoN 20 18 7	S31254	
					X 6 NiCrTiMoV 25 15	S13800	
					X 1 CrNiMoN 25 22 8	S32654	
	Z 10 NC 32.21		NCF 800		X 10 NiCrAlTi 32 20	N08800	
	Z 4 CNUNb 16.4 M					S15500	
			SUS 630				
2388	Z 9 CAN 17.7		SUS 631	X 7 CrNiAl 17 7	X 3 CrNiMoAl 13 8 2	S17700	09KH17N7YU1
2570	Z 6 NCTDV 25.15		SUH 660		X 5 CrNiCuNb 16 4	S66286	

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	MATERIALS	TRADE MARK	AISI-ASTM	W.-Nr	DIN	BS
K1	**150-250 HB** Grey cast iron Ghise grigie Grauguss Fonte grise Fundición gris Серый чугун		A48-20B	0.6010	GG-10	Grade 100
			A48 25 B	0.6015	GG-15	Grade 150
			A48 30 B	0.6020	GG-20	Grade 220
			G 3500		GG-220 HB	
			A48 35 B	0.6025	GG-25	Grade 260
			A48 45 B	0.6030	GG-30	Grade 300
			A48 50 B	0.6035	GG-35	Grade 350
			A48-60B	0.6040	GG-40	Grade 400
K2	**150-350 HB** Nodular cast iron Ghise sferoidali Sphäroguss Fonte nodulaire Fundición nodular Чугун с шаровидным графитом		Grade 350		GJV-300	
			Grade 400		GJV-350	
			Grade 400-15		GJV-400	
			Grade 450		GJV-450	
			Grade 500		GJV-500	
				0.7033	GGG-35.3	Grade 350/22
			60-40-18	0.7040	GGG-40	Grade 420/12
			60-40-18	0.7043	GGG-40.3	Grade 370/17
			A536 80-55-6	0.7050	GGG-50	Grade 500/7
			A476 80-60-03	0.7060	GGG-60	Grade 600/3
			A536 100-70-03	0.7070	GGG-70	Grade 700/2
K3	**120-260 HB** Austenitic cast iron Ghise austenitiche Austenitischer Guss Fonte austénitique Fundición austenítica Аустенитный чугун	(Tempered)	A220 60004		GTS-55-04	P 540/5
		Ni-Resist 2	A436 Type 2	0.6660	GGL-NiCr 20 2	Grade F2
		Ni-Resist 3	A436 Type 3	0.6676	GGL-NiCr 30 3	Grade F3
		Ni-Resist 1	A436 Type 1	0.6655	GGL-NiCuCr 15 6 2	Grade F1
		Ni-Resist D-5	A439 Type D-5	0.7683	GGG-Ni 35	
		Ni-Resist D-2	A436 Type D-2	0.7660	GGG-NiCr 20 2	Grade S2
		Ni-Resist D-3	A436 Type D-3	0.7676	GGG-NiCr 30 3	Grade S3
		Nodumag	–	0.7652	GGG-NiMn 13 7	Grade S6
		Ni-Resist D-2M	A439 Type D-2M	0.7673	GGG-NiMn 23 4	Grade S2M
K4	**250-500 HB** ADI cast iron Ghise ADI ADI Guss Fonte ADI Fundición ADI Отпущенный ковкий чугун	ADI 800	850/550/10		GJS-800-8	
		ADI 1000	1050/700/7		GJS-1000-5	
		ADI 1200	1200/850/4		GJS-1200-2	
		ADI 1400	1400/1100/1		GJS-1400-1	
		ADI 1600	1600/1300/-		GJS-1600-1	

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SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
01 10-00			FC 100	G 10			Sc 10
01 15-00	Ft 15 D	FG 15	FC 150	G15	EN-GJL-150	F11601	Sc 15
01 20-00	Ft 20 D	FG 20	FC 200	G20	EN-GJL-200	F12101	Sc 20
02 19-00					EN-GJL-215		
01 25-00	Ft 25 D	FG 25	FC 250	G25	EN-GJL-250	F12401	Sc 25
01 30-00	Ft 30 D	FG 30	FC 300	G30	EN-GJL-300	F13101	Sc 30
01 35-00	Ft 35 D	FG 35	FC 350	G35	EN-GJL-350	F13502	Sc 35
0140-00	Ft 40 D		FC 40				
					EN-GJV-300		
					EN-GJV-350		
					EN-GJV-400		
					EN-GJV-450		
					EN-GJV-500		
07 17-15	FGS 370-17		FCD 350-22L		EN-GJS-350-22		
07 17-02	FGS 400-12	FGE 38-17	FCD 400-18L	GS 400-12	EN-GJS-400-15	F32800	Vc 42-12
07 17-12	FGS-370-17			GSO 42/17	EN-GJS-400-18	F32800	Vc 42-12
07 27-02	FGS 500-7	FGE 50-7	FCD 500-7	GS 500-7	EN-GJS-500-7	F33800	Vc 50-2
07 32-03	FGS 600-3	FGE 60-2	FCD 600-3	GS 600-3	EN-GJS-600-3	F34100	Vc 60-2
07 37-01	FGS 700-2	FGS 70-2	FCD 700-2	GS 700-2	EN-GJS-700-2	F34800	Vc 70-2
08 54-00	P 540/5		PCMP55-04	P 55-04	EN-GJMB-550-4	F24130	
05 23-00	FGL Ni20 Cr2				EN-GJLA-XNiCr 20-2	F41002	
	FGL Ni30 Cr3				EN-GJLA-XNiCr 30-3	F41004	
	FGL Ni15 Cu6 Cr2				EN-GJLA-XNiCuCr15-6-2	F41000	
	FGS Ni35				EN-GJSA-XNi35	F43006	
	FGS Ni20 Cr2				EN-GJSA-XNiCr20-2	F43000	
	FGS Ni30 Cr3				EN-GJSA-XNiCr30-3	F43003	
07 72-00	FGS Ni13 Mn7				EN-GJSA-XNiMn13-7	–	
	FGS Ni23 Mn4				EN-GJSA-XNiMn23-4	F43010	
					EN-GJS-800-8	ADI grade 1	
					EN-GJS-1000-5	ADI grade 2	
					EN-GJS-1200-2	ADI grade 3	
					EN-GJS-1400-1	ADI grade 4	
					EN-GJS-1600-1	ADI grade 5	

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

MATERIALS		TRADE MARK	AISI-ASTM	W.-Nr	DIN	BS
N1	Aluminium alloys ≤ 12% Si Leghe di alluminio ≤ 12% Si Aluminiumlegierungen ≤ 12% Si Alliages d'aluminium ≤ 12 % Si Aleación de aluminio ≤ 12% Si Алюминиевое литье ≤ 12% Si		A1200	3.0205	Al 99	1C
			A1050/1050A	3.0255	Al 99.5	1B
			1070/1070A	3.0275	Al 99.7	
			1080/1080A	3.0285	Al 99.8	1A
				3.0515	AlMn1	N3
		Aluman 100		3.0517	AlMn1Cu	
			3105	3.0505	AlMn0.5Mg0.5	N31
			3005	3.0525	ALMn1Mg0.5	
			3004	3.0526	AlMn1Mg1	
			6012	3.0615	AlMgSiPb	
		Avional 660	2014/2014A	3.1255	AlCuSiMn	H15
		Avional 050	2117	3.1305	AlCuMg0.5	L86
		Avional 100	2017/2017A	3.1325	AlCuMg 1	(H14)
		Avional 150	2024	3.1355	AlCuMg 2	DTD5090
		–	2030	3.1645	AlCuMgPb	–
		Recidal 11	2011	3.1655	AlCuBiPb	FC1
			A380	3.2161	G-AlSi8Cu3	
			B26	3.2341	G-AlSi5Mg	LM25
		Anticorodal 063		3.3206	AlMgSi0.5	(H9)
				3.3210	AlMgSi0.7	(H10)
		Anticorodal 061	6061	3.3211	AlMg1SiCu	H20
		Peraluman 080		3.3315	AlMg1	N41
		Peraluman 150	5050	3.3316	AlMg1.5	
		Peraluman 250	5052	3.3523	AlMg2.5	
			5251	3.3525	AlMg2Mn0.3	N4
		Peraluman 350	5154	3.3535	ALMg3	N5/N56
			5454	3.3537	AlMg2.7Mn	N51
		Peraluman 440	5083	3.3547	AlMg4.5Mn	N8
		Peraluman 500	5056	3.3555	ALMg5	N6
		Anticorodal 061	6061	3.3211	AlMg1SiCu	H20
		Anticorodal 100	6082	3.2315	AlMgSi 1	H30
		Aldrey 051	6101		EAlMgSi0.5	E91E
			6106		AlMgSiMn	
			6463			
			6262			
			7010		AlZn6MgCu	DTD5130
			7020	3.4335	AlZn4.5Mg1	H17
		Ergal 55	7075	3.4365	AlZnMgCu1.5	2L95

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
4010	A4	L-3001	A1×3	9001/1			
4007	A5		A1×1	9001/2	AW-1050A	AA1050A	
	A7						
	A8						
4054		L-3811			AW-3103	AA3103	
	A-M1/3003		A3003		AW-3003	AA3003	
	AMG0.5			9003/4			
	AM1G	L-3820		9003/2			
	ASGPB						
4338	A-U4SG/2014	L-3130		9002/3	AW-2014	AA2014	
	AU2G			9002/1			
	AU4G	L-3120	A3×2	9002/2			
	AU4G1	L-3140	A3×4	9002/4			
4335	AU4Pb	L-3121	–	9002/8			
4355	A-U5PbBi/2011	L-3192	A2011	9002/5	AW-2011	AA2011	
4251					AC-46200	A13800	
4244	A-S7G		AC 4C	3599	AC-42000		
4103	A-GS/6060	L-3441		9006/1	AW-6060	AA6060	
4104,4107	A-GSUC/6061	L-3454	(A6063)		AW-6063	AA6005	
	AGSUC	L-3420	A2×4	9006/2			
4106	A-G0.6	L-3350		9005/1	AW-5005	AA5005	
				9005/7			
4120	AG2.5C	L-3360	A2×1	9005/2			
	AG2M	L-3361					
	AG3			9005/8			
	AG2.5MC	L-3391	A2×9	9005/3			
4140	AG4.5MC	L-3321	A2×7	9005/5			
	A-G5						
	AGSUC		A2×4	9006/2			
4212	ASGM 0.7	L-3451	–	9006/4			
	AGS/L						
				9007/4			
4425	AZ5G	L-3741	–	9007/1	AW-7020	AA7020	
	AZ5GU	L-3710	A34×6	9007/2	AW-7075	AA7075	

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

MATERIALS		TRADE MARK	AISI-ASTM	W.-Nr	DIN	BS
N2	Aluminium alloys > 12% Si Leghe di alluminio > 12% Si Aluminiumlegierungen > 12% Si Alliages d'aluminium > 12 % Si Aleación de aluminio > 12% Si Алюминиевое литье > 12% Si		AMS 4442	3.5103	G-MgSe3Zn2Zr1	MAG6-TE
					G-AlSi2	
					G-AlSi4.5	DTD716A
			355.1		G-AlSi5	LM16
			A356	3.2371	G-AlSi7Mg	LM25
			A380		G-AlSi8Cu3	LM24
				3.2373	G-AlSi9Mg	
			A360	3.2381	G-AlSi10Mg	LM9
				3.2383	G-AlSi10Mg (Cu)	(LM9)
			A413.0	3.2582	GD-AlSi12	
			A413.1	3.2583	G-AlSi12(Cu)	LM20
			A413.2	3.2581	G-AlSi12	LM6
				3.3561	G-AlMg5	LM5
			319		G-AlSi6Cu4	LM21
			319.2		G-AlSi6Cu4	LM4
					–	LM2
			319.2		G-AlSi6Cu4	LM22
			204			AEA 24860
						LM28
			336.0			LM13
				3.5812	G-MgAl8Zn1	MAG1
				3.5312	G-MgAl3Zn	–
				3.5912	G-MgAl9Zn1	MAG7
				3.5101	G-MgZn4SE1Zr1	MAG5
				3.5102	G-MgZn5Th2Zr1	
				3.5106	G-MgAg3SE2Zr1	MAG 12
			AZ61A	3.5612	G-MgAl6Zn	MAG-E-121
			AZ80A	3.5812	G-MgAl8Zn	
				3.2315	AlMgSi1	H30
			B85	3.2381	G-AlSi10Mg	LM9
			A413.2	3.2382	GD-AlSi12	
			B390.0			

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
	ZRE1				MN65120	M12330	
					41000	–	
	AS4G					ALSi5Mg	
	AS4GU				45300	ALSi5Cu 1	
4244	A-S7G		AC4C		42000	AlSi7Mg	
4250	A-S9U3		AC4B		46500	Al Si9 Cu3 (Fe) (Zn)	
4253	A-S10G				43100	Al Si 10 Mg	
					43200		
4247							
4260	A-S12				47000	Al Si 12 (Cu)	
4261	A-S12U		AC3A		44100	Al Si 12	
4252	A-SU12		AC4A		51300	ALMg 6	
	A-S5UZ		AC2A		45000	Al Si 6 Cu 4	
	A-S5U3		AC2A		45200	Al Si 5 Cu 3 Mn	
			ADC12				
	A-S5U		AC2A		45400	Al Si 5 Cu 3	
	A-U5GT		AC1B		2100	Al Cu 4 Mg Ti	
						AlSi18Cu1Mg1Ni1	
	A-S12UN		AC8A			AlSi12Cu1Mg1Ni1	
	G-A9						
	G-A9Z1						
	G-Z4TR						
	G-Ag22.5						
	G-A6-Z1				MG-P-63	M11600	
	(G-A7-Z1)				MG-P-61		
4212	A-SGM0.7/6082				AW-6082	AA6082	
4253	A-S10G				AC-43400	A13600	
					AC-44200		
			ADC14				

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

MATERIALS		TRADE MARK	AISI-ASTM	W.-Nr	DIN	BS
N3	Copper Rame Kupfer Cuivre Cobre Медные сплавы			2.0060	E-Cu57	C101
				2.0065	E-Cu58	–
				2.0070	SE Cu	–
					–	C102
					–	–
				2.0090	SF Cu	C106
					–	C104
					–	C110
					–	C105
				2.0040	OF Cu	C103
			CA952	2.0940-01	CuAl10Fe	AB1
			CA955	2.0975-01	CuAl10Ni	AB2
				2.0872	CuNi10Fe1Mn	CN102
					CuNi10Zn45	
				2.0790	CuNi18Zn19Pb	
			CA937	2.1176	CuPb10Sn	LB2
				2.1050-01	CuSn10	CT1
				2.1087	CuSn10Zn	
				2.0240	CuZn15	CZ102
				2.0321	CuZn37	CZ108
				2.0530	CuZn38Sn1	
				2.0401	CuZn39Pb3	CZ121
				2.0402	CuZn40Pb2	CZ120
				2.1202	SB Cu	C107
				2.1356	Cu Mn 3	–
				2.1522	Cu Si2 Mn	–
					–	C108
					–	CC101
					–	CC102
					–	CC102
				2.0857	–	–
					–	CB101
					–	C112
					–	–
					–	–
					–	CS101
					–	C109
					–	C111

SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
–	Cu/a1		C1100	E-Cu57	CW004A	C11000	
–	–		–	–	–	–	
–	–		–	–	CW021A	C10300	
–	–		–	–	CW005A	C11020	
–	–		–	–	CW023A	C12000	
–	Cu/b		C1220	–	CW024A	C12200	
–	–		–	–	CW006A	C12500	
–	–		–	–	CW009A	C10100	
–	–		–	–	–	–	
–	Cu/c1		C1020	–	CW008A	C10200	
5710	CuAl10Fe				CC331G	C95200	BrA9ZH3L
5716	CuAl10Ni5Fe5				CC333G	C95500	BrA10ZH4N4L
5667	CuNi10Fe1Mn					C70600	
	CuNi18Zn19Pb1					C76300	
5640	CuSn10Pb10				CW352H	C93700	
5443	CuSn10				CC480K	C90700	
5458						C90500	
5112	CuZn15		C2300		CW502L	C23000	L90
5150	CuZn37				CW508L	C27200	
					CW717R	C46400	LO60-1
5170	CuZn39Pb3				CW614N	C38500	
5168	CuZn39Pb2				CW612N	C37800	
–	–		–	–	–	C14200	
–	–		–	–	–	–	
–	–		–	–	–	–	
–	–		–	–	–	C16200	
–	–		–	–	CW105C	C18200	
–	–		–	–	CW106C	–	
–	–		–	–	CW111C	C70250	
–	–		–	–	CW112C	C70320	
–	–		–	–	CW101C	C17200	
–	–		–	–	CW104C	C17500	
–	–		–	–	CW120C	C15000	
–	–		–	–	CW115C	C65100	
–	–		–	–	CW116C	C65500	
–	–		–	–	CW118C	C14500	
–	–		–	–	CW114C	C14700	

MATERIALS		TRADE MARK	AISI-ASTM	W.-Nr	DIN	BS
N4	Bronze and brass Bronzo e ottone Bronze und Messing Bronze et laiton Bronce y latón Бронзы и Латуни		C50700	2.1010	CuSn2	–
			C51100	2.1016	CuSn4	PB101
			C51000	–	CUSn5	PB102
			C51900	2.1020	CuSn6	PB103
			C52100	2.1030	CUSn8	PB104
			C54400			
					CuSn10	
					CuSn12	
				2.1020	CuSn6	PB103
		AMPCO 18				
		AMPCO 21				
		AMPCO 22				
				2.0220	CuZn5	CZ125
				2.0230	CuZn10	Cz101
				2.0240	CuZn15	CZ102
				2.0250	CuZn20	CZ103
				2.0261	CuZn28	
				2.0265	CuZn30	CZ106
				2.0280	CuZn33	
				2.0335	CuZn36	CZ107
				2.0321	CuZn37	CZ108
				2.0360	CuZn40	CZ109
				2.0331	CuZn36Pb1.5	CZ119
				2.0331	CuZn36Pb1.5	CZ119
				2.0375	CuZn36Pb3	CZ124
				2.0371	CuZn38Pb1.5	CZ128
				2.0372	CuZn39Pb0.5	CZ123
					CuZn38Pb2	
				2.0380	CuZn39Pb2	CZ131 / (CZ128)
				2.0401	CuZn39Pb3	CZ121
				2.0402	CuZn40Pb2	CZ122
				2.0410	CuZn44Pb2	CZ130
				2.0470	CuZn28Sn1	CZ111
				2.0530	CuZn38Sn1	
				–	CuZn19Sn	
				2.0460	CuZn20Al2	CZ110
				2.0561	CuZn40Al1	
				2.0550	CuZn40Al2	
				–	CuZn20Al2As	
				2.0572	CuZn40Mn2	CZ136
				2.0932	CuAl8Fe3	
				2.0966	CuAl10Ni5Fe4	CA104
N5	Plastic materials Materiali plastici Kunstoffmaterialien Matériaux plastiques Materiales plásticos Пластические материалы	Polycarbonate (PC)				
N6	Fiber and composites Fibre e compositi Faserwerkstoffe und Verbundwerkstoffe Fibres et composites Fibras y compuestos Композитные материалы	T300				
		T700				
		T800				
		HTA				
		Epoxy				
		PPS				
		PEEK				
		Epoxy				
		HX				
		E-glass				
		Kevlar				

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
			–				
			C5111				
			C5102				
			C5191				
			C5212				
			C5441				
5428	CuSn6		C5191		CW452K	C51900	BrOF6.5-0.15
			C2100		CW500L	C21000	
			C2200		CW501L	C22000	
			C2300		CW502L	C23000	
			C2400		CW503L	C24000	
					CW504L		
			C2600		CW505L	C26000	
			C2680		CW506L	C26800	
			C2700		CW507L	C27000	
			C2700		CW508L	C27200	
			C2800		CW509L	C28000	
					CW601N	C34500	
			C3501		CW600N	C34000	
			C3601		CW603N	C36000	
						C35300	
					CW610N	C36500	
			C3771		CW612N	C37700	
			C3603		CW614N	C38500	
					CW617N	C38000	
						C44300	
						C68700	
					CW723R		
					CW303G	C61400	
					CW307G	C63000	

MATERIALS		TRADE MARK	STRUCTURE	MF*	AISI-ASTM	W.-Nr	DIN
S1	**< 25 HRC** Heat resistant super alloys (HRSA) - good machinability Leghe resistenti al calore - buona lavorabilità Warmfeste Legierungen - gute Verarbeitbarkeit Alliages résistants à la chaleur - bonne usinabilité Aleaciones resistentes al calor de fácil mecanización Жаропрочные суперсплавы (хорошая обрабатываемость)	Nickel 201	Nickel based superalloys	4.3			
		17-4 PH (solubilized)	Iron based superalloys	2.1			
		AM 350	Iron based superalloys	1.8			
		Lapelloy	Iron based superalloys	1.8			
		17-7 (precipitation)	Iron based superalloys	1.8			
		Hastelloy C (plate)	Nickel based superalloys	1.8	N10002		NiCr17Mo17Few
		Hastelloy S	Nickel based superalloys	1.8			
		Inconel 625 (cast)	Nickel based superalloys	1.7	N06625	2.4856	NiCr22Mo9Nb
		A 286 (plate)	Iron based superalloys	1.4			
		IN 801	Iron based superalloys	1.4			
		M 308	Iron based superalloys	1.4			
		Hastelloy B-2	Nickel based superalloys	1.4		2.4617	
		Hastelloy C (cast)	Nickel based superalloys	1.4	N10002		NiCr17Mo17Few
		Hastelloy C-22	Nickel based superalloys	1.4			
		Hastelloy N (forged)	Nickel based superalloys	1.4	N10003		
		Inconel 600	Nickel based superalloys	1.4	N06600	2.4816	
		Inconel 601	Nickel based superalloys	1.4	N06601	2.4851	NiCr23Fe
		Inconel 706	Nickel based superalloys	1.4			
		Inconel X750 (solubilized)	Nickel based superalloys	1.4	N07750	2.4669	NiCr 15 Fe 7 TiAl
S2	**25-35 HRC** Heat resistant super alloys (HRSA) - medium machinability Leghe resistenti al calore - media lavorabilità Warmfeste Legierungen - mittlere Verarbeitbarkeit Alliages résistants à la chaleur - moyenne usinabilité Aleaciones resistentes al calor de media mecanización Жаропрочные суперсплавы (средняя обрабатываемость)	A 286 (Isolubilizzato)	Iron based superalloys	1.3			
		AM 350 (cast)	Iron based superalloys	1.3			
		Incoloy 800	Iron based superalloys	1.3	N08800	1.4876	X10NiCrAlTi32-21
		Incoloy 825	Iron based superalloys	1.3	N08825	2.4858	NiCr21Mo
		Hastelloy C-276	Nickel based superalloys	1.3			
		Hastelloy C-4	Nickel based superalloys	1.3			
		Hastelloy D	Nickel based superalloys	1.3			
		Hastelloy G	Nickel based superalloys	1.3			
		Hastelloy G-3	Nickel based superalloys	1.3			
		Hastelloy N (cast)	Nickel based superalloys	1.3	N10003		
		Hastelloy W	Nickel based superalloys	1.3			
		Hastelloy X	Nickel based superalloys	1.3	N06002	2.4665	NiCr22FeMo
		Inconel 625 (pipe)	Nickel based superalloys	1.3	N06625	2.4856	NiCr22Mo9Nb
		Inconel 708 (forged)	Nickel based superalloys	1.3			
		Nimonic 80	Nickel based superalloys	1.3	N06075	2.4630	NiCr20Ti
		Nimonic 105	Nickel based superalloys	1.3			
		A 286 (precipitation)	Iron based superalloys	1.1			
		AM 355	Iron based superalloys	1.1			
		IN 800	Iron based superalloys	1.1			
		N 155	Iron based superalloys	1.1			
		15-5 PH	Iron based superalloys	1.1			
		17-4 PH (Isolubilizzato)	Iron based superalloys	1.1			
		Incoloy 909	Iron based superalloys	1.1			
		Stellite 21	Cobalt based superalloys	1.1			
		Stellite 30	Cobalt based superalloys	1.1			
		Stellite 31	Cobalt based superalloys	1.1			
		Inconel 625 (forged)	Nickel based superalloys	1.1	N06625	2.4856	NiCr22Mo9Nb
		Inconel 713	Nickel based superalloys	1.1			
		Inconel 718 (cast)	Nickel based superalloys	1.1	N07718	2.4668	NiCr19Fe19NbMo
		Inconel 718 (pipe)	Nickel based superalloys	1.1	N07718	2.4668	NiCr19Fe19NbMo
		Inconel 901	Nickel based superalloys	1.1			
		Nimonic 81	Nickel based superalloys	1.1	N07080	2.4631	NiCr20TiAl
		Nimonic 263	Nickel based superalloys	1.1			
		Waspalloy (cast)	Nickel based superalloys	1.1	N07001	2.4654	NiCr20Co14MoTi

* Machinability Factor based on Inconel 718 (forged) = 1.0

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

BS	SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
		NC17DWY						
		NC22DNb						
NiMo28		N10665						
		NC17DWY						
		NC15Fe						
HR505		NC19FeNB						
3075(NA15)								
		NC21FeDU						
HR6.204		NC22FeD						
		NC22DNb						
HR5.203-4		NC20T						
		NC22DNb						
Hr8		Nc19FeNb						
Hr8		Nc19FeNb						
HR401,601		NC20TA						
		NC20K14						

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

	MATERIALS	TRADE MARK	STRUCTURE	MF*	AISI-ASTM	W.-Nr	DIN
S3	**35-45 HRC** Heat resistant super alloys (HRSA) - low machinability Leghe resistenti al calore - difficile lavorabilità Warmfeste Legierungen - schwere Verarbeitbarkeit Alliages résistants à la chaleur - faible usinabilité Aleaciones resistentes al calor de difícil mecanización Жаропрочные суперсплавы (плохая обрабатываемость)	Cobalt based superalloys	Haynes 188 (pipe)	1.0			
		Nickel based superalloys	Inconel X750 (precipitation)	1.0	N07750	2.4669	NiCr 15 Fe 7 TiAl
		Nickel based superalloys	Inconel 718 (forged)	**1.0**	N07718	2.4668	NiCr19Fe19NbMo
		Nickel based superalloys	Nimonic 115	1.0			
		Nickel based superalloys	Waspalloy (forged)	1.0	N07001	2.4654	NiCr20Co14MoTi
		Cobalt based superalloys	Haynes 25	0.9			
		Cobalt based superalloys	Haynes 188 (forged)	0.9			
		Nickel based superalloys	Udimet 500	0.9			NiCr18cCoMoAlTi
		Nickel based superalloys	Udimet 700	0.9			NiCo15Cr15MoAlTi
		Nickel based superalloys	Nimonic 90	0.7			
		Nickel based superalloys	Nimonic 91	0.7			
		Nickel based superalloys	Nimonic 101	0.7			
		Nickel based superalloys	Mar-M 247	0.7			NiCo10W10Cr9AlTi
		Nickel based superalloys	Mar-M 200	0.6			NiW13Co10Cr9AlTi
		Cobalt based superalloys	H 531	0.4			
		Nickel based superalloys	Rene 95	0.4			
		Cobalt based superalloys	Air Resist	0.3			
S4	Low alloy titanium (good machinability) Leghe di titanio basso legate e medio legate Niedriglegierte und mittellegierte Titanlegierungen Alliages de titane faiblement alliés et moyennement alliés Aleaciones de titanio de fácil mecanización Низколегированные титановые сплавы (хорошая обрабатываемость)		Grade 1		265-G1		TiAl2Sn4Zr2MoSi
			Grade 2		265-G2		TiAl2Sn4Zr6Mo
			Grade 3 (13 HRC)		265-G3	3.7055	Ti 99.6
			Grade 9 (15 HRC)			3.7195	Ti3Al2.5V
							TiAl7Mo4
						3.7115	TiAl5Sn2.5
						3.7124	TiCu2.5
						3.7155	TiAl6Zr5Mo0.5
						–	TiAl5Mo4Sn4Si0.5
						3.7175	TiAl6V6Sn2
						3.7185	TiAl4Mo4Sn2
						3.7025	Ti 99.8
						3.7035	Ti 99.7a
S5	High alloy titanium (medium machinability) Leghe di titanio medio legate e alto legate Mittellegierte und hochlegierte Titanlegierungen Alliages de titane moyennement alliés et fortement alliés Aleaciones de titanio de media mecanización Высоколегированные титановые сплавы (средняя обрабатываемость)		Grade 4 (23 HRC)		265-G4		
			Grade 5 (36 HRC)			3.7164	Ti6Al4V
			Grade 6 (36 HRC)				Ti5Al2.5SN
			Grade 23 (35 HRC)			3.7165	Ti6Al4VELI
			6242 (34 HRC)		4975		TiAl2Sn4Zr2MoSi
			6246 (39 HRC)				TiAl2Sn4Zr6Mo
							TiV10Fe2Al3

* Machinability Factor based on Inconel 718 (forged) = 1.0

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

BS	SS	AFNOR	UNE-IHA	JIS	UNI	EN	UNS	GOST
HR505		NC19FeNB						
Hr8		Nc19FeNb						
		NC20K14						
		NCK19DAT						
		NCKD20AT						
							R50250	
							R50400	
							R50550	
						Ti9	R56320	
TA14/17		T-A6V						
		TA 1						
		TA 2-5						
							R50700	
TA10-13/TA29		T-A5E				TiAl6V4	R56400	
							R54250	
TA11							R56401	
							R56260	

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

	MATERIALS	W.-Nr	DIN	BS	SS	AFNOR
H1	**50-56 HRC** Hardened steel Acciai temprati generali Allgemeine gehärtete Stähle Aciers trempés Aceros templados Закаленные стали	1.7131	16 MnCr 5	527 M 17	2511	16 MC 5
		1.1201	42 CrMo 4	708 M40	2244	42 CD 4
		1.1231	Ck 67	060 A 67	1770	XC 68
		1.1248	Ck 75	060 A 78	1774, 1778	XC 75
		1.1274	Ck 101	060 A 96	1870	
		1.1545	C 105 W1		1880	Y1 105
		1.2550	60 WCrV 7			55 WC 20
		1.7176	55 Cr 3	527 A 60	2253	55 C 3
		1.3401	X 120 Mn 12	BW 10	2183	Z 120 M 12
H2	**54-62 HRC** Hardened bearing steel Acciai temprati per cuscinetti Gehärtete Kugellagerstähle Aciers trempés pour roulements Aceros templados para rodamientos Закаленные подшипниковые стали	1.2210	115 CrV 3			100 C 3
		1.2510	100 MnCrW 4	BO 1	2140	90 MWCV 5
		1.2842	90 MnCrV 8	BO 2		90 MV 8
		1.3505	100 Cr 6	534 A 99	2258	100 C 6
H3	**60-65 HRC** Hardened tool steel Acciai per utensili temprati Gehärtete Werkzeugstähle Aciers trempés pour outils Aceros templados para herramientas Закаленные инструментальные стали	1.2344	X 40 CrMoV 5 1	BH 13	2242	Z 40 CDV 5
		1.2363	X 100 CrMoV 5 1	BA 2	2260	Z 100 CDV 5
		1.2379	X 155 CrVMo 12 1	BD 2		Z 160 CDV 12
		1.2436	X 210 CrW 12		2312	
		1.2601	X 165 CrMoV 12		2310	
		1.2713	55 NiCrMoV 6			55 NCDV 7
		1.3243	S 6-5-2-5		2723	Z 85 WDKCV 06-05-05-04-02
		1.3247	S 2-10-1-8	BM 42		Z 110 DKCWV 09-08-04
		1.3343	S 6-5-2	BM 2	2722	Z 85 WDCV 06-05-04-0
		1.3355	S 18-0-1	BT 1		Z 80 WCV 18-04-01
H4	**50-56 HRC** Hardened martensitic stainless steel Acciai inossidabili martensitici temprati Gehärtete martensitische Edelstähle Aciers inoxydables martensitiques trempés Aceros inoxidables martensíticos templados Закаленные мартенситные нержавеющие стали	1.4021	X 20 Cr 13	420 S 37	2303	Z 20 C 13
		1.4109	X 65 CrMo 14			Z 70 D 14
		1.4112	X 90 CrMoV 18	409 S 19	2327	Z 2 CND 18 05
		1.4125	X 105 CrMo 17			Z 100 CD 17
		1.4534	X 3 CrNiMoAl 13 8 2			
		1.4542	X 5 CrNiCuNb 17 4			Z 6 CNU 17.4
		1.4568	X 7 CrNiAl 17 7	301 S 81	2388	Z 9 CAN 17.7
		1.4943	X 4 NiCrTi 25 15	HR 51	2570	Z 6 NCTDV 25.15
H5	**48-55 HRC** Hardened white cast iron Ghise bianche temprate Gehärteter Weißguss Fonte blanche trempée Fundición blanca templada Закаленный белый чугун	G-X330 NiCr 4 2	FB Ni4 Cr2 BC	Grade 2 A	05 12-00	Grade 2 A
		G-X260 NiCr 4 2	FB Ni4 Cr2 HC	Grade 2 B	05 13-00	Grade 2 B
		G-X300 CrNiSi 9 5 2	FB Cr9 Ni5	Grade 2 C, D, E	04 57-00	Grade 2 C, D, E

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

UNE-IHA	JIS	UNI	EN	UNS	GOST
	SCR 415	16 MnCr 5	16 MnCr 5	G51170	
	SCM 440 (H)	42 CrMo 4	42 CrMo 4	G41400	
		C 70	C 67S	G10700	
		C 75	C 75S	G10780	
	SUP 4		C 100S	G10950	
		C 100 KU	C 105U		
		55 WCrV 8 KU			
	SUP 9 (A)	55 Cr 3	55 Cr 3	G51550	
	SC MnH 1				
		107 CrV 3 KU	107 CrV 3	T61202	
	SKS 3	95 MnWCr 5 KU		T31501	
		90 MnVCr 8 KU	90 MnCrV 8	T31502	
	SUJ 2	100 Cr 6	100 Cr 6	G51986	
	SKD 61	X 40 CrMo 5 1 1 KU	X 40 CrMoV 5 1	T20813	
	SKD 12	X 100 CrMoV 5 1 KU	X 100 CrMoV 5	T30102	
	SKD 11	X 155 CrVMo 12 1 KU	X 155 CrVMo 12 1	T30402	
	SKD 2	X 215 CrW 12 1 KU			
		X 165 CrMoW 12 KU			
	SKT 4			T61206	
	SKH 55	HS 6-5-2-5	HS 6-5-2-5		
	SKH 51	HS 2-9-1-8	HS 2-10-1-8	T11342	
	SKH 9, SKH 51	HS 6-5-2	HS 6-5-2	T11302	
	SKH 2	HS 18-0-1	HS 18-0-1	T12001	
	SUS 420 J 1	X 20 Cr 13	X 20 Cr 13	S42000	
	SUS 440 A		X 70 CrMo 15	S44002	
	SUS 440 B	X CrTi 12	X 90 CrMoV 18	S44003	
	SUS 440 C	X 105 CrMo 17	X 105 CrMo 17	S44004	
			X 3 CrNiMoAl 13 8 2	S13800	
	SCS 24, SUS 630		X 5 CrNiCuNb 16 4	S17400	
	SUS 631	X 7 CrNiAl 17 7	X 7 CrNiAl 17 7	S17700	
	SUH 660		X 6 NiCrTiMoV 25 15	S66286	
			EN-GJN-HV520	F45001	
			EN-GJN-HV550	F45000	
			EN-GJN-HV600(X-Cr11)	F45003	

Durezza Härte Dureté Dureza Твёрдость

HRC	VICKERS	BRINELL HARDNESS		ROCKWELL HARDNESS			ROCKWELL SUPERFICIAL HARDNESS			SHORE HARDNESS	N/mm² TENSILE STRENGHT	HRC
		standard ball	tungsten carbide ball	A scale	B scale	D scale	15-N scale	30-N scale	45-N scale			
68	940	-	-	85.6	-	76.9	93.2	84.4	75.4	97	-	68
67	900	-	-	85.0	-	76.1	92.9	83.6	74.2	95	-	67
66	865	-	-	84.5	-	75.4	92.5	82.8	73.3	92	-	66
65	832	-	(739)	83.9	-	74.5	92.2	81.9	72.0	91	-	65
64	800	-	(722)	83.4	-	73.8	91.8	81.1	71.0	88	-	64
63	772	-	(705)	82.8	-	73.0	91.4	80.1	69.9	87	-	63
62	746	-	(688)	82.3	-	72.2	91.1	79.3	68.8	85	-	62
61	720	-	(670)	81.8	-	71.5	90.7	78.4	67.7	83	-	61
60	697	-	(654)	81.2	-	70.7	90.2	77.5	66.7	81	-	60
59	674	-	(634)	80.7	-	69.9	89.8	76.6	65.5	80	-	59
58	653	-	615	80.1	-	69.2	89.3	75.7	64.3	78	-	58
57	633	-	595	79.6	-	68.5	88.9	74.8	63.2	76	-	57
56	613	-	577	79.0	-	67.7	88.3	73.9	62.0	75	-	56
55	595	-	560	78.5	-	66.9	87.9	73.0	60.9	74	2075	55
54	577	-	543	78.0	-	66.1	87.4	72.0	59.8	72	2015	54
53	560	-	525	77.4	-	65.4	86.9	71.2	58.6	71	1950	53
52	544	(500)	512	76.8	-	64.6	86.4	70.2	57.4	69	1880	52
51	528	(487)	496	76.3	-	63.8	85.9	69.4	56.1	68	1820	51
50	513	(475)	481	75.9	-	63.1	85.5	68.5	55.0	67	1760	50
49	498	(464)	469	75.2	-	62.1	85.0	67.6	53.8	66	1695	49
48	484	451	455	74.7	-	61.4	84.5	66.7	52.5	64	1635	48
47	471	442	443	74.1	-	60.8	83.9	65.8	51.4	63	1580	47
46	458	432	432	73.6	-	60.0	83.5	64.8	50.3	62	1530	46
45	446	421	421	73.1	-	59.2	83.0	64.0	49.0	60	1480	45
44	434	409	409	72.5	-	58.5	82.5	63.1	47.8	58	1435	44
43	423	400	400	72.0	-	57.7	82.0	62.2	46.7	57	1385	43
42	412	390	390	71.5	-	56.9	81.5	61.3	45.5	56	1340	42
41	402	381	381	70.9	-	56.2	80.9	60.4	44.3	55	1295	41
40	392	371	371	70.4	-	55.4	80.4	59.5	43.1	54	1250	40
39	382	362	362	69.9	-	54.6	79.9	58.6	41.9	52	1215	39
38	372	353	353	69.4	-	53.8	79.4	57.7	40.8	51	1180	38
37	363	344	344	68.9	-	53.1	78.8	56.8	39.6	50	1160	37
36	354	336	336	68.4	(109.0)	52.3	78.3	55.9	38.4	49	1115	36
35	345	327	327	67.9	(108.5)	51.5	77.7	55.0	37.2	48	1080	35
34	336	319	319	67.4	(108.0)	50.8	77.2	54.2	36.1	47	1055	34
33	327	311	311	66.8	(107.5)	50.0	76.6	53.3	34.9	46	1025	33
32	318	301	301	66.3	(107.0)	49.2	76.1	52.1	33.7	44	1000	32
31	310	294	294	65.8	(106.0)	48.4	75.6	51.3	32.5	43	980	31
30	302	286	286	65.3	(105.5)	47.7	75.0	50.4	31.3	42	950	30
29	294	279	279	64.7	(104.5)	47.0	74.5	49.5	30.1	41	930	29
28	286	271	271	64.3	(104.0)	46.1	73.9	48.6	28.9	41	910	28
27	279	264	264	63.8	(103.0)	45.2	73.3	47.7	27.8	40	880	27
26	272	258	258	63.3	(102.5)	44.6	72.8	46.8	26.7	38	860	26
25	266	253	253	62.8	(101.5)	43.8	72.2	45.9	25.5	38	840	25
24	260	247	247	62.4	(101.0)	43.1	71.6	45.0	24.3	37	825	24
23	254	243	243	62.0	100.0	42.1	71.0	44.0	23.1	36	805	23
22	248	237	237	61.5	99.0	41.6	70.5	43.2	22.0	35	785	22
21	243	231	231	61.0	98.5	40.9	69.9	42.3	20.7	35	770	21
20	238	226	226	60.5	97.8	40.1	69.4	41.5	19.6	34	760	20
(18)	230	219	219	-	96.7	-	-	-	-	33	730	(18)
(16)	222	212	212	-	95.5	-	-	-	-	32	705	(16)
(14)	213	203	203	-	93.9	-	-	-	-	31	675	(14)
(12)	204	194	194	-	92.3	-	-	-	-	29	650	(12)
(10)	196	187	187	-	90.7	-	-	-	-	28	620	(10)
(8)	188	179	179	-	89.5	-	-	-	-	27	600	(8)
(6)	180	171	171	-	87.1	-	-	-	-	26	580	(6)
(4)	173	165	165	-	85.5	-	-	-	-	25	550	(4)
(2)	166	158	158	-	83.5	-	-	-	-	24	530	(2)
(0)	160	152	152	-	81.7	-	-	-	-	24	515	(0)

Formule Formeln Formules Fórmulas Формулы

CUTTING SPEED VELOCITÀ DI TAGLIO SCHNITTGESCHWINDIGKEIT
VITESSE DE COUPE VELOCIDAD DE CORTE СКОРОСТЬ РЕЗАНИЯ

$$Vc = \frac{D \times \pi \times n}{1000} \quad \textbf{m/min}$$

SPLINDLE SPEED VELOCITÀ DI ROTAZIONE MANDRINO SPINDELGESCHWINDIGKEIT
VITESSE DE ROTATION DU MANDRIN VELOCIDAD DE ROTACIÓN DEL MANDRIL ЧАСТОТА ВРАЩЕНИЯ ШПИНДЕЛЯ

$$n = \frac{Vc \times 1000}{\pi \times D} \quad \textbf{rpm}$$

FEED PER REVOLUTION AVANZAMENTO PER GIRO VORSCHUB PRO UMDREHUNG
AVANCE PAR TOUR AVANCE POR VUELTA ОБОРОТНАЯ ПОДАЧА

$$fn = \frac{Vf}{n} \quad \textbf{mm/rev} \qquad fn = fz \times z \quad \textbf{mm/rev}$$

FEED RATE VELOCITÀ DI AVANZAMENTO VORSCHUBSGESCHWINDIGKEIT
VITESSE D'AVANCE VELOCIDAD DE AVANCE МИНУТНАЯ ПОДАЧА

$$Vf = fn \times n \quad \textbf{mm/min}$$

FEED/TOOTH AVANZAMENTO/TAGLIENTE VORSCHUB/SCHNEIDE
AVANCE/ARÊTE DE COUPE AVANCE/FILO ПОДАЧА НА ЗУБ

$$fz = \frac{Vf}{n \times z} \quad \textbf{mm}$$

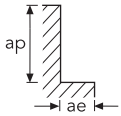
METAL (CHIP) REMOVAL RATE VOLUME TRUCIOLO ASPORTATO VOLUMEN ABGETRAGENER SPÄNE
VOLUME DE COPEAU VOLUMEN VIRUTA EXTRAÍDA ОБЪЕМ УДАЛЕННОЙ СТРУЖКИ

$$Q = \frac{ap \times ae \times Vf}{1000} \quad \textbf{cm}^3\textbf{/min}$$

D DIAMETER DIAMETRO DURCHMESSER DIAMÈTRE DIÁMETRO ДИАМЕТР

Z NUMBER OF TEETH NUMERO TAGLIENTI SCHNEIDENANZAHL NUMÉRO DE DENTS NÚMERO DE DIENTES КОЛИЧЕСТВО ЗУБЬЕВ

ap
ae



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STOCK		
●	stock standard stock standard Standard Lager	stock standard stock estándar складская позиция
○	non-standard stock stock non standard nicht Standard Lager	stock non standard stock no estándar не складская позиция
▽	stock exhaustion esaurimento stock Vorraterschöpfung	épuisement du stock agotamiento de stock складские остатки

APPLICATION GUIDELINES INDICAZIONI PER L'APPLICAZIONE LEITFADEN ZUR ANWENDUNG INDICATIONS POUR L'APPLICATION INDICACIONES PARA SU APLICACIÓN УКАЗАНИЯ ПО ПРИМЕНЕНИЮ		
★	1st choice 1a scelta 1. Wahl	1er choix 1ª elección 1-й выбор
☆	suitable adatto geeignet	adapté adecuado пригоден

SHANK ATTACCO SCHAFT QUEUE MANGO ХВОСТОВИК		
	cylindrical shank attacco cilindrico zylindrischer Schaft	queue cylindrique mango cilíndrico цилиндрическое крепление

GEOMETRY GEOMETRIA GEOMETRIE GÉOMÉTRIE GEOMETRÍA ГЕОМЕТРИЯ		
	general purpose uso generico allgemeine Anwendung	applications génériques uso genérico общего назначения
	general purpose with inside coolant uso generico con refrigerazione interna allgemeine Anwendung mit innerer Kühlmittelzuführung	applications génériques à trous d'huile uso genérico con refrigeración interna общего назначения с внутренней подачей СОЖ
	4 guides chamfer with inside coolant 4 fasi con refrigerazione interna 4 Führungsfasen mit innerer Kühlmittelzuführung	4 listels à trous d'huile 4 fases con refrigeración interna 4 направляющих с внутренней подачей СОЖ
	universal application applicazione universale Universelle Anwendung	application universelle aplicación universal универсальное применение
	universal application with inside coolant applicazione universale con refrigerazione interna Universelle Anwendung mit Innenkühlung	application universelle avec lubrification interne aplicación universal con refrigeración interna универсальное применение с внутренним охлаждением
	stainless steel with inside coolant acciaio inossidabile con refrigerazione interna rostfreien Stahl mit innerer Kühlmittelzuführung	acier inoxydable à trous d'huile acero inoxidable con refrigeración interna нержавеющая сталь с внутренней подачей подачей СОЖ
	aluminium with inside coolant alluminio con refrigerazione interna Aluminium mit innerer Kühlmittelzuführung	aluminium à trous d'huile aluminio con refrigeración interna алюминий с внутренней подачей подачей СОЖ

Legenda Verzeichnis Légende Leyenda Условные обозначения

GEOMETRY GEOMETRIA GEOMETRIE GÉOMÉTRIE GEOMETRÍA ГЕОМЕТРИЯ

	hardened steel acciaio temprato Hartstahl	acier trempé acero templado закалённая сталь
	wide range of materials, with inside coolant, mini ampia gamma di materiali, con refrigerazione interna, mini breite Auswahl an Materialien, mit Innenkühlung, mini	large gamme de matériaux, avec lubrification interne, mini amplia gama de materiales, con refrigeración interna, mini широкий выбор материалов, с внутренним охлаждением, мини
	wide range of materials, with inside coolant, long ampia gamma di materiali, con refrigerazione interna, lunga breite Auswahl an Materialien, mit Innenkühlung, lang	large gamme de matériaux, avec lubrification interne, longue amplia gama de materiales, con refrigeración interna, larga широкий выбор материалов, с внутренним охлаждением, длинная
	NC starting drill punte da centri NC NC Anbohrer mit Spitzenwinkel	forets à centrer NC brocas de hacer punto NC центровочные свёрла для станков с ЧПУ

MATERIAL MATERIALE WERKSTOFF MATIÈRE MATERIAL МАТЕРИАЛ

	micrograin micrograna Mikrokörnung	micrograin micrograno микрозернистый твёрдый сплав

SURFACE TREATMENT TRATTAMENTO SUPERFICIALE OBERFLÄCHENBEHANDLUNG TRAITMENT DE SURFACE TRATAMIENTO SUPERFICIAL ОБРАБОТКА ПОВЕРХНОСТИ

	uncoated non rivestito unbeschichtet	non revêtu no revestido без покрытия
	polished lappato geläppt	poli pulido полированный

COATINGS RIVESTIMENTI BESCHICHTUNGEN REVÊTEMENTS RECUBRIMIENTOS ПОКРЫТИЕ

		... PV200	... PV250	... PV300	... PV1000
hardness (HV) durezza (HV) Härte (HV)	dureté (HV) dureza (HV) твёрдость (HV)	3300	3300	3300	3600
friction coefficient coefficiente d'attrito Reibungskoeffizient	coefficent de frottement coeficiente de rozamiento коэффициент трения	0.3	0.3	0.3	0.25
thickness (µ) spessore (µ) dicke (µ)	épaisseur (µ) espesor (µ) толщина (мкм)	3	2.5÷3.5	2.5÷3.5	2÷3
max working temperature (°C) temperatura max (°C) hochste Temperatur (°C)	température maximale (°C) temperatura máx (°C) макс. температура (°C)	950°	900°	1100°	1200°

	ITEM No.	PAGE	
TA-HTA-4HTA general purpose 3xD - 5xD - 8xD	**343TA**	54	
	318N	54	
	353TA	58	
	353HTA	58	
	355TA	66	
	355HTA	66	
	3584HTA	74	
PU-HPU universal application 3xD - 5xD	**353PU**	83	
	353HPU	83	
	355PU	92	
	355HPU	92	
SUH stainless steel 3xD - 5xD	**353SUH**	105	
	355SUH	111	
ALH non-ferrous material 3xD - 5xD	**353ALH**	119	
	355ALH	123	
HRC hardened steel 45-62 HRC 3xD	**353HRC**	129	
SUH MINI short, long and extra long 5xD ÷ 30xD	**355SUH MINI**	140	
	358SUH MINI	144	
	3512SUH MINI	148	
	3520SUH MINI	152	
	3525SUH MINI	156	
	3530SUH MINI	160	
HL long and extra long 12xD ÷ 30xD	**3512HL**	173	
	3515HL	178	
	3520HL	183	
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NC spotting 90° - 120°	**CS-D-TA 90**	200	
	CS-D-TA 120	200	

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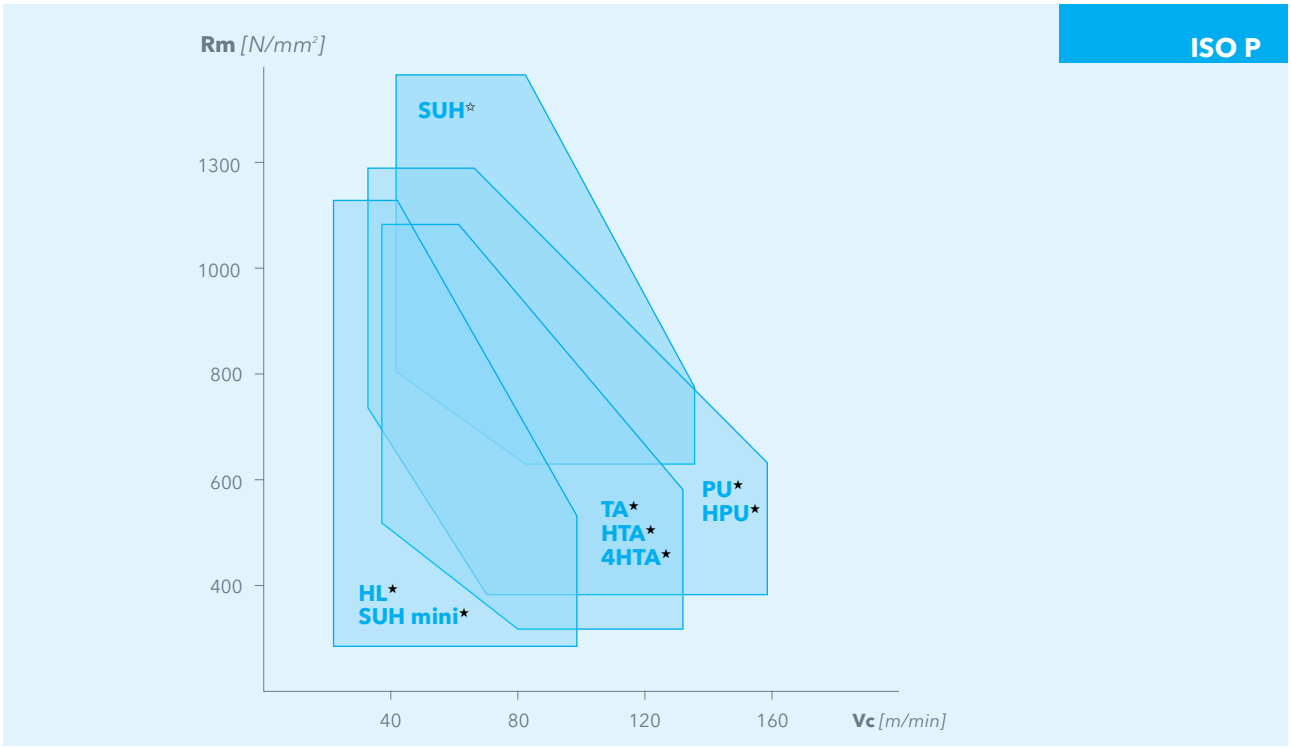
RANGE	DRILLING DEPTH	NORM	TYPE	MATERIAL / COATING	HRC	POINT ANGLE	HELIX ANGLE	CHAMFER	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
1-16	3xD	DIN6539	TA	MG PV200		140°	30°		★	☆	☆	☆		
1-13	3xD	DIN6539	TA	MG BR		140°	30°		★	☆	☆	☆		
3-20	3xD	DIN6537K	TA	MG PV200		140°	30°		★	☆	☆		☆	
3-20	3xD	DIN6537K	HTA	MG PV200		140°	30°		★	☆	☆	☆	☆	
3-20	5xD	DIN3537L	TA	MG PV200		140°	30°		★	☆	☆		☆	
3-20	5xD	DIN3537L	HTA	MG PV200		140°	30°		★	☆	☆	☆	☆	
3-16	8xD	OSAWA	4HTA	MG PV300		140°	30°		★	★	★	☆	☆	
3-20	3xD	DIN6537K	PU	MG PV250		140°	30°	45°	★	★	★	☆	★	
3-20	3xD	DIN6537K	HPU	MG PV250		140°	30°	45°	★	★	★	☆	★	
3-20	5xD	DIN6537L	PU	MG PV250		140°	30°	45°	★	★	★	☆	★	
3-20	5xD	DIN6537L	HPU	MG PV250		140°	30°	45°	★	★	★	☆	★	
3-20	3xD	DIN6537K	SUH	MG PV300		140°	30°		☆	★	☆	☆	☆	
3-20	5xD	DIN6537L	SUH	MG PV300		140°	30°		☆	★	☆	☆	☆	
3-20	3xD	DIN6537K	ALH	MG POLISHED		130°	30°					★		
3-20	5xD	DIN6537L	ALH	MG POLISHED		130°	30°					★		
2.6-14.2	3xD	DIN6537K	HRC	MG PV1000	45-62	150°	15°	45°						★
1-3	5xD	OSAWA	SUH MINI	MG PV300		135°	30°		★	★	★	☆	☆	
1-3	8xD	OSAWA	SUH MINI	MG PV300		135°	30°		★	★	★	☆	☆	
1-3	12xD	OSAWA	SUH MINI	MG PV300		135°	30°		★	★	★	☆	☆	
1-3	20xD	OSAWA	SUH MINI	MG PV300		135°	30°		★	★	★	☆	☆	
1-3	25xD	OSAWA	SUH MINI	MG PV300		135°	30°		★	★	★	☆	☆	
1-3	30xD	OSAWA	SUH MINI	MG PV300		135°	30°		★	★	★	☆	☆	
3.1-10	12xD	OSAWA	HL	MG PV250		135°	30°		★	★	★	☆	☆	
3.1-10	15xD	OSAWA	HL	MG PV250		135°	30°		★	★	★	☆	☆	
3.1-10	20xD	OSAWA	HL	MG PV250		135°	30°		★	★	★	☆	☆	
3.1-9.5	25xD	OSAWA	HL	MG PV250		135°	30°		★	★	★	☆	☆	
3.1-8	30xD	OSAWA	HL	MG PV250		135°	30°		★	★	★	☆	☆	
6-16		OSAWA	SD	MG PV200		90°	30°		★	★	★	★	☆	
6-16		OSAWA	SD	MG PV200		120°	30°		★	★	★	★	☆	

★ 1st choice ☆ suitable

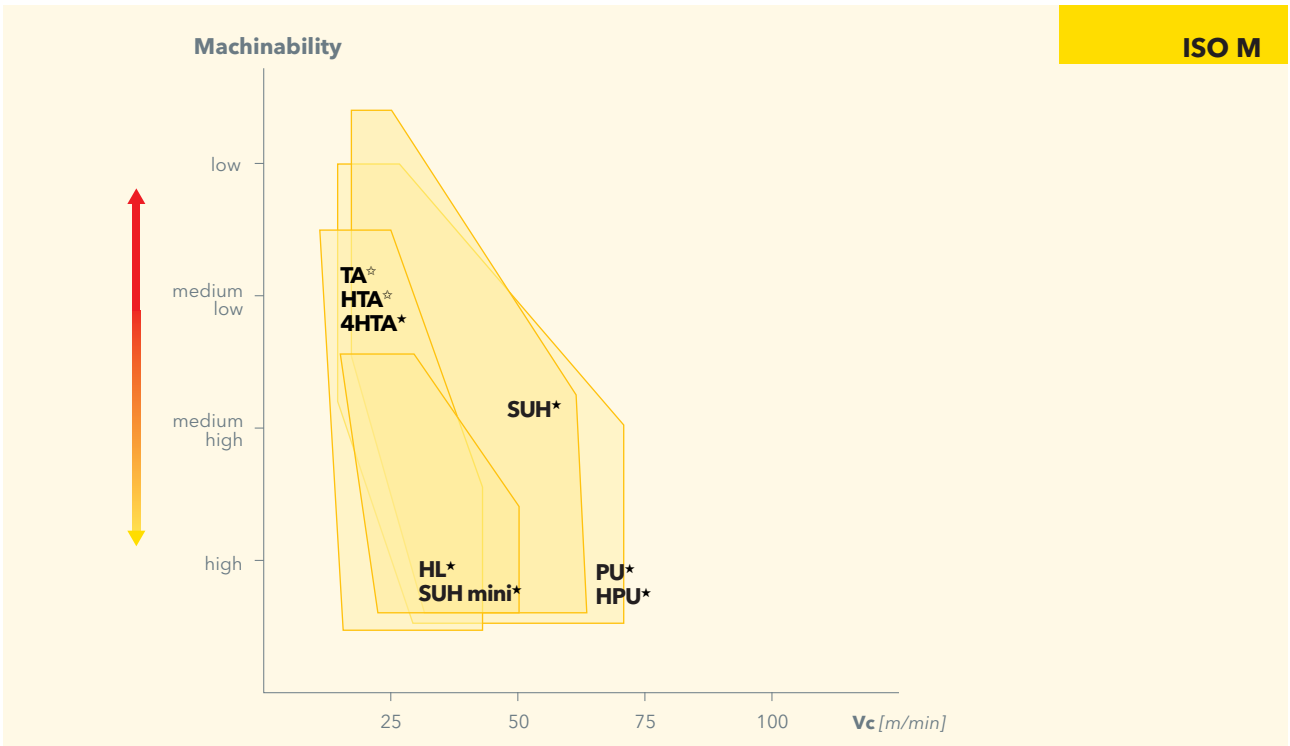
Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

STEEL APPLICATION



★ 1st choice ☆ suitable

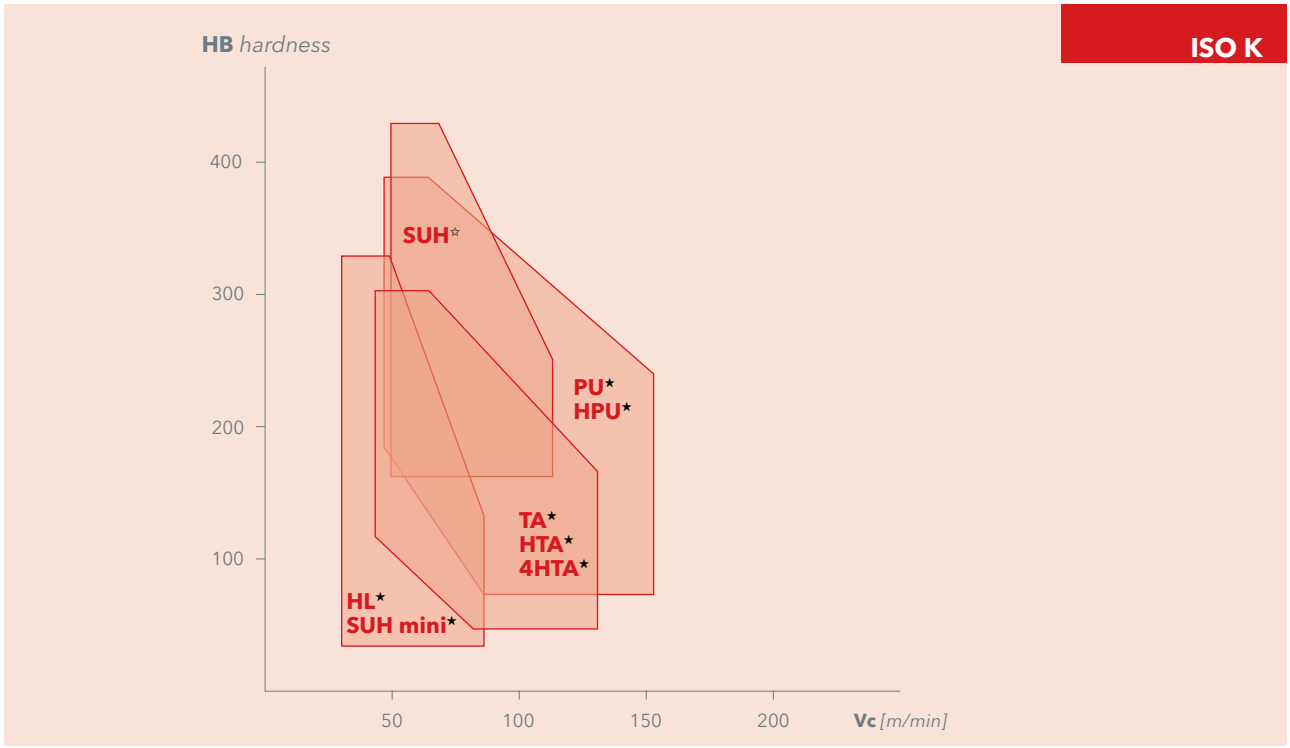
STAINLESS STEEL APPLICATION



★ 1st choice ☆ suitable

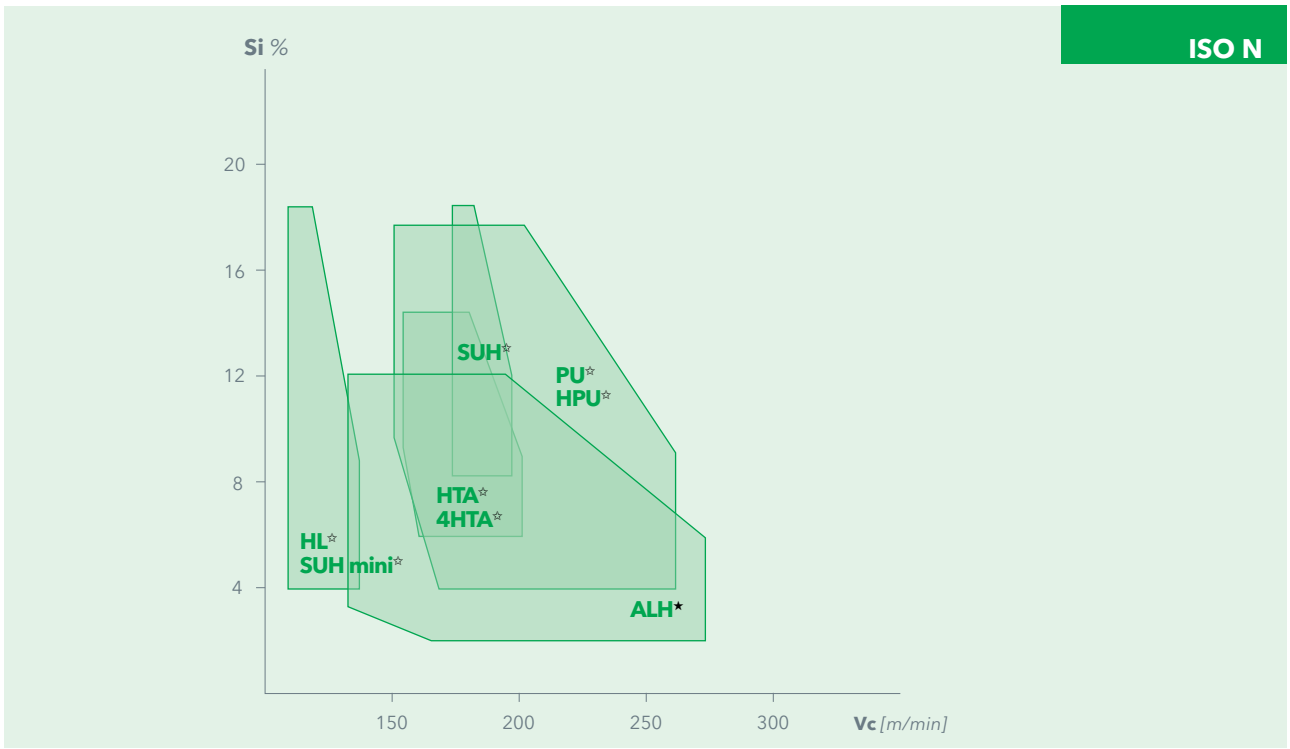
TA : general purpose (page 51)
HTA : general purpose with inside coolant (page 51)
4HTA : 4 margins general purpose with inside coolant (page 51)
PU : universal purpose (page 81)
HPU : universal purpose with inside coolant (page 81)
SUH : special purpose with inside coolant (page 103)
SUH MINI : miniature 5xD ÷ 30xD with inside coolant (page 133)
HL : long 12xD ÷ 30xD (page 165)

CAST IRON APPLICATION



★ 1st choice ☆ suitable

NON-FERROUS MATERIALS APPLICATION

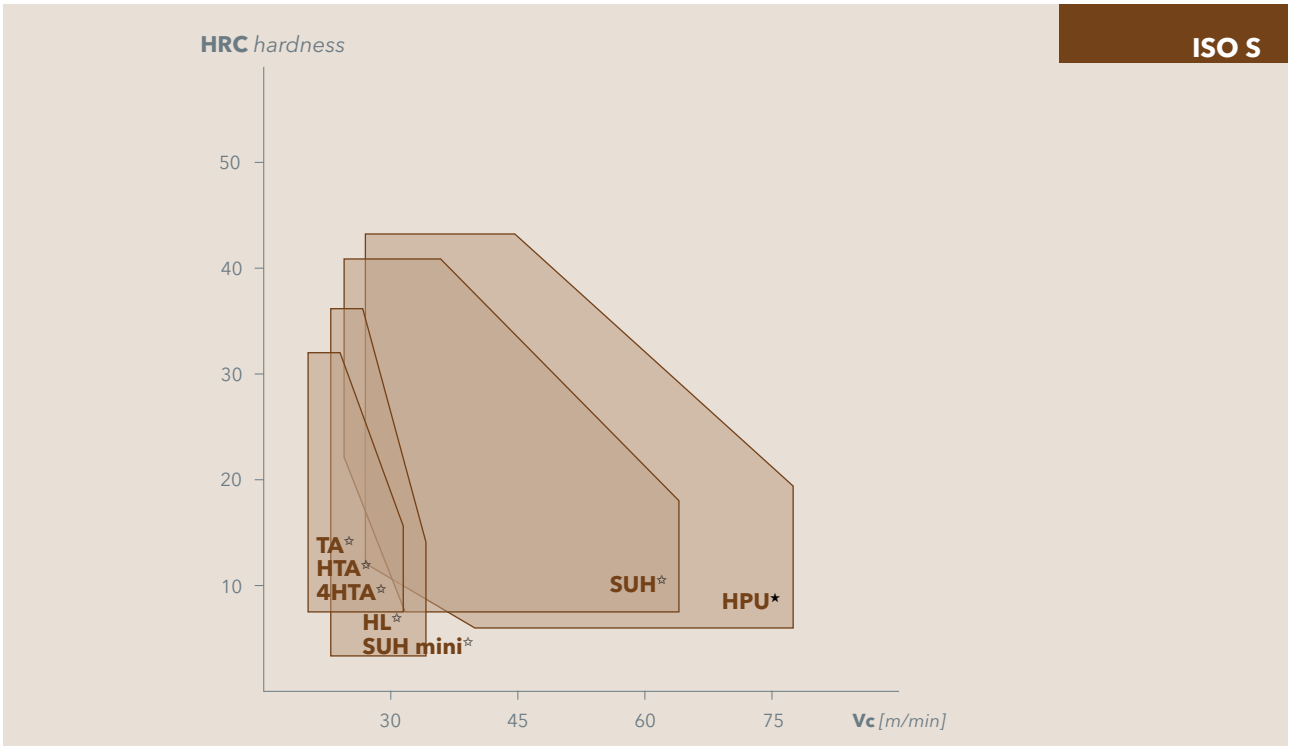


★ 1st choice ☆ suitable

TA : general purpose (page 51)
HTA : general purpose with inside coolant (page 51)
4HTA : 4 margins general purpose with inside coolant (page 51)
PU : universal purpose (page 81)
HPU : universal purpose with inside coolant (page 81)
SUH : special purpose with inside coolant (page 103)
ALH : special purpose with inside coolant (page 117)
SUH MINI : miniature 5xD ÷ 30xD with inside coolant (page 133)
HL : long 12xD ÷ 30xD (page 165)

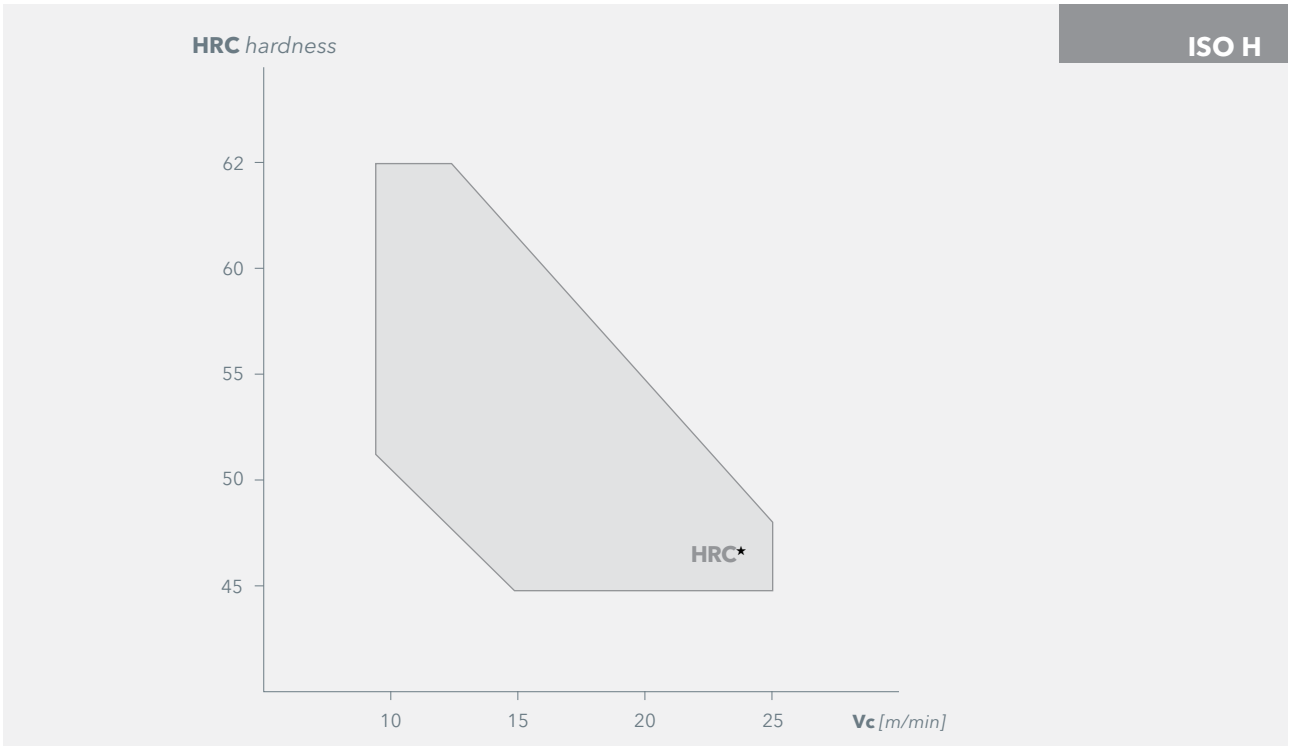
Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

SUPER ALLOYS APPLICATION



★ 1st choice ☆ suitable

HARDENED STEEL APPLICATION



★ 1st choice ☆ suitable

TA : general purpose (page 51)
HTA : general purpose with inside coolant (page 51)
4HTA : 4 margins general purpose with inside coolant (page 51)
HPU : universal purpose with inside coolant (page 81)
SUH : special purpose with inside coolant (page 103)
HRC : special purpose (page 127)
SUH MINI : miniature 5xD ÷ 30xD with inside coolant (page 133)
HL : long 12xD ÷ 30xD (page 165)

TYPHOON TA-HTA-4HTA

HIGH PERFORMANCE - GENERAL PURPOSE

The tool of choice for multi-purpose drilling on ISO P, M, K below 1100 N/mm².

La soluzione ideale per la foratura di materiali ISO P, M, K sino a 1100 N/mm².

Die optimale Lösung für das Bohren der Materialien ISO P, M, K bis zu 1100 N/mm².

La solution idéale pour le perçage de matériaux ISO P, M, K jusqu'à 1100 N/mm².

La solución ideal para el taladro de materiales ISO P, M, K hasta 1100 N/mm².

Идеальное решение для сверления материалов по ISO P, M, K до 1100 Н/мм².

TYPHOON TA-HTA-4HTA

TA

HTA

TA-HTA
- Self-centering geometry for accurate holes
- Curved cutting edge for low cutting forces.
- High relief angle: reduces cutting forces, improves chip shape and ejection
- Wide chip pocket: improves chip ejection
- Back taper geometry: improves the cutting performance
- Modified oil holes: improves coolant feed
- Substrate and coating: specifically selected for high wear resistance, long and reliable life

TA-HTA
- Affûtage autocentré pour un perçage plus précis
- Profil de l'arête ondulé pour faible effort de coupe
- Géométrie de l'arête avec dépouille accentuée pour réduire l'effort de coupe et améliorer la forme et le contrôle des copeaux
- Goujoures recourbées et larges pour améliorer l'évacuation des copeaux
- Géométrie du corps avec conicité arrière pour faciliter la coupe
- Trous d'arrosage avec géométrie modifiée pour apporter une lubrification plus importante.
- Substrat et revêtement spécifiques pour garantir durée et fiabilité

TA-HTA
- Affilatura autocentrante per fori precisi
- Profilo del tagliente ondulato per basso sforzo di taglio
- Geometria del tagliente con spoglia accentuata per ridurre lo sforzo di taglio e migliorare la forma e il controllo dei trucioli
- Gole ricurve e ampie per migliorare l'evacuazione dei trucioli
- Geometria del corpo con conicità posteriore per agevolare l'azione di taglio
- Fori di refrigerazione con geometria modificata per un maggior apporto di refrigerante
- Substrato e rivestimento specifici per garantire durata e affidabilità

TA-HTA
- Afilado autocentrante para agujeros precisos
- Perfil del filo ondulado, para bajo esfuerzo de corte
- Geometría del filo con salida acentuada para reducir el esfuerzo de corte y mejorar la forma y el control de las virutas
- Ranuras curvadas y amplias para mejorar la evacuación de las virutas
- Geometría del cuerpo con conicidad posterior para facilitar la acción de corte
- Agujeros de refrigeración con geometría modificada para una mayor aportación de refrigerante
- Sustrato y revestimiento específicos para garantizar duración y fiabilidad

TA-HTA
- Selbstzentrierender Schliff für präzise Bohrungen
- Gewelltes Schneidkantenprofil für geringen Schneiddruck
- Geometrie der Schneidkante mit ausgeprägtem Hinterschliff zur Reduzierung des Schneiddrucks und zur Verbesserung der Späneform und -kontrolle
- Gebogene und breite Nuten zur Verbesserung der Späneabführung
- Geometrie des Körpers mit konischem hinteren Bereich zur Erleichterung des Schnittvorgangs
- Kühlöffnungen mit abgeänderter Geometrie für einen verbesserten Kühlmittelzufluss
- Spezielles Trägermaterial und spezielle Beschichtung zur Gewährleistung von Standzeit und Zuverlässigkeit

TA-HTA
- Самоцентрирующаяся заточка для сверления отверстий высокой точности
- Закругленный профиль режущей кромки для низких режущий усилий
- Большой угол наклона спиральной канавки для уменьшения сил резания и улучшения условий удаления стружки
- Широкие стружечные канавки для лучшего вывода стружки
- Геометрия с обратным конусом для повышения производительности
- Большие отверстия: увеличена эффективность подвода СОЖ
- Специальное покрытие для повышения стойкости инструмента

4HTA

4HTA 8xD
- Self-centering geometry for accurate holes
- 4 margin lands: reliable machining for highly accurate and straight holes even in deep drilling
- Straight cutting edge: short chips for easy evacuation and high reliability
- Special edge design: high performance and edge protection
- Back taper geometry: improves the cutting performance
- Chip pocket finishing: highly polished to reduce welding and improves chip ejection
- Large oil holes: improves coolant feed
- Substrate and coating: specifically selected for high wear resistance, long and reliable life

4HTA 8xD
- Affûtage autocentré pour un perçage plus précis.
- Géométrie avec « 4 listels » : trous droits et précis, même en présence de trous profonds.
- Profil de l'arête droit et renforcé : il génère des copeaux courts et garantit une grande fiabilité
- Géométrie de l'arête avec affûtage spécifique pour protéger l'arête et les angles
- Géométrie du corps avec conicité arrière pour faciliter l'action de coupe
- Finition des goujoures : polie pour réduire le problème du collage et faciliter l'évacuation des copeaux
- Trous de lubrification avec géométrie modifiée pour un apport de lubrifiant plus important
- Substrat et revêtement spécifiques pour garantir durée et fiabilité

4HTA 8xD
- Affilatura autocentrante per fori precisi
- Geometria con "4 Margini": fori rettilinei e precisi, anche nel caso di profondità elevate.
- Profilo del tagliente diritto e rinforzato: genera trucioli corti e garantisce grande affidabilità
- Geometria del tagliente con affilatura specifica a protezione del tagliente e degli spigoli
- Geometria del corpo con conicità posteriore per agevolare l'azione di taglio
- Finitura gole: lappate per ridurre il problema dell'incollaggio e facilitare l'evacuazione dei trucioli
- Fori di refrigerazione con geometria modificata per un maggior apporto di refrigerante
- Substrato e rivestimento specifici per garantire durata e affidabilità

4HTA 8xD
- Afilado autocentrante para agujeros precisos
- Geometría con «4 Márgenes»: agujeros rectilíneos y precisos, incluso en caso de profundidades elevadas.
- Perfil del filo recto y reforzado: genera virutas cortas y garantiza una gran fiabilidad
- Geometría del filo con afilado específico para proteger el filo y los ángulos
- Geometría del cuerpo con conicidad posterior para facilitar la acción de corte
- Acabado ranuras: lapeadas para reducir el problema del encolado y facilitar la evacuación de las virutas
- Agujeros de refrigeración con geometría modificada para una mayor aportación de refrigerante
- Sustrato y revestimiento específicos para garantizar duración y fiabilidad

4HTA 8xD
- Selbstzentrierender Schliff für präzise Bohrungen
- Geometrie mit „4 Fasen": gerade und präzise Bohrungen, auch bei großen Tiefen.
- Gerades und verstärktes Schneidkantenprofil: zur Erzeugung kurzer Späne und zur Gewährleistung hoher Zuverlässigkeit
- Geometrie der Schneidkante mit speziellem Schliff zum Schutz von Schneidkante und Kanten
- Geometrie des Körpers mit konischem hinteren Bereich zur Erleichterung des Schnittvorgangs
- Schlichtbearbeitung der Nuten: geläppt, um Probleme durch Verkleben zu reduzieren und um die Späneabführung zu erleichtern
- Kühlöffnungen mit abgeänderter Geometrie für einen verbesserten Kühlmittelzufluss
- Spezielles Trägermaterial und spezielle Beschichtung zur Gewährleistung von Standzeit und Zuverlässigkeit

4HTA 8xD
- Самоцентрирующаяся заточка для сверления отверстий высокой точности
- Геометрия с 4 режущими кромками: надежная обработка и высокая точность отверстия, даже, при глубоком сверлении
- Прямые режущие кромки: легкий вывод короткой стружки и высокая эффективность
- Геометрия режущих кромок со специальной заточкой: высокая производительность и защита кромок
- Геометрия с обратным конусом: повышение производительности
- Отполированные стружечные канавки: уменьшают вероятность приваривания стружки и облегчают ее вывод
- Большие отверстия: увеличена эффективность подвода СОЖ
- Специальное покрытие для повышения стойкости инструмента

343TA-318N

general purpose, coated (343TA) and uncoated (318N)

3XD | DIN 6539 | TA | MG PV200 (343TA) | MG BR (318N) | 140° | 30°

343TA

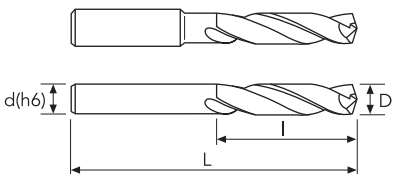
318N

P	M	K	N	S	H	
★	☆	☆	☆			343TA
★	☆	☆	☆			318N

★ 1st choice ☆ suitable

< ø2 mm

≥ ø2 mm



						343TA		318N	
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1.20	0/-0.010	2	8		40	343TA0120	●	P318N0120	●
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2.20	0/-0.010	2.2	13		40	343TA0220	●	P318N0220	●
2.30	0/-0.010	2.3	13		46	343TA0230	●	P318N0230	●
2.40	0/-0.010	2.4	14		46	343TA0240	●	P318N0240	●
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4.70	0/-0.012	4.7	24		58	343TA0470	●	P318N0470	●
4.80	0/-0.012	4.8	26		62	343TA0480	●	P318N0480	●

● stock standard ○ non-standard stock ▽ stock exhaustion

343TA-318N

general purpose, coated (343TA) and uncoated (318N)

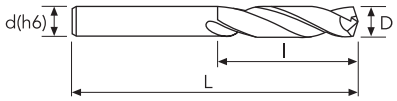
3XD | DIN 6539 | TA | MG PV200 (343TA) | MG BR (318N) | 140° | 30°

343TA

318N

P	M	K	N	S	H	
★	☆	☆	☆			343TA
★	☆	☆	☆			318N

★ 1st choice ☆ suitable



						343TA		318N	
D(h7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
4.90	0/-0.012	4.9	26		62	343TA0490	●	P318N0490	●
5.00	0/-0.012	5	26		62	343TA0500	●	P318N0500	●
5.10	0/-0.012	5.1	26		62	343TA0510	●	P318N0510	●
5.20	0/-0.012	5.2	26		62	343TA0520	●	P318N0520	●
5.30	0/-0.012	5.3	26		66	343TA0530	●	P318N0530	●
5.40	0/-0.012	5.4	28		66	343TA0540	●	P318N0540	●
5.50	0/-0.012	5.5	28		66	343TA0550	●	P318N0550	●
5.60	0/-0.012	5.6	28		66	343TA0560	●	P318N0560	●
5.70	0/-0.012	5.7	28		66	343TA0570	●	P318N0570	●
5.80	0/-0.012	5.8	28		70	343TA0580	●	P318N0580	●
5.90	0/-0.012	5.9	28		70	343TA0590	●	P318N0590	●
6.00	0/-0.012	6	28		70	343TA0600	●	P318N0600	●
6.10	0/-0.015	6.1	31		70	343TA0610	●	P318N0610	●
6.20	0/-0.015	6.2	31		70	343TA0620	●	P318N0620	●
6.30	0/-0.015	6.3	31		70	343TA0630	●	P318N0630	●
6.40	0/-0.015	6.4	31		70	343TA0640	●	P318N0640	●
6.50	0/-0.015	6.5	31		70	343TA0650	●	P318N0650	●
6.60	0/-0.015	6.6	31		70	343TA0660	●	P318N0660	●
6.70	0/-0.015	6.7	31		70	343TA0670	●	P318N0670	●
6.80	0/-0.015	6.8	34		74	343TA0680	●	P318N0680	●
6.90	0/-0.015	6.9	34		74	343TA0690	●	P318N0690	●
7.00	0/-0.015	7	34		74	343TA0700	●	P318N0700	●
7.10	0/-0.015	7.1	34		74	343TA0710	●	P318N0710	●
7.20	0/-0.015	7.2	34		74	343TA0720	●	P318N0720	●
7.30	0/-0.015	7.3	34		79	343TA0730	●	P318N0730	●
7.40	0/-0.015	7.4	34		79	343TA0740	●	P318N0740	●
7.50	0/-0.015	7.5	34		79	343TA0750	●	P318N0750	●
7.60	0/-0.015	7.6	37		79	343TA0760	●	P318N0760	○
7.70	0/-0.015	7.7	37		79	343TA0770	●	P318N0770	○
7.80	0/-0.015	7.8	37		79	343TA0780	●	P318N0780	●
7.90	0/-0.015	7.9	37		79	343TA0790	●	P318N0790	○
8.00	0/-0.015	8	37		79	343TA0800	●	P318N0800	●
8.10	0/-0.015	8.1	37		79	343TA0810	●	P318N0810	●
8.20	0/-0.015	8.2	37		79	343TA0820	●	P318N0820	●
8.30	0/-0.015	8.3	37		84	343TA0830	●	P318N0830	●
8.40	0/-0.015	8.4	37		84	343TA0840	●	P318N0840	○
8.50	0/-0.015	8.5	37		84	343TA0850	●	P318N0850	●
8.60	0/-0.015	8.6	40		84	343TA0860	●	P318N0860	●
8.70	0/-0.015	8.7	40		84	343TA0870	●	P318N0870	●

● stock standard ○ non-standard stock ▽ stock exhaustion

343TA-318N

general purpose, coated (343TA) and uncoated (318N)

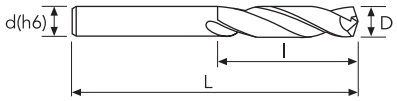
3XD | DIN 6539 | TA | MG PV200 (343TA) | MG BR (318N) | 140° | 30°

343TA

318N

P	M	K	N	S	H	
★	☆	☆	☆			343TA
★	☆	☆	☆			318N

★ 1st choice ☆ suitable



						343TA		318N	
D(h7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
8.80	0/-0.015	8.8	40		84	343TA0880	●	P318N0880	●
8.90	0/-0.015	8.9	40		84	343TA0890	●	P318N0890	○
9.00	0/-0.015	9	40		84	343TA0900	●	P318N0900	●
9.10	0/-0.015	9.1	40		84	343TA0910	●	P318N0910	○
9.20	0/-0.015	9.2	40		84	343TA0920	●	P318N0920	●
9.30	0/-0.015	9.3	40		89	343TA0930	●	P318N0930	●
9.40	0/-0.015	9.4	40		89	343TA0940	●	P318N0940	○
9.50	0/-0.015	9.5	40		89	343TA0950	●	P318N0950	●
9.60	0/-0.015	9.6	43		89	343TA0960	●	P318N0960	○
9.70	0/-0.015	9.7	43		89	343TA0970	●	P318N0970	○
9.80	0/-0.015	9.8	43		89	343TA0980	●	P318N0980	●
9.90	0/-0.015	9.9	43		89	343TA0990	●	P318N0990	○
10.00	0/-0.015	10	43		89	343TA1000	●	P318N1000	●
10.20	0/-0.018	10.2	43		89	343TA1020	●	P318N1020	●
10.50	0/-0.018	10.5	43		95	343TA1050	●	P318N1050	●
11.00	0/-0.018	11	47		95	343TA1100	●	P318N1100	●
11.50	0/-0.018	11.5	47		102	343TA1150	●	P318N1150	●
12.00	0/-0.018	12	51		102	343TA1200	●	P318N1200	●
12.50	0/-0.018	12.5	51		103	343TA1250	●	P318N1250	●
13.00	0/-0.018	13	51		103	343TA1300	●	P318N1300	●
13.50	0/-0.018	13.5	54		107	343TA1350	●		
14.00	0/-0.018	14	54		107	343TA1400	●		
14.50	0/-0.018	14.5	56		111	343TA1450	●		
15.00	0/-0.018	15	56		111	343TA1500	●		
15.50	0/-0.018	15.5	58		115	343TA1550	●		
16.00	0/-0.018	16	58		115	343TA1600	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

343TA

Material Group ISO 513	P1 P2 P3			M1 M2			K1			N1 N2		
Hardness/Rm	< 800 N/mm²			< 750 N/mm²			150-250 HB					
Vc (m/min)	80-100			35-45			80-100			140-180		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1	28660	0.050	1430	12740	0.035	450	28660	0.050	1430	50960	0.065	3310
2	14330	0.070	1000	6370	0.049	310	14330	0.070	1000	25480	0.091	2320
3	9550	0.086	820	4250	0.060	260	9550	0.086	820	16990	0.112	1900
4	7170	0.126	900	3180	0.088	280	7170	0.126	900	12740	0.164	2090
5	5730	0.131	750	2550	0.092	230	5730	0.131	750	10190	0.170	1740
6	4780	0.145	690	2120	0.102	220	4780	0.145	690	8490	0.189	1600
7	4090	0.165	670	1820	0.116	210	4090	0.165	670	7280	0.215	1560
8	3580	0.185	660	1590	0.130	210	3580	0.185	660	6370	0.241	1530
9	3180	0.205	650	1420	0.144	200	3180	0.205	650	5660	0.267	1510
10	2870	0.224	640	1270	0.157	200	2870	0.224	640	5100	0.291	1490
11	2610	0.244	640	1160	0.171	200	2610	0.244	640	4630	0.317	1470
12	2390	0.263	630	1060	0.184	200	2390	0.263	630	4250	0.342	1450
13	2200	0.282	620	980	0.197	190	2200	0.282	620	3920	0.367	1440
14	2050	0.302	620	910	0.211	190	2050	0.302	620	3640	0.393	1430
15	1910	0.315	600	850	0.221	190	1910	0.315	600	3400	0.410	1390
16	1790	0.336	600	800	0.235	190	1790	0.336	600	3180	0.437	1390

318N

Material Group ISO 513	P1 P2 P3			M1 M2			K1			N1 N2		
Hardness/Rm	< 800 N/mm²			< 750 N/mm²			150-250 HB					
Vc (m/min)	60-80			20-30			50-70			100-140		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1	22290	0.035	780	7960	0.025	200	19110	0.032	600	38220	0.046	1740
2	11150	0.050	560	3980	0.035	140	9550	0.045	430	19110	0.065	1240
3	7430	0.065	480	2650	0.046	120	6370	0.059	370	12740	0.085	1080
4	5570	0.080	450	1990	0.056	110	4780	0.072	340	9550	0.104	990
5	4460	0.095	420	1590	0.067	110	3820	0.086	330	7640	0.124	940
6	3720	0.110	410	1330	0.077	100	3180	0.099	310	6370	0.143	910
7	3180	0.125	400	1140	0.088	100	2730	0.113	310	5460	0.163	890
8	2790	0.140	390	1000	0.098	100	2390	0.126	300	4780	0.182	870
9	2480	0.155	380	880	0.109	100	2120	0.140	300	4250	0.202	860
10	2230	0.170	380	800	0.119	100	1910	0.153	290	3820	0.221	840
11	2030	0.185	380	720	0.130	90	1740	0.167	290	3470	0.241	830
12	1860	0.200	370	660	0.140	90	1590	0.180	290	3180	0.260	830
13	1710	0.215	370	610	0.151	90	1470	0.194	280	2940	0.280	820

353TA-353HTA

general purpose, TA and HTA (through coolant)

3XD | DIN 6537K | TA | HTA | MG PV200 | 140° | 30°

353TA 353HTA

353TA

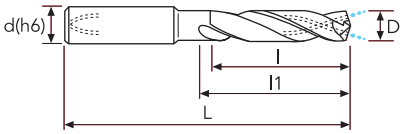
353HTA

P	M	K	N	S	H	
★	☆	☆		☆		353TA
★	☆	☆	☆	☆		353HTA

★ 1st choice ☆ suitable

353TA

353HTA



						353TA		353HTA	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
3.00	+0.012/+0.002	6	14	20	62	353TA0300	●	353HTA0300	●
3.10	+0.016/+0.004	6	14	20	62	353TA0310	●	353HTA0310	●
3.20	+0.016/+0.004	6	14	20	62	353TA0320	●	353HTA0320	●
3.30	+0.016/+0.004	6	14	20	62	353TA0330	●	353HTA0330	●
3.40	+0.016/+0.004	6	14	20	62	353TA0340	●	353HTA0340	●
3.50	+0.016/+0.004	6	14	20	62	353TA0350	●	353HTA0350	●
3.60	+0.016/+0.004	6	14	20	62	353TA0360	●	353HTA0360	●
3.70	+0.016/+0.004	6	14	20	62	353TA0370	●	353HTA0370	●
3.80	+0.016/+0.004	6	17	24	66	353TA0380	●	353HTA0380	●
3.90	+0.016/+0.004	6	17	24	66	353TA0390	●	353HTA0390	●
4.00	+0.016/+0.004	6	17	24	66	353TA0400	●	353HTA0400	●
4.10	+0.016/+0.004	6	17	24	66	353TA0410	●	353HTA0410	●
4.20	+0.016/+0.004	6	17	24	66	353TA0420	●	353HTA0420	●
4.30	+0.016/+0.004	6	17	24	66	353TA0430	●	353HTA0430	●
4.40	+0.016/+0.004	6	17	24	66	353TA0440	●	353HTA0440	●
4.50	+0.016/+0.004	6	17	24	66	353TA0450	●	353HTA0450	●
4.60	+0.016/+0.004	6	17	24	66	353TA0460	●	353HTA0460	●
4.70	+0.016/+0.004	6	17	24	66	353TA0470	●	353HTA0470	●
4.80	+0.016/+0.004	6	20	28	66	353TA0480	●	353HTA0480	●
4.90	+0.016/+0.004	6	20	28	66	353TA0490	●	353HTA0490	●
5.00	+0.016/+0.004	6	20	28	66	353TA0500	●	353HTA0500	●
5.10	+0.016/+0.004	6	20	28	66	353TA0510	●	353HTA0510	●
5.20	+0.016/+0.004	6	20	28	66	353TA0520	●	353HTA0520	●
5.30	+0.016/+0.004	6	20	28	66	353TA0530	●	353HTA0530	●
5.40	+0.016/+0.004	6	20	28	66	353TA0540	●	353HTA0540	●
5.50	+0.016/+0.004	6	20	28	66	353TA0550	●	353HTA0550	●
5.60	+0.016/+0.004	6	20	28	66	353TA0560	●	353HTA0560	●
5.70	+0.016/+0.004	6	20	28	66	353TA0570	●	353HTA0570	●
5.80	+0.016/+0.004	6	20	28	66	353TA0580	●	353HTA0580	●
5.90	+0.016/+0.004	6	20	28	66	353TA0590	●	353HTA0590	●
6.00	+0.016/+0.004	6	20	28	66	353TA0600	●	353HTA0600	●
6.10	+0.021/+0.006	8	24	34	79	353TA0610	●	353HTA0610	●
6.20	+0.021/+0.006	8	24	34	79	353TA0620	●	353HTA0620	●
6.30	+0.021/+0.006	8	24	34	79	353TA0630	●	353HTA0630	●
6.40	+0.021/+0.006	8	24	34	79	353TA0640	●	353HTA0640	●
6.50	+0.021/+0.006	8	24	34	79	353TA0650	●	353HTA0650	●
6.60	+0.021/+0.006	8	24	34	79	353TA0660	●	353HTA0660	●
6.70	+0.021/+0.006	8	24	34	79	353TA0670	●	353HTA0670	●
6.80	+0.021/+0.006	8	24	34	79	353TA0680	●	353HTA0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353TA-353HTA

general purpose, TA and HTA (through coolant)

3XD | DIN 6537K | TA | HTA | MG PV200 | 140° | 30°

353TA 353HTA

353TA

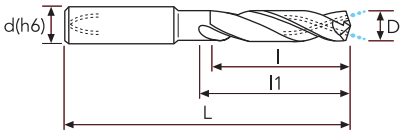
353HTA

P	M	K	N	S	H	
★	☆	☆		☆		353TA
★	☆	☆	☆	☆		353HTA

★ 1st choice ☆ suitable

353TA

353HTA



						353TA		353HTA	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
6.90	+0.021/+0.006	8	24	34	79	353TA0690	●	353HTA0690	●
7.00	+0.021/+0.006	8	24	34	79	353TA0700	●	353HTA0700	●
7.10	+0.021/+0.006	8	29	41	79	353TA0710	●	353HTA0710	●
7.20	+0.021/+0.006	8	29	41	79	353TA0720	●	353HTA0720	●
7.30	+0.021/+0.006	8	29	41	79	353TA0730	●	353HTA0730	●
7.40	+0.021/+0.006	8	29	41	79	353TA0740	●	353HTA0740	●
7.50	+0.021/+0.006	8	29	41	79	353TA0750	●	353HTA0750	●
7.60	+0.021/+0.006	8	29	41	79	353TA0760	●	353HTA0760	●
7.70	+0.021/+0.006	8	29	41	79	353TA0770	●	353HTA0770	●
7.80	+0.021/+0.006	8	29	41	79	353TA0780	●	353HTA0780	●
7.90	+0.021/+0.006	8	29	41	79	353TA0790	●	353HTA0790	●
8.00	+0.021/+0.006	8	29	41	79	353TA0800	●	353HTA0800	●
8.10	+0.021/+0.006	10	35	47	89	353TA0810	●	353HTA0810	●
8.20	+0.021/+0.006	10	35	47	89	353TA0820	●	353HTA0820	●
8.30	+0.021/+0.006	10	35	47	89	353TA0830	●	353HTA0830	●
8.40	+0.021/+0.006	10	35	47	89	353TA0840	●	353HTA0840	●
8.50	+0.021/+0.006	10	35	47	89	353TA0850	●	353HTA0850	●
8.60	+0.021/+0.006	10	35	47	89	353TA0860	●	353HTA0860	●
8.70	+0.021/+0.006	10	35	47	89	353TA0870	●	353HTA0870	●
8.80	+0.021/+0.006	10	35	47	89	353TA0880	●	353HTA0880	●
8.90	+0.021/+0.006	10	35	47	89	353TA0890	●	353HTA0890	●
9.00	+0.021/+0.006	10	35	47	89	353TA0900	●	353HTA0900	●
9.10	+0.021/+0.006	10	35	47	89	353TA0910	●	353HTA0910	●
9.20	+0.021/+0.006	10	35	47	89	353TA0920	●	353HTA0920	●
9.30	+0.021/+0.006	10	35	47	89	353TA0930	●	353HTA0930	●
9.40	+0.021/+0.006	10	35	47	89	353TA0940	●	353HTA0940	●
9.50	+0.021/+0.006	10	35	47	89	353TA0950	●	353HTA0950	●
9.60	+0.021/+0.006	10	35	47	89	353TA0960	●	353HTA0960	●
9.70	+0.021/+0.006	10	35	47	89	353TA0970	●	353HTA0970	●
9.80	+0.021/+0.006	10	35	47	89	353TA0980	●	353HTA0980	●
9.90	+0.021/+0.006	10	35	47	89	353TA0990	●	353HTA0990	●
10.00	+0.021/+0.006	10	35	47	89	353TA1000	●	353HTA1000	●
10.10	+0.025/+0.007	12	40	55	102	353TA1010	●		
10.20	+0.025/+0.007	12	40	55	102	353TA1020	●	353HTA1020	●
10.30	+0.025/+0.007	12	40	55	102	353TA1030	●		
10.40	+0.025/+0.007	12	40	55	102	353TA1040	●	353HTA1040	●
10.50	+0.025/+0.007	12	40	55	102	353TA1050	●	353HTA1050	●
10.60	+0.025/+0.007	12	40	55	102	353TA1060	●	353HTA1060	●
10.70	+0.025/+0.007	12	40	55	102	353TA1070	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

353TA-353HTA

general purpose, TA and HTA (through coolant)

3XD | DIN 6537K | TA | HTA | MG PV200 | 140° | 30°

353TA 353HTA

353TA

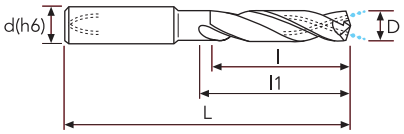
353HTA

P	M	K	N	S	H	
★	☆	☆		☆		353TA
★	☆	☆	☆	☆		353HTA

★ 1st choice ☆ suitable

353TA

353HTA



						353TA		353HTA	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
10.80	+0.025/+0.007	12	40	55	102	353TA1080	●	353HTA1080	●
10.90	+0.025/+0.007	12	40	55	102	353TA1090	○	353HTA1090	○
11.00	+0.025/+0.007	12	40	55	102	353TA1100	●	353HTA1100	●
11.10	+0.025/+0.007	12	40	55	102	353TA1110	○		
11.20	+0.025/+0.007	12	40	55	102	353TA1120	●	353HTA1120	●
11.30	+0.025/+0.007	12	40	55	102	353TA1130	●	353HTA1130	●
11.40	+0.025/+0.007	12	40	55	102	353TA1140	○		
11.50	+0.025/+0.007	12	40	55	102	353TA1150	●	353HTA1150	●
11.60	+0.025/+0.007	12	40	55	102	353TA1160	○		
11.70	+0.025/+0.007	12	40	55	102	353TA1170	○		
11.80	+0.025/+0.007	12	40	55	102	353TA1180	●	353HTA1180	●
11.90	+0.025/+0.007	12	40	55	102	353TA1190	○		
12.00	+0.025/+0.007	12	40	55	102	353TA1200	●	353HTA1200	●
12.20	+0.025/+0.007	14	43	60	107	353TA1220	●	353HTA1220	●
12.50	+0.025/+0.007	14	43	60	107	353TA1250	●	353HTA1250	●
12.80	+0.025/+0.007	14	43	60	107	353TA1280	●	353HTA1280	●
13.00	+0.025/+0.007	14	43	60	107	353TA1300	●	353HTA1300	●
13.30	+0.025/+0.007	14	43	60	107			353HTA1330	●
13.50	+0.025/+0.007	14	43	60	107	353TA1350	●	353HTA1350	●
13.80	+0.025/+0.007	14	43	60	107			353HTA1380	●
14.00	+0.025/+0.007	14	43	60	107	353TA1400	●	353HTA1400	●
14.50	+0.025/+0.007	16	45	65	115	353TA1450	●	353HTA1450	●
15.00	+0.025/+0.007	16	65	65	115	353TA1500	●	353HTA1500	●
15.30	+0.025/+0.007	16	65	65	115			353HTA1530	●
15.50	+0.025/+0.007	16	65	65	115	353TA1550	●	353HTA1550	●
15.80	+0.025/+0.007	16	65	65	115			353HTA1580	●
16.00	+0.025/+0.007	16	65	65	115	353TA1600	●	353HTA1600	●
16.50	+0.025/+0.007	18	73	73	123	353TA1650	●	353HTA1650	●
17.00	+0.025/+0.007	18	73	73	123	353TA1700	●	353HTA1700	●
17.50	+0.025/+0.007	18	73	73	123	353TA1750	●	353HTA1750	●
18.00	+0.025/+0.007	18	73	73	123	353TA1800	●	353HTA1800	●
18.50	+0.029/+0.008	20	79	79	131	353TA1850	●	353HTA1850	●
19.00	+0.029/+0.008	20	79	79	131	353TA1900	●	353HTA1900	●
19.50	+0.029/+0.008	20	79	79	131	353TA1950	●	353HTA1950	●
20.00	+0.029/+0.008	20	79	79	131	353TA2000	●	353HTA2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

353TA

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	90-110			80-100			50-70			30-50		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	10620	0.100	1060	9550	0.085	810	6370	0.075	480	4250	0.060	260
	4	7960	0.110	880	7170	0.094	670	4780	0.083	390	3180	0.066	210
	5	6370	0.120	760	5730	0.102	580	3820	0.090	340	2550	0.072	180
	6	5310	0.135	720	4780	0.115	550	3180	0.101	320	2120	0.081	170
	7	4550	0.150	680	4090	0.128	520	2730	0.113	310	1820	0.090	160
	8	3980	0.165	660	3580	0.140	500	2390	0.124	300	1590	0.099	160
	9	3540	0.180	640	3180	0.153	490	2120	0.135	290	1420	0.108	150
	10	3180	0.195	620	2870	0.166	480	1910	0.146	280	1270	0.117	150
	11	2900	0.210	610	2610	0.179	470	1740	0.158	270	1160	0.126	150
	12	2650	0.230	610	2390	0.196	470	1590	0.173	270	1060	0.138	150
	13	2450	0.250	610	2200	0.213	470	1470	0.188	280	980	0.150	150
	14	2270	0.270	610	2050	0.230	470	1360	0.203	280	910	0.162	150
	15	2120	0.290	610	1910	0.247	470	1270	0.218	280	850	0.174	150
	16	1990	0.310	620	1790	0.264	470	1190	0.233	280	800	0.186	150
	17	1870	0.330	620	1690	0.281	470	1120	0.248	280	750	0.198	150
	18	1770	0.350	620	1590	0.298	470	1060	0.263	280	710	0.210	150
	19	1680	0.370	620	1510	0.315	470	1010	0.278	280	670	0.222	150
	20	1590	0.390	620	1430	0.332	470	960	0.293	280	640	0.234	150

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	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	100-140			80-120			70-90			50-70		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	12740	0.110	1400	10620	0.099	1050	8490	0.088	750	6370	0.077	490
	4	9550	0.130	1240	7960	0.117	930	6370	0.104	660	4780	0.091	430
	5	7640	0.150	1150	6370	0.135	860	5100	0.120	610	3820	0.105	400
	6	6370	0.170	1080	5310	0.153	810	4250	0.136	580	3180	0.119	380
	7	5460	0.190	1040	4550	0.171	780	3640	0.152	550	2730	0.133	360
	8	4780	0.210	1000	3980	0.189	750	3180	0.168	530	2390	0.147	350
	9	4250	0.230	980	3540	0.207	730	2830	0.184	520	2120	0.161	340
	10	3820	0.250	960	3180	0.225	720	2550	0.200	510	1910	0.175	330
	11	3470	0.260	900	2900	0.234	680	2320	0.208	480	1740	0.182	320
	12	3180	0.280	890	2650	0.252	670	2120	0.224	470	1590	0.196	310
	13	2940	0.300	880	2450	0.270	660	1960	0.240	470	1470	0.210	310
	14	2730	0.320	870	2270	0.288	650	1820	0.256	470	1360	0.224	300
	15	2550	0.340	870	2120	0.306	650	1700	0.272	460	1270	0.238	300
	16	2390	0.360	860	1990	0.324	640	1590	0.288	460	1190	0.252	300
	17	2250	0.370	830	1870	0.333	620	1500	0.296	440	1120	0.259	290
	18	2120	0.380	810	1770	0.342	610	1420	0.304	430	1060	0.266	280
	19	2010	0.390	780	1680	0.351	590	1340	0.312	420	1010	0.273	280
	20	1910	0.400	760	1590	0.360	570	1270	0.320	410	960	0.280	270

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Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	35-55			25-45			20-30			15-25		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	4780	0.070	330	3720	0.060	220	2650	0.053	140	2120	0.042	90
4	3580	0.077	280	2790	0.065	180	1990	0.058	110	1590	0.046	70
5	2870	0.084	240	2230	0.071	160	1590	0.063	100	1270	0.050	60
6	2390	0.095	230	1860	0.080	150	1330	0.071	90	1060	0.057	60
7	2050	0.105	220	1590	0.089	140	1140	0.079	90	910	0.063	60
8	1790	0.116	210	1390	0.098	140	1000	0.087	90	800	0.069	60
9	1590	0.126	200	1240	0.107	130	880	0.095	80	710	0.076	50
10	1430	0.137	200	1110	0.116	130	800	0.102	80	640	0.082	50
11	1300	0.147	190	1010	0.125	130	720	0.110	80	580	0.088	50
12	1190	0.161	190	930	0.137	130	660	0.121	80	530	0.097	50
13	1100	0.175	190	860	0.149	130	610	0.131	80	490	0.105	50
14	1020	0.189	190	800	0.161	130	570	0.142	80	450	0.113	50
15	960	0.203	190	740	0.173	130	530	0.152	80	420	0.122	50
16	900	0.217	200	700	0.184	130	500	0.163	80	400	0.130	50
17	840	0.231	190	660	0.196	130	470	0.173	80	370	0.139	50
18	800	0.245	200	620	0.208	130	440	0.184	80	350	0.147	50
19	750	0.259	190	590	0.220	130	420	0.194	80	340	0.155	50
20	720	0.273	200	560	0.232	130	400	0.205	80	320	0.164	50

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Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	40-60			30-50			25-35			15-25		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	5310	0.070	370	4250	0.056	240	3180	0.049	160	2120	0.042	90
4	3980	0.090	360	3180	0.072	230	2390	0.063	150	1590	0.054	90
5	3180	0.100	320	2550	0.080	200	1910	0.070	130	1270	0.060	80
6	2650	0.110	290	2120	0.088	190	1590	0.077	120	1060	0.066	70
7	2270	0.130	300	1820	0.104	190	1360	0.091	120	910	0.078	70
8	1990	0.150	300	1590	0.120	190	1190	0.105	120	800	0.090	70
9	1770	0.160	280	1420	0.128	180	1060	0.112	120	710	0.096	70
10	1590	0.175	280	1270	0.140	180	960	0.123	120	640	0.105	70
11	1450	0.180	260	1160	0.144	170	870	0.126	110	580	0.108	60
12	1330	0.200	270	1060	0.160	170	800	0.140	110	530	0.120	60
13	1220	0.215	260	980	0.172	170	730	0.151	110	490	0.129	60
14	1140	0.230	260	910	0.184	170	680	0.161	110	450	0.138	60
15	1060	0.245	260	850	0.196	170	640	0.172	110	420	0.147	60
16	1000	0.260	260	800	0.208	170	600	0.182	110	400	0.156	60
17	940	0.270	250	750	0.216	160	560	0.189	110	370	0.162	60
18	880	0.285	250	710	0.228	160	530	0.200	110	350	0.171	60
19	840	0.300	250	670	0.240	160	500	0.210	110	340	0.180	60
20	800	0.310	250	640	0.248	160	480	0.217	100	320	0.186	60

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Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**90-110**			**80-100**			**50-70**			**30-50**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	10620	0.100	1060	9550	0.085	810	6370	0.075	480	4250	0.060	260
4	7960	0.110	880	7170	0.094	670	4780	0.083	390	3180	0.066	210
5	6370	0.120	760	5730	0.102	580	3820	0.090	340	2550	0.072	180
6	5310	0.135	720	4780	0.115	550	3180	0.101	320	2120	0.081	170
7	4550	0.150	680	4090	0.128	520	2730	0.113	310	1820	0.090	160
8	3980	0.165	660	3580	0.140	500	2390	0.124	300	1590	0.099	160
9	3540	0.180	640	3180	0.153	490	2120	0.135	290	1420	0.108	150
10	3180	0.195	620	2870	0.166	480	1910	0.146	280	1270	0.117	150
11	2900	0.210	610	2610	0.179	470	1740	0.158	270	1160	0.126	150
12	2650	0.230	610	2390	0.196	470	1590	0.173	270	1060	0.138	150
13	2450	0.250	610	2200	0.213	470	1470	0.188	280	980	0.150	150
14	2270	0.270	610	2050	0.230	470	1360	0.203	280	910	0.162	150
15	2120	0.290	610	1910	0.247	470	1270	0.218	280	850	0.174	150
16	1990	0.310	620	1790	0.264	470	1190	0.233	280	800	0.186	150
17	1870	0.330	620	1690	0.281	470	1120	0.248	280	750	0.198	150
18	1770	0.350	620	1590	0.298	470	1060	0.263	280	710	0.210	150
19	1680	0.370	620	1510	0.315	470	1010	0.278	280	670	0.222	150
20	1590	0.390	620	1430	0.332	470	960	0.293	280	640	0.234	150

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Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**100-120**			**80-100**			**60-80**			**50-70**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	11680	0.110	1280	9550	0.099	950	7430	0.088	650	6370	0.077	490
4	8760	0.130	1140	7170	0.117	840	5570	0.104	580	4780	0.091	430
5	7010	0.150	1050	5730	0.135	770	4460	0.120	540	3820	0.105	400
6	5840	0.170	990	4780	0.153	730	3720	0.136	510	3180	0.119	380
7	5000	0.190	950	4090	0.171	700	3180	0.152	480	2730	0.133	360
8	4380	0.210	920	3580	0.189	680	2790	0.168	470	2390	0.147	350
9	3890	0.230	890	3180	0.207	660	2480	0.184	460	2120	0.161	340
10	3500	0.250	880	2870	0.225	650	2230	0.200	450	1910	0.175	330
11	3180	0.260	830	2610	0.234	610	2030	0.208	420	1740	0.182	320
12	2920	0.280	820	2390	0.252	600	1860	0.224	420	1590	0.196	310
13	2690	0.300	810	2200	0.270	590	1710	0.240	410	1470	0.210	310
14	2500	0.320	800	2050	0.288	590	1590	0.256	410	1360	0.224	300
15	2340	0.340	800	1910	0.306	580	1490	0.272	410	1270	0.238	300
16	2190	0.360	790	1790	0.324	580	1390	0.288	400	1190	0.252	300
17	2060	0.370	760	1690	0.333	560	1310	0.296	390	1120	0.259	290
18	1950	0.380	740	1590	0.342	540	1240	0.304	380	1060	0.266	280
19	1840	0.390	720	1510	0.351	530	1170	0.312	370	1010	0.273	280
20	1750	0.400	700	1430	0.360	510	1110	0.320	360	960	0.280	270

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Material Group ISO 513	N1 > 5% Si			N2			N4					
Hardness/Rm												
Vc (m/min)	180-220			160-200			160-180					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
3	21230	0.132	2800	19110	0.119	2270	18050	0.119	2140			
4	15920	0.156	2480	14330	0.140	2010	13540	0.140	1900			
5	12740	0.180	2290	11460	0.162	1860	10830	0.162	1750			
6	10620	0.204	2170	9550	0.184	1750	9020	0.184	1660			
7	9100	0.228	2070	8190	0.205	1680	7730	0.205	1590			
8	7960	0.252	2010	7170	0.227	1630	6770	0.227	1540			
9	7080	0.276	1950	6370	0.248	1580	6020	0.248	1500			
10	6370	0.300	1910	5730	0.270	1550	5410	0.270	1460			
11	5790	0.312	1810	5210	0.281	1460	4920	0.281	1380			
12	5310	0.336	1780	4780	0.302	1450	4510	0.302	1360			
13	4900	0.360	1760	4410	0.324	1430	4160	0.324	1350			
14	4550	0.384	1750	4090	0.346	1410	3870	0.346	1340			
15	4250	0.408	1730	3820	0.367	1400	3610	0.367	1330			
16	3980	0.432	1720	3580	0.389	1390	3380	0.389	1310			
17	3750	0.444	1670	3370	0.400	1350	3180	0.400	1270			
18	3540	0.456	1610	3180	0.410	1310	3010	0.410	1240			
19	3350	0.468	1570	3020	0.421	1270	2850	0.421	1200			
20	3180	0.480	1530	2870	0.432	1240	2710	0.432	1170			

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Material Group ISO 513	S1 S2			S3			S4			S5		
Hardness/Rm	< 35 HRC			35-45 HRC								
Vc (m/min)	25-35			15-25			30-40			20-30		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	3180	0.045	140	2120	0.032	70	3720	0.043	160	2650	0.036	100
4	2390	0.050	120	1590	0.035	60	2790	0.047	130	1990	0.040	80
5	1910	0.054	100	1270	0.038	50	2230	0.051	110	1590	0.043	70
6	1590	0.061	100	1060	0.043	50	1860	0.058	110	1330	0.049	60
7	1360	0.068	90	910	0.047	40	1590	0.064	100	1140	0.054	60
8	1190	0.074	90	800	0.052	40	1390	0.071	100	1000	0.059	60
9	1060	0.081	90	710	0.057	40	1240	0.077	100	880	0.065	60
10	960	0.088	80	640	0.061	40	1110	0.083	90	800	0.070	60
11	870	0.095	80	580	0.066	40	1010	0.090	90	720	0.076	50
12	800	0.104	80	530	0.072	40	930	0.098	90	660	0.083	50
13	730	0.113	80	490	0.079	40	860	0.107	90	610	0.090	50
14	680	0.122	80	450	0.085	40	800	0.115	90	570	0.097	60
15	640	0.131	80	420	0.091	40	740	0.124	90	530	0.104	60
16	600	0.140	80	400	0.098	40	700	0.133	90	500	0.112	60
17	560	0.149	80	370	0.104	40	660	0.141	90	470	0.119	60
18	530	0.158	80	350	0.110	40	620	0.150	90	440	0.126	60
19	500	0.167	80	340	0.117	40	590	0.158	90	420	0.133	60
20	480	0.176	80	320	0.123	40	560	0.167	90	400	0.140	60

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Material Group ISO 513	S1 S2			S3			S4			S5		
Hardness/Rm	< 35 HRC			35-45 HRC								
Vc (m/min)	30-40			20-30			40-60			30-40		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	3720	0.046	170	2650	0.032	90	5310	0.044	230	3720	0.037	140
4	2790	0.055	150	1990	0.039	80	3980	0.052	210	2790	0.044	120
5	2230	0.063	140	1590	0.044	70	3180	0.060	190	2230	0.050	110
6	1860	0.073	140	1330	0.051	70	2650	0.069	180	1860	0.058	110
7	1590	0.080	130	1140	0.056	60	2270	0.076	170	1590	0.064	100
8	1390	0.090	130	1000	0.063	60	1990	0.086	170	1390	0.072	100
9	1240	0.100	120	880	0.070	60	1770	0.095	170	1240	0.080	100
10	1110	0.110	120	800	0.077	60	1590	0.105	170	1110	0.088	100
11	1010	0.120	120	720	0.084	60	1450	0.114	170	1010	0.096	100
12	930	0.130	120	660	0.091	60	1330	0.124	160	930	0.104	100
13	860	0.137	120	610	0.096	60	1220	0.130	160	860	0.110	90
14	800	0.145	120	570	0.102	60	1140	0.138	160	800	0.116	90
15	740	0.153	110	530	0.107	60	1060	0.145	150	740	0.122	90
16	700	0.160	110	500	0.112	60	1000	0.152	150	700	0.128	90
17	660	0.170	110	470	0.119	60	940	0.162	150	660	0.136	90
18	620	0.180	110	440	0.126	60	880	0.171	150	620	0.144	90
19	590	0.190	110	420	0.133	60	840	0.181	150	590	0.152	90
20	560	0.200	110	400	0.140	60	800	0.190	150	560	0.160	90

355TA-355HTA

general purpose, TA and HTA (through coolant)

5XD | DIN 6537L | TA | HTA | MG PV200 | 140° | 30°

355TA 355HTA

355TA

355HTA

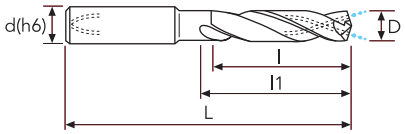
P	M	K	N	S	H
★	☆	☆		☆	
★	☆	☆	☆	☆	

355TA
355HTA

★ 1st choice ☆ suitable

355TA

355HTA



						355TA		355HTA	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
3.00	+0.012/+0.002	6	23	28	66	355TA0300	●	355HTA0300	●
3.10	+0.016/+0.004	6	23	28	66	355TA0310	●	355HTA0310	●
3.20	+0.016/+0.004	6	23	28	66	355TA0320	●	355HTA0320	●
3.30	+0.016/+0.004	6	23	28	66	355TA0330	●	355HTA0330	●
3.40	+0.016/+0.004	6	23	28	66	355TA0340	●	355HTA0340	●
3.50	+0.016/+0.004	6	23	28	66	355TA0350	●	355HTA0350	●
3.60	+0.016/+0.004	6	23	28	66	355TA0360	●	355HTA0360	●
3.70	+0.016/+0.004	6	23	28	66	355TA0370	●	355HTA0370	●
3.80	+0.016/+0.004	6	29	36	74	355TA0380	●	355HTA0380	●
3.90	+0.016/+0.004	6	29	36	74	355TA0390	●	355HTA0390	●
4.00	+0.016/+0.004	6	29	36	74	355TA0400	●	355HTA0400	●
4.10	+0.016/+0.004	6	29	36	74	355TA0410	●	355HTA0410	●
4.20	+0.016/+0.004	6	29	36	74	355TA0420	●	355HTA0420	●
4.30	+0.016/+0.004	6	29	36	74	355TA0430	●	355HTA0430	●
4.40	+0.016/+0.004	6	29	36	74	355TA0440	●	355HTA0440	●
4.50	+0.016/+0.004	6	29	36	74	355TA0450	●	355HTA0450	●
4.60	+0.016/+0.004	6	29	36	74	355TA0460	●	355HTA0460	●
4.70	+0.016/+0.004	6	29	36	74	355TA0470	●	355HTA0470	●
4.80	+0.016/+0.004	6	35	44	82	355TA0480	●	355HTA0480	●
4.90	+0.016/+0.004	6	35	44	82	355TA0490	●	355HTA0490	●
5.00	+0.016/+0.004	6	35	44	82	355TA0500	●	355HTA0500	●
5.10	+0.016/+0.004	6	35	44	82	355TA0510	●	355HTA0510	●
5.20	+0.016/+0.004	6	35	44	82	355TA0520	●	355HTA0520	●
5.30	+0.016/+0.004	6	35	44	82	355TA0530	●	355HTA0530	●
5.40	+0.016/+0.004	6	35	44	82	355TA0540	●	355HTA0540	●
5.50	+0.016/+0.004	6	35	44	82	355TA0550	●	355HTA0550	●
5.60	+0.016/+0.004	6	35	44	82	355TA0560	●	355HTA0560	●
5.70	+0.016/+0.004	6	35	44	82	355TA0570	●	355HTA0570	●
5.80	+0.016/+0.004	6	35	44	82	355TA0580	●	355HTA0580	●
5.90	+0.016/+0.004	6	35	44	82	355TA0590	●	355HTA0590	●
6.00	+0.016/+0.004	6	35	44	82	355TA0600	●	355HTA0600	●
6.10	+0.021/+0.006	8	43	53	91	355TA0610	●	355HTA0610	●
6.20	+0.021/+0.006	8	43	53	91	355TA0620	●	355HTA0620	●
6.30	+0.021/+0.006	8	43	53	91	355TA0630	●	355HTA0630	●
6.40	+0.021/+0.006	8	43	53	91	355TA0640	●	355HTA0640	●
6.50	+0.021/+0.006	8	43	53	91	355TA0650	●	355HTA0650	●
6.60	+0.021/+0.006	8	43	53	91	355TA0660	●	355HTA0660	●
6.70	+0.021/+0.006	8	43	53	91	355TA0670	●	355HTA0670	●
6.80	+0.021/+0.006	8	43	53	91	355TA0680	●	355HTA0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355TA-355HTA

general purpose, TA and HTA (through coolant)

5XD | DIN 6537L | TA | HTA | MG PV200 | 140° | 30°

355TA 355HTA

355TA

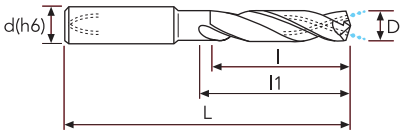
355HTA

P	M	K	N	S	H	
★	☆	☆		☆		355TA
★	☆	☆	☆	☆		355HTA

★ 1st choice ☆ suitable

355TA

355HTA



						355TA		355HTA	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
6.90	+0.021/+0.006	8	43	53	91	355TA0690	●	355HTA0690	●
7.00	+0.021/+0.006	8	43	53	91	355TA0700	●	355HTA0700	●
7.10	+0.021/+0.006	8	43	53	91	355TA0710	●	355HTA0710	●
7.20	+0.021/+0.006	8	43	53	91	355TA0720	●	355HTA0720	●
7.30	+0.021/+0.006	8	43	53	91	355TA0730	●	355HTA0730	●
7.40	+0.021/+0.006	8	43	53	91	355TA0740	●	355HTA0740	●
7.50	+0.021/+0.006	8	43	53	91	355TA0750	●	355HTA0750	●
7.60	+0.021/+0.006	8	43	53	91	355TA0760	●	355HTA0760	●
7.70	+0.021/+0.006	8	43	53	91	355TA0770	●	355HTA0770	●
7.80	+0.021/+0.006	8	43	53	91	355TA0780	●	355HTA0780	●
7.90	+0.021/+0.006	8	43	53	91	355TA0790	●	355HTA0790	●
8.00	+0.021/+0.006	8	43	53	91	355TA0800	●	355HTA0800	●
8.10	+0.021/+0.006	10	49	61	103	355TA0810	●	355HTA0810	●
8.20	+0.021/+0.006	10	49	61	103	355TA0820	●	355HTA0820	●
8.30	+0.021/+0.006	10	49	61	103	355TA0830	●	355HTA0830	●
8.40	+0.021/+0.006	10	49	61	103	355TA0840	●	355HTA0840	●
8.50	+0.021/+0.006	10	49	61	103	355TA0850	●	355HTA0850	●
8.60	+0.021/+0.006	10	49	61	103	355TA0860	●	355HTA0860	●
8.70	+0.021/+0.006	10	49	61	103	355TA0870	●	355HTA0870	●
8.80	+0.021/+0.006	10	49	61	103	355TA0880	●	355HTA0880	●
8.90	+0.021/+0.006	10	49	61	103	355TA0890	●	355HTA0890	●
9.00	+0.021/+0.006	10	49	61	103	355TA0900	●	355HTA0900	●
9.10	+0.021/+0.006	10	49	61	103	355TA0910	●	355HTA0910	●
9.20	+0.021/+0.006	10	49	61	103	355TA0920	●	355HTA0920	●
9.30	+0.021/+0.006	10	49	61	103	355TA0930	●	355HTA0930	●
9.40	+0.021/+0.006	10	49	61	103	355TA0940	●	355HTA0940	●
9.50	+0.021/+0.006	10	61	61	103	355TA0950	●	355HTA0950	●
9.60	+0.021/+0.006	10	61	61	103	355TA0960	●	355HTA0960	●
9.70	+0.021/+0.006	10	61	61	103	355TA0970	●	355HTA0970	●
9.80	+0.021/+0.006	10	61	61	103	355TA0980	●	355HTA0980	●
9.90	+0.021/+0.006	10	61	61	103	355TA0990	●	355HTA0990	●
10.00	+0.021/+0.006	10	61	61	103	355TA1000	●	355HTA1000	●
10.10	+0.025/+0.007	12	71	71	118	355TA1010	●		
10.20	+0.025/+0.007	12	71	71	118	355TA1020	●	355HTA1020	●
10.30	+0.025/+0.007	12	71	71	118	355TA1030	●		
10.40	+0.025/+0.007	12	71	71	118	355TA1040	○		
10.50	+0.025/+0.007	12	71	71	118	355TA1050	●	355HTA1050	●
10.60	+0.025/+0.007	12	71	71	118	355TA1060	●		
10.70	+0.025/+0.007	12	71	71	118	355TA1070	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

355TA-355HTA

general purpose, TA and HTA (through coolant)

5XD | DIN 6537L | TA | HTA | MG PV200 | 140° | 30°

355TA 355HTA

355TA

355HTA

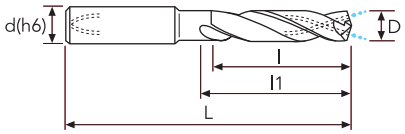
P	M	K	N	S	H
★	☆	☆		☆	
★	☆	☆	☆	☆	

355TA
355HTA

★ 1st choice ☆ suitable

355TA

355HTA



						355TA		355HTA	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
10.80	+0.025/+0.007	12	71	71	118	355TA1080	●	355HTA1080	●
10.90	+0.025/+0.007	12	71	71	118	355TA1090	○	355HTA1090	○
11.00	+0.025/+0.007	12	71	71	118	355TA1100	●	355HTA1100	●
11.10	+0.025/+0.007	12	71	71	118	355TA1110	○		
11.20	+0.025/+0.007	12	71	71	118	355TA1120	●	355HTA1120	●
11.30	+0.025/+0.007	12	71	71	118	355TA1130	●	355HTA1130	●
11.40	+0.025/+0.007	12	71	71	118	355TA1140	●		
11.50	+0.025/+0.007	12	71	71	118	355TA1150	●	355HTA1150	●
11.60	+0.025/+0.007	12	71	71	118	355TA1160	○		
11.70	+0.025/+0.007	12	71	71	118	355TA1170	●		
11.80	+0.025/+0.007	12	71	71	118	355TA1180	●	355HTA1180	●
11.90	+0.025/+0.007	12	71	71	118	355TA1190	○		
12.00	+0.025/+0.007	12	71	71	118	355TA1200	●	355HTA1200	●
12.20	+0.025/+0.007	14	77	77	124	355TA1220	●	355HTA1220	●
12.50	+0.025/+0.007	14	77	77	124	355TA1250	●	355HTA1250	●
12.80	+0.025/+0.007	14	77	77	124			355HTA1280	●
13.00	+0.025/+0.007	14	77	77	124	355TA1300	●	355HTA1300	●
13.30	+0.025/+0.007	14	77	77	124			355HTA1330	●
13.50	+0.025/+0.007	14	77	77	124	355TA1350	●	355HTA1350	●
13.80	+0.025/+0.007	14	77	77	124			355HTA1380	●
14.00	+0.025/+0.007	14	77	77	124	355TA1400	●	355HTA1400	●
14.50	+0.025/+0.007	16	83	83	133	355TA1450	●	355HTA1450	●
15.00	+0.025/+0.007	16	83	83	133	355TA1500	●	355HTA1500	●
15.30	+0.025/+0.007	16	83	83	133			355HTA1530	●
15.50	+0.025/+0.007	16	83	83	133	355TA1550	●	355HTA1550	●
15.80	+0.025/+0.007	16	83	83	133			355HTA1580	●
16.00	+0.025/+0.007	16	83	83	133	355TA1600	●	355HTA1600	●
16.50	+0.025/+0.007	18	93	93	143	355TA1650	●	355HTA1650	●
17.00	+0.025/+0.007	18	93	93	143	355TA1700	●	355HTA1700	●
17.50	+0.025/+0.007	18	93	93	143	355TA1750	●	355HTA1750	●
18.00	+0.025/+0.007	18	93	93	143	355TA1800	●	355HTA1800	●
18.50	+0.029/+0.008	20	101	101	153	355TA1850	●	355HTA1850	●
19.00	+0.029/+0.008	20	101	101	153	355TA1900	●	355HTA1900	●
19.50	+0.029/+0.008	20	101	101	153	355TA1950	○	355HTA1950	●
20.00	+0.029/+0.008	20	101	101	153	355TA2000	●	355HTA2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355TA

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	**80-100**			**70-90**			**40-60**			**20-40**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	3	9550	0.085	810	8490	0.068	580	5310	0.060	320	3180	0.043	140
	4	7170	0.094	670	6370	0.075	480	3980	0.065	260	2390	0.047	110
	5	5730	0.102	580	5100	0.082	420	3180	0.071	230	1910	0.051	100
	6	4780	0.115	550	4250	0.092	390	2650	0.080	210	1590	0.057	90
	7	4090	0.128	520	3640	0.102	370	2270	0.089	200	1360	0.064	90
	8	3580	0.140	500	3180	0.112	360	1990	0.098	200	1190	0.070	80
	9	3180	0.153	490	2830	0.122	350	1770	0.107	190	1060	0.077	80
	10	2870	0.166	480	2550	0.133	340	1590	0.116	180	960	0.083	80
	11	2610	0.179	470	2320	0.143	330	1450	0.125	180	870	0.089	80
	12	2390	0.196	470	2120	0.156	330	1330	0.137	180	800	0.098	80
	13	2200	0.213	470	1960	0.170	330	1220	0.149	180	730	0.106	80
	14	2050	0.230	470	1820	0.184	330	1140	0.161	180	680	0.115	80
	15	1910	0.247	470	1700	0.197	340	1060	0.173	180	640	0.123	80
	16	1790	0.264	470	1590	0.211	340	1000	0.184	180	600	0.132	80
	17	1690	0.281	470	1500	0.224	340	940	0.196	180	560	0.140	80
	18	1590	0.298	470	1420	0.238	340	880	0.208	180	530	0.149	80
	19	1510	0.315	470	1340	0.252	340	840	0.220	180	500	0.157	80
	20	1430	0.332	470	1270	0.265	340	800	0.232	190	480	0.166	80

355HTA

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	**100-120**			**80-100**			**60-80**			**40-60**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	3	11680	0.094	1090	9550	0.070	670	7430	0.056	420	5310	0.047	250
	4	8760	0.111	970	7170	0.083	590	5570	0.066	370	3980	0.055	220
	5	7010	0.128	890	5730	0.096	550	4460	0.077	340	3180	0.064	200
	6	5840	0.145	840	4780	0.108	520	3720	0.087	320	2650	0.072	190
	7	5000	0.162	810	4090	0.121	500	3180	0.097	310	2270	0.081	180
	8	4380	0.179	780	3580	0.134	480	2790	0.107	300	1990	0.089	180
	9	3890	0.196	760	3180	0.147	470	2480	0.117	290	1770	0.098	170
	10	3500	0.213	740	2870	0.159	460	2230	0.128	280	1590	0.106	170
	11	3180	0.221	700	2610	0.166	430	2030	0.133	270	1450	0.111	160
	12	2920	0.238	690	2390	0.179	430	1860	0.143	270	1330	0.119	160
	13	2690	0.255	690	2200	0.191	420	1710	0.153	260	1220	0.128	160
	14	2500	0.272	680	2050	0.204	420	1590	0.163	260	1140	0.136	160
	15	2340	0.289	680	1910	0.217	410	1490	0.173	260	1060	0.145	150
	16	2190	0.306	670	1790	0.230	410	1390	0.184	260	1000	0.153	150
	17	2060	0.315	650	1690	0.236	400	1310	0.189	250	940	0.157	150
	18	1950	0.323	630	1590	0.242	390	1240	0.194	240	880	0.162	140
	19	1840	0.332	610	1510	0.249	380	1170	0.199	230	840	0.166	140
	20	1750	0.340	600	1430	0.255	360	1110	0.204	230	800	0.170	140

CUTTING PARAMETERS

355TA

	Material Group ISO 513	M1 M2			M3			M4			M5		
	Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
	Vc (m/min)	30-50			25-35			20-30			15-25		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	4250	0.060	250	3180	0.048	150	2650	0.042	110	2120	0.030	60
	4	3180	0.065	210	2390	0.052	130	1990	0.046	90	1590	0.033	50
	5	2550	0.071	180	1910	0.057	110	1590	0.050	80	1270	0.036	50
	6	2120	0.080	170	1590	0.064	100	1330	0.056	70	1060	0.040	40
	7	1820	0.089	160	1360	0.071	100	1140	0.062	70	910	0.045	40
	8	1590	0.098	160	1190	0.079	90	1000	0.069	70	800	0.049	40
	9	1420	0.107	150	1060	0.086	90	880	0.075	70	710	0.054	40
	10	1270	0.116	150	960	0.093	90	800	0.081	60	640	0.058	40
	11	1160	0.125	140	870	0.100	90	720	0.087	60	580	0.062	40
	12	1060	0.137	150	800	0.109	90	660	0.096	60	530	0.068	40
	13	980	0.149	150	730	0.119	90	610	0.104	60	490	0.074	40
	14	910	0.161	150	680	0.129	90	570	0.112	60	450	0.080	40
	15	850	0.173	150	640	0.138	90	530	0.121	60	420	0.086	40
	16	800	0.184	150	600	0.148	90	500	0.129	60	400	0.092	40
	17	750	0.196	150	560	0.157	90	470	0.137	60	370	0.098	40
	18	710	0.208	150	530	0.167	90	440	0.146	60	350	0.104	40
	19	670	0.220	150	500	0.176	90	420	0.154	60	340	0.110	40
	20	640	0.232	150	480	0.186	90	400	0.162	60	320	0.116	40

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	Material Group ISO 513	M1 M2			M3			M4			M5		
	Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
	Vc (m/min)	30-50			25-35			20-30			10-20		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	4250	0.060	250	3180	0.048	150	2650	0.042	110	1590	0.036	60
	4	3180	0.077	240	2390	0.061	150	1990	0.054	110	1190	0.046	50
	5	2550	0.085	220	1910	0.068	130	1590	0.060	90	960	0.051	50
	6	2120	0.094	200	1590	0.075	120	1330	0.065	90	800	0.056	40
	7	1820	0.111	200	1360	0.088	120	1140	0.077	90	680	0.066	50
	8	1590	0.128	200	1190	0.102	120	1000	0.089	90	600	0.077	50
	9	1420	0.136	190	1060	0.109	120	880	0.095	80	530	0.082	40
	10	1270	0.149	190	960	0.119	110	800	0.104	80	480	0.089	40
	11	1160	0.153	180	870	0.122	110	720	0.107	80	430	0.092	40
	12	1060	0.170	180	800	0.136	110	660	0.119	80	400	0.102	40
	13	980	0.183	180	730	0.146	110	610	0.128	80	370	0.110	40
	14	910	0.196	180	680	0.156	110	570	0.137	80	340	0.117	40
	15	850	0.208	180	640	0.167	110	530	0.146	80	320	0.125	40
	16	800	0.221	180	600	0.177	110	500	0.155	80	300	0.133	40
	17	750	0.230	170	560	0.184	100	470	0.161	80	280	0.138	40
	18	710	0.242	170	530	0.194	100	440	0.170	70	270	0.145	40
	19	670	0.255	170	500	0.204	100	420	0.179	70	250	0.153	40
	20	640	0.264	170	480	0.211	100	400	0.184	70	240	0.158	40

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Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**80-100**			**70-90**			**40-60**			**20-40**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	9550	0.085	810	8490	0.068	580	5310	0.060	320	3180	0.043	140
4	7170	0.094	670	6370	0.075	480	3980	0.065	260	2390	0.047	110
5	5730	0.102	580	5100	0.082	420	3180	0.071	230	1910	0.051	100
6	4780	0.115	550	4250	0.092	390	2650	0.080	210	1590	0.057	90
7	4090	0.128	520	3640	0.102	370	2270	0.089	200	1360	0.064	90
8	3580	0.140	500	3180	0.112	360	1990	0.098	200	1190	0.070	80
9	3180	0.153	490	2830	0.122	350	1770	0.107	190	1060	0.077	80
10	2870	0.166	480	2550	0.133	340	1590	0.116	180	960	0.083	80
11	2610	0.179	470	2320	0.143	330	1450	0.125	180	870	0.089	80
12	2390	0.196	470	2120	0.156	330	1330	0.137	180	800	0.098	80
13	2200	0.213	470	1960	0.170	330	1220	0.149	180	730	0.106	80
14	2050	0.230	470	1820	0.184	330	1140	0.161	180	680	0.115	80
15	1910	0.247	470	1700	0.197	340	1060	0.173	180	640	0.123	80
16	1790	0.264	470	1590	0.211	340	1000	0.184	180	600	0.132	80
17	1690	0.281	470	1500	0.224	340	940	0.196	180	560	0.140	80
18	1590	0.298	470	1420	0.238	340	880	0.208	180	530	0.149	80
19	1510	0.315	470	1340	0.252	340	840	0.220	180	500	0.157	80
20	1430	0.332	470	1270	0.265	340	800	0.232	190	480	0.166	80

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Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**90-110**			**70-90**			**50-70**			**40-60**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	10620	0.094	990	8490	0.084	710	6370	0.075	480	5310	0.065	350
4	7960	0.111	880	6370	0.099	630	4780	0.088	420	3980	0.077	310
5	6370	0.128	810	5100	0.115	590	3820	0.102	390	3180	0.089	280
6	5310	0.145	770	4250	0.130	550	3180	0.116	370	2650	0.101	270
7	4550	0.162	730	3640	0.145	530	2730	0.129	350	2270	0.113	260
8	3980	0.179	710	3180	0.161	510	2390	0.143	340	1990	0.125	250
9	3540	0.196	690	2830	0.176	500	2120	0.156	330	1770	0.137	240
10	3180	0.213	680	2550	0.191	490	1910	0.170	320	1590	0.149	240
11	2900	0.221	640	2320	0.199	460	1740	0.177	310	1450	0.155	220
12	2650	0.238	630	2120	0.214	450	1590	0.190	300	1330	0.167	220
13	2450	0.255	620	1960	0.230	450	1470	0.204	300	1220	0.179	220
14	2270	0.272	620	1820	0.245	450	1360	0.218	300	1140	0.190	220
15	2120	0.289	610	1700	0.260	440	1270	0.231	290	1060	0.202	210
16	1990	0.306	610	1590	0.275	440	1190	0.245	290	1000	0.214	210
17	1870	0.315	590	1500	0.283	420	1120	0.252	280	940	0.220	210
18	1770	0.323	570	1420	0.291	410	1060	0.258	270	880	0.226	200
19	1680	0.332	560	1340	0.298	400	1010	0.265	270	840	0.232	190
20	1590	0.340	540	1270	0.306	390	960	0.272	260	800	0.238	190

355HTA

Material Group ISO 513	N1 > 5% Si			N2			N4					
Hardness/Rm												
Vc (m/min)	180-220			160-200			160-180					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
3	21230	0.112	2380	19110	0.101	1930	18050	0.090	1620			
4	15920	0.133	2110	14330	0.119	1710	13540	0.106	1440			
5	12740	0.153	1950	11460	0.138	1580	10830	0.122	1330			
6	10620	0.173	1840	9550	0.156	1490	9020	0.139	1250			
7	9100	0.194	1760	8190	0.174	1430	7730	0.155	1200			
8	7960	0.214	1710	7170	0.193	1380	6770	0.171	1160			
9	7080	0.235	1660	6370	0.211	1340	6020	0.188	1130			
10	6370	0.255	1620	5730	0.230	1320	5410	0.204	1100			
11	5790	0.265	1540	5210	0.239	1240	4920	0.212	1040			
12	5310	0.286	1520	4780	0.257	1230	4510	0.228	1030			
13	4900	0.306	1500	4410	0.275	1210	4160	0.245	1020			
14	4550	0.326	1490	4090	0.294	1200	3870	0.261	1010			
15	4250	0.347	1470	3820	0.312	1190	3610	0.277	1000			
16	3980	0.367	1460	3580	0.330	1180	3380	0.294	990			
17	3750	0.377	1420	3370	0.340	1140	3180	0.302	960			
18	3540	0.388	1370	3180	0.349	1110	3010	0.310	930			
19	3350	0.398	1330	3020	0.358	1080	2850	0.318	910			
20	3180	0.408	1300	2870	0.367	1050	2710	0.326	880			

355TA

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	20-30			10-20			25-35			15-25		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	2650	0.038	100	1590	0.027	40	3180	0.036	120	2120	0.031	60
	4	1990	0.042	80	1190	0.029	40	2390	0.040	100	1590	0.034	50
	5	1590	0.046	70	960	0.032	30	1910	0.044	80	1270	0.037	50
	6	1330	0.052	70	800	0.036	30	1590	0.049	80	1060	0.041	40
	7	1140	0.057	70	680	0.040	30	1360	0.055	70	910	0.046	40
	8	1000	0.063	60	600	0.044	30	1190	0.060	70	800	0.050	40
	9	880	0.069	60	530	0.048	30	1060	0.065	70	710	0.055	40
	10	800	0.075	60	480	0.052	30	960	0.071	70	640	0.060	40
	11	720	0.080	60	430	0.056	20	870	0.076	70	580	0.064	40
	12	660	0.088	60	400	0.062	20	800	0.084	70	530	0.070	40
	13	610	0.096	60	370	0.067	20	730	0.091	70	490	0.077	40
	14	570	0.103	60	340	0.072	20	680	0.098	70	450	0.083	40
	15	530	0.111	60	320	0.078	20	640	0.105	70	420	0.089	40
	16	500	0.119	60	300	0.083	20	600	0.113	70	400	0.095	40
	17	470	0.126	60	280	0.088	20	560	0.120	70	370	0.101	40
	18	440	0.134	60	270	0.094	30	530	0.127	70	350	0.107	40
	19	420	0.142	60	250	0.099	20	500	0.134	70	340	0.113	40
	20	400	0.149	60	240	0.104	30	480	0.142	70	320	0.119	40

355HTA

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	25-35			15-25			40-50			25-35		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	3180	0.039	120	2120	0.027	60	4780	0.037	180	3180	0.031	100
	4	2390	0.047	110	1590	0.033	50	3580	0.044	160	2390	0.037	90
	5	1910	0.054	100	1270	0.037	50	2870	0.051	150	1910	0.043	80
	6	1590	0.062	100	1060	0.043	50	2390	0.059	140	1590	0.050	80
	7	1360	0.068	90	910	0.048	40	2050	0.065	130	1360	0.054	70
	8	1190	0.077	90	800	0.054	40	1790	0.073	130	1190	0.061	70
	9	1060	0.085	90	710	0.060	40	1590	0.081	130	1060	0.068	70
	10	960	0.094	90	640	0.065	40	1430	0.089	130	960	0.075	70
	11	870	0.102	90	580	0.071	40	1300	0.097	130	870	0.082	70
	12	800	0.111	90	530	0.077	40	1190	0.105	120	800	0.088	70
	13	730	0.116	90	490	0.082	40	1100	0.111	120	730	0.093	70
	14	680	0.123	80	450	0.086	40	1020	0.117	120	680	0.099	70
	15	640	0.130	80	420	0.091	40	960	0.124	120	640	0.104	70
	16	600	0.136	80	400	0.095	40	900	0.129	120	600	0.109	70
	17	560	0.145	80	370	0.101	40	840	0.137	120	560	0.116	60
	18	530	0.153	80	350	0.107	40	800	0.145	120	530	0.122	60
	19	500	0.162	80	340	0.113	40	750	0.153	120	500	0.129	60
	20	480	0.170	80	320	0.119	40	720	0.162	120	480	0.136	70

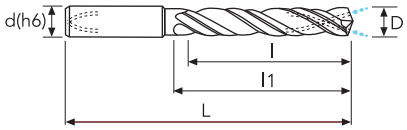
3584HTA

4-margin lands, long (8xD), 4HTA (through coolant)

8XD | OSAWA NORM | 4HTA | MG PV300 | 140° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
3.00	+0.012/+0.002	6	32	40	85	358HTA0300	●
3.10	+0.016/+0.004	6	32	40	85	358HTA0310	●
3.20	+0.016/+0.004	6	32	40	85	358HTA0320	●
3.30	+0.016/+0.004	6	32	40	85	358HTA0330	●
3.40	+0.016/+0.004	6	32	40	85	358HTA0340	●
3.50	+0.016/+0.004	6	32	40	85	358HTA0350	●
3.60	+0.016/+0.004	6	36	40	85	358HTA0360	●
3.70	+0.016/+0.004	6	36	40	85	358HTA0370	●
3.80	+0.016/+0.004	6	36	40	85	358HTA0380	●
3.90	+0.016/+0.004	6	36	40	85	358HTA0390	○
4.00	+0.016/+0.004	6	38	46	85	358HTA0400	●
4.10	+0.016/+0.004	6	38	46	85	358HTA0410	●
4.20	+0.016/+0.004	6	38	46	85	358HTA0420	●
4.30	+0.016/+0.004	6	40	46	97	358HTA0430	●
4.40	+0.016/+0.004	6	40	46	97	358HTA0440	○
4.50	+0.016/+0.004	6	44	46	97	358HTA0450	●
4.60	+0.016/+0.004	6	44	46	97	358HTA0460	●
4.70	+0.016/+0.004	6	44	46	97	358HTA0470	●
4.80	+0.016/+0.004	6	44	46	97	358HTA0480	●
4.90	+0.016/+0.004	6	44	46	97	358HTA0490	○
5.00	+0.016/+0.004	6	48	57	97	358HTA0500	●
5.10	+0.016/+0.004	6	48	57	97	358HTA0510	●
5.20	+0.016/+0.004	6	48	57	97	358HTA0520	●
5.30	+0.016/+0.004	6	48	57	97	358HTA0530	●
5.40	+0.016/+0.004	6	48	57	97	358HTA0540	○
5.50	+0.016/+0.004	6	48	57	97	358HTA0550	●
5.60	+0.016/+0.004	6	48	57	97	358HTA0560	●
5.70	+0.016/+0.004	6	48	57	97	358HTA0570	○
5.80	+0.016/+0.004	6	48	57	97	358HTA0580	●
5.90	+0.016/+0.004	6	48	57	97	358HTA0590	●
6.00	+0.016/+0.004	6	48	57	97	358HTA0600	●
6.10	+0.021/+0.006	8	64	76	116	358HTA0610	●
6.20	+0.021/+0.006	8	64	76	116	358HTA0620	●
6.30	+0.021/+0.006	8	64	76	116	358HTA0630	●
6.40	+0.021/+0.006	8	64	76	116	358HTA0640	○
6.50	+0.021/+0.006	8	64	76	116	358HTA0650	●
6.60	+0.021/+0.006	8	64	76	116	358HTA0660	○
6.70	+0.021/+0.006	8	64	76	116	358HTA0670	●
6.80	+0.021/+0.006	8	64	76	116	358HTA0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

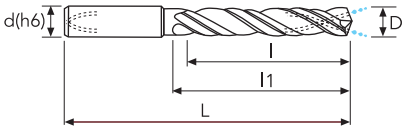
3584HTA

4-margin lands, long (8xD), 4HTA (through coolant)

8XD | OSAWA NORM | 4HTA | MG PV300 | 140° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
6.90	+0.021/+0.006	8	64	76	116	358HTA0690	●
7.00	+0.021/+0.006	8	64	76	116	358HTA0700	●
7.10	+0.021/+0.006	8	64	76	116	358HTA0710	●
7.20	+0.021/+0.006	8	64	76	116	358HTA0720	●
7.30	+0.021/+0.006	8	64	76	116	358HTA0730	●
7.40	+0.021/+0.006	8	64	76	116	358HTA0740	●
7.50	+0.021/+0.006	8	64	76	116	358HTA0750	●
7.60	+0.021/+0.006	8	64	76	116	358HTA0760	●
7.70	+0.021/+0.006	8	64	76	116	358HTA0770	○
7.80	+0.021/+0.006	8	64	76	116	358HTA0780	●
7.90	+0.021/+0.006	8	64	76	116	358HTA0790	○
8.00	+0.021/+0.006	8	64	76	116	358HTA0800	●
8.10	+0.021/+0.006	10	80	95	142	358HTA0810	●
8.20	+0.021/+0.006	10	80	95	142	358HTA0820	●
8.30	+0.021/+0.006	10	80	95	142	358HTA0830	●
8.40	+0.021/+0.006	10	80	95	142	358HTA0840	○
8.50	+0.021/+0.006	10	80	95	142	358HTA0850	●
8.60	+0.021/+0.006	10	80	95	142	358HTA0860	●
8.70	+0.021/+0.006	10	80	95	142	358HTA0870	●
8.80	+0.021/+0.006	10	80	95	142	358HTA0880	●
8.90	+0.021/+0.006	10	80	95	142	358HTA0890	○
9.00	+0.021/+0.006	10	80	95	142	358HTA0900	●
9.10	+0.021/+0.006	10	80	95	142	358HTA0910	●
9.20	+0.021/+0.006	10	80	95	142	358HTA0920	●
9.30	+0.021/+0.006	10	80	95	142	358HTA0930	●
9.40	+0.021/+0.006	10	80	95	142	358HTA0940	○
9.50	+0.021/+0.006	10	80	95	142	358HTA0950	●
9.60	+0.021/+0.006	10	80	95	142	358HTA0960	○
9.70	+0.021/+0.006	10	80	95	142	358HTA0970	○
9.80	+0.021/+0.006	10	80	95	142	358HTA0980	●
9.90	+0.021/+0.006	10	80	95	142	358HTA0990	○
10.00	+0.021/+0.006	10	80	95	142	358HTA1000	●
10.20	+0.025/+0.007	12	96	114	163	358HTA1020	●
10.50	+0.025/+0.007	12	96	114	163	358HTA1050	●
10.80	+0.025/+0.007	12	96	114	163	358HTA1080	●
11.00	+0.025/+0.007	12	96	114	163	358HTA1100	●
11.20	+0.025/+0.007	12	96	114	163	358HTA1120	●
11.30	+0.025/+0.007	12	96	114	163	358HTA1130	○
11.50	+0.025/+0.007	12	96	114	163	358HTA1150	●

● stock standard ○ non-standard stock ▽ stock exhaustion

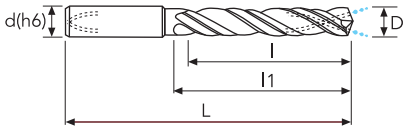
3584HTA

4-margin lands, long (8xD), 4HTA (through coolant)

8XD | OSAWA NORM | 4HTA | MG PV300 | 140° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
11.80	+0.025/+0.007	12	96	114	163	358HTA1180	●
12.00	+0.025/+0.007	12	96	114	163	358HTA1200	●
12.20	+0.025/+0.007	14	112	133	182	358HTA1220	●
12.50	+0.025/+0.007	14	112	133	182	358HTA1250	●
12.80	+0.025/+0.007	14	112	133	182	358HTA1280	●
13.00	+0.025/+0.007	14	112	133	182	358HTA1300	●
13.50	+0.025/+0.007	14	112	133	182	358HTA1350	●
14.00	+0.025/+0.007	14	112	133	182	358HTA1400	●
14.50	+0.025/+0.007	16	128	152	204	358HTA1450	●
15.00	+0.025/+0.007	16	128	152	204	358HTA1500	●
15.50	+0.025/+0.007	16	128	152	204	358HTA1550	●
16.00	+0.025/+0.007	16	128	152	204	358HTA1600	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3584HTA

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	**100-120**			**80-100**			**50-70**			**40-60**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	11680	0.072	840	9550	0.065	620	6370	0.058	370	5310	0.050	270
4	8760	0.089	780	7170	0.080	570	4780	0.071	340	3980	0.062	250
5	7010	0.106	740	5730	0.095	550	3820	0.085	320	3180	0.074	240
6	5840	0.122	710	4780	0.110	520	3180	0.098	310	2650	0.085	230
7	5000	0.139	700	4090	0.125	510	2730	0.111	300	2270	0.097	220
8	4380	0.155	680	3580	0.140	500	2390	0.124	300	1990	0.109	220
9	3890	0.172	670	3180	0.155	490	2120	0.138	290	1770	0.120	210
10	3500	0.188	660	2870	0.169	490	1910	0.150	290	1590	0.132	210
11	3180	0.205	650	2610	0.185	480	1740	0.164	290	1450	0.144	210
12	2920	0.221	650	2390	0.199	480	1590	0.177	280	1330	0.155	210
13	2690	0.238	640	2200	0.214	470	1470	0.190	280	1220	0.167	200
14	2500	0.254	640	2050	0.229	470	1360	0.203	280	1140	0.178	200
15	2340	0.270	630	1910	0.243	460	1270	0.216	270	1060	0.189	200
16	2190	0.286	630	1790	0.257	460	1190	0.229	270	1000	0.200	200

Ø RUN OUT <0.02mm

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	**40-50**			**30-40**			**20-30**			**15-25**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	4780	0.070	330	3720	0.056	210	2650	0.049	130	2120	0.042	90
4	3580	0.090	320	2790	0.072	200	1990	0.063	130	1590	0.054	90
5	2870	0.100	290	2230	0.080	180	1590	0.070	110	1270	0.060	80
6	2390	0.110	260	1860	0.088	160	1330	0.077	100	1060	0.066	70
7	2050	0.130	270	1590	0.104	170	1140	0.091	100	910	0.078	70
8	1790	0.150	270	1390	0.120	170	1000	0.105	110	800	0.090	70
9	1590	0.160	250	1240	0.128	160	880	0.112	100	710	0.096	70
10	1430	0.175	250	1110	0.140	160	800	0.123	100	640	0.105	70
11	1300	0.180	230	1010	0.144	150	720	0.126	90	580	0.108	60
12	1190	0.200	240	930	0.160	150	660	0.140	90	530	0.120	60
13	1100	0.215	240	860	0.172	150	610	0.151	90	490	0.129	60
14	1020	0.230	230	800	0.184	150	570	0.161	90	450	0.138	60
15	960	0.245	240	740	0.196	150	530	0.172	90	420	0.147	60
16	900	0.260	230	700	0.208	150	500	0.182	90	400	0.156	60

Ø RUN OUT <0.02mm

3584HTA

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**100-120**			**80-100**			**50-70**			**40-60**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	11680	0.072	840	9550	0.065	620	6370	0.058	370	5310	0.050	270
4	8760	0.089	780	7170	0.080	570	4780	0.071	340	3980	0.062	250
5	7010	0.106	740	5730	0.095	550	3820	0.085	320	3180	0.074	240
6	5840	0.122	710	4780	0.110	520	3180	0.098	310	2650	0.085	230
7	5000	0.139	700	4090	0.125	510	2730	0.111	300	2270	0.097	220
8	4380	0.155	680	3580	0.140	500	2390	0.124	300	1990	0.109	220
9	3890	0.172	670	3180	0.155	490	2120	0.138	290	1770	0.120	210
10	3500	0.188	660	2870	0.169	490	1910	0.150	290	1590	0.132	210
11	3180	0.205	650	2610	0.185	480	1740	0.164	290	1450	0.144	210
12	2920	0.221	650	2390	0.199	480	1590	0.177	280	1330	0.155	210
13	2690	0.238	640	2200	0.214	470	1470	0.190	280	1220	0.167	200
14	2500	0.254	640	2050	0.229	470	1360	0.203	280	1140	0.178	200
15	2340	0.270	630	1910	0.243	460	1270	0.216	270	1060	0.189	200
16	2190	0.286	630	1790	0.257	460	1190	0.229	270	1000	0.200	200

Material Group ISO 513	N1 > 5% Si			N2			N4					
Hardness/Rm												
Vc (m/min)	**160-200**			**140-180**			**130-170**					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
3	19110	0.086	1650	16990	0.078	1320	15920	0.078	1240			
4	14330	0.107	1530	12740	0.096	1220	11940	0.096	1150			
5	11460	0.127	1460	10190	0.114	1170	9550	0.114	1090			
6	9550	0.146	1400	8490	0.132	1120	7960	0.132	1050			
7	8190	0.167	1370	7280	0.150	1090	6820	0.150	1020			
8	7170	0.186	1330	6370	0.167	1070	5970	0.167	1000			
9	6370	0.206	1310	5660	0.186	1050	5310	0.186	990			
10	5730	0.226	1290	5100	0.203	1040	4780	0.203	970			
11	5210	0.246	1280	4630	0.221	1030	4340	0.221	960			
12	4780	0.265	1270	4250	0.239	1010	3980	0.239	950			
13	4410	0.286	1260	3920	0.257	1010	3670	0.257	940			
14	4090	0.305	1250	3640	0.274	1000	3410	0.274	940			
15	3820	0.324	1240	3400	0.292	990	3180	0.292	930			
16	3580	0.343	1230	3180	0.309	980	2990	0.309	920			

3584HTA

Material Group ISO 513	S1 S2			S3			S4			S5		
Hardness/Rm	< 35 HRC			35-45 HRC								
Vc (m/min)	25-35			15-25			35-45			25-35		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	3180	0.046	150	2120	0.032	70	4250	0.044	190	3180	0.037	120
4	2390	0.055	130	1590	0.039	60	3180	0.052	170	2390	0.044	110
5	1910	0.063	120	1270	0.044	60	2550	0.060	150	1910	0.050	100
6	1590	0.073	120	1060	0.051	50	2120	0.069	150	1590	0.058	90
7	1360	0.080	110	910	0.056	50	1820	0.076	140	1360	0.064	90
8	1190	0.090	110	800	0.063	50	1590	0.086	140	1190	0.072	90
9	1060	0.100	110	710	0.070	50	1420	0.095	130	1060	0.080	80
10	960	0.110	110	640	0.077	50	1270	0.105	130	960	0.088	80
11	870	0.120	100	580	0.084	50	1160	0.114	130	870	0.096	80
12	800	0.130	100	530	0.091	50	1060	0.124	130	800	0.104	80
13	730	0.137	100	490	0.096	50	980	0.130	130	730	0.110	80
14	680	0.145	100	450	0.102	50	910	0.138	130	680	0.116	80
15	640	0.153	100	420	0.107	40	850	0.145	120	640	0.122	80
16	600	0.160	100	400	0.112	40	800	0.152	120	600	0.128	80

TYPHOON PU-HPU

HIGH PERFORMANCE - UNIVERSAL APPLICATION

Universal high performance drills for ISO P, M, K, N, S.

Punte universali ad alto rendimento per applicazione su materiali ISO P, M, K, N, S.

Universelle Hochleistungsbohrer für Anwendungen auf den Materialien ISO P, M, K, N, S.

Forets universels haute performance pour des applications sur des matériaux ISO P, M, K, N, S.

Puntas universales de alto rendimiento para aplicación en materiales ISO P, M, K, N, S.

Универсальные высокопроизводительные сверла для обработки материалов по ISO P, M, K, N, S.

TYPHOON PU-HPU

HIGH PERFORMANCE - UNIVERSAL APPLICATION

PU

HPU

- Self-centering geometry for accurate holes
- Reinforced geometry for higher feed rate
- Wide flute for smoother chip ejection
- Straight cutting edge: high chipping resistance and short chip shape
- Thicker chisel edge: enables higher feed rate
- 45° chamfer for wear and chipping protection
- Selected substrate and last generation coating for great wear resistance and long life even at high cutting speed

- Affûtage autocentré pour des trous précis
- Géométrie renforcée pour des vitesses d'avance élevées
- Géométrie des goujures large pour une évacuation meilleure des copeaux
- Géométrie de l'arête rectiligne : très robuste, elle permet de former des copeaux courts
- Géométrie de l'arête transversale : épaissie pour permettre des avancements plus élevés
- Angles de l'arête biseautés à 45° pour les protéger de l'usure et des éclats
- Substrat en carbure et revêtement spécifique pour garantir une longue durée à des vitesses de coupe élevées

- Affilatura autocentrante per fori precisi
- Geometria rinforzata per elevati avanzamenti
- Geometria gole ampia per una migliore evacuazione dei trucioli
- Geometria del tagliente rettilineo: molto robusta che permette di formare trucioli corti
- Geometria del tagliente trasversale: inspessita per consentire avanzamenti più elevati
- Spigoli del tagliente smussati a 45° per proteggerli da usura e scheggiature
- Substrato in metallo duro e rivestimento specifici per garantire lunga durata anche a velocità di taglio elevate

- Afilado autocentrante para agujeros precisos
- Geometría reforzada para elevados avances
- Geometría de las ranuras amplia para una mejor evacuación de las virutas
- Geometría del filo rectilíneo: muy resistente, que permite formar virutas cortas
- Geometría del filo transversal: engrosada para permitir avances más elevados
- Ángulos del filo redondeados a 45° para protegerlos del desgaste y astillado
- Sustrato en metal duro y revestimiento específicos para garantizar una larga duración incluso a velocidades de corte elevadas

- Selbstzentrierender Schliff für präzise Bohrungen
- Verstärkte Geometrie für erhöhten Vorschub
- Breite Geometrie der Nuten für eine verbesserte Späneabführung
- Gerade Geometrie der Schneidkante: äußerst robust, wodurch kurze Späne erzeugt werden
- Transversale Geometrie der Schneidkante: verstärkt für erhöhten Vorschub
- Im 45°-Winkel angefaste Schneidkanten zum Schutz gegen Verschleiß und Absplittern
- Trägermaterial aus Hartmetall und spezielle Beschichtung zur Gewährleistung einer langen Lebensdauer auch bei hohen Schnittgeschwindigkeiten

- Самоцентрирующаяся заточка для сверления отверстий высокой точности
- Усиленная геометрия для работы с высокими подачами
- Широкие канавки для хорошего отвода стружки
- Прямые режущие кромки: формирование короткой стружки и предотвращение ее пакетирования
- Увеличенная перемычка: позволяет увеличить подачу
- Фаски 45° для защиты от износа и пакетирования стружки
- Специальное покрытие последнего поколения для повышения стойкости и надежности при работе с высокими скоростями резания

353PU-353HPU

universal application, high productivity,
PU and HPU (through coolant)

3XD | DIN 6537K | PU | HPU | MG PV250 | 140°+C45° | 30°

353PU 353HPU

353PU

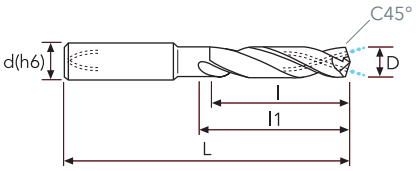
353HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

353PU

353HPU



						353PU		353HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
3.00	+0.012/+0.002	6	14	20	62	353PU0300	●	353HPU0300	●
3.10	+0.016/+0.004	6	14	20	62	353PU0310	●	353HPU0310	●
3.20	+0.016/+0.004	6	14	20	62	353PU0320	●	353HPU0320	●
3.30	+0.016/+0.004	6	14	20	62	353PU0330	●	353HPU0330	●
3.40	+0.016/+0.004	6	14	20	62	353PU0340	●	353HPU0340	●
3.50	+0.016/+0.004	6	14	20	62	353PU0350	●	353HPU0350	●
3.60	+0.016/+0.004	6	14	20	62	353PU0360	●	353HPU0360	●
3.70	+0.016/+0.004	6	14	20	62	353PU0370	●	353HPU0370	●
3.80	+0.016/+0.004	6	17	24	66	353PU0380	●	353HPU0380	●
3.90	+0.016/+0.004	6	17	24	66	353PU0390	●	353HPU0390	●
4.00	+0.016/+0.004	6	17	24	66	353PU0400	●	353HPU0400	●
4.10	+0.016/+0.004	6	17	24	66	353PU0410	●	353HPU0410	●
4.20	+0.016/+0.004	6	17	24	66	353PU0420	●	353HPU0420	●
4.30	+0.016/+0.004	6	17	24	66	353PU0430	●	353HPU0430	●
4.40	+0.016/+0.004	6	17	24	66	353PU0440	●	353HPU0440	●
4.50	+0.016/+0.004	6	17	24	66	353PU0450	●	353HPU0450	●
4.60	+0.016/+0.004	6	17	24	66	353PU0460	●	353HPU0460	●
4.70	+0.016/+0.004	6	17	24	66	353PU0470	●	353HPU0470	●
4.80	+0.016/+0.004	6	20	28	66	353PU0480	●	353HPU0480	●
4.90	+0.016/+0.004	6	20	28	66	353PU0490	●	353HPU0490	●
5.00	+0.016/+0.004	6	20	28	66	353PU0500	●	353HPU0500	●
5.10	+0.016/+0.004	6	20	28	66	353PU0510	●	353HPU0510	●
5.20	+0.016/+0.004	6	20	28	66	353PU0520	●	353HPU0520	●
5.30	+0.016/+0.004	6	20	28	66	353PU0530	●	353HPU0530	●
5.40	+0.016/+0.004	6	20	28	66	353PU0540	●	353HPU0540	●
5.50	+0.016/+0.004	6	20	28	66	353PU0550	●	353HPU0550	●
5.60	+0.016/+0.004	6	20	28	66	353PU0560	●	353HPU0560	●
5.70	+0.016/+0.004	6	20	28	66	353PU0570	●	353HPU0570	●
5.80	+0.016/+0.004	6	20	28	66	353PU0580	●	353HPU0580	●
5.90	+0.016/+0.004	6	20	28	66	353PU0590	●	353HPU0590	●
6.00	+0.016/+0.004	6	20	28	66	353PU0600	●	353HPU0600	●
6.10	+0.021/+0.006	8	24	34	79	353PU0610	●	353HPU0610	●
6.20	+0.021/+0.006	8	24	34	79	353PU0620	●	353HPU0620	●
6.30	+0.021/+0.006	8	24	34	79	353PU0630	●	353HPU0630	●
6.40	+0.021/+0.006	8	24	34	79	353PU0640	●	353HPU0640	●
6.50	+0.021/+0.006	8	24	34	79	353PU0650	●	353HPU0650	●
6.60	+0.021/+0.006	8	24	34	79	353PU0660	●	353HPU0660	●
6.70	+0.021/+0.006	8	24	34	79	353PU0670	●	353HPU0670	●
6.80	+0.021/+0.006	8	24	34	79	353PU0680	●	353HPU0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353PU-353HPU

universal application, high productivity,
PU and HPU (through coolant)

3XD | DIN 6537K | PU | HPU | MG PV250 | 140°+C45° | 30°

353PU 353HPU

353PU

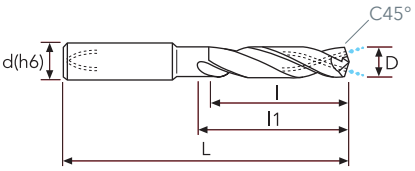
353HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

353PU

353HPU



						353PU		353HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
6.90	+0.021/+0.006	8	24	34	79	353PU0690	●	353HPU0690	●
7.00	+0.021/+0.006	8	24	34	79	353PU0700	●	353HPU0700	●
7.10	+0.021/+0.006	8	29	41	79	353PU0710	●	353HPU0710	●
7.20	+0.021/+0.006	8	29	41	79	353PU0720	●	353HPU0720	●
7.30	+0.021/+0.006	8	29	41	79	353PU0730	●	353HPU0730	●
7.40	+0.021/+0.006	8	29	41	79	353PU0740	●	353HPU0740	●
7.50	+0.021/+0.006	8	29	41	79	353PU0750	●	353HPU0750	●
7.60	+0.021/+0.006	8	29	41	79	353PU0760	●	353HPU0760	●
7.70	+0.021/+0.006	8	29	41	79	353PU0770	●	353HPU0770	●
7.80	+0.021/+0.006	8	29	41	79	353PU0780	●	353HPU0780	●
7.90	+0.021/+0.006	8	29	41	79	353PU0790	●	353HPU0790	●
8.00	+0.021/+0.006	8	29	41	79	353PU0800	●	353HPU0800	●
8.10	+0.021/+0.006	10	35	47	89	353PU0810	●	353HPU0810	●
8.20	+0.021/+0.006	10	35	47	89	353PU0820	●	353HPU0820	●
8.30	+0.021/+0.006	10	35	47	89	353PU0830	●	353HPU0830	●
8.40	+0.021/+0.006	10	35	47	89	353PU0840	●	353HPU0840	●
8.50	+0.021/+0.006	10	35	47	89	353PU0850	●	353HPU0850	●
8.60	+0.021/+0.006	10	35	47	89	353PU0860	●	353HPU0860	●
8.70	+0.021/+0.006	10	35	47	89	353PU0870	●	353HPU0870	●
8.80	+0.021/+0.006	10	35	47	89	353PU0880	●	353HPU0880	●
8.90	+0.021/+0.006	10	35	47	89	353PU0890	●	353HPU0890	●
9.00	+0.021/+0.006	10	35	47	89	353PU0900	●	353HPU0900	●
9.10	+0.021/+0.006	10	35	47	89	353PU0910	●	353HPU0910	●
9.20	+0.021/+0.006	10	35	47	89	353PU0920	●	353HPU0920	●
9.30	+0.021/+0.006	10	35	47	89	353PU0930	●	353HPU0930	●
9.40	+0.021/+0.006	10	35	47	89	353PU0940	●	353HPU0940	●
9.50	+0.021/+0.006	10	35	47	89	353PU0950	●	353HPU0950	●
9.60	+0.021/+0.006	10	35	47	89	353PU0960	●	353HPU0960	●
9.70	+0.021/+0.006	10	35	47	89	353PU0970	●	353HPU0970	●
9.80	+0.021/+0.006	10	35	47	89	353PU0980	●	353HPU0980	●
9.90	+0.021/+0.006	10	35	47	89	353PU0990	●	353HPU0990	●
10.00	+0.021/+0.006	10	35	47	89	353PU1000	●	353HPU1000	●
10.10	+0.025/+0.007	12	40	55	102	353PU1010	●	353HPU1010	●
10.20	+0.025/+0.007	12	40	55	102	353PU1020	●	353HPU1020	●
10.30	+0.025/+0.007	12	40	55	102	353PU1030	●	353HPU1030	●
10.40	+0.025/+0.007	12	40	55	102	353PU1040	●	353HPU1040	●
10.50	+0.025/+0.007	12	40	55	102	353PU1050	●	353HPU1050	●
10.60	+0.025/+0.007	12	40	55	102	353PU1060	●	353HPU1060	●
10.70	+0.025/+0.007	12	40	55	102	353PU1070	●	353HPU1070	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353PU-353HPU

universal application, high productivity,
PU and HPU (through coolant)

3XD | DIN 6537K | PU | HPU | MG PV250 | 140°+C45° | 30°

353PU 353HPU

353PU

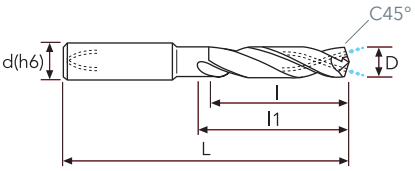
353HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

353PU

353HPU



						353PU		353HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
10.80	+0.025/+0.007	12	40	55	102	353PU1080	●	353HPU1080	●
10.90	+0.025/+0.007	12	40	55	102	353PU1090	●	353HPU1090	●
11.00	+0.025/+0.007	12	40	55	102	353PU1100	●	353HPU1100	●
11.10	+0.025/+0.007	12	40	55	102	353PU1110	●	353HPU1110	●
11.20	+0.025/+0.007	12	40	55	102	353PU1120	●	353HPU1120	●
11.30	+0.025/+0.007	12	40	55	102	353PU1130	●	353HPU1130	●
11.40	+0.025/+0.007	12	40	55	102	353PU1140	●	353HPU1140	●
11.50	+0.025/+0.007	12	40	55	102	353PU1150	●	353HPU1150	●
11.60	+0.025/+0.007	12	40	55	102	353PU1160	●	353HPU1160	●
11.70	+0.025/+0.007	12	40	55	102	353PU1170	●	353HPU1170	●
11.80	+0.025/+0.007	12	40	55	102	353PU1180	●	353HPU1180	●
11.90	+0.025/+0.007	12	40	55	102	353PU1190	●	353HPU1190	●
12.00	+0.025/+0.007	12	40	55	102	353PU1200	●	353HPU1200	●
12.10	+0.025/+0.007	14	43	60	107	353PU1210	●	353HPU1210	●
12.20	+0.025/+0.007	14	43	60	107	353PU1220	●	353HPU1220	●
12.30	+0.025/+0.007	14	43	60	107	353PU1230	●	353HPU1230	●
12.40	+0.025/+0.007	14	43	60	107	353PU1240	●	353HPU1240	●
12.50	+0.025/+0.007	14	43	60	107	353PU1250	●	353HPU1250	●
12.60	+0.025/+0.007	14	43	60	107	353PU1260	●	353HPU1260	●
12.70	+0.025/+0.007	14	43	60	107	353PU1270	●	353HPU1270	●
12.80	+0.025/+0.007	14	43	60	107	353PU1280	●	353HPU1280	●
12.90	+0.025/+0.007	14	43	60	107	353PU1290	●	353HPU1290	●
13.00	+0.025/+0.007	14	43	60	107	353PU1300	●	353HPU1300	●
13.10	+0.025/+0.007	14	43	60	107	353PU1310	●	353HPU1310	●
13.20	+0.025/+0.007	14	43	60	107	353PU1320	●	353HPU1320	●
13.30	+0.025/+0.007	14	43	60	107	353PU1330	●	353HPU1330	●
13.40	+0.025/+0.007	14	43	60	107	353PU1340	●	353HPU1340	●
13.50	+0.025/+0.007	14	43	60	107	353PU1350	●	353HPU1350	●
13.60	+0.025/+0.007	14	43	60	107	353PU1360	●	353HPU1360	●
13.70	+0.025/+0.007	14	43	60	107	353PU1370	●	353HPU1370	●
13.80	+0.025/+0.007	14	43	60	107	353PU1380	●	353HPU1380	●
13.90	+0.025/+0.007	14	43	60	107	353PU1390	●	353HPU1390	●
14.00	+0.025/+0.007	14	43	60	107	353PU1400	●	353HPU1400	●
14.10	+0.025/+0.007	16	45	65	115	353PU1410	●	353HPU1410	●
14.20	+0.025/+0.007	16	45	65	115	353PU1420	●	353HPU1420	●
14.30	+0.025/+0.007	16	45	65	115	353PU1430	●	353HPU1430	●
14.50	+0.025/+0.007	16	45	65	115	353PU1450	●	353HPU1450	●
14.60	+0.025/+0.007	16	45	65	115	353PU1460	●	353HPU1460	●
14.70	+0.025/+0.007	16	45	65	115	353PU1470	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

353PU-353HPU

universal application, high productivity,
PU and HPU (through coolant)

3XD | DIN 6537K | PU | HPU | MG PV250 | 140°+C45° | 30°

353PU 353HPU

353PU

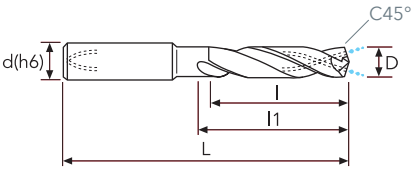
353HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

353PU

353HPU



						353PU		353HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
14.80	+0.025/+0.007	16	45	65	115	353PU1480	●	353HPU1480	●
15.00	+0.025/+0.007	16	65	65	115	353PU1500	●	353HPU1500	●
15.10	+0.025/+0.007	16	65	65	115	353PU1510	●	353HPU1510	●
15.20	+0.025/+0.007	16	65	65	115	353PU1520	●	353HPU1520	●
15.30	+0.025/+0.007	16	65	65	115	353PU1530	●	353HPU1530	●
15.50	+0.025/+0.007	16	65	65	115	353PU1550	●	353HPU1550	●
15.60	+0.025/+0.007	16	65	65	115	353PU1560	●	353HPU1560	●
15.70	+0.025/+0.007	16	65	65	115	353PU1570	●	353HPU1570	●
15.80	+0.025/+0.007	16	65	65	115	353PU1580	●	353HPU1580	●
16.00	+0.025/+0.007	16	65	65	115	353PU1600	●	353HPU1600	●
16.10	+0.025/+0.007	18	73	73	123			353HPU1610	●
16.20	+0.025/+0.007	18	73	73	123			353HPU1620	●
16.30	+0.025/+0.007	18	73	73	123			353HPU1630	●
16.50	+0.025/+0.007	18	73	73	123	353PU1650	●	353HPU1650	●
16.70	+0.025/+0.007	18	73	73	123			353HPU1670	●
16.80	+0.025/+0.007	18	73	73	123			353HPU1680	●
17.00	+0.025/+0.007	18	73	73	123	353PU1700	●	353HPU1700	●
17.10	+0.025/+0.007	18	73	73	123			353HPU1710	●
17.20	+0.025/+0.007	18	73	73	123			353HPU1720	●
17.50	+0.025/+0.007	18	73	73	123	353PU1750	●	353HPU1750	●
17.60	+0.025/+0.007	18	73	73	123			353HPU1760	●
17.70	+0.025/+0.007	18	73	73	123			353HPU1770	●
17.80	+0.025/+0.007	18	73	73	123			353HPU1780	●
18.00	+0.025/+0.007	18	73	73	123	353PU1800	●	353HPU1800	●
18.10	+0.029/+0.008	20	79	79	131			353HPU1810	●
18.20	+0.029/+0.008	20	79	79	131			353HPU1820	●
18.30	+0.029/+0.008	20	79	79	131			353HPU1830	●
18.50	+0.029/+0.008	20	79	79	131	353PU1850	●	353HPU1850	●
18.60	+0.029/+0.008	20	79	79	131			353HPU1860	●
18.70	+0.029/+0.008	20	79	79	131			353HPU1870	●
18.80	+0.029/+0.008	20	79	79	131			353HPU1880	●
19.00	+0.029/+0.008	20	79	79	131	353PU1900	●	353HPU1900	●
19.20	+0.029/+0.008	20	79	79	131			353HPU1920	●
19.30	+0.029/+0.008	20	79	79	131			353HPU1930	●
19.50	+0.029/+0.008	20	79	79	131	353PU1950	●	353HPU1950	●
19.60	+0.029/+0.008	20	79	79	131			353HPU1960	●
19.80	+0.029/+0.008	20	79	79	131			353HPU1980	●
20.00	+0.029/+0.008	20	79	79	131	353PU2000	●	353HPU2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353PU

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	**110-130**			**90-110**			**60-80**			**40-60**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**3**	12740	0.110	1400	10620	0.094	990	7430	0.083	610	5310	0.066	350
	4	9550	0.120	1150	7960	0.102	810	5570	0.090	500	3980	0.072	290
	5	7640	0.130	990	6370	0.111	700	4460	0.098	430	3180	0.078	250
	6	6370	0.145	920	5310	0.123	650	3720	0.109	400	2650	0.087	230
	7	5460	0.160	870	4550	0.136	620	3180	0.120	380	2270	0.096	220
	8	4780	0.175	840	3980	0.149	590	2790	0.131	370	1990	0.105	210
	9	4250	0.190	810	3540	0.162	570	2480	0.143	350	1770	0.114	200
	10	3820	0.205	780	3180	0.174	550	2230	0.154	340	1590	0.123	200
	11	3470	0.220	760	2900	0.187	540	2030	0.165	330	1450	0.132	190
	12	3180	0.240	760	2650	0.204	540	1860	0.180	330	1330	0.144	190
	13	2940	0.260	760	2450	0.221	540	1710	0.195	330	1220	0.156	190
	14	2730	0.285	780	2270	0.242	550	1590	0.214	340	1140	0.171	190
	15	2550	0.310	790	2120	0.264	560	1490	0.233	350	1060	0.186	200
	16	2390	0.335	800	1990	0.285	570	1390	0.251	350	1000	0.201	200
	17	2250	0.360	810	1870	0.306	570	1310	0.270	350	940	0.216	200
	18	2120	0.385	820	1770	0.327	580	1240	0.289	360	880	0.231	200
	19	2010	0.410	820	1680	0.349	590	1170	0.308	360	840	0.246	210
	20	1910	0.435	830	1590	0.370	590	1110	0.326	360	800	0.261	210

353HPU

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	**140-160**			**120-150**			**90-110**			**60-80**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**3**	15920	0.127	2010	13800	0.114	1570	10620	0.101	1070	7430	0.089	660
	4	11940	0.150	1790	10350	0.135	1390	7960	0.120	950	5570	0.105	580
	5	9550	0.173	1650	8280	0.155	1290	6370	0.138	880	4460	0.121	540
	6	7960	0.196	1560	6900	0.176	1210	5310	0.156	830	3720	0.137	510
	7	6820	0.219	1490	5910	0.197	1160	4550	0.175	800	3180	0.153	490
	8	5970	0.242	1440	5180	0.217	1130	3980	0.193	770	2790	0.169	470
	9	5310	0.265	1400	4600	0.238	1100	3540	0.212	750	2480	0.185	460
	10	4780	0.288	1370	4140	0.259	1070	3180	0.230	730	2230	0.201	450
	11	4340	0.299	1300	3760	0.269	1010	2900	0.239	690	2030	0.209	420
	12	3980	0.322	1280	3450	0.290	1000	2650	0.258	680	1860	0.225	420
	13	3670	0.345	1270	3180	0.311	990	2450	0.276	680	1710	0.242	410
	14	3410	0.368	1250	2960	0.331	980	2270	0.294	670	1590	0.258	410
	15	3180	0.391	1240	2760	0.352	970	2120	0.313	660	1490	0.274	410
	16	2990	0.414	1240	2590	0.373	970	1990	0.331	660	1390	0.290	400
	17	2810	0.426	1200	2440	0.383	930	1870	0.340	640	1310	0.298	390
	18	2650	0.437	1160	2300	0.393	900	1770	0.350	620	1240	0.306	380
	19	2510	0.449	1130	2180	0.404	880	1680	0.359	600	1170	0.314	370
	20	2390	0.460	1100	2070	0.414	860	1590	0.368	590	1110	0.322	360

353PU

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	45-55			35-45			25-35			20-30		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	5310	0.077	410	4250	0.065	280	3180	0.058	180	2650	0.046	120
4	3980	0.084	330	3180	0.071	230	2390	0.063	150	1990	0.050	100
5	3180	0.091	290	2550	0.077	200	1910	0.068	130	1590	0.055	90
6	2650	0.102	270	2120	0.086	180	1590	0.076	120	1330	0.061	80
7	2270	0.112	250	1820	0.095	170	1360	0.084	110	1140	0.067	80
8	1990	0.123	240	1590	0.104	170	1190	0.092	110	1000	0.074	70
9	1770	0.133	240	1420	0.113	160	1060	0.100	110	880	0.080	70
10	1590	0.144	230	1270	0.122	150	960	0.108	100	800	0.086	70
11	1450	0.154	220	1160	0.131	150	870	0.116	100	720	0.092	70
12	1330	0.168	220	1060	0.143	150	800	0.126	100	660	0.101	70
13	1220	0.182	220	980	0.155	150	730	0.137	100	610	0.109	70
14	1140	0.200	230	910	0.170	150	680	0.150	100	570	0.120	70
15	1060	0.217	230	850	0.184	160	640	0.163	100	530	0.130	70
16	1000	0.235	230	800	0.199	160	600	0.176	110	500	0.141	70
17	940	0.252	240	750	0.214	160	560	0.189	110	470	0.151	70
18	880	0.270	240	710	0.229	160	530	0.202	110	440	0.162	70
19	840	0.287	240	670	0.244	160	500	0.215	110	420	0.172	70
20	800	0.305	240	640	0.259	170	480	0.228	110	400	0.183	70

353HPU

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	60-80			50-70			35-45			20-40		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	7430	0.082	610	6370	0.066	420	4250	0.058	240	3180	0.049	160
4	5570	0.097	540	4780	0.078	370	3180	0.068	220	2390	0.058	140
5	4460	0.112	500	3820	0.090	340	2550	0.078	200	1910	0.067	130
6	3720	0.127	470	3180	0.102	320	2120	0.089	190	1590	0.076	120
7	3180	0.142	450	2730	0.114	310	1820	0.099	180	1360	0.085	120
8	2790	0.157	440	2390	0.126	300	1590	0.110	170	1190	0.094	110
9	2480	0.172	430	2120	0.138	290	1420	0.120	170	1060	0.103	110
10	2230	0.187	420	1910	0.150	290	1270	0.131	170	960	0.112	110
11	2030	0.194	390	1740	0.155	270	1160	0.136	160	870	0.117	100
12	1860	0.209	390	1590	0.167	270	1060	0.147	160	800	0.126	100
13	1710	0.224	380	1470	0.179	260	980	0.157	150	730	0.135	100
14	1590	0.239	380	1360	0.191	260	910	0.167	150	680	0.144	100
15	1490	0.254	380	1270	0.203	260	850	0.178	150	640	0.152	100
16	1390	0.269	370	1190	0.215	260	800	0.188	150	600	0.161	100
17	1310	0.277	360	1120	0.221	250	750	0.194	150	560	0.166	90
18	1240	0.284	350	1060	0.227	240	710	0.199	140	530	0.170	90
19	1170	0.292	340	1010	0.233	240	670	0.204	140	500	0.175	90
20	1110	0.299	330	960	0.239	230	640	0.209	130	480	0.179	90

353PU

	Material Group ISO 513	K1			K2			K3			K4		
	Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
	Vc (m/min)	**110-130**			**90-110**			**60-80**			**40-60**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**3**	12740	0.110	1400	10620	0.094	990	7430	0.083	610	5310	0.066	350
	4	9550	0.120	1150	7960	0.102	810	5570	0.090	500	3980	0.072	290
	5	7640	0.130	990	6370	0.111	700	4460	0.098	430	3180	0.078	250
	6	6370	0.145	920	5310	0.123	650	3720	0.109	400	2650	0.087	230
	7	5460	0.160	870	4550	0.136	620	3180	0.120	380	2270	0.096	220
	8	4780	0.175	840	3980	0.149	590	2790	0.131	370	1990	0.105	210
	9	4250	0.190	810	3540	0.162	570	2480	0.143	350	1770	0.114	200
	10	3820	0.205	780	3180	0.174	550	2230	0.154	340	1590	0.123	200
	11	3470	0.220	760	2900	0.187	540	2030	0.165	330	1450	0.132	190
	12	3180	0.240	760	2650	0.204	540	1860	0.180	330	1330	0.144	190
	13	2940	0.260	760	2450	0.221	540	1710	0.195	330	1220	0.156	190
	14	2730	0.285	780	2270	0.242	550	1590	0.214	340	1140	0.171	190
	15	2550	0.310	790	2120	0.264	560	1490	0.233	350	1060	0.186	200
	16	2390	0.335	800	1990	0.285	570	1390	0.251	350	1000	0.201	200
	17	2250	0.360	810	1870	0.306	570	1310	0.270	350	940	0.216	200
	18	2120	0.385	820	1770	0.327	580	1240	0.289	360	880	0.231	200
	19	2010	0.410	820	1680	0.349	590	1170	0.308	360	840	0.246	210
	20	1910	0.435	830	1590	0.370	590	1110	0.326	360	800	0.261	210

353HPU

	Material Group ISO 513	K1			K2			K3			K4		
	Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
	Vc (m/min)	**120-140**			**100-120**			**80-100**			**60-80**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**3**	13800	0.127	1750	11680	0.114	1330	9550	0.101	970	7430	0.089	660
	4	10350	0.150	1550	8760	0.135	1180	7170	0.120	860	5570	0.105	580
	5	8280	0.173	1430	7010	0.155	1090	5730	0.138	790	4460	0.121	540
	6	6900	0.196	1350	5840	0.176	1030	4780	0.156	750	3720	0.137	510
	7	5910	0.219	1290	5000	0.197	980	4090	0.175	710	3180	0.153	490
	8	5180	0.242	1250	4380	0.217	950	3580	0.193	690	2790	0.169	470
	9	4600	0.265	1220	3890	0.238	930	3180	0.212	670	2480	0.185	460
	10	4140	0.288	1190	3500	0.259	910	2870	0.230	660	2230	0.201	450
	11	3760	0.299	1120	3180	0.269	860	2610	0.239	620	2030	0.209	420
	12	3450	0.322	1110	2920	0.290	850	2390	0.258	620	1860	0.225	420
	13	3180	0.345	1100	2690	0.311	840	2200	0.276	610	1710	0.242	410
	14	2960	0.368	1090	2500	0.331	830	2050	0.294	600	1590	0.258	410
	15	2760	0.391	1080	2340	0.352	820	1910	0.313	600	1490	0.274	410
	16	2590	0.414	1070	2190	0.373	820	1790	0.331	590	1390	0.290	400
	17	2440	0.426	1040	2060	0.383	790	1690	0.340	580	1310	0.298	390
	18	2300	0.437	1010	1950	0.393	770	1590	0.350	560	1240	0.306	380
	19	2180	0.449	980	1840	0.404	740	1510	0.359	540	1170	0.314	370
	20	2070	0.460	950	1750	0.414	720	1430	0.368	530	1110	0.322	360

353PU

	Material Group ISO 513	N1 > 5%Si			N2			N3 N4					
	Hardness/Rm												
	Vc (m/min)	220-260			200-240			160-200					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
Ø RUN OUT <0.02mm	3	25480	0.132	3360	23350	0.119	2770	19110	0.106	2020			
	4	19110	0.144	2750	17520	0.130	2270	14330	0.115	1650			
	5	15290	0.156	2390	14010	0.140	1970	11460	0.125	1430			
	6	12740	0.174	2220	11680	0.157	1830	9550	0.139	1330			
	7	10920	0.192	2100	10010	0.173	1730	8190	0.154	1260			
	8	9550	0.210	2010	8760	0.189	1660	7170	0.168	1200			
	9	8490	0.228	1940	7780	0.205	1600	6370	0.182	1160			
	10	7640	0.246	1880	7010	0.221	1550	5730	0.197	1130			
	11	6950	0.264	1830	6370	0.238	1510	5210	0.211	1100			
	12	6370	0.288	1830	5840	0.259	1510	4780	0.230	1100			
	13	5880	0.312	1830	5390	0.281	1510	4410	0.250	1100			
	14	5460	0.342	1870	5000	0.308	1540	4090	0.274	1120			
	15	5100	0.372	1900	4670	0.335	1560	3820	0.298	1140			
	16	4780	0.402	1920	4380	0.362	1580	3580	0.322	1150			
	17	4500	0.432	1940	4120	0.389	1600	3370	0.346	1160			
	18	4250	0.462	1960	3890	0.416	1620	3180	0.370	1180			
	19	4020	0.492	1980	3690	0.443	1630	3020	0.394	1190			
	20	3820	0.522	1990	3500	0.470	1640	2870	0.418	1200			

353HPU

	Material Group ISO 513	N1 > 5%Si			N2			N3 N4					
	Hardness/Rm												
	Vc (m/min)	240-280			220-260			180-220					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
Ø RUN OUT <0.02mm	3	27600	0.152	4190	25480	0.139	3550	21230	0.111	2360			
	4	20700	0.179	3710	19110	0.164	3140	15920	0.132	2090			
	5	16560	0.207	3430	15290	0.190	2900	12740	0.152	1930			
	6	13800	0.235	3240	12740	0.215	2740	10620	0.172	1830			
	7	11830	0.262	3100	10920	0.240	2620	9100	0.192	1750			
	8	10350	0.290	3000	9550	0.266	2540	7960	0.213	1690			
	9	9200	0.317	2920	8490	0.291	2470	7080	0.233	1650			
	10	8280	0.345	2860	7640	0.316	2420	6370	0.253	1610			
	11	7530	0.359	2700	6950	0.329	2290	5790	0.263	1520			
	12	6900	0.386	2670	6370	0.354	2260	5310	0.283	1500			
	13	6370	0.414	2640	5880	0.380	2230	4900	0.304	1490			
	14	5910	0.442	2610	5460	0.405	2210	4550	0.324	1470			
	15	5520	0.469	2590	5100	0.430	2190	4250	0.344	1460			
	16	5180	0.497	2570	4780	0.455	2180	3980	0.364	1450			
	17	4870	0.511	2490	4500	0.468	2110	3750	0.374	1400			
	18	4600	0.524	2410	4250	0.481	2040	3540	0.385	1360			
	19	4360	0.538	2350	4020	0.493	1980	3350	0.395	1320			
	20	4140	0.552	2290	3820	0.506	1930	3180	0.405	1290			

353PU

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	30-40			20-30			35-45			25-35		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	3720	0.050	180	2650	0.035	90	4250	0.047	200	3180	0.040	130
	4	2790	0.054	150	1990	0.038	80	3180	0.051	160	2390	0.043	100
	5	2230	0.059	130	1590	0.041	70	2550	0.056	140	1910	0.047	90
	6	1860	0.065	120	1330	0.046	60	2120	0.062	130	1590	0.052	80
	7	1590	0.072	110	1140	0.050	60	1820	0.068	120	1360	0.058	80
	8	1390	0.079	110	1000	0.055	60	1590	0.075	120	1190	0.063	70
	9	1240	0.086	110	880	0.060	50	1420	0.081	120	1060	0.068	70
	10	1110	0.092	100	800	0.065	50	1270	0.088	110	960	0.074	70
	11	1010	0.099	100	720	0.069	50	1160	0.094	110	870	0.079	70
	12	930	0.108	100	660	0.076	50	1060	0.103	110	800	0.086	70
	13	860	0.117	100	610	0.082	50	980	0.111	110	730	0.094	70
	14	800	0.128	100	570	0.090	50	910	0.122	110	680	0.103	70
	15	740	0.140	100	530	0.098	50	850	0.133	110	640	0.112	70
	16	700	0.151	110	500	0.106	50	800	0.143	110	600	0.121	70
	17	660	0.162	110	470	0.113	50	750	0.154	120	560	0.130	70
	18	620	0.173	110	440	0.121	50	710	0.165	120	530	0.139	70
	19	590	0.185	110	420	0.129	50	670	0.175	120	500	0.148	70
	20	560	0.196	110	400	0.137	50	640	0.186	120	480	0.157	80

353HPU

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	40-60			25-45			50-70			40-60		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	5310	0.057	300	3720	0.040	150	6370	0.054	340	5310	0.046	240
	4	3980	0.067	270	2790	0.047	130	4780	0.064	310	3980	0.054	210
	5	3180	0.078	250	2230	0.054	120	3820	0.074	280	3180	0.062	200
	6	2650	0.088	230	1860	0.062	110	3180	0.084	270	2650	0.070	190
	7	2270	0.098	220	1590	0.069	110	2730	0.093	260	2270	0.079	180
	8	1990	0.109	220	1390	0.076	110	2390	0.103	250	1990	0.087	170
	9	1770	0.119	210	1240	0.083	100	2120	0.113	240	1770	0.095	170
	10	1590	0.129	210	1110	0.091	100	1910	0.123	230	1590	0.104	160
	11	1450	0.135	200	1010	0.094	100	1740	0.128	220	1450	0.108	160
	12	1330	0.145	190	930	0.101	90	1590	0.138	220	1330	0.116	150
	13	1220	0.155	190	860	0.109	90	1470	0.147	220	1220	0.124	150
	14	1140	0.166	190	800	0.116	90	1360	0.157	210	1140	0.132	150
	15	1060	0.176	190	740	0.123	90	1270	0.167	210	1060	0.141	150
	16	1000	0.186	190	700	0.130	90	1190	0.177	210	1000	0.149	150
	17	940	0.191	180	660	0.134	90	1120	0.182	200	940	0.153	140
	18	880	0.197	170	620	0.138	90	1060	0.187	200	880	0.157	140
	19	840	0.202	170	590	0.141	80	1010	0.192	190	840	0.161	140
	20	800	0.207	170	560	0.145	80	960	0.197	190	800	0.166	130

355PU-355HPU

universal application, high productivity,
PU and HPU (through coolant)

5XD | DIN 6537L | PU | HPU | MG PV250 | 140°+C45° | 30°

355PU 355HPU

355PU

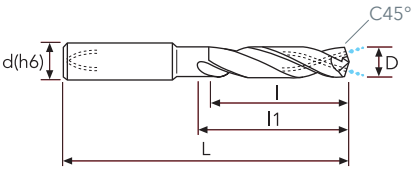
355HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

355PU

355HPU



						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
3.00	+0.012/+0.002	6	23	28	66	355PU0300	●	355HPU0300	●
3.10	+0.016/+0.004	6	23	28	66	355PU0310	●	355HPU0310	●
3.20	+0.016/+0.004	6	23	28	66	355PU0320	●	355HPU0320	●
3.25	+0.016/+0.004	6	23	28	66			355HPU0325	●
3.30	+0.016/+0.004	6	23	28	66	355PU0330	●	355HPU0330	●
3.40	+0.016/+0.004	6	23	28	66	355PU0340	●	355HPU0340	●
3.50	+0.016/+0.004	6	23	28	66	355PU0350	●	355HPU0350	●
3.60	+0.016/+0.004	6	23	28	66	355PU0360	●	355HPU0360	●
3.70	+0.016/+0.004	6	23	28	66	355PU0370	●	355HPU0370	●
3.80	+0.016/+0.004	6	29	36	74	355PU0380	●	355HPU0380	●
3.90	+0.016/+0.004	6	29	36	74	355PU0390	●	355HPU0390	●
4.00	+0.016/+0.004	6	29	36	74	355PU0400	●	355HPU0400	●
4.10	+0.016/+0.004	6	29	36	74	355PU0410	●	355HPU0410	●
4.20	+0.016/+0.004	6	29	36	74	355PU0420	●	355HPU0420	●
4.30	+0.016/+0.004	6	29	36	74	355PU0430	●	355HPU0430	●
4.40	+0.016/+0.004	6	29	36	74	355PU0440	●	355HPU0440	●
4.50	+0.016/+0.004	6	29	36	74	355PU0450	●	355HPU0450	●
4.60	+0.016/+0.004	6	29	36	74	355PU0460	●	355HPU0460	●
4.65	+0.016/+0.004	6	29	36	74			355HPU0465	●
4.70	+0.016/+0.004	6	29	36	74	355PU0470	●	355HPU0470	●
4.80	+0.016/+0.004	6	35	44	82	355PU0480	●	355HPU0480	●
4.90	+0.016/+0.004	6	35	44	82	355PU0490	●	355HPU0490	●
5.00	+0.016/+0.004	6	35	44	82	355PU0500	●	355HPU0500	●
5.10	+0.016/+0.004	6	35	44	82	355PU0510	●	355HPU0510	●
5.20	+0.016/+0.004	6	35	44	82	355PU0520	●	355HPU0520	●
5.30	+0.016/+0.004	6	35	44	82	355PU0530	●	355HPU0530	●
5.40	+0.016/+0.004	6	35	44	82	355PU0540	●	355HPU0540	●
5.50	+0.016/+0.004	6	35	44	82	355PU0550	●	355HPU0550	●
5.55	+0.016/+0.004	6	35	44	82			355HPU0555	●
5.60	+0.016/+0.004	6	35	44	82	355PU0560	●	355HPU0560	●
5.70	+0.016/+0.004	6	35	44	82	355PU0570	●	355HPU0570	●
5.80	+0.016/+0.004	6	35	44	82	355PU0580	●	355HPU0580	●
5.90	+0.016/+0.004	6	35	44	82	355PU0590	●	355HPU0590	●
6.00	+0.016/+0.004	6	35	44	82	355PU0600	●	355HPU0600	●
6.10	+0.021/+0.006	8	43	53	91	355PU0610	●	355HPU0610	●
6.20	+0.021/+0.006	8	43	53	91	355PU0620	●	355HPU0620	●
6.30	+0.021/+0.006	8	43	53	91	355PU0630	●	355HPU0630	●
6.40	+0.021/+0.006	8	43	53	91	355PU0640	●	355HPU0640	●
6.50	+0.021/+0.006	8	43	53	91	355PU0650	●	355HPU0650	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355PU-355HPU

universal application, high productivity,
PU and HPU (through coolant)

5XD | DIN 6537L | PU | HPU | MG PV250 | 140°+C45° | 30°

355PU 355HPU

355PU

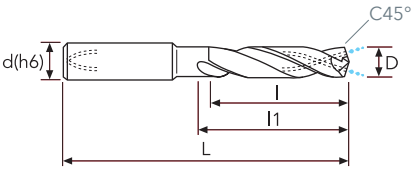
355HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

355PU

355HPU



						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
6.60	+0.021/+0.006	8	43	53	91	355PU0660	●	355HPU0660	●
6.70	+0.021/+0.006	8	43	53	91	355PU0670	●	355HPU0670	●
6.80	+0.021/+0.006	8	43	53	91	355PU0680	●	355HPU0680	●
6.90	+0.021/+0.006	8	43	53	91	355PU0690	●	355HPU0690	●
7.00	+0.021/+0.006	8	43	53	91	355PU0700	●	355HPU0700	●
7.10	+0.021/+0.006	8	43	53	91	355PU0710	●	355HPU0710	●
7.20	+0.021/+0.006	8	43	53	91	355PU0720	●	355HPU0720	●
7.30	+0.021/+0.006	8	43	53	91	355PU0730	●	355HPU0730	●
7.40	+0.021/+0.006	8	43	53	91	355PU0740	●	355HPU0740	●
7.45	+0.021/+0.006	8	43	53	91			355HPU0745	●
7.50	+0.021/+0.006	8	43	53	91	355PU0750	●	355HPU0750	●
7.60	+0.021/+0.006	8	43	53	91	355PU0760	●	355HPU0760	●
7.70	+0.021/+0.006	8	43	53	91	355PU0770	●	355HPU0770	●
7.80	+0.021/+0.006	8	43	53	91	355PU0780	●	355HPU0780	●
7.90	+0.021/+0.006	8	43	53	91	355PU0790	●	355HPU0790	●
8.00	+0.021/+0.006	8	43	53	91	355PU0800	●	355HPU0800	●
8.10	+0.021/+0.006	10	49	61	103	355PU0810	●	355HPU0810	●
8.20	+0.021/+0.006	10	49	61	103	355PU0820	●	355HPU0820	●
8.30	+0.021/+0.006	10	49	61	103	355PU0830	●	355HPU0830	●
8.40	+0.021/+0.006	10	49	61	103	355PU0840	●	355HPU0840	●
8.50	+0.021/+0.006	10	49	61	103	355PU0850	●	355HPU0850	●
8.60	+0.021/+0.006	10	49	61	103	355PU0860	●	355HPU0860	●
8.70	+0.021/+0.006	10	49	61	103	355PU0870	●	355HPU0870	●
8.80	+0.021/+0.006	10	49	61	103	355PU0880	●	355HPU0880	●
8.90	+0.021/+0.006	10	49	61	103	355PU0890	●	355HPU0890	●
9.00	+0.021/+0.006	10	49	61	103	355PU0900	●	355HPU0900	●
9.10	+0.021/+0.006	10	49	61	103	355PU0910	●	355HPU0910	●
9.20	+0.021/+0.006	10	49	61	103	355PU0920	●	355HPU0920	●
9.25	+0.021/+0.006	10	49	61	103			355HPU0925	●
9.30	+0.021/+0.006	10	49	61	103	355PU0930	●	355HPU0930	●
9.40	+0.021/+0.006	10	49	61	103	355PU0940	●	355HPU0940	●
9.45	+0.021/+0.006	10	49	61	103			355HPU0945	●
9.50	+0.021/+0.006	10	61	61	103	355PU0950	●	355HPU0950	●
9.60	+0.021/+0.006	10	61	61	103	355PU0960	●	355HPU0960	●
9.70	+0.021/+0.006	10	61	61	103	355PU0970	●	355HPU0970	●
9.80	+0.021/+0.006	10	61	61	103	355PU0980	●	355HPU0980	●
9.90	+0.021/+0.006	10	61	61	103	355PU0990	●	355HPU0990	●
10.00	+0.021/+0.006	10	61	61	103	355PU1000	●	355HPU1000	●
10.10	+0.025/+0.007	12	71	71	118	355PU1010	●	355HPU1010	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355PU-355HPU

universal application, high productivity,
PU and HPU (through coolant)

5XD | DIN 6537L | PU | HPU | MG PV250 | 140°+C45° | 30°

355PU 355HPU

355PU

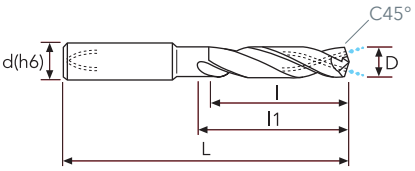
355HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

355PU

355HPU



						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
10.20	+0.025/+0.007	12	71	71	118	355PU1020	●	355HPU1020	●
10.30	+0.025/+0.007	12	71	71	118	355PU1030	●	355HPU1030	●
10.40	+0.025/+0.007	12	71	71	118	355PU1040	●	355HPU1040	●
10.50	+0.025/+0.007	12	71	71	118	355PU1050	●	355HPU1050	●
10.60	+0.025/+0.007	12	71	71	118	355PU1060	●	355HPU1060	●
10.70	+0.025/+0.007	12	71	71	118	355PU1070	●	355HPU1070	●
10.80	+0.025/+0.007	12	71	71	118	355PU1080	●	355HPU1080	●
10.90	+0.025/+0.007	12	71	71	118	355PU1090	●	355HPU1090	●
11.00	+0.025/+0.007	12	71	71	118	355PU1100	●	355HPU1100	●
11.10	+0.025/+0.007	12	71	71	118	355PU1110	●	355HPU1110	●
11.20	+0.025/+0.007	12	71	71	118	355PU1120	●	355HPU1120	●
11.25	+0.025/+0.007	12	71	71	118			355HPU1125	●
11.30	+0.025/+0.007	12	71	71	118	355PU1130	●	355HPU1130	●
11.40	+0.025/+0.007	12	71	71	118	355PU1140	●	355HPU1140	●
11.50	+0.025/+0.007	12	71	71	118	355PU1150	●	355HPU1150	●
11.60	+0.025/+0.007	12	71	71	118	355PU1160	●	355HPU1160	●
11.70	+0.025/+0.007	12	71	71	118	355PU1170	●	355HPU1170	●
11.80	+0.025/+0.007	12	71	71	118	355PU1180	●	355HPU1180	●
11.90	+0.025/+0.007	12	71	71	118	355PU1190	●	355HPU1190	●
12.00	+0.025/+0.007	12	71	71	118	355PU1200	●	355HPU1200	●
12.10	+0.025/+0.007	14	77	77	124	355PU1210	●	355HPU1210	●
12.20	+0.025/+0.007	14	77	77	124	355PU1220	●	355HPU1220	●
12.30	+0.025/+0.007	14	77	77	124			355HPU1230	●
12.40	+0.025/+0.007	14	77	77	124			355HPU1240	●
12.50	+0.025/+0.007	14	77	77	124	355PU1250	●	355HPU1250	●
12.60	+0.025/+0.007	14	77	77	124			355HPU1260	●
12.70	+0.025/+0.007	14	77	77	124	355PU1270	●	355HPU1270	●
12.80	+0.025/+0.007	14	77	77	124	355PU1280	●	355HPU1280	●
12.90	+0.025/+0.007	14	77	77	124			355HPU1290	●
13.00	+0.025/+0.007	14	77	77	124	355PU1300	●	355HPU1300	●
13.10	+0.025/+0.007	14	77	77	124	355PU1310	●	355HPU1310	●
13.20	+0.025/+0.007	14	77	77	124	355PU1320	●	355HPU1320	●
13.30	+0.025/+0.007	14	77	77	124	355PU1330	●	355HPU1330	●
13.40	+0.025/+0.007	14	77	77	124			355HPU1340	●
13.50	+0.025/+0.007	14	77	77	124	355PU1350	●	355HPU1350	●
13.60	+0.025/+0.007	14	77	77	124			355HPU1360	●
13.70	+0.025/+0.007	14	77	77	124	355PU1370	●	355HPU1370	●
13.80	+0.025/+0.007	14	77	77	124	355PU1380	●	355HPU1380	●
13.90	+0.025/+0.007	14	77	77	124			355HPU1390	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355PU-355HPU

universal application, high productivity,
PU and HPU (through coolant)

5XD | DIN 6537L | PU | HPU | MG PV250 | 140°+C45° | 30°

355PU 355HPU

355PU

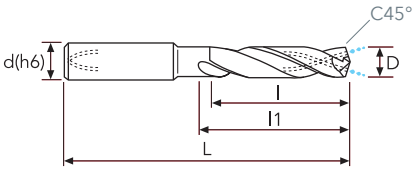
355HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

355PU

355HPU



						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
14.00	+0.025/+0.007	14	77	77	124	355PU1400	●	355HPU1400	●
14.10	+0.025/+0.007	16	83	83	133			355HPU1410	●
14.20	+0.025/+0.007	16	83	83	133			355HPU1420	●
14.30	+0.025/+0.007	16	83	83	133			355HPU1430	●
14.40	+0.025/+0.007	16	83	83	133			355HPU1440	●
14.50	+0.025/+0.007	16	83	83	133	355PU1450	●	355HPU1450	●
14.60	+0.025/+0.007	16	83	83	133			355HPU1460	●
14.70	+0.025/+0.007	16	83	83	133			355HPU1470	●
14.80	+0.025/+0.007	16	83	83	133			355HPU1480	●
14.90	+0.025/+0.007	16	83	83	133			355HPU1490	●
15.00	+0.025/+0.007	16	83	83	133	355PU1500	●	355HPU1500	●
15.10	+0.025/+0.007	16	83	83	133			355HPU1510	●
15.20	+0.025/+0.007	16	83	83	133			355HPU1520	●
15.30	+0.025/+0.007	16	83	83	133	355PU1530	●	355HPU1530	●
15.40	+0.025/+0.007	16	83	83	133			355HPU1540	●
15.50	+0.025/+0.007	16	83	83	133	355PU1550	●	355HPU1550	●
15.60	+0.025/+0.007	16	83	83	133			355HPU1560	●
15.70	+0.025/+0.007	16	83	83	133			355HPU1570	●
15.80	+0.025/+0.007	16	83	83	133	355PU1580	●	355HPU1580	●
15.90	+0.025/+0.007	16	83	83	133			355HPU1590	●
16.00	+0.025/+0.007	16	83	83	133	355PU1600	●	355HPU1600	●
16.10	+0.025/+0.007	18	93	93	143			355HPU1610	●
16.20	+0.025/+0.007	18	93	93	143			355HPU1620	●
16.30	+0.025/+0.007	18	93	93	143			355HPU1630	●
16.40	+0.025/+0.007	18	93	93	143			355HPU1640	●
16.50	+0.025/+0.007	18	93	93	143	355PU1650	●	355HPU1650	●
16.60	+0.025/+0.007	18	93	93	143			355HPU1660	●
16.70	+0.025/+0.007	18	93	93	143			355HPU1670	●
16.80	+0.025/+0.007	18	93	93	143			355HPU1680	●
16.90	+0.025/+0.007	18	93	93	143			355HPU1690	●
17.00	+0.025/+0.007	18	93	93	143	355PU1700	●	355HPU1700	●
17.10	+0.025/+0.007	18	93	93	143			355HPU1710	●
17.20	+0.025/+0.007	18	93	93	143			355HPU1720	●
17.30	+0.025/+0.007	18	93	93	143			355HPU1730	●
17.40	+0.025/+0.007	18	93	93	143			355HPU1740	●
17.50	+0.025/+0.007	18	93	93	143	355PU1750	●	355HPU1750	●
17.60	+0.025/+0.007	18	93	93	143			355HPU1760	●
17.70	+0.025/+0.007	18	93	93	143			355HPU1770	●
17.80	+0.025/+0.007	18	93	93	143			355HPU1780	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355PU-355HPU

universal application, high productivity,
PU and HPU (through coolant)

5XD | DIN 6537L | PU | HPU | MG PV250 | 140°+C45° | 30°

355PU 355HPU

355PU

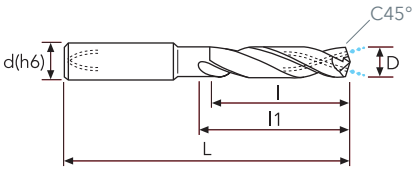
355HPU

P	M	K	N	S	H
★	★	★	☆	★	

★ 1st choice ☆ suitable

355PU

355HPU



						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
17.90	+0.025/+0.007	18	93	93	143			355HPU1790	●
18.00	+0.025/+0.007	18	93	93	143	355PU1800	●	355HPU1800	●
18.10	+0.029/+0.008	20	101	101	153			355HPU1810	●
18.20	+0.029/+0.008	20	101	101	153			355HPU1820	●
18.30	+0.029/+0.008	20	101	101	153			355HPU1830	●
18.40	+0.029/+0.008	20	101	101	153			355HPU1840	●
18.50	+0.029/+0.008	20	101	101	153	355PU1850	●	355HPU1850	●
18.60	+0.029/+0.008	20	101	101	153			355HPU1860	●
18.70	+0.029/+0.008	20	101	101	153			355HPU1870	●
18.80	+0.029/+0.008	20	101	101	153			355HPU1880	●
18.90	+0.029/+0.008	20	101	101	153			355HPU1890	●
19.00	+0.029/+0.008	20	101	101	153	355PU1900	●	355HPU1900	●
19.10	+0.029/+0.008	20	101	101	153			355HPU1910	●
19.20	+0.029/+0.008	20	101	101	153			355HPU1920	●
19.30	+0.029/+0.008	20	101	101	153			355HPU1930	●
19.40	+0.029/+0.008	20	101	101	153			355HPU1940	●
19.50	+0.029/+0.008	20	101	101	153	355PU1950	●	355HPU1950	●
19.60	+0.029/+0.008	20	101	101	153			355HPU1960	●
19.70	+0.029/+0.008	20	101	101	153			355HPU1970	●
19.80	+0.029/+0.008	20	101	101	153			355HPU1980	●
19.90	+0.029/+0.008	20	101	101	153			355HPU1990	●
20.00	+0.029/+0.008	20	101	101	153	355PU2000	●	355HPU2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

355PU

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	100-120			80-100			50-70			30-50		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	11680	0.094	1090	9550	0.075	710	6370	0.065	420	4250	0.047	200
4	8760	0.102	890	7170	0.082	590	4780	0.071	340	3180	0.051	160
5	7010	0.111	770	5730	0.088	510	3820	0.077	300	2550	0.055	140
6	5840	0.123	720	4780	0.099	470	3180	0.086	270	2120	0.062	130
7	5000	0.136	680	4090	0.109	440	2730	0.095	260	1820	0.068	120
8	4380	0.149	650	3580	0.119	430	2390	0.104	250	1590	0.074	120
9	3890	0.162	630	3180	0.129	410	2120	0.113	240	1420	0.081	110
10	3500	0.174	610	2870	0.139	400	1910	0.122	230	1270	0.087	110
11	3180	0.187	590	2610	0.150	390	1740	0.131	230	1160	0.094	110
12	2920	0.204	600	2390	0.163	390	1590	0.143	230	1060	0.102	110
13	2690	0.221	590	2200	0.177	390	1470	0.155	230	980	0.111	110
14	2500	0.242	610	2050	0.194	400	1360	0.170	230	910	0.121	110
15	2340	0.264	620	1910	0.211	400	1270	0.184	230	850	0.132	110
16	2190	0.285	620	1790	0.228	410	1190	0.199	240	800	0.142	110
17	2060	0.306	630	1690	0.245	410	1120	0.214	240	750	0.153	110
18	1950	0.327	640	1590	0.262	420	1060	0.229	240	710	0.164	120
19	1840	0.349	640	1510	0.279	420	1010	0.244	250	670	0.174	120
20	1750	0.370	650	1430	0.296	420	960	0.259	250	640	0.185	120

355HPU

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	130-150			110-130			80-100			50-70		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	14860	0.108	1600	12740	0.081	1030	9550	0.065	620	6370	0.054	340
4	11150	0.127	1420	9550	0.095	910	7170	0.076	550	4780	0.064	300
5	8920	0.147	1310	7640	0.110	840	5730	0.088	500	3820	0.073	280
6	7430	0.166	1230	6370	0.125	790	4780	0.100	480	3180	0.083	260
7	6370	0.186	1180	5460	0.139	760	4090	0.111	460	2730	0.093	250
8	5570	0.205	1140	4780	0.154	740	3580	0.123	440	2390	0.103	250
9	4950	0.225	1110	4250	0.169	720	3180	0.135	430	2120	0.112	240
10	4460	0.244	1090	3820	0.183	700	2870	0.147	420	1910	0.122	230
11	4050	0.254	1030	3470	0.191	660	2610	0.152	400	1740	0.127	220
12	3720	0.274	1020	3180	0.205	650	2390	0.164	390	1590	0.137	220
13	3430	0.293	1010	2940	0.220	650	2200	0.176	390	1470	0.147	220
14	3180	0.313	990	2730	0.235	640	2050	0.188	380	1360	0.156	210
15	2970	0.332	990	2550	0.249	640	1910	0.199	380	1270	0.166	210
16	2790	0.352	980	2390	0.264	630	1790	0.211	380	1190	0.176	210
17	2620	0.362	950	2250	0.271	610	1690	0.217	370	1120	0.181	200
18	2480	0.371	920	2120	0.279	590	1590	0.223	350	1060	0.186	200
19	2350	0.381	900	2010	0.286	570	1510	0.229	350	1010	0.191	190
20	2230	0.391	870	1910	0.293	560	1430	0.235	340	960	0.196	190

355PU

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	40-50			30-40			25-35			20-30		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	4780	0.065	310	3720	0.052	190	3180	0.046	150	2650	0.033	90
4	3580	0.071	260	2790	0.057	160	2390	0.050	120	1990	0.036	70
5	2870	0.077	220	2230	0.062	140	1910	0.054	100	1590	0.039	60
6	2390	0.086	210	1860	0.069	130	1590	0.060	100	1330	0.043	60
7	2050	0.095	200	1590	0.076	120	1360	0.067	90	1140	0.048	50
8	1790	0.104	190	1390	0.083	120	1190	0.073	90	1000	0.052	50
9	1590	0.113	180	1240	0.090	110	1060	0.079	80	880	0.057	50
10	1430	0.122	170	1110	0.098	110	960	0.085	80	800	0.061	50
11	1300	0.131	170	1010	0.105	110	870	0.092	80	720	0.065	50
12	1190	0.143	170	930	0.114	110	800	0.100	80	660	0.071	50
13	1100	0.155	170	860	0.124	110	730	0.108	80	610	0.077	50
14	1020	0.170	170	800	0.136	110	680	0.119	80	570	0.085	50
15	960	0.184	180	740	0.148	110	640	0.129	80	530	0.092	50
16	900	0.199	180	700	0.159	110	600	0.140	80	500	0.100	50
17	840	0.214	180	660	0.171	110	560	0.150	80	470	0.107	50
18	800	0.229	180	620	0.183	110	530	0.160	80	440	0.115	50
19	750	0.244	180	590	0.195	120	500	0.171	90	420	0.122	50
20	720	0.259	190	560	0.207	120	480	0.181	90	400	0.129	50

355HPU

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	50-70			40-60			30-40			20-30		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	6370	0.070	450	5310	0.056	300	3720	0.049	180	2650	0.042	110
4	4780	0.083	390	3980	0.066	260	2790	0.058	160	1990	0.050	100
5	3820	0.095	360	3180	0.076	240	2230	0.067	150	1590	0.057	90
6	3180	0.108	340	2650	0.086	230	1860	0.076	140	1330	0.065	90
7	2730	0.121	330	2270	0.097	220	1590	0.085	130	1140	0.072	80
8	2390	0.133	320	1990	0.107	210	1390	0.093	130	1000	0.080	80
9	2120	0.146	310	1770	0.117	210	1240	0.102	130	880	0.088	80
10	1910	0.159	300	1590	0.127	200	1110	0.111	120	800	0.095	80
11	1740	0.165	290	1450	0.132	190	1010	0.116	120	720	0.099	70
12	1590	0.178	280	1330	0.142	190	930	0.125	120	660	0.107	70
13	1470	0.191	280	1220	0.152	190	860	0.133	110	610	0.114	70
14	1360	0.203	280	1140	0.163	190	800	0.142	110	570	0.122	70
15	1270	0.216	270	1060	0.173	180	740	0.151	110	530	0.130	70
16	1190	0.229	270	1000	0.183	180	700	0.160	110	500	0.137	70
17	1120	0.235	260	940	0.188	180	660	0.165	110	470	0.141	70
18	1060	0.241	260	880	0.193	170	620	0.169	100	440	0.145	60
19	1010	0.248	250	840	0.198	170	590	0.173	100	420	0.149	60
20	960	0.254	240	800	0.203	160	560	0.178	100	400	0.152	60

355PU

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**100-120**			**80-100**			**50-70**			**30-50**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	11680	0.094	1090	9550	0.075	710	6370	0.065	420	4250	0.047	200
4	8760	0.102	890	7170	0.082	590	4780	0.071	340	3180	0.051	160
5	7010	0.111	770	5730	0.088	510	3820	0.077	300	2550	0.055	140
6	5840	0.123	720	4780	0.099	470	3180	0.086	270	2120	0.062	130
7	5000	0.136	680	4090	0.109	440	2730	0.095	260	1820	0.068	120
8	4380	0.149	650	3580	0.119	430	2390	0.104	250	1590	0.074	120
9	3890	0.162	630	3180	0.129	410	2120	0.113	240	1420	0.081	110
10	3500	0.174	610	2870	0.139	400	1910	0.122	230	1270	0.087	110
11	3180	0.187	590	2610	0.150	390	1740	0.131	230	1160	0.094	110
12	2920	0.204	600	2390	0.163	390	1590	0.143	230	1060	0.102	110
13	2690	0.221	590	2200	0.177	390	1470	0.155	230	980	0.111	110
14	2500	0.242	610	2050	0.194	400	1360	0.170	230	910	0.121	110
15	2340	0.264	620	1910	0.211	400	1270	0.184	230	850	0.132	110
16	2190	0.285	620	1790	0.228	410	1190	0.199	240	800	0.142	110
17	2060	0.306	630	1690	0.245	410	1120	0.214	240	750	0.153	110
18	1950	0.327	640	1590	0.262	420	1060	0.229	240	710	0.164	120
19	1840	0.349	640	1510	0.279	420	1010	0.244	250	670	0.174	120
20	1750	0.370	650	1430	0.296	420	960	0.259	250	640	0.185	120

355HPU

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**110-130**			**90-110**			**65-85**			**45-65**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	12740	0.108	1370	10620	0.097	1030	7960	0.086	680	5840	0.075	440
4	9550	0.127	1210	7960	0.114	910	5970	0.102	610	4380	0.089	390
5	7640	0.147	1120	6370	0.132	840	4780	0.117	560	3500	0.103	360
6	6370	0.166	1060	5310	0.150	790	3980	0.133	530	2920	0.116	340
7	5460	0.186	1010	4550	0.167	760	3410	0.149	510	2500	0.130	330
8	4780	0.205	980	3980	0.185	740	2990	0.164	490	2190	0.144	310
9	4250	0.225	960	3540	0.202	720	2650	0.180	480	1950	0.157	310
10	3820	0.244	930	3180	0.220	700	2390	0.196	470	1750	0.171	300
11	3470	0.254	880	2900	0.229	660	2170	0.203	440	1590	0.178	280
12	3180	0.274	870	2650	0.246	650	1990	0.219	440	1460	0.192	280
13	2940	0.293	860	2450	0.264	650	1840	0.235	430	1350	0.205	280
14	2730	0.313	850	2270	0.282	640	1710	0.250	430	1250	0.219	270
15	2550	0.332	850	2120	0.299	630	1590	0.266	420	1170	0.233	270
16	2390	0.352	840	1990	0.317	630	1490	0.282	420	1090	0.246	270
17	2250	0.362	810	1870	0.326	610	1410	0.289	410	1030	0.253	260
18	2120	0.371	790	1770	0.334	590	1330	0.297	400	970	0.260	250
19	2010	0.381	770	1680	0.343	580	1260	0.305	380	920	0.267	250
20	1910	0.391	750	1590	0.352	560	1190	0.313	370	880	0.274	240

355PU

	Material Group ISO 513	N1 > 5%Si			N2			N3 N4					
	Hardness/Rm												
	Vc (m/min)	200-240			180-220			140-180					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
Ø RUN OUT <0.02mm	3	23350	0.112	2620	21230	0.101	2140	16990	0.090	1530			
	4	17520	0.122	2140	15920	0.110	1750	12740	0.098	1250			
	5	14010	0.133	1860	12740	0.119	1520	10190	0.106	1080			
	6	11680	0.148	1730	10620	0.133	1410	8490	0.118	1000			
	7	10010	0.163	1630	9100	0.147	1340	7280	0.131	950			
	8	8760	0.179	1560	7960	0.161	1280	6370	0.143	910			
	9	7780	0.194	1510	7080	0.174	1230	5660	0.155	880			
	10	7010	0.209	1470	6370	0.188	1200	5100	0.167	850			
	11	6370	0.224	1430	5790	0.202	1170	4630	0.180	830			
	12	5840	0.245	1430	5310	0.220	1170	4250	0.196	830			
	13	5390	0.265	1430	4900	0.239	1170	3920	0.212	830			
	14	5000	0.291	1450	4550	0.262	1190	3640	0.233	850			
	15	4670	0.316	1480	4250	0.285	1210	3400	0.253	860			
	16	4380	0.342	1500	3980	0.308	1220	3180	0.273	870			
	17	4120	0.367	1510	3750	0.330	1240	3000	0.294	880			
	18	3890	0.393	1530	3540	0.353	1250	2830	0.314	890			
	19	3690	0.418	1540	3350	0.376	1260	2680	0.335	900			
	20	3500	0.444	1550	3180	0.399	1270	2550	0.355	910			

355HPU

	Material Group ISO 513	N1 > 5%Si			N2			N3 N4					
	Hardness/Rm												
	Vc (m/min)	230-270			210-250			170-210					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
Ø RUN OUT <0.02mm	3	26540	0.129	3420	24420	0.116	2840	20170	0.090	1820			
	4	19900	0.152	3030	18310	0.137	2510	15130	0.107	1620			
	5	15920	0.176	2800	14650	0.158	2320	12100	0.123	1490			
	6	13270	0.199	2650	12210	0.179	2190	10080	0.140	1410			
	7	11370	0.223	2530	10460	0.201	2100	8640	0.156	1350			
	8	9950	0.246	2450	9160	0.222	2030	7560	0.172	1300			
	9	8850	0.270	2390	8140	0.243	1980	6720	0.189	1270			
	10	7960	0.293	2330	7320	0.264	1930	6050	0.205	1240			
	11	7240	0.305	2210	6660	0.274	1830	5500	0.213	1170			
	12	6630	0.328	2180	6100	0.296	1800	5040	0.230	1160			
	13	6120	0.352	2150	5630	0.317	1780	4650	0.246	1150			
	14	5690	0.375	2140	5230	0.338	1770	4320	0.263	1140			
	15	5310	0.399	2120	4880	0.359	1750	4030	0.279	1130			
	16	4980	0.422	2100	4580	0.380	1740	3780	0.296	1120			
	17	4680	0.434	2030	4310	0.391	1680	3560	0.304	1080			
	18	4420	0.446	1970	4070	0.401	1630	3360	0.312	1050			
	19	4190	0.457	1920	3860	0.412	1590	3180	0.320	1020			
	20	3980	0.469	1870	3660	0.422	1550	3030	0.328	1000			

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	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	25-35			15-25			30-40			20-30		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	3180	0.042	130	2120	0.029	60	3720	0.040	150	2650	0.034	90
	4	2390	0.046	110	1590	0.032	50	2790	0.044	120	1990	0.037	70
	5	1910	0.050	90	1270	0.035	40	2230	0.047	110	1590	0.040	60
	6	1590	0.055	90	1060	0.039	40	1860	0.053	100	1330	0.044	60
	7	1360	0.061	80	910	0.043	40	1590	0.058	90	1140	0.049	60
	8	1190	0.067	80	800	0.047	40	1390	0.064	90	1000	0.054	50
	9	1060	0.073	80	710	0.051	40	1240	0.069	90	880	0.058	50
	10	960	0.078	80	640	0.055	40	1110	0.074	80	800	0.063	50
	11	870	0.084	70	580	0.059	30	1010	0.080	80	720	0.067	50
	12	800	0.092	70	530	0.064	30	930	0.087	80	660	0.073	50
	13	730	0.099	70	490	0.070	30	860	0.094	80	610	0.080	50
	14	680	0.109	70	450	0.076	30	800	0.104	80	570	0.087	50
	15	640	0.119	80	420	0.083	30	740	0.113	80	530	0.095	50
	16	600	0.128	80	400	0.090	40	700	0.122	90	500	0.103	50
	17	560	0.138	80	370	0.096	40	660	0.131	90	470	0.110	50
	18	530	0.147	80	350	0.103	40	620	0.140	90	440	0.118	50
	19	500	0.157	80	340	0.110	40	590	0.149	90	420	0.125	50
	20	480	0.166	80	320	0.116	40	560	0.158	90	400	0.133	50

355HPU

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	35-55			20-40			45-65			35-55		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3	4780	0.048	230	3180	0.034	110	5840	0.046	270	4780	0.039	190
	4	3580	0.057	200	2390	0.040	100	4380	0.054	240	3580	0.046	160
	5	2870	0.066	190	1910	0.046	90	3500	0.063	220	2870	0.053	150
	6	2390	0.075	180	1590	0.052	80	2920	0.071	210	2390	0.060	140
	7	2050	0.084	170	1360	0.059	80	2500	0.079	200	2050	0.067	140
	8	1790	0.092	170	1190	0.065	80	2190	0.088	190	1790	0.074	130
	9	1590	0.101	160	1060	0.071	80	1950	0.096	190	1590	0.081	130
	10	1430	0.110	160	960	0.077	70	1750	0.104	180	1430	0.088	130
	11	1300	0.114	150	870	0.080	70	1590	0.109	170	1300	0.091	120
	12	1190	0.123	150	800	0.086	70	1460	0.117	170	1190	0.099	120
	13	1100	0.132	150	730	0.092	70	1350	0.125	170	1100	0.106	120
	14	1020	0.141	140	680	0.099	70	1250	0.134	170	1020	0.113	110
	15	960	0.150	140	640	0.105	70	1170	0.142	170	960	0.120	110
	16	900	0.158	140	600	0.111	70	1090	0.150	160	900	0.127	110
	17	840	0.163	140	560	0.114	60	1030	0.155	160	840	0.130	110
	18	800	0.167	130	530	0.117	60	970	0.159	150	800	0.134	110
	19	750	0.172	130	500	0.120	60	920	0.163	150	750	0.137	100
	20	720	0.176	130	480	0.123	60	880	0.167	150	720	0.141	100

TYPHOON SUH

HIGH PERFORMANCE - STAINLESS STEEL

High performance tools for stainless steel (ISO M), steel (ISO P), cast iron (ISO K) and HRSA super alloys (ISO S) below 45 HRC.

Punte ad alto rendimento per la foratura di acciaio inossidabile (ISO M), acciaio (ISO P), ghisa (ISO K) e super leghe (ISO S) sino a 45 HRC.

Hochleistungsbohrer für das Bohren von rostfreiem Stahl (ISO M), Stahl (ISO P), Gusseisen (ISO K) und Superlegierungen (ISO S) bis 45 HRC.

Forets haute performance pour le perçage de l'acier inoxydable (ISO M), de l'acier (ISO P), de la fonte (ISO K) et des super alliages (ISO S) jusqu'à 45 HRC.

Puntas de alto rendimiento para el taladro de acero inoxidable (ISO M), acero (ISO P), hierro fundido (ISO K) e súper aleaciones (ISO S) hasta 45 HRC.

Высокопроизводительный инструмент для обработки нержавеющей стали (ISO M), стали (ISO P), чугуна (ISO K) и жаропрочных сплавов (ISO S) с твёрдостью до 45 HRC.

TYPHOON SUH

HIGH PERFORMANCE - STAINLESS STEEL

- Self-centering geometry: highly accurate holes
- Straight cutting edge: short chips for easy evacuation and high reliability
- Special edge design: high performance and edge protection
- Back taper geometry: improves the cutting efficiency
- Chip pocket finishing: highly polished to reduce welding and improve chip ejection
- Large oil holes: improves coolant feed
- Substrate and coating: specifically selected for high wear resistance, long and reliable life

- Affûtage autocentré pour l'exécution de trous précis
- Profil de l'arête droit et renforcé : il génère des copeaux courts et garantit une grande fiabilité
- Géométrie de l'arête avec affûtage spécifique pour protéger l'arête et les angles
- Géométrie du corps avec conicité arrière pour faciliter l'action de coupe
- Finition des goujoures : polie pour réduire le problème du collage et facilitent l'évacuation des copeaux
- Trous de lubrification avec géométrie modifiée pour un apport de lubrifiant plus important
- Substrat et revêtement spécifiques pour garantir durée et fiabilité

- Affilatura autocentrante per l'esecuzione di fori precisi
- Profilo del tagliente diritto e rinforzato: genera trucioli corti e garantisce grande affidabilità
- Geometria del tagliente con affilatura specifica a protezione del tagliente e degli spigoli
- Geometria del corpo con conicità posteriore per agevolare l'azione di taglio
- Finitura gole: lappate per ridurre il problema dell'incollaggio e facilitare l'evacuazione dei trucioli
- Fori di refrigerazione con geometria modificata per un maggior apporto di refrigerante
- Substrato e rivestimento specifici per garantire durata e affidabilità

- Afilado autocentrante para la ejecución de agujeros precisos
- Perfil del filo recto y reforzado: genera virutas cortas y garantiza una gran fiabilidad
- Geometría del filo con afilado específico para proteger el filo y los ángulos
- Geometría del cuerpo con conicidad posterior para facilitar la acción de corte
- Acabado ranuras: lapeadas para reducir el problema del encolado y facilitar la evacuación de las virutas
- Agujeros de refrigeración con geometría modificada para una mayor aportación de refrigerante
- Sustrato y revestimiento específicos para garantizar duración y fiabilidad

- Selbstzentrierender Schliff für die Herstellung von präzisen Bohrungen
- Gerades und verstärktes Schneidkantenprofil: zur Erzeugung kurzer Späne und zur Gewährleistung hoher Zuverlässigkeit
- Geometrie der Schneidkante mit speziellem Schliff zum Schutz von Schneidkante und Kanten
- Geometrie des Körpers mit konischem hinteren Bereich zur Erleichterung des Schnittvorgangs
- Schlichtbearbeitung der Nuten: geläppt, um Probleme durch Verkleben zu reduzieren und um die Späneabführung zu erleichtern
- Kühlöffnungen mit abgeänderter Geometrie für einen verbesserten Kühlmittelzufluss
- Spezielles Trägermaterial und spezielle Beschichtung zur Gewährleistung von Standzeit und Zuverlässigkeit

- Самоцентрирующаяся геометрия: высокая точность отверстий
- Прямые режущие кромки: формирование короткой стружки и высокая надежность
- Геометрия режущей кромки со специальной заточкой: высокая производительность и защита кромок
- Геометрия с обратным конусом: увеличивает эффективность обработки
- Отполированные стружечные канавки: уменьшают вероятность приваривания стружки и облегчают ее вывод
- Широкие каналы для СОЖ: увеличена эффективность подвода СОЖ
- Специальное покрытие для повышения стойкости инструмента

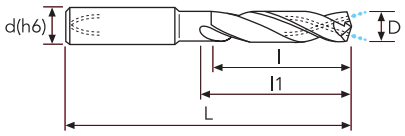
353SUH

stainless steel, polished flutes, SUH (through coolant)

3XD | DIN 6537K | SUH | MG PV300 | 140° | 30°

P	M	K	N	S	H
☆	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
3.00	+0.012/+0.002	6	14	20	62	353SUH0300	●
3.10	+0.016/+0.004	6	14	20	62	353SUH0310	●
3.20	+0.016/+0.004	6	14	20	62	353SUH0320	●
3.30	+0.016/+0.004	6	14	20	62	353SUH0330	●
3.40	+0.016/+0.004	6	14	20	62	353SUH0340	●
3.50	+0.016/+0.004	6	14	20	62	353SUH0350	●
3.60	+0.016/+0.004	6	14	20	62	353SUH0360	●
3.70	+0.016/+0.004	6	14	20	62	353SUH0370	●
3.80	+0.016/+0.004	6	17	24	66	353SUH0380	●
3.90	+0.016/+0.004	6	17	24	66	353SUH0390	●
4.00	+0.016/+0.004	6	17	24	66	353SUH0400	●
4.10	+0.016/+0.004	6	17	24	66	353SUH0410	●
4.20	+0.016/+0.004	6	17	24	66	353SUH0420	●
4.30	+0.016/+0.004	6	17	24	66	353SUH0430	●
4.40	+0.016/+0.004	6	17	24	66	353SUH0440	●
4.50	+0.016/+0.004	6	17	24	66	353SUH0450	●
4.60	+0.016/+0.004	6	17	24	66	353SUH0460	●
4.70	+0.016/+0.004	6	17	24	66	353SUH0470	●
4.80	+0.016/+0.004	6	20	28	66	353SUH0480	●
4.90	+0.016/+0.004	6	20	28	66	353SUH0490	●
5.00	+0.016/+0.004	6	20	28	66	353SUH0500	●
5.10	+0.016/+0.004	6	20	28	66	353SUH0510	●
5.20	+0.016/+0.004	6	20	28	66	353SUH0520	●
5.30	+0.016/+0.004	6	20	28	66	353SUH0530	●
5.40	+0.016/+0.004	6	20	28	66	353SUH0540	●
5.50	+0.016/+0.004	6	20	28	66	353SUH0550	●
5.60	+0.016/+0.004	6	20	28	66	353SUH0560	●
5.70	+0.016/+0.004	6	20	28	66	353SUH0570	●
5.80	+0.016/+0.004	6	20	28	66	353SUH0580	●
5.90	+0.016/+0.004	6	20	28	66	353SUH0590	●
6.00	+0.016/+0.004	6	20	28	66	353SUH0600	●
6.10	+0.021/+0.006	8	24	34	79	353SUH0610	●
6.20	+0.021/+0.006	8	24	34	79	353SUH0620	●
6.30	+0.021/+0.006	8	24	34	79	353SUH0630	●
6.40	+0.021/+0.006	8	24	34	79	353SUH0640	●
6.50	+0.021/+0.006	8	24	34	79	353SUH0650	●
6.60	+0.021/+0.006	8	24	34	79	353SUH0660	●
6.70	+0.021/+0.006	8	24	34	79	353SUH0670	●
6.80	+0.021/+0.006	8	24	34	79	353SUH0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

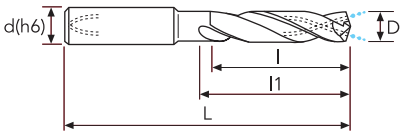
353SUH

stainless steel, polished flutes, SUH (through coolant)

3XD | DIN 6537K | SUH | MG PV300 | 140° | 30°

P	M	K	N	S	H
☆	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
6.90	+0.021/+0.006	8	24	34	79	353SUH0690	●
7.00	+0.021/+0.006	8	24	34	79	353SUH0700	●
7.10	+0.021/+0.006	8	29	41	79	353SUH0710	●
7.20	+0.021/+0.006	8	29	41	79	353SUH0720	●
7.30	+0.021/+0.006	8	29	41	79	353SUH0730	●
7.40	+0.021/+0.006	8	29	41	79	353SUH0740	●
7.50	+0.021/+0.006	8	29	41	79	353SUH0750	●
7.60	+0.021/+0.006	8	29	41	79	353SUH0760	●
7.70	+0.021/+0.006	8	29	41	79	353SUH0770	●
7.80	+0.021/+0.006	8	29	41	79	353SUH0780	●
7.90	+0.021/+0.006	8	29	41	79	353SUH0790	●
8.00	+0.021/+0.006	8	29	41	79	353SUH0800	●
8.10	+0.021/+0.006	10	35	47	89	353SUH0810	●
8.20	+0.021/+0.006	10	35	47	89	353SUH0820	●
8.30	+0.021/+0.006	10	35	47	89	353SUH0830	●
8.40	+0.021/+0.006	10	35	47	89	353SUH0840	●
8.50	+0.021/+0.006	10	35	47	89	353SUH0850	●
8.60	+0.021/+0.006	10	35	47	89	353SUH0860	●
8.70	+0.021/+0.006	10	35	47	89	353SUH0870	●
8.80	+0.021/+0.006	10	35	47	89	353SUH0880	●
8.90	+0.021/+0.006	10	35	47	89	353SUH0890	●
9.00	+0.021/+0.006	10	35	47	89	353SUH0900	●
9.10	+0.021/+0.006	10	35	47	89	353SUH0910	●
9.20	+0.021/+0.006	10	35	47	89	353SUH0920	●
9.30	+0.021/+0.006	10	35	47	89	353SUH0930	●
9.40	+0.021/+0.006	10	35	47	89	353SUH0940	●
9.50	+0.021/+0.006	10	35	47	89	353SUH0950	●
9.60	+0.021/+0.006	10	35	47	89	353SUH0960	●
9.70	+0.021/+0.006	10	35	47	89	353SUH0970	●
9.80	+0.021/+0.006	10	35	47	89	353SUH0980	●
9.90	+0.021/+0.006	10	35	47	89	353SUH0990	●
10.00	+0.021/+0.006	10	35	47	89	353SUH1000	●
10.20	+0.025/+0.007	12	40	55	102	353SUH1020	●
10.50	+0.025/+0.007	12	40	55	102	353SUH1050	●
10.80	+0.025/+0.007	12	40	55	102	353SUH1080	●
11.00	+0.025/+0.007	12	40	55	102	353SUH1100	●
11.20	+0.025/+0.007	12	40	55	102	353SUH1120	○
11.30	+0.025/+0.007	12	40	55	102	353SUH1130	○
11.50	+0.025/+0.007	12	40	55	102	353SUH1150	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353SUH

stainless steel, polished flutes, SUH (through coolant)

3XD | DIN 6537K | SUH | MG PV300 | 140° | 30°

P	M	K	N	S	H
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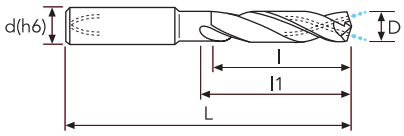
★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
11.80	+0.025/+0.007	12	40	55	102	353SUH1180	●
12.00	+0.025/+0.007	12	40	55	102	353SUH1200	●
12.20	+0.025/+0.007	14	43	60	107	353SUH1220	●
12.50	+0.025/+0.007	14	43	60	107	353SUH1250	●
12.80	+0.025/+0.007	14	43	60	107	353SUH1280	●
13.00	+0.025/+0.007	14	43	60	107	353SUH1300	●
13.30	+0.025/+0.007	14	43	60	107	353SUH1330	●
13.50	+0.025/+0.007	14	43	60	107	353SUH1350	●
13.80	+0.025/+0.007	14	43	60	107	353SUH1380	●
14.00	+0.025/+0.007	14	43	60	107	353SUH1400	●
14.50	+0.025/+0.007	16	45	65	115	353SUH1450	●
15.00	+0.025/+0.007	16	65	65	115	353SUH1500	●
15.30	+0.025/+0.007	16	65	65	115	353SUH1530	●
15.50	+0.025/+0.007	16	65	65	115	353SUH1550	●
15.80	+0.025/+0.007	16	65	65	115	353SUH1580	●
16.00	+0.025/+0.007	16	65	65	115	353SUH1600	●
16.50	+0.025/+0.007	18	73	73	123	353SUH1650	●
17.00	+0.025/+0.007	18	73	73	123	353SUH1700	●
17.50	+0.025/+0.007	18	73	73	123	353SUH1750	●
18.00	+0.025/+0.007	18	73	73	123	353SUH1800	●
18.50	+0.029/+0.008	20	79	79	131	353SUH1850	●
19.00	+0.029/+0.008	20	79	79	131	353SUH1900	●
19.50	+0.029/+0.008	20	79	79	131	353SUH1950	●
20.00	+0.029/+0.008	20	79	79	131	353SUH2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353SUH

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	130-150			100-140			80-100			55-75		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	14860	0.118	1760	12740	0.106	1360	9550	0.095	900	6900	0.083	570
4	11150	0.140	1560	9550	0.126	1200	7170	0.112	800	5180	0.098	510
5	8920	0.161	1440	7640	0.145	1110	5730	0.129	740	4140	0.113	470
6	7430	0.183	1360	6370	0.164	1050	4780	0.146	700	3450	0.128	440
7	6370	0.204	1300	5460	0.184	1000	4090	0.163	670	2960	0.143	420
8	5570	0.226	1260	4780	0.203	970	3580	0.181	650	2590	0.158	410
9	4950	0.247	1220	4250	0.223	950	3180	0.198	630	2300	0.173	400
10	4460	0.269	1200	3820	0.242	920	2870	0.215	620	2070	0.188	390
11	4050	0.280	1130	3470	0.252	870	2610	0.224	580	1880	0.196	370
12	3720	0.301	1120	3180	0.271	860	2390	0.241	580	1730	0.211	360
13	3430	0.323	1110	2940	0.290	850	2200	0.258	570	1590	0.226	360
14	3180	0.344	1090	2730	0.310	850	2050	0.275	560	1480	0.241	360
15	2970	0.366	1090	2550	0.329	840	1910	0.292	560	1380	0.256	350
16	2790	0.387	1080	2390	0.348	830	1790	0.310	550	1290	0.271	350
17	2620	0.398	1040	2250	0.358	810	1690	0.318	540	1220	0.278	340
18	2480	0.409	1010	2120	0.368	780	1590	0.327	520	1150	0.286	330
19	2350	0.419	990	2010	0.377	760	1510	0.335	510	1090	0.293	320
20	2230	0.430	960	1910	0.387	740	1430	0.344	490	1040	0.301	310

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	50-70			40-60			30-40			20-30		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	6370	0.077	490	5310	0.061	330	3720	0.054	200	2650	0.046	120
4	4780	0.091	430	3980	0.073	290	2790	0.064	180	1990	0.055	110
5	3820	0.105	400	3180	0.084	270	2230	0.073	160	1590	0.063	100
6	3180	0.119	380	2650	0.095	250	1860	0.083	150	1330	0.071	90
7	2730	0.133	360	2270	0.106	240	1590	0.093	150	1140	0.080	90
8	2390	0.147	350	1990	0.117	230	1390	0.103	140	1000	0.088	90
9	2120	0.161	340	1770	0.129	230	1240	0.112	140	880	0.096	80
10	1910	0.175	330	1590	0.140	220	1110	0.122	140	800	0.105	80
11	1740	0.182	320	1450	0.145	210	1010	0.127	130	720	0.109	80
12	1590	0.196	310	1330	0.157	210	930	0.137	130	660	0.117	80
13	1470	0.210	310	1220	0.168	200	860	0.147	130	610	0.126	80
14	1360	0.224	300	1140	0.179	200	800	0.157	130	570	0.134	80
15	1270	0.238	300	1060	0.190	200	740	0.166	120	530	0.143	80
16	1190	0.252	300	1000	0.201	200	700	0.176	120	500	0.151	80
17	1120	0.259	290	940	0.207	190	660	0.181	120	470	0.155	70
18	1060	0.266	280	880	0.212	190	620	0.186	120	440	0.159	70
19	1010	0.273	280	840	0.218	180	590	0.191	110	420	0.164	70
20	960	0.280	270	800	0.224	180	560	0.196	110	400	0.168	70

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	Material Group ISO 513	K1			K2			K3			K4		
	Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
	Vc (m/min)	**110-130**			**90-110**			**70-90**			**55-75**		
Ø RUN OUT <0.02mm	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	3	12740	0.118	1510	10620	0.106	1130	8490	0.095	800	6900	0.083	570
	4	9550	0.140	1330	7960	0.126	1000	6370	0.112	710	5180	0.098	510
	5	7640	0.161	1230	6370	0.145	920	5100	0.129	660	4140	0.113	470
	6	6370	0.183	1160	5310	0.164	870	4250	0.146	620	3450	0.128	440
	7	5460	0.204	1120	4550	0.184	840	3640	0.163	590	2960	0.143	420
	8	4780	0.226	1080	3980	0.203	810	3180	0.181	570	2590	0.158	410
	9	4250	0.247	1050	3540	0.223	790	2830	0.198	560	2300	0.173	400
	10	3820	0.269	1030	3180	0.242	770	2550	0.215	550	2070	0.188	390
	11	3470	0.280	970	2900	0.252	730	2320	0.224	520	1880	0.196	370
	12	3180	0.301	960	2650	0.271	720	2120	0.241	510	1730	0.211	360
	13	2940	0.323	950	2450	0.290	710	1960	0.258	510	1590	0.226	360
	14	2730	0.344	940	2270	0.310	700	1820	0.275	500	1480	0.241	360
	15	2550	0.366	930	2120	0.329	700	1700	0.292	500	1380	0.256	350
	16	2390	0.387	920	1990	0.348	690	1590	0.310	490	1290	0.271	350
	17	2250	0.398	890	1870	0.358	670	1500	0.318	480	1220	0.278	340
	18	2120	0.409	870	1770	0.368	650	1420	0.327	460	1150	0.286	330
	19	2010	0.419	840	1680	0.377	630	1340	0.335	450	1090	0.293	320
	20	1910	0.430	820	1590	0.387	620	1270	0.344	440	1040	0.301	310

	Material Group ISO 513	N2			N4								
	Hardness/Rm												
	Vc (m/min)	**180-220**			**160-200**								
Ø RUN OUT <0.02mm	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)						
	3	21230	0.128	2710	19110	0.128	2440						
	4	15920	0.151	2400	14330	0.151	2160						
	5	12740	0.174	2220	11460	0.174	2000						
	6	10620	0.197	2100	9550	0.197	1880						
	7	9100	0.221	2010	8190	0.221	1810						
	8	7960	0.244	1940	7170	0.244	1750						
	9	7080	0.267	1890	6370	0.267	1700						
	10	6370	0.290	1850	5730	0.290	1660						
	11	5790	0.302	1750	5210	0.302	1570						
	12	5310	0.325	1730	4780	0.325	1550						
	13	4900	0.348	1710	4410	0.348	1540						
	14	4550	0.372	1690	4090	0.372	1520						
	15	4250	0.395	1680	3820	0.395	1510						
	16	3980	0.418	1660	3580	0.418	1500						
	17	3750	0.430	1610	3370	0.430	1450						
	18	3540	0.441	1560	3180	0.441	1400						
	19	3350	0.453	1520	3020	0.453	1370						
	20	3180	0.464	1480	2870	0.464	1330						

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Material Group ISO 513	S1 S2			S3			S4			S5		
Hardness/Rm	< 35 HRC			35-45 HRC								
Vc (m/min)	30-50			20-40			45-65			35-55		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	4250	0.053	230	3180	0.037	120	5840	0.051	300	4780	0.043	200
4	3180	0.063	200	2390	0.044	110	4380	0.060	260	3580	0.050	180
5	2550	0.073	190	1910	0.051	100	3500	0.069	240	2870	0.058	170
6	2120	0.082	170	1590	0.058	90	2920	0.078	230	2390	0.066	160
7	1820	0.092	170	1360	0.064	90	2500	0.087	220	2050	0.074	150
8	1590	0.102	160	1190	0.071	80	2190	0.097	210	1790	0.081	150
9	1420	0.111	160	1060	0.078	80	1950	0.106	210	1590	0.089	140
10	1270	0.121	150	960	0.085	80	1750	0.115	200	1430	0.097	140
11	1160	0.126	150	870	0.088	80	1590	0.119	190	1300	0.101	130
12	1060	0.135	140	800	0.095	80	1460	0.129	190	1190	0.108	130
13	980	0.145	140	730	0.102	70	1350	0.138	190	1100	0.116	130
14	910	0.155	140	680	0.108	70	1250	0.147	180	1020	0.124	130
15	850	0.164	140	640	0.115	70	1170	0.156	180	960	0.132	130
16	800	0.174	140	600	0.122	70	1090	0.165	180	900	0.139	130
17	750	0.179	130	560	0.125	70	1030	0.170	180	840	0.143	120
18	710	0.184	130	530	0.129	70	970	0.175	170	800	0.147	120
19	670	0.189	130	500	0.132	70	920	0.179	160	750	0.151	110
20	640	0.194	120	480	0.135	70	880	0.155	140	720	0.155	110

355SUH

stainless steel, polished flutes, SUH (through coolant)

5XD | DIN 6537L | SUH | MG PV300 | 140° | 30°

P	M	K	N	S	H
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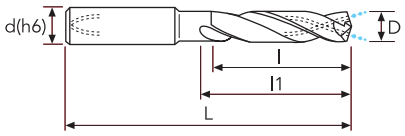
★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
3.00	+0.012/+0.002	6	23	28	66	355SUH0300	●
3.10	+0.016/+0.004	6	23	28	66	355SUH0310	●
3.20	+0.016/+0.004	6	23	28	66	355SUH0320	●
3.30	+0.016/+0.004	6	23	28	66	355SUH0330	●
3.40	+0.016/+0.004	6	23	28	66	355SUH0340	●
3.50	+0.016/+0.004	6	23	28	66	355SUH0350	●
3.60	+0.016/+0.004	6	23	28	66	355SUH0360	●
3.70	+0.016/+0.004	6	23	28	66	355SUH0370	●
3.80	+0.016/+0.004	6	29	36	74	355SUH0380	●
3.90	+0.016/+0.004	6	29	36	74	355SUH0390	●
4.00	+0.016/+0.004	6	29	36	74	355SUH0400	●
4.10	+0.016/+0.004	6	29	36	74	355SUH0410	●
4.20	+0.016/+0.004	6	29	36	74	355SUH0420	●
4.30	+0.016/+0.004	6	29	36	74	355SUH0430	●
4.40	+0.016/+0.004	6	29	36	74	355SUH0440	●
4.50	+0.016/+0.004	6	29	36	74	355SUH0450	●
4.60	+0.016/+0.004	6	29	36	74	355SUH0460	●
4.70	+0.016/+0.004	6	29	36	74	355SUH0470	●
4.80	+0.016/+0.004	6	35	44	82	355SUH0480	●
4.90	+0.016/+0.004	6	35	44	82	355SUH0490	●
5.00	+0.016/+0.004	6	35	44	82	355SUH0500	●
5.10	+0.016/+0.004	6	35	44	82	355SUH0510	●
5.20	+0.016/+0.004	6	35	44	82	355SUH0520	●
5.30	+0.016/+0.004	6	35	44	82	355SUH0530	●
5.40	+0.016/+0.004	6	35	44	82	355SUH0540	●
5.50	+0.016/+0.004	6	35	44	82	355SUH0550	●
5.60	+0.016/+0.004	6	35	44	82	355SUH0560	●
5.70	+0.016/+0.004	6	35	44	82	355SUH0570	●
5.80	+0.016/+0.004	6	35	44	82	355SUH0580	●
5.90	+0.016/+0.004	6	35	44	82	355SUH0590	●
6.00	+0.016/+0.004	6	35	44	82	355SUH0600	●
6.10	+0.021/+0.006	8	43	53	91	355SUH0610	●
6.20	+0.021/+0.006	8	43	53	91	355SUH0620	●
6.30	+0.021/+0.006	8	43	53	91	355SUH0630	●
6.40	+0.021/+0.006	8	43	53	91	355SUH0640	●
6.50	+0.021/+0.006	8	43	53	91	355SUH0650	●
6.60	+0.021/+0.006	8	43	53	91	355SUH0660	●
6.70	+0.021/+0.006	8	43	53	91	355SUH0670	●
6.80	+0.021/+0.006	8	43	53	91	355SUH0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355SUH

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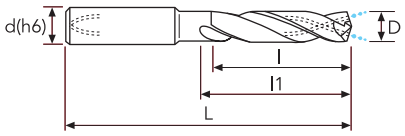
5XD | DIN 6537L | SUH | MG PV300 | 140° | 30°

P	M	K	N	S	H
☆	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
6.90	+0.021/+0.006	8	43	53	91	355SUH0690	●
7.00	+0.021/+0.006	8	43	53	91	355SUH0700	●
7.10	+0.021/+0.006	8	43	53	91	355SUH0710	●
7.20	+0.021/+0.006	8	43	53	91	355SUH0720	●
7.30	+0.021/+0.006	8	43	53	91	355SUH0730	●
7.40	+0.021/+0.006	8	43	53	91	355SUH0740	●
7.50	+0.021/+0.006	8	43	53	91	355SUH0750	●
7.60	+0.021/+0.006	8	43	53	91	355SUH0760	●
7.70	+0.021/+0.006	8	43	53	91	355SUH0770	●
7.80	+0.021/+0.006	8	43	53	91	355SUH0780	●
7.90	+0.021/+0.006	8	43	53	91	355SUH0790	●
8.00	+0.021/+0.006	8	43	53	91	355SUH0800	●
8.10	+0.021/+0.006	10	49	61	103	355SUH0810	●
8.20	+0.021/+0.006	10	49	61	103	355SUH0820	●
8.30	+0.021/+0.006	10	49	61	103	355SUH0830	●
8.40	+0.021/+0.006	10	49	61	103	355SUH0840	●
8.50	+0.021/+0.006	10	49	61	103	355SUH0850	●
8.60	+0.021/+0.006	10	49	61	103	355SUH0860	●
8.70	+0.021/+0.006	10	49	61	103	355SUH0870	●
8.80	+0.021/+0.006	10	49	61	103	355SUH0880	●
8.90	+0.021/+0.006	10	49	61	103	355SUH0890	●
9.00	+0.021/+0.006	10	49	61	103	355SUH0900	●
9.10	+0.021/+0.006	10	49	61	103	355SUH0910	●
9.20	+0.021/+0.006	10	49	61	103	355SUH0920	●
9.30	+0.021/+0.006	10	49	61	103	355SUH0930	●
9.40	+0.021/+0.006	10	49	61	103	355SUH0940	●
9.50	+0.021/+0.006	10	61	61	103	355SUH0950	●
9.60	+0.021/+0.006	10	61	61	103	355SUH0960	●
9.70	+0.021/+0.006	10	61	61	103	355SUH0970	●
9.80	+0.021/+0.006	10	61	61	103	355SUH0980	●
9.90	+0.021/+0.006	10	61	61	103	355SUH0990	●
10.00	+0.021/+0.006	10	61	61	103	355SUH1000	●
10.20	+0.025/+0.007	12	71	71	118	355SUH1020	●
10.30	+0.025/+0.007	12	71	71	118	355SUH1030	●
10.50	+0.025/+0.007	12	71	71	118	355SUH1050	●
10.80	+0.025/+0.007	12	71	71	118	355SUH1080	●
11.00	+0.025/+0.007	12	71	71	118	355SUH1100	●
11.20	+0.025/+0.007	12	71	71	118	355SUH1120	●
11.30	+0.025/+0.007	12	71	71	118	355SUH1130	●

● stock standard ○ non-standard stock ▽ stock exhaustion

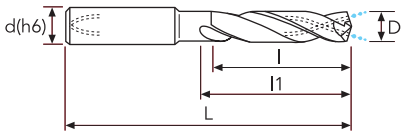
355SUH

stainless steel, polished flutes, SUH (through coolant)

5XD | DIN 6537L | SUH | MG PV300 | 140° | 30°

P	M	K	N	S	H
☆	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
11.50	+0.025/+0.007	12	71	71	118	355SUH1150	●
11.80	+0.025/+0.007	12	71	71	118	355SUH1180	●
12.00	+0.025/+0.007	12	71	71	118	355SUH1200	●
12.20	+0.025/+0.007	14	77	77	124	355SUH1220	●
12.50	+0.025/+0.007	14	77	77	124	355SUH1250	●
12.80	+0.025/+0.007	14	77	77	124	355SUH1280	●
13.00	+0.025/+0.007	14	77	77	124	355SUH1300	●
13.30	+0.025/+0.007	14	77	77	124	355SUH1330	●
13.50	+0.025/+0.007	14	77	77	124	355SUH1350	●
13.80	+0.025/+0.007	14	77	77	124	355SUH1380	●
14.00	+0.025/+0.007	14	77	77	124	355SUH1400	●
14.50	+0.025/+0.007	16	83	83	133	355SUH1450	●
15.00	+0.025/+0.007	16	83	83	133	355SUH1500	●
15.30	+0.025/+0.007	16	83	83	133	355SUH1530	●
15.50	+0.025/+0.007	16	83	83	133	355SUH1550	●
15.80	+0.025/+0.007	16	83	83	133	355SUH1580	●
16.00	+0.025/+0.007	16	83	83	133	355SUH1600	●
16.50	+0.025/+0.007	18	93	93	143	355SUH1650	●
17.00	+0.025/+0.007	18	93	93	143	355SUH1700	●
17.50	+0.025/+0.007	18	93	93	143	355SUH1750	●
18.00	+0.025/+0.007	18	93	93	143	355SUH1800	●
18.50	+0.029/+0.008	20	101	101	153	355SUH1850	●
19.00	+0.029/+0.008	20	101	101	153	355SUH1900	●
19.50	+0.029/+0.008	20	101	101	153	355SUH1950	●
20.00	+0.029/+0.008	20	101	101	153	355SUH2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355SUH

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	**120-140**			**100-120**			**70-90**			**45-65**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	13800	0.101	1390	11680	0.075	880	8490	0.060	510	5840	0.050	290
4	10350	0.119	1230	8760	0.089	780	6370	0.071	450	4380	0.059	260
5	8280	0.137	1130	7010	0.103	720	5100	0.082	420	3500	0.069	240
6	6900	0.155	1070	5840	0.117	680	4250	0.093	400	2920	0.078	230
7	5910	0.174	1030	5000	0.130	650	3640	0.104	380	2500	0.087	220
8	5180	0.192	990	4380	0.144	630	3180	0.115	370	2190	0.096	210
9	4600	0.210	970	3890	0.158	610	2830	0.126	360	1950	0.105	200
10	4140	0.228	950	3500	0.171	600	2550	0.137	350	1750	0.114	200
11	3760	0.238	890	3180	0.178	570	2320	0.143	330	1590	0.119	190
12	3450	0.256	880	2920	0.192	560	2120	0.154	330	1460	0.128	190
13	3180	0.274	870	2690	0.206	550	1960	0.164	320	1350	0.137	190
14	2960	0.292	870	2500	0.219	550	1820	0.175	320	1250	0.146	180
15	2760	0.311	860	2340	0.233	550	1700	0.186	320	1170	0.155	180
16	2590	0.329	850	2190	0.247	540	1590	0.197	310	1090	0.164	180
17	2440	0.338	820	2060	0.254	520	1500	0.203	300	1030	0.169	170
18	2300	0.347	800	1950	0.260	510	1420	0.208	300	970	0.174	170
19	2180	0.356	780	1840	0.267	490	1340	0.214	290	920	0.178	160
20	2070	0.366	760	1750	0.274	480	1270	0.219	280	880	0.183	160

Material Group ISO 513	M1			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	**40-60**			**30-50**			**25-35**			**15-25**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	5310	0.065	350	4250	0.052	220	3180	0.046	150	2120	0.039	80
4	3980	0.077	310	3180	0.062	200	2390	0.054	130	1590	0.046	70
5	3180	0.089	280	2550	0.071	180	1910	0.062	120	1270	0.053	70
6	2650	0.101	270	2120	0.081	170	1590	0.071	110	1060	0.061	60
7	2270	0.113	260	1820	0.090	160	1360	0.079	110	910	0.068	60
8	1990	0.125	250	1590	0.100	160	1190	0.087	100	800	0.075	60
9	1770	0.137	240	1420	0.109	160	1060	0.096	100	710	0.082	60
10	1590	0.148	240	1270	0.119	150	960	0.104	100	640	0.089	60
11	1450	0.154	220	1160	0.124	140	870	0.108	90	580	0.093	50
12	1330	0.166	220	1060	0.133	140	800	0.116	90	530	0.100	50
13	1220	0.178	220	980	0.143	140	730	0.125	90	490	0.107	50
14	1140	0.190	220	910	0.152	140	680	0.133	90	450	0.114	50
15	1060	0.202	210	850	0.162	140	640	0.141	90	420	0.121	50
16	1000	0.214	210	800	0.171	140	600	0.150	90	400	0.128	50
17	940	0.220	210	750	0.176	130	560	0.154	90	370	0.132	50
18	880	0.226	200	710	0.181	130	530	0.158	80	350	0.135	50
19	840	0.232	190	670	0.185	120	500	0.162	80	340	0.139	50
20	800	0.238	190	640	0.190	120	480	0.166	80	320	0.143	50

355SUH

	Material Group ISO 513	K1			K2			K3			K4		
	Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
	Vc (m/min)	**100-120**			**80-100**			**55-75**			**40-60**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**3**	11680	0.101	1170	9550	0.090	860	6900	0.080	550	5310	0.070	370
	4	8760	0.119	1040	7170	0.107	770	5180	0.095	490	3980	0.083	330
	5	7010	0.137	960	5730	0.123	710	4140	0.110	450	3180	0.096	310
	6	5840	0.155	910	4780	0.140	670	3450	0.124	430	2650	0.109	290
	7	5000	0.174	870	4090	0.156	640	2960	0.139	410	2270	0.122	280
	8	4380	0.192	840	3580	0.173	620	2590	0.154	400	1990	0.134	270
	9	3890	0.210	820	3180	0.189	600	2300	0.168	390	1770	0.147	260
	10	3500	0.228	800	2870	0.206	590	2070	0.183	380	1590	0.160	250
	11	3180	0.238	760	2610	0.214	560	1880	0.190	360	1450	0.166	240
	12	2920	0.256	750	2390	0.230	550	1730	0.205	350	1330	0.179	240
	13	2690	0.274	740	2200	0.247	540	1590	0.219	350	1220	0.192	230
	14	2500	0.292	730	2050	0.263	540	1480	0.234	350	1140	0.205	230
	15	2340	0.311	730	1910	0.280	530	1380	0.249	340	1060	0.217	230
	16	2190	0.329	720	1790	0.296	530	1290	0.263	340	1000	0.230	230
	17	2060	0.338	700	1690	0.304	510	1220	0.270	330	940	0.237	220
	18	1950	0.347	680	1590	0.313	500	1150	0.278	320	880	0.243	210
	19	1840	0.356	660	1510	0.321	480	1090	0.285	310	840	0.249	210
	20	1750	0.366	640	1430	0.329	470	1040	0.292	300	800	0.256	200

	Material Group ISO 513	N2			N4								
	Hardness/Rm												
	Vc (m/min)	**180-220**			**160-200**								
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)						
Ø RUN OUT <0.02mm	**3**	21230	0.109	2300	19110	0.096	1840						
	4	15920	0.128	2040	14330	0.114	1630						
	5	12740	0.148	1890	11460	0.132	1510						
	6	10620	0.168	1780	9550	0.149	1420						
	7	9100	0.188	1710	8190	0.167	1370						
	8	7960	0.207	1650	7170	0.184	1320						
	9	7080	0.227	1610	6370	0.202	1290						
	10	6370	0.247	1570	5730	0.219	1260						
	11	5790	0.257	1490	5210	0.228	1190						
	12	5310	0.276	1470	4780	0.246	1170						
	13	4900	0.296	1450	4410	0.263	1160						
	14	4550	0.316	1440	4090	0.281	1150						
	15	4250	0.336	1430	3820	0.298	1140						
	16	3980	0.355	1410	3580	0.316	1130						
	17	3750	0.365	1370	3370	0.325	1090						
	18	3540	0.375	1330	3180	0.333	1060						
	19	3350	0.385	1290	3020	0.342	1030						
	20	3180	0.395	1260	2870	0.351	1010						

355SUH

Material Group ISO 513	S1 S2			S3			S4			S5		
Hardness/Rm	< 35 HRC			35-45 HRC								
Vc (m/min)	25-45			15-35			40-60			30-50		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	3720	0.045	170	2650	0.032	80	5310	0.043	230	4250	0.036	150
4	2790	0.053	150	1990	0.037	70	3980	0.051	200	3180	0.043	140
5	2230	0.062	140	1590	0.043	70	3180	0.059	190	2550	0.049	130
6	1860	0.070	130	1330	0.049	70	2650	0.066	180	2120	0.056	120
7	1590	0.078	120	1140	0.055	60	2270	0.074	170	1820	0.063	110
8	1390	0.086	120	1000	0.060	60	1990	0.082	160	1590	0.069	110
9	1240	0.095	120	880	0.066	60	1770	0.090	160	1420	0.076	110
10	1110	0.103	110	800	0.072	60	1590	0.098	160	1270	0.082	100
11	1010	0.107	110	720	0.075	50	1450	0.102	150	1160	0.086	100
12	930	0.115	110	660	0.081	50	1330	0.109	150	1060	0.092	100
13	860	0.123	110	610	0.086	50	1220	0.117	140	980	0.099	100
14	800	0.132	110	570	0.092	50	1140	0.125	140	910	0.105	100
15	740	0.140	100	530	0.098	50	1060	0.133	140	850	0.112	100
16	700	0.148	100	500	0.104	50	1000	0.141	140	800	0.118	90
17	660	0.152	100	470	0.106	50	940	0.145	140	750	0.122	90
18	620	0.156	100	440	0.109	50	880	0.148	130	710	0.125	90
19	590	0.160	90	420	0.112	50	840	0.152	130	670	0.128	90
20	560	0.164	90	400	0.115	50	800	0.156	130	640	0.132	80

TYPHOON ALH

HIGH PERFORMANCE - NON-FERROUS MATERIALS

Drills specifically designed for non-ferrous materials (ISO N).

Punte progettate appositamente per la foratura di materiali non ferrosi (ISO N).

Eigens für das Bohren von nicht eisenhaltigen Materialien (ISO N) entwickelte Bohrer.

Forets conçus spécialement pour le perçage de matériaux non ferreux (ISO N).

Puntas proyectadas específicamente para el taladro de materiales no ferrosos (ISO N).

Свёрла, разработанные специально для сверления отверстий в цветных металлах (ISO N).

TYPHOON ALH

- Self-centering geometry: highly accurate holes
- Straight cutting edge and highly positive geometry: low cutting forces to prevent welding
- Chip pocket: wide and curved to improve the chip ejection
- Back taper geometry: improves the cutting efficiency
- Chip pocket finishing: highly polished to reduce welding and improve chip ejection
- Modified oil holes: improves coolant feed
- Substrate: specifically selected for high wear resistance, long and reliable life

- Affûtage autocentré pour l'exécution de trous précis
- Profil de l'arête droit avec affûtage spécifique pour réduire l'effort de coupe
- Géométrie des goujoures : arquées et larges pour faciliter l'évacuation des copeaux
- Géométrie du corps avec conicité arrière pour faciliter l'action de coupe
- Finition des goujoures : polie pour réduire le problème du collage et faciliter l'évacuation des copeaux
- Trous de lubrification avec géométrie modifiée pour un apport de lubrifiant plus important
- Substrat spécifique pour garantir durée et fiabilité

- Affilatura autocentrante per l'esecuzione di fori precisi
- Profilo del tagliente diritto con affilatura specifica per ridurre lo sforzo di taglio
- Geometria delle gole: arcuate e ampie per agevolare l'evacuazione dei trucioli
- Geometria del corpo con conicità posteriore per agevolare l'azione di taglio
- Finitura gole: lappate per ridurre il problema dell'incollaggio e facilitare l'evacuazione dei trucioli
- Fori di refrigerazione con geometria modificata per un maggior apporto di refrigerante
- Substrato specifico per garantire durata e affidabilità

- Afilado autocentrante para la ejecución de agujeros precisos
- Perfil del borde recto con afilado específico para reducir el esfuerzo de corte
- Geometría de las ranuras: arqueadas y amplias para facilitar la evacuación de las virutas
- Geometría del cuerpo con conicidad posterior para facilitar la acción de corte
- Acabado ranuras: lapeadas para reducir el problema del encolado y facilitar la evacuación de las virutas
- Agujeros de refrigeración con geometría modificada para una mayor aportación de refrigerante
- Sustrato específico para garantizar duración y fiabilidad

- Selbstzentrierender Schliff für die Herstellung von präzisen Bohrungen
- Gerades Schneidkantenprofil mit Spezialschliff zur Reduzierung des Schneiddrucks
- Geometrie der Nuten: gebogen und breit zur Vereinfachung der Späneabführung
- Geometrie des Körpers mit konischem hinteren Bereich zur Erleichterung des Schnittvorgangs
- Schlichtbearbeitung der Nuten: geläppt, um Probleme durch Verkleben zu reduzieren und um die Späneabführung zu erleichtern
- Kühlöffnungen mit abgeänderter Geometrie für einen verbesserten Kühlmittelzufluss
- Spezielles Trägermaterial zur Gewährleistung von Lebensdauer und Zuverlässigkeit

- Самоцентрирующаяся геометрия: высокая точность отверстий
- Прямые режущие кромки и большой передний угол: низкие силы резания
- Стружечные канавки: широкие с большим наклоном для надежной эвакуации стружки
- Геометрия с обратным конусом: увеличивает эффективность обработки
- Отполированные стружечные канавки: уменьшают вероятность приваривания стружки и облегчают ее вывод
- Большие отверстия: увеличена эффективность подвода СОЖ
- Специальное покрытие для повышения стойкости инструмента

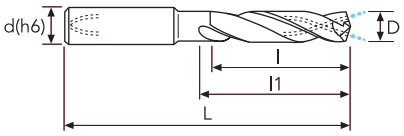
353ALH

aluminium, polished flutes, ALH (through coolant)

3XD | DIN 6537K | ALH | MG POLISHED | 130° | 30°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
3.00	+0.012/+0.002	6	14	20	62	353ALH0300	●
3.10	+0.016/+0.004	6	14	20	62	353ALH0310	●
3.20	+0.016/+0.004	6	14	20	62	353ALH0320	●
3.30	+0.016/+0.004	6	14	20	62	353ALH0330	●
3.40	+0.016/+0.004	6	14	20	62	353ALH0340	●
3.50	+0.016/+0.004	6	14	20	62	353ALH0350	●
3.60	+0.016/+0.004	6	14	20	62	353ALH0360	●
3.70	+0.016/+0.004	6	14	20	62	353ALH0370	●
3.80	+0.016/+0.004	6	17	24	66	353ALH0380	●
3.90	+0.016/+0.004	6	17	24	66	353ALH0390	●
4.00	+0.016/+0.004	6	17	24	66	353ALH0400	●
4.10	+0.016/+0.004	6	17	24	66	353ALH0410	●
4.20	+0.016/+0.004	6	17	24	66	353ALH0420	●
4.30	+0.016/+0.004	6	17	24	66	353ALH0430	●
4.40	+0.016/+0.004	6	17	24	66	353ALH0440	○
4.50	+0.016/+0.004	6	17	24	66	353ALH0450	●
4.60	+0.016/+0.004	6	17	24	66	353ALH0460	●
4.70	+0.016/+0.004	6	17	24	66	353ALH0470	●
4.80	+0.016/+0.004	6	20	28	66	353ALH0480	●
4.90	+0.016/+0.004	6	20	28	66	353ALH0490	○
5.00	+0.016/+0.004	6	20	28	66	353ALH0500	●
5.10	+0.016/+0.004	6	20	28	66	353ALH0510	●
5.20	+0.016/+0.004	6	20	28	66	353ALH0520	●
5.30	+0.016/+0.004	6	20	28	66	353ALH0530	●
5.40	+0.016/+0.004	6	20	28	66	353ALH0540	○
5.50	+0.016/+0.004	6	20	28	66	353ALH0550	●
5.60	+0.016/+0.004	6	20	28	66	353ALH0560	●
5.70	+0.016/+0.004	6	20	28	66	353ALH0570	●
5.80	+0.016/+0.004	6	20	28	66	353ALH0580	●
5.90	+0.016/+0.004	6	20	28	66	353ALH0590	○
6.00	+0.016/+0.004	6	20	28	66	353ALH0600	●
6.10	+0.021/+0.006	8	24	34	79	353ALH0610	●
6.20	+0.021/+0.006	8	24	34	79	353ALH0620	●
6.30	+0.021/+0.006	8	24	34	79	353ALH0630	●
6.40	+0.021/+0.006	8	24	34	79	353ALH0640	○
6.50	+0.021/+0.006	8	24	34	79	353ALH0650	●
6.60	+0.021/+0.006	8	24	34	79	353ALH0660	○
6.70	+0.021/+0.006	8	24	34	79	353ALH0670	●
6.80	+0.021/+0.006	8	24	34	79	353ALH0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

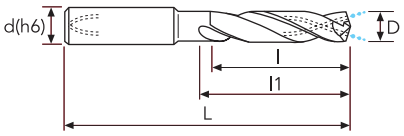
353ALH

aluminium, polished flutes, ALH (through coolant)

3XD | DIN 6537K | ALH | MG POLISHED | 130° | 30°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
6.90	+0.021/+0.006	8	24	34	79	353ALH0690	○
7.00	+0.021/+0.006	8	24	34	79	353ALH0700	●
7.10	+0.021/+0.006	8	29	41	79	353ALH0710	○
7.20	+0.021/+0.006	8	29	41	79	353ALH0720	●
7.30	+0.021/+0.006	8	29	41	79	353ALH0730	○
7.40	+0.021/+0.006	8	29	41	79	353ALH0740	○
7.50	+0.021/+0.006	8	29	41	79	353ALH0750	●
7.60	+0.021/+0.006	8	29	41	79	353ALH0760	○
7.70	+0.021/+0.006	8	29	41	79	353ALH0770	○
7.80	+0.021/+0.006	8	29	41	79	353ALH0780	●
7.90	+0.021/+0.006	8	29	41	79	353ALH0790	○
8.00	+0.021/+0.006	8	29	41	79	353ALH0800	●
8.10	+0.021/+0.006	10	35	47	89	353ALH0810	○
8.20	+0.021/+0.006	10	35	47	89	353ALH0820	●
8.30	+0.021/+0.006	10	35	47	89	353ALH0830	●
8.40	+0.021/+0.006	10	35	47	89	353ALH0840	○
8.50	+0.021/+0.006	10	35	47	89	353ALH0850	●
8.60	+0.021/+0.006	10	35	47	89	353ALH0860	●
8.70	+0.021/+0.006	10	35	47	89	353ALH0870	○
8.80	+0.021/+0.006	10	35	47	89	353ALH0880	●
8.90	+0.021/+0.006	10	35	47	89	353ALH0890	○
9.00	+0.021/+0.006	10	35	47	89	353ALH0900	●
9.10	+0.021/+0.006	10	35	47	89	353ALH0910	○
9.20	+0.021/+0.006	10	35	47	89	353ALH0920	○
9.30	+0.021/+0.006	10	35	47	89	353ALH0930	○
9.40	+0.021/+0.006	10	35	47	89	353ALH0940	○
9.50	+0.021/+0.006	10	35	47	89	353ALH0950	●
9.60	+0.021/+0.006	10	35	47	89	353ALH0960	○
9.70	+0.021/+0.006	10	35	47	89	353ALH0970	○
9.80	+0.021/+0.006	10	35	47	89	353ALH0980	○
9.90	+0.021/+0.006	10	35	47	89	353ALH0990	○
10.00	+0.021/+0.006	10	35	47	89	353ALH1000	●
10.20	+0.025/+0.007	12	40	55	102	353ALH1020	●
10.30	+0.025/+0.007	12	40	55	102	353ALH1030	●
10.50	+0.025/+0.007	12	40	55	102	353ALH1050	●
10.80	+0.025/+0.007	12	40	55	102	353ALH1080	○
11.00	+0.025/+0.007	12	40	55	102	353ALH1100	●
11.20	+0.025/+0.007	12	40	55	102	353ALH1120	○
11.30	+0.025/+0.007	12	40	55	102	353ALH1130	○

● stock standard ○ non-standard stock ▽ stock exhaustion

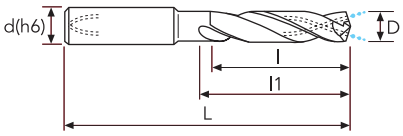
353ALH

aluminium, polished flutes, ALH (through coolant)

3XD | DIN 6537K | ALH | MG POLISHED | 130° | 30°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
11.50	+0.025/+0.007	12	40	55	102	353ALH1150	●
11.80	+0.025/+0.007	12	40	55	102	353ALH1180	○
12.00	+0.025/+0.007	12	40	55	102	353ALH1200	●
12.20	+0.025/+0.007	14	43	60	107	353ALH1220	○
12.50	+0.025/+0.007	14	43	60	107	353ALH1250	○
12.80	+0.025/+0.007	14	43	60	107	353ALH1280	○
13.00	+0.025/+0.007	14	43	60	107	353ALH1300	○
13.50	+0.025/+0.007	14	43	60	107	353ALH1350	○
14.00	+0.025/+0.007	14	43	60	107	353ALH1400	○
14.50	+0.025/+0.007	16	45	65	115	353ALH1450	○
15.00	+0.025/+0.007	16	65	65	115	353ALH1500	○
15.50	+0.025/+0.007	16	65	65	115	353ALH1550	○
16.00	+0.025/+0.007	16	65	65	115	353ALH1600	○
16.50	+0.025/+0.007	18	73	73	123	353ALH1650	○
17.00	+0.025/+0.007	18	73	73	123	353ALH1700	○
17.50	+0.025/+0.007	18	73	73	123	353ALH1750	○
18.00	+0.025/+0.007	18	73	73	123	353ALH1800	○
18.50	+0.029/+0.008	20	79	79	131	353ALH1850	○
19.00	+0.029/+0.008	20	79	79	131	353ALH1900	○
19.50	+0.029/+0.008	20	79	79	131	353ALH1950	○
20.00	+0.029/+0.008	20	79	79	131	353ALH2000	○

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

353ALH

Material Group ISO 513	N1			N2			N3 N4			N5		
Hardness/Rm												
Vc (m/min)	260-300			230-270			200-240			280-320		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	29720	0.160	4760	26540	0.152	4030	23350	0.136	3180	31850	0.176	5610
4	22290	0.190	4240	19900	0.181	3590	17520	0.162	2830	23890	0.209	4990
5	17830	0.220	3920	15920	0.209	3330	14010	0.187	2620	19110	0.242	4620
6	14860	0.250	3720	13270	0.238	3150	11680	0.213	2480	15920	0.275	4380
7	12740	0.280	3570	11370	0.266	3020	10010	0.238	2380	13650	0.308	4200
8	11150	0.310	3460	9950	0.295	2930	8760	0.264	2310	11940	0.341	4070
9	9910	0.340	3370	8850	0.323	2860	7780	0.289	2250	10620	0.374	3970
10	8920	0.370	3300	7960	0.352	2800	7010	0.315	2200	9550	0.407	3890
11	8110	0.400	3240	7240	0.380	2750	6370	0.340	2170	8690	0.440	3820
12	7430	0.430	3190	6630	0.409	2710	5840	0.366	2130	7960	0.473	3770
13	6860	0.460	3160	6120	0.437	2670	5390	0.391	2110	7350	0.506	3720
14	6370	0.490	3120	5690	0.466	2650	5000	0.417	2080	6820	0.539	3680
15	5940	0.520	3090	5310	0.494	2620	4670	0.442	2060	6370	0.572	3640
16	5570	0.550	3060	4980	0.523	2600	4380	0.468	2050	5970	0.605	3610
17	5250	0.580	3050	4680	0.551	2580	4120	0.493	2030	5620	0.638	3590
18	4950	0.610	3020	4420	0.580	2560	3890	0.519	2020	5310	0.671	3560
19	4690	0.640	3000	4190	0.608	2550	3690	0.544	2010	5030	0.704	3540
20	4460	0.670	2990	3980	0.637	2530	3500	0.570	1990	4780	0.737	3520

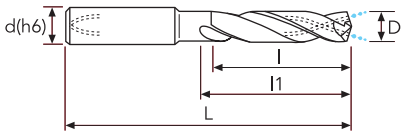
355ALH

aluminium, polished flutes, ALH (through coolant)

5XD | DIN 6537L | ALH | MG POLISHED | 130° | 30°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
3.00	+0.012/+0.002	6	23	28	66	355ALH0300	●
3.10	+0.016/+0.004	6	23	28	66	355ALH0310	○
3.20	+0.016/+0.004	6	23	28	66	355ALH0320	●
3.30	+0.016/+0.004	6	23	28	66	355ALH0330	●
3.40	+0.016/+0.004	6	23	28	66	355ALH0340	●
3.50	+0.016/+0.004	6	23	28	66	355ALH0350	●
3.60	+0.016/+0.004	6	23	28	66	355ALH0360	●
3.70	+0.016/+0.004	6	23	28	66	355ALH0370	●
3.80	+0.016/+0.004	6	29	36	74	355ALH0380	●
3.90	+0.016/+0.004	6	29	36	74	355ALH0390	○
4.00	+0.016/+0.004	6	29	36	74	355ALH0400	●
4.10	+0.016/+0.004	6	29	36	74	355ALH0410	○
4.20	+0.016/+0.004	6	29	36	74	355ALH0420	●
4.30	+0.016/+0.004	6	29	36	74	355ALH0430	●
4.40	+0.016/+0.004	6	29	36	74	355ALH0440	○
4.50	+0.016/+0.004	6	29	36	74	355ALH0450	●
4.60	+0.016/+0.004	6	29	36	74	355ALH0460	○
4.70	+0.016/+0.004	6	29	36	74	355ALH0470	○
4.80	+0.016/+0.004	6	35	44	82	355ALH0480	●
4.90	+0.016/+0.004	6	35	44	82	355ALH0490	○
5.00	+0.016/+0.004	6	35	44	82	355ALH0500	●
5.10	+0.016/+0.004	6	35	44	82	355ALH0510	●
5.20	+0.016/+0.004	6	35	44	82	355ALH0520	●
5.30	+0.016/+0.004	6	35	44	82	355ALH0530	○
5.40	+0.016/+0.004	6	35	44	82	355ALH0540	○
5.50	+0.016/+0.004	6	35	44	82	355ALH0550	●
5.60	+0.016/+0.004	6	35	44	82	355ALH0560	●
5.70	+0.016/+0.004	6	35	44	82	355ALH0570	○
5.80	+0.016/+0.004	6	35	44	82	355ALH0580	●
5.90	+0.016/+0.004	6	35	44	82	355ALH0590	○
6.00	+0.016/+0.004	6	35	44	82	355ALH0600	●
6.10	+0.021/+0.006	8	43	53	91	355ALH0610	○
6.20	+0.021/+0.006	8	43	53	91	355ALH0620	●
6.30	+0.021/+0.006	8	43	53	91	355ALH0630	○
6.40	+0.021/+0.006	8	43	53	91	355ALH0640	○
6.50	+0.021/+0.006	8	43	53	91	355ALH0650	●
6.60	+0.021/+0.006	8	43	53	91	355ALH0660	○
6.70	+0.021/+0.006	8	43	53	91	355ALH0670	●
6.80	+0.021/+0.006	8	43	53	91	355ALH0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

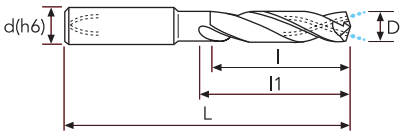
355ALH

aluminium, polished flutes, ALH (through coolant)

5XD | DIN 6537L | ALH | MG POLISHED | 130° | 30°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
6.90	+0.021/+0.006	8	43	53	91	355ALH0690	●
7.00	+0.021/+0.006	8	43	53	91	355ALH0700	●
7.10	+0.021/+0.006	8	43	53	91	355ALH0710	○
7.20	+0.021/+0.006	8	43	53	91	355ALH0720	●
7.30	+0.021/+0.006	8	43	53	91	355ALH0730	○
7.40	+0.021/+0.006	8	43	53	91	355ALH0740	○
7.50	+0.021/+0.006	8	43	53	91	355ALH0750	●
7.60	+0.021/+0.006	8	43	53	91	355ALH0760	○
7.70	+0.021/+0.006	8	43	53	91	355ALH0770	○
7.80	+0.021/+0.006	8	43	53	91	355ALH0780	●
7.90	+0.021/+0.006	8	43	53	91	355ALH0790	○
8.00	+0.021/+0.006	8	43	53	91	355ALH0800	●
8.10	+0.021/+0.006	10	49	61	103	355ALH0810	○
8.20	+0.021/+0.006	10	49	61	103	355ALH0820	●
8.30	+0.021/+0.006	10	49	61	103	355ALH0830	○
8.40	+0.021/+0.006	10	49	61	103	355ALH0840	○
8.50	+0.021/+0.006	10	49	61	103	355ALH0850	●
8.60	+0.021/+0.006	10	49	61	103	355ALH0860	○
8.70	+0.021/+0.006	10	49	61	103	355ALH0870	○
8.80	+0.021/+0.006	10	49	61	103	355ALH0880	●
8.90	+0.021/+0.006	10	49	61	103	355ALH0890	○
9.00	+0.021/+0.006	10	49	61	103	355ALH0900	●
9.10	+0.021/+0.006	10	49	61	103	355ALH0910	○
9.20	+0.021/+0.006	10	49	61	103	355ALH0920	○
9.30	+0.021/+0.006	10	49	61	103	355ALH0930	○
9.40	+0.021/+0.006	10	49	61	103	355ALH0940	○
9.50	+0.021/+0.006	10	61	61	103	355ALH0950	●
9.60	+0.021/+0.006	10	61	61	103	355ALH0960	○
9.70	+0.021/+0.006	10	61	61	103	355ALH0970	○
9.80	+0.021/+0.006	10	61	61	103	355ALH0980	○
9.90	+0.021/+0.006	10	61	61	103	355ALH0990	○
10.00	+0.021/+0.006	10	61	61	103	355ALH1000	●
10.20	+0.025/+0.007	12	71	71	118	355ALH1020	●
10.50	+0.025/+0.007	12	71	71	118	355ALH1050	●
10.80	+0.025/+0.007	12	71	71	118	355ALH1080	○
11.00	+0.025/+0.007	12	71	71	118	355ALH1100	●
11.20	+0.025/+0.007	12	71	71	118	355ALH1120	○
11.30	+0.025/+0.007	12	71	71	118	355ALH1130	○
11.50	+0.025/+0.007	12	71	71	118	355ALH1150	●

● stock standard ○ non-standard stock ▽ stock exhaustion

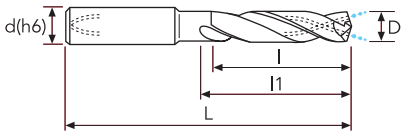
355ALH

aluminium, polished flutes, ALH (through coolant)

5XD | DIN 6537L | ALH | MG POLISHED | 130° | 30°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
11.80	+0.025/+0.007	12	71	71	118	355ALH1180	○
12.00	+0.025/+0.007	12	71	71	118	355ALH1200	●
12.50	+0.025/+0.007	14	77	77	124	355ALH1250	○
13.00	+0.025/+0.007	14	77	77	124	355ALH1300	○
13.50	+0.025/+0.007	14	77	77	124	355ALH1350	○
14.00	+0.025/+0.007	14	77	77	124	355ALH1400	○
14.50	+0.025/+0.007	16	83	83	133	355ALH1450	○
15.00	+0.025/+0.007	16	83	83	133	355ALH1500	○
15.50	+0.025/+0.007	16	83	83	133	355ALH1550	○
16.00	+0.025/+0.007	16	83	83	133	355ALH1600	○
16.50	+0.025/+0.007	18	93	93	143	355ALH1650	○
17.00	+0.025/+0.007	18	93	93	143	355ALH1700	○
17.50	+0.025/+0.007	18	93	93	143	355ALH1750	○
18.00	+0.025/+0.007	18	93	93	143	355ALH1800	○
18.50	+0.029/+0.008	20	101	101	153	355ALH1850	○
19.00	+0.029/+0.008	20	101	101	153	355ALH1900	○
19.50	+0.029/+0.008	20	101	101	153	355ALH1950	○
20.00	+0.029/+0.008	20	101	101	153	355ALH2000	○

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

355ALH

Material Group ISO 513	N1			N2			N3 N4			N5		
Hardness/Rm												
Vc (m/min)	240-280			200-240			180-220			260-300		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3	27600	0.136	3750	23350	0.129	3020	21230	0.116	2450	29720	0.150	4450
4	20700	0.162	3340	17520	0.153	2690	15920	0.137	2190	22290	0.178	3960
5	16560	0.187	3100	14010	0.178	2490	12740	0.159	2030	17830	0.206	3670
6	13800	0.213	2930	11680	0.202	2360	10620	0.181	1920	14860	0.234	3470
7	11830	0.238	2820	10010	0.226	2260	9100	0.202	1840	12740	0.262	3340
8	10350	0.264	2730	8760	0.250	2190	7960	0.224	1780	11150	0.290	3230
9	9200	0.289	2660	7780	0.275	2140	7080	0.246	1740	9910	0.318	3150
10	8280	0.315	2600	7010	0.299	2090	6370	0.267	1700	8920	0.346	3090
11	7530	0.340	2560	6370	0.323	2060	5790	0.289	1670	8110	0.374	3030
12	6900	0.366	2520	5840	0.347	2030	5310	0.311	1650	7430	0.402	2990
13	6370	0.391	2490	5390	0.371	2000	4900	0.332	1630	6860	0.430	2950
14	5910	0.417	2460	5000	0.396	1980	4550	0.354	1610	6370	0.458	2920
15	5520	0.442	2440	4670	0.420	1960	4250	0.376	1600	5940	0.486	2890
16	5180	0.468	2420	4380	0.444	1950	3980	0.397	1580	5570	0.514	2860
17	4870	0.493	2400	4120	0.468	1930	3750	0.419	1570	5250	0.542	2850
18	4600	0.519	2390	3890	0.493	1920	3540	0.441	1560	4950	0.570	2820
19	4360	0.544	2370	3690	0.517	1910	3350	0.462	1550	4690	0.598	2810
20	4140	0.570	2360	3500	0.541	1890	3180	0.484	1540	4460	0.626	2790

TYPHOON HRC

HIGH PERFORMANCE - HARDENED STEEL 45÷62 HRC

Reliable high precision drills for hardened steel 45÷62 HRC.

Punte ad alta precisione per la foratura di acciai temprati 45÷62 HRC.

Hohe Präzision und zuverlässige Bohrungen für gehärteten Stahl 45÷62 HRC.

Forets haute précision et fiables pour acier trempé 45÷62 HRC.

Brocas de alta precisión para aceros templados 45÷62 HRC.

Высокоточные и высокопроизводительные сверла для обработки сталей с твердостью 45÷62 HRC.

TYPHOON HRC

HIGH PERFORMANCE - HARDENED STEEL 45÷62 HRC

- Drills for hardened steel 45÷62 HRC
- Self-centering geometry: high accurate holes
- Straight and reinforced edge: high stability and chipping resistance
- 45° chamfer: edge corners protection
- Thicker web: high rigidity and stability
- 15° helix angle: low helix for higher rigidity
- Substrate and coating: specifically selected for high wear resistance, long and reliable life

- Forets pour aciers trempés 45÷62 HRC
- Affûtage autocentré pour l'exécution de trous précis
- Profil de l'arête droit et renforcé
- Géométrie des angles : protection avec biseau à 45°
- Cœur très épais pour garantir rigidité et stabilité
- Angle de l'hélice à 15° : angle peu accentué pour une solidité maximale
- Substrat et revêtement spécifiques pour garantir durée et fiabilité

- Punte per acciai temprati 45÷62 HRC
- Affilatura autocentrante per l'esecuzione di fori precisi
- Profilo del tagliente diritto e rinforzato
- Geometria degli spigoli: protezione con smusso a 45°
- Nocciolo molto spesso per garantire rigidità e stabilità
- Angolo dell'elica a 15°: angolo poco accentuato per massima robustezza
- Substrato e rivestimento specifici per garantire durata e affidabilità

- Brocas para aceros templados 45÷62 HRC
- Geometría autocentrante para la realización de agujeros precisos
- Perfil del filo recto y reforzado
- Geometría de las bordes: protección con redondeo a 45°
- Núcleo muy grueso para garantizar rigidez y estabilidad
- Ángulo de la hélice a 15°: ángulo poco acentuado para la máxima resistencia
- Sustrato y revestimiento específicos para garantizar duración y fiabilidad

- Bohrer für gehärteten Stahl 45-62 HRC
- Selbstzentrierender Schliff für die Herstellung von präzisen Bohrungen
- Gerades und verstärktes Schneidkantenprofil
- Geometrie der Kanten: Schutzfase mit 45°
- Sehr starker Kern zur Gewährleistung von Steifigkeit und Stabilität
- Anstellwinkel 15°: geringer Winkel für maximale Robustheit
- Spezielles Trägermaterial und spezielle Beschichtung zur Gewährleistung von Standzeit und Zuverlässigkeit

- Свёрла для закалённой стали 45÷62 HRC
- Самоцентрирующаяся геометрия: высокая точность отверстий
- Прямые усиленные кромки: высокая стабильность резания и предотвращение пакетирования
- Фаска 45°: защита кромок
- Утолщенная сердцевина: высокая жесткость и стабильность
- Угол наклона винтовой канавки 15°: маленький угол для высокой жесткости
- Специальное покрытие для повышения стойкости инструмента

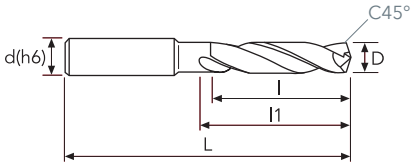
353HRC

hardened steel 45÷62 HRC

3XD | DIN 6537K | HRC | MG PV1000 | 45÷62 HRC | 150°+C45° | 15°

P	M	K	N	S	H
					★

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
2.60	0/-0.010	6	14	20	62	353HRC0260	●
3.00	0/-0.010	6	14	20	62	353HRC0300	●
3.30	0/-0.012	6	14	20	62	353HRC0330	●
3.40	0/-0.012	6	14	20	62	353HRC0340	●
3.50	0/-0.012	6	14	20	62	353HRC0350	●
3.70	0/-0.012	6	14	20	62	353HRC0370	●
3.80	0/-0.012	6	17	24	66	353HRC0380	●
4.00	0/-0.012	6	17	24	66	353HRC0400	●
4.10	0/-0.012	6	17	24	66	353HRC0410	●
4.20	0/-0.012	6	17	24	66	353HRC0420	●
4.30	0/-0.012	6	17	24	66	353HRC0430	●
4.50	0/-0.012	6	17	24	66	353HRC0450	●
4.60	0/-0.012	6	17	24	66	353HRC0460	●
4.80	0/-0.012	6	20	28	66	353HRC0480	●
5.00	0/-0.012	6	20	28	66	353HRC0500	●
5.10	0/-0.012	6	20	28	66	353HRC0510	●
5.20	0/-0.012	6	20	28	66	353HRC0520	●
5.30	0/-0.012	6	20	28	66	353HRC0530	●
5.50	0/-0.012	6	20	28	66	353HRC0550	●
5.60	0/-0.012	6	20	28	66	353HRC0560	●
5.80	0/-0.012	6	20	28	66	353HRC0580	●
6.00	0/-0.012	6	20	28	66	353HRC0600	●
6.10	0/-0.015	8	29	41	79	353HRC0610	●
6.20	0/-0.015	8	29	41	79	353HRC0620	●
6.50	0/-0.015	8	29	41	79	353HRC0650	●
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6.90	0/-0.015	8	29	41	79	353HRC0690	●
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8.00	0/-0.015	8	29	41	79	353HRC0800	●
8.10	0/-0.015	10	35	47	89	353HRC0810	●
8.20	0/-0.015	10	35	47	89	353HRC0820	●
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8.60	0/-0.015	10	35	47	89	353HRC0860	●
8.70	0/-0.015	10	35	47	89	353HRC0870	●
8.80	0/-0.015	10	35	47	89	353HRC0880	●
9.00	0/-0.015	10	35	47	89	353HRC0900	●

● stock standard ○ non-standard stock ▽ stock exhaustion

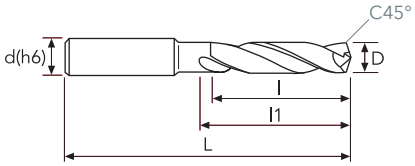
353HRC

hardened steel 45÷62 HRC

3XD | DIN 6537K | HRC | MG PV1000 | 45÷62 HRC | 150°+C45° | 15°

P	M	K	N	S	H
					★

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
9.30	0/-0.015	10	35	47	89	353HRC0930	●
9.50	0/-0.015	10	35	47	89	353HRC0950	●
9.80	0/-0.015	10	35	47	89	353HRC0980	●
10.00	0/-0.015	10	35	47	89	353HRC1000	●
10.20	0/-0.018	12	40	55	102	353HRC1020	●
10.30	0/-0.018	12	40	55	102	353HRC1030	●
10.40	0/-0.018	12	40	55	102	353HRC1040	●
10.50	0/-0.018	12	40	55	102	353HRC1050	●
10.80	0/-0.018	12	40	55	102	353HRC1080	●
11.00	0/-0.018	12	40	55	102	353HRC1100	●
11.20	0/-0.018	12	40	55	102	353HRC1120	●
11.50	0/-0.018	12	40	55	102	353HRC1150	●
11.80	0/-0.018	12	40	55	102	353HRC1180	●
12.00	0/-0.018	12	40	55	102	353HRC1200	●
12.20	0/-0.018	14	43	60	107	353HRC1220	●
12.50	0/-0.018	14	43	60	107	353HRC1250	●
12.80	0/-0.018	14	43	60	107	353HRC1280	●
13.00	0/-0.018	14	43	60	107	353HRC1300	●
14.20	0/-0.018	16	45	65	115	353HRC1420	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353HRC

	Material Group ISO 513	H1 H4			H2			H3			H5		
	Hardness/Rm	50-56 HRC			54-62 HRC			< 62 HRC			48-55 HRC		
	Vc (m/min)	**15-25**			**12-18**			**8-12**			**20-30**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	3	2120	0.020	40	1590	0.017	30	1060	0.013	10	2650	0.020	50
	4	1590	0.030	50	1190	0.026	30	800	0.020	20	1990	0.030	60
	5	1270	0.040	50	960	0.034	30	640	0.026	20	1590	0.040	60
	6	1060	0.050	50	800	0.043	30	530	0.033	20	1330	0.050	70
	7	910	0.060	50	680	0.051	30	450	0.039	20	1140	0.060	70
	8	800	0.070	60	600	0.060	40	400	0.046	20	1000	0.070	70
	9	710	0.080	60	530	0.068	40	350	0.052	20	880	0.080	70
	10	640	0.090	60	480	0.077	40	320	0.059	20	800	0.090	70
	11	580	0.100	60	430	0.085	40	290	0.065	20	720	0.100	70
	12	530	0.110	60	400	0.094	40	270	0.072	20	660	0.110	70
	13	490	0.120	60	370	0.102	40	240	0.078	20	610	0.120	70
	14.2	450	0.130	60	340	0.111	40	230	0.085	20	570	0.130	70

TYPHOON SUH MINI

HIGH PERFORMANCE - MINIATURE SHORT, LONG AND EXTRA LONG

Miniature drills, from short (5xD) to extra-long (30xD) type, suitable for ISO P, M, K, N, S materials.

Mini punte corte (5xD), lunghe ed extra-lunghe (30xD), adatte alla foratura di materiali ISO P, M, K, N, S.

Kurze (5xD), lange und extra-lange (30xD) Kleinstbohrer für das Bohren der Materialien ISO P, M, K, N, S.

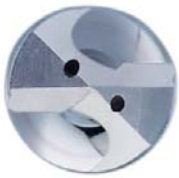
Mini forets courts (5xD), longs et extra-longs (30xD), appropriés au perçage de matériaux ISO P, M, K, N, S.

Mini brocas cortas (5xD), largas y extra largas (30xD), adecuadas para el taladro de materiales ISO P, M, K, N, S.

Мини-свёрла от коротких (5xD) до супердлинных (30xD). Пригодны для обработки отверстий в материалах по ISO P, M, K, N, S.

TYPHOON SUH MINI

HIGH PERFORMANCE - MINIATURE SHORT AND LONG



- Miniature drills are manufactured with unified 3 mm shank
- Oil holes for internal coolant feed
- Self-centering geometry: highly accurate holes
- Straight and reinforced edge: high stability and chipping resistance
- Edge geometry: special design for edge and corners protection
- Chip pocket: highly polished to prevent welding and to improve the chip ejection
- Substrate and coating: specifically selected for high wear resistance, long and reliable life
- Available from Ø1 mm to Ø3 mm
- Different cutting length types from short (5xD) to extra-long (30xD)

- Mini forets fabriqués avec une tige unifiée ayant un diamètre de 3 mm
- Trous de lubrification
- Affûtage autocentré pour l'exécution de trous précis et peu d'efforts de coupe
- Profil de l'arête droit et renforcé : il génère des copeaux courts et garantit une grande fiabilité
- Géométrie de l'arête avec affûtage spécifique pour protéger l'arête et les angles
- Finition des goujoures : polie pour réduire le problème du collage et faciliter l'évacuation des copeaux
- Substrat et revêtement : spécifiques pour garantir durée et fiabilité
- Disponibles du Ø1 mm au Ø3 mm
- Différents types de longueur, de la plus courte (5xD) aux extra-longues (30xD)

- Mini-punte costruite con gambo unificato Ø3 mm
- Fori di refrigerazione
- Affilatura autocentrante per l'esecuzione di fori precisi e bassi sforzi di taglio
- Profilo del tagliente diritto e rinforzato: genera trucioli corti e garantisce grande affidabilità
- Geometria del tagliente con affilatura specifica a protezione del tagliente e degli spigoli
- Finitura gole: lappate per ridurre il problema dell'incollaggio e facilitare l'evacuazione dei trucioli
- Substrato e rivestimento: specifici per garantire durata e affidabilità
- Disponibili da Ø1 mm a Ø3 mm
- Differenti tipi di lunghezza, dalle corte (5XD) alle extra-lunghe (30XD)

- Mini-brocas fabricadas con mango unificado con diámetro de 3 mm
- Agujeros de refrigeración
- Afilado autocentrante para la realización de agujeros precisos y bajos esfuerzos de corte
- Perfil del filo recto y reforzado: genera virutas cortas y garantiza una gran fiabilidad
- Geometría del filo con afilado específico para proteger el filo y los ángulos
- Acabado ranuras: lapeadas para reducir el problema del encolado y facilitar la evacuación de las virutas
- Sustrato y revestimiento: específicos para garantizar duración y fiabilidad
- Disponibles de Ø1 mm a Ø3mm
- Diferentes tipos de longitud, desde las cortas (5XD) hasta las extra-largas (30XD)

- Kleinstbohrer mit genormtem Schaft und einem Durchmesser von 3 mm
- Kühlöffnungen
- Selbstzentrierender Schliff für präzise Bohrungen und geringen Schneiddruck
- Gerades und verstärktes Schneidkantenprofil: zur Erzeugung kurzer Späne und zur Gewährleistung hoher Zuverlässigkeit
- Geometrie der Schneidkante mit speziellem Schliff zum Schutz von Schneidkante und Kanten
- Schlichtbearbeitung der Nuten: geläppt, um Probleme durch Verkleben zu reduzieren und um die Späneabführung zu erleichtern
- Trägermaterial und Beschichtung: speziell zur Gewährleistung von Standzeit und Zuverlässigkeit
- Erhältlich von Ø1 mm bis Ø3 mm
- Verschiedene Längen, von kurz (5XD) bis extra-lang (30XD)

- Мини-свёрла с унифицированным 3х мм хвостовиком
- Отверстия для подвода СОЖ
- Самоцентрирующаяся геометрия: высокая точность отверстий
- Прямые усиленные кромки: высокая стабильность резания и предотвращение пакетирования
- Геометрия режущей кромки со специальной заточкой для защиты лезвия и кромок
- Отполированные стружечные канавки: уменьшают вероятность приваривания стружки и облегчают ее вывод
- Специальное покрытие для повышения стойкости инструмента
- Доступны диаметром от Ø1 мм до Ø3 мм
- Различные длины: от коротких (5XD) до супердлинных (30XD)

MACHINING OF DEEP HOLES PERPENDICULAR TO THE SURFACE

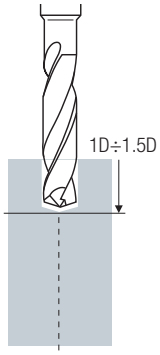
ESECUZIONE FORI PROFONDI ORTOGONALI ALLA SUPERFICIE

HERSTELLUNG TIEFER RECHTWINKLIGER BOHRUNGEN

EXÉCUTION DE TROUS PROFONDS ORTHOGONAUX À LA SURFACE

MECANIZADO DE AGUJEROS PROFUNDOS PERPENDICULARES A LA SUPERFÍCIE

СВЕРЛЕНИЕ ГЛУБОКИХ ОТВЕРСТИЙ ПЕРПЕНДИКУЛЯРНО ОБРАБАТЫВАЕМОЙ ПОВЕХНОСТИ



STEP 1

As pilot drill (1xD,1.5xD), please use 343TA with head angle 140° (SUH MINI=135°) and m7 tolerance (SUH MINI=h7)

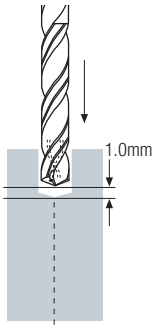
Utiliser un foret 343TA avec un angle en bout de 140° (SUH MINI=135°) et une tolérance m7 (SUH MINI=h7), pour effectuer un trou pilote (1xD -1.5xD) très précis.

Utilizzare una punta 343TA con angolo in testa di 140° (SUH MINI=135°) e tolleranza m7 (SUH MINI=h7), per eseguire un foro pilota (1xD -1.5xD) molto preciso

Utilice una broca 343TA con ángulo de punta de 140° (SUH MINI=135°) y tolerancia m7 (SUH MINI=h7), para realizar un agujero piloto (1xD -1,5xD) muy preciso

Einen Bohrer 343TA mit einem Spitzenwinkel von 140° (SUH MINI=135°) und Toleranz m7 (SUH MINI=h7) für die Herstellung einer äußerst präzisen Richtbohrung (1xD - 1.5xD) verwenden.

Для пилотного отверстия (1xD -1.5xD) используйте сверло 343TA с углом при вершине 140° (SUH MINI=135°) и допуском на диаметр m7 (SUH MINI=h7).



STEP 2

With coolant feed OFF, enter the pilot hole with SUH MINI drill at Vc=20 m/min and fn=0.3 mm/rev. Position the SUH MINI drill at 1 mm from the end of the pilot hole, then start supplying the coolant and start drilling.

Sans actionner la lubrification interne, entrer avec le foret long série SUH MINI à l'intérieur du trou. Vc=20 m/min, fn=0.3 mm/rév. Placer le foret SUH MINI jusqu'à 1 mm du fond du trou pilote. Actionner la lubrification interne à haute pression et commencer le perçage.

Senza azionare il refrigerante interno, entrare con la punta lunga serie SUH MINI all'interno del foro. Vc=20 m/min, fn=0.3 mm/rev. Posizionare la punta SUH MINI sino a 1 mm dal fondo del foro pilota. Azionare il refrigerante interno ad alta pressione e cominciare la foratura.

Sin accionar el refrigerante interno, entre con la broca larga de la serie SUH MINI dentro del agujero. Vc=20m/min, fn=0.3mm/rev. Posicione la broca SUH MINI hasta 1 mm. del fondo del agujero piloto. Accione el refrigerante interno a alta presión y comience el taladro.

Ohne Aktivierung der internen Kühlung, einen langen Bohrer der Serie SUH MINI in die Bohrung einführen. Vc=20 m/min, fn=0,3 mm/U. Den Bohrer SUH MINI bis 1 mm vom Ende der Richtbohrung ansetzen. Die interne Kühlung mit Hochdruck aktivieren und mit der Bohrung beginnen.

Без подачи СОЖ, введите длинное сверло серии SUH MINI внутрь пилотного отверстия с режимами Vc=20 м/мин и fn=0,3 мм/об. Спозиционируйте сверло SUH MINI на расстоянии 1 мм от дна отверстия. Включите подачу СОЖ и начните сверление.

STEP 3

Make continue drilling operation without steps for chip ejection.
In case of through holes, reduce the feed by 30% before the hole exit (approx. 1 mm).
Stop the coolant feed.

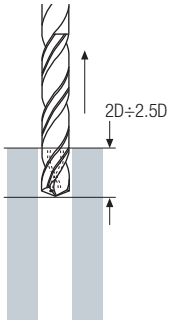
Percer sans step pour l'évacuation des copeaux.
En présence de trous débouchants, 1 mm avant d'avoir terminé le trou, réduire l'avance de 30 %.
Arrêter la lubrification.

Forare senza step per scarico trucioli.
Nel caso di fori passanti, 1 mm prima di aver completato il foro, ridurre l'avanzamento del 30%.
Fermare il refrigerante.

Taladre sin step para la descarga de virutas.
En el caso de agujeros pasantes, 1 mm antes de haber completado el agujero, reduzca el avance un 30%.
Pare el refrigerante.

Für die Späneabführung Stufenlos bohren.
Bei Durchgangsbohrungen 1 mm vor Fertigstellung der Bohrung den Vorschub um 30% reduzieren.
Die Kühlung deaktivieren.

Сверлите без остановок и выводов инструмента.
В случае обработки сквозного отверстия, снизьте подачу на 30%, за 1 мм до выхода.
Отключите подачу СОЖ.



STEP 4

Withdraw the drill using max rpm and double fn, until 2xD from the hole entrance.

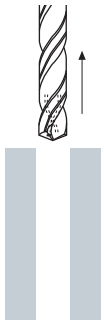
Retirer le foret en utilisant le maximum de tours disponibles et le double de l'avancement conseillé jusqu'à une profondeur 2xD.

Ritirare la punta utilizzando il massimo dei giri disponibili e il doppio dell'avanzamento consigliato sino ad una profondità 2xD.

Retire la broca utilizando el máximo de rpm disponibles y el doble del avance aconsejado hasta una profundidad 2xD.

Den Bohrer zurückziehen, dabei die maximal verfügbare Drehzahl und den doppelten Wert des empfohlenen Vorschubs bis zu einer Tiefe 2xD einsetzen.

Выньте сверло до уровня 2xD, используя максимальную частоту вращения и двойную подачу.



STEP 5

Completing the exit from the hole by using slow and constant speed.

Terminer la dernière partie du perçage avec une vitesse réduite et constante.

Completare l'ultimo tratto di arretramento con velocità ridotta e costante.

Complete el último tramo de retroceso con velocidad reducida y constante.

Den letzten Abschnitt beim Zurückziehen mit reduzierter und konstanter Geschwindigkeit fertigstellen.

Полностью выньте сверло на заниженных режимах.

MACHINING OF DEEP HOLES ON SLANTED OR IRREGULAR SURFACES

ESECUZIONE FORI PROFONDI SU SUPERFICI IRREGOLARI O OBLIQUE

HERSTELLUNG TIEFER BOHRUNGEN AUF SCHRÄGEN ODER UNREGELMÄSSIGEN OBERFLÄCHEN

EXÉCUTION DE TROUS PROFONDS SUR DES SURFACES IRRÉGULIÈRES OU OBLIQUES

MECANIZADO DE AGUJEROS PROFUNDOS SOBRE SUPERFÍCIES IRREGULARES U OBLICUAS

ОБРАБОТКА ГЛУБОКИХ ОТВЕРСТИЙ НА НАКЛОННЫХ ИЛИ НЕРОВНЫХ ПЛОСКОСТЯХ

STEP 1

Prepare a flat surface of the same size as the drilling diameter.

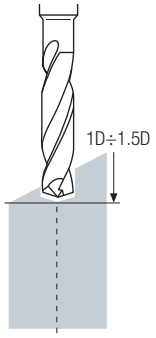
Realizzare una superficie piana utilizzando una fresa con tagliente frontale. Il piano realizzato deve avere le stesse dimensioni del diametro di foratura profonda.

Eine ebene Oberfläche, durch einen Fräser mit stirnseitiger Schneidkante, herstellen. Die hergestellte Oberfläche muss dieselben Abmessungen des Durchmessers der tiefen Bohrung aufweisen.

Réaliser une surface plane en utilisant une fraise avec une arête frontale. Le plan réalisé doit avoir les mêmes dimensions que le diamètre de perçage profond.

Realizar una superficie plana usando una fresa con filo frontal. El plano realizado tiene que tener las mismas dimensiones que el diámetro de taladro profundo.

Подготовьте ровную поверхность с помощью концевой фрезы. Эта поверхность должна быть того же размера, что и диаметр будущего глубокого отверстия.



STEP 2

As pilot drill (1xD,1.5xD), please use 343TA with head angle 140° (SUH MINI=135°) and m7 tolerance (SUH MINI=h7).

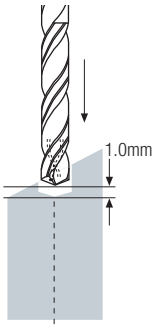
Utilizzare una punta 343TA con angolo in testa di 140° (SUH MINI=135°) e tolleranza m7 (SUH MINI=h7), per eseguire un foro pilota (1xD -1.5xD) molto preciso.

Einen Bohrer 343TA mit einem Spitzenwinkel von 140° (SUH MINI=135°) und Toleranz m7 (SUH MINI=h7) für die Herstellung einer äußerst präzisen Richtbohrung (1xD - 1.5xD) verwenden.

Utiliser un foret 343TA avec un angle en bout de 140° (SUH MINI=135°) et une tolérance m7 (SUH MINI=h7), pour effectuer un trou pilote (1xD -1.5xD) très précis.

Utilice una broca 343TA con ángulo punta de 140° (SUH MINI=135°) y tolerancia m7 (SUH MINI=h7), para realizar un agujero piloto (1xD -1,5xD) muy preciso.

Для пилотного отверстия (1xD -1.5xD) используйте сверло 343TA с углом при вершине 140° (SUH MINI=135°) и допуском на диаметр m7 (SUH MINI=h7).



STEP 3

With coolant feed OFF, enter the pilot hole with SUH MINI drill at Vc=20 m/min and fn=0.3 mm/rev. Position the SUH MINI drill at 1 mm from the end of the pilot hole, then start supplying the coolant and start drilling.

Sans actionner la lubrification interne, entrer avec le foret long série SUH MINI à l'intérieur du trou. Vc=20 m/min, fn=0.3 mm/rév. Placer le foret SUH MINI jusqu'à 1 mm du fond du trou pilote. Actionner la lubrification interne à haute pression et commencer le perçage.

Senza azionare il refrigerante interno, entrare con la punta lunga serie SUH MINI all'interno del foro. Vc=20 m/min, fn=0.3 mm/rev. Posizionare la punta SUH MINI sino a 1 mm dal fondo del foro pilota. Azionare il refrigerante interno ad alta pressione e cominciare la foratura.

Sin accionar el refrigerante interno, entre con la broca larga de la serie SUH MINI dentro del agujero. Vc=20m/min, fn=0.3 mm/rev. Posicione la broca SUH MINI hasta 1 mm. del fondo del agujero piloto. Accione el refrigerante interno a alta presión y comience el taladro.

Ohne Aktivierung der internen Kühlung, einen langen Bohrer der Serie SUH MINI in die Bohrung einführen. Vc=20 m/min, fn=0,3 mm/U. Den Bohrer SUH MINI bis 1 mm vom Ende der Richtbohrung ansetzen. Die interne Kühlung mit Hochdruck aktivieren und mit der Bohrung beginnen.

Без включения СОЖ, введите длинное сверло серии SUH MINI внутрь пилотного отверстия с режимами Vc=20 м/мин и fn=0.3 мм/об. Спозиционируйте сверло SUH MINI на расстоянии 1 мм от дна отверстия. Включите подачу СОЖ и начните сверление.

STEP 4

Make continue drilling operation without steps for chip ejection.
In case of through holes, reduce the feed by 30% before the hole exit (approx. 1 mm).
Stop the coolant feed.

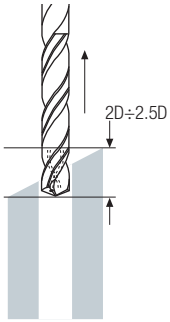
Percer sans step pour l'évacuation des copeaux.
En présence de trous débouchants, 1 mm avant d'avoir terminé le trou, réduire l'avance de 30 %.
Arrêter la lubrification.

Forare senza step per scarico trucioli.
Nel caso di fori passanti, 1 mm prima di aver completato il foro, ridurre l'avanzamento del 30%.
Fermare il refrigerante.

Taladre sin step para la descarga de virutas.
En el caso de agujeros pasantes, 1 mm antes de haber completado el agujero, reduzca el avance un 30%.
Pare el refrigerante.

Für die Späneabführung Stufenlos bohren.
Bei Durchgangsbohrungen 1 mm vor Fertigstellung der Bohrung den Vorschub um 30% reduzieren.
Die Kühlung deaktivieren.

Сверлите без остановок и выводов инструмента.
В случае обработки сквозного отверстия, снизьте подачу на 30%, за 1 мм до выхода.
Отключите подачу СОЖ.



STEP 5

Withdraw the drill using max rpm and double fn, until 2xD÷2.5xD from the hole entrance.

Retirer le foret en utilisant le maximum de tours disponibles et le double de l'avancement conseillé jusqu'à une profondeur 2xD÷2.5xD.

Ritirare la punta utilizzando il massimo dei giri disponibili e il doppio dell'avanzamento consigliato sino ad una profondità 2xD÷2.5xD.

Retire la broca utilizando el máximo de rpm disponibles y el doble del avance aconsejado hasta una profundidad de 2xD÷2.5xD.

Den Bohrer zurückziehen, dabei die maximal verfügbare Drehzahl und den doppelten Wert des empfohlenen Vorschubs bis zu einer Tiefe 2xD÷2.5xD einsetzen.

Выньте сверло до уровня 2xD, используя максимальную частоту вращения и двойную подачу.

STEP 6

Completing the exit from the hole by using slow and constant speed.

Terminer la dernière partie du perçage avec une vitesse réduite et constante.

Completare l'ultimo tratto di arretramento con velocità ridotta e costante.

Complete el último tramo de retroceso con velocidad reducida y constante.

Den letzten Abschnitt beim Zurückziehen mit reduzierter und konstanter Geschwindigkeit fertigstellen.

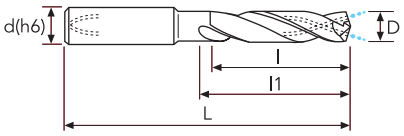
Полностью выньте сверло на заниженных режимах.

355SUH MINI

3 mm shank, short (5xD), polished flutes, SUH (through coolant)

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	drilling length	EDP No.	Stock
1.00	0/-0.010	3	6.5	8	50	5 x D	355SUH0100	●
1.10	0/-0.010	3	7.2	8.7	50	5 x D	355SUH0110	●
1.20	0/-0.010	3	7.8	9.3	50	5 x D	355SUH0120	●
1.30	0/-0.010	3	8.5	10	50	5 x D	355SUH0130	●
1.40	0/-0.010	3	9.1	10.6	50	5 x D	355SUH0140	●
1.50	0/-0.010	3	9.8	11.3	50	5 x D	355SUH0150	●
1.60	0/-0.010	3	10.4	11.9	50	5 x D	355SUH0160	●
1.70	0/-0.010	3	11.1	12.6	55	5 x D	355SUH0170	●
1.80	0/-0.010	3	11.7	13.2	55	5 x D	355SUH0180	●
1.90	0/-0.010	3	12.4	13.9	55	5 x D	355SUH0190	●
2.00	0/-0.010	3	13	16	55	5 x D	355SUH0200	●
2.10	0/-0.010	3	13.7	16.9	55	5 x D	355SUH0210	●
2.20	0/-0.010	3	14.3	17.6	55	5 x D	355SUH0220	●
2.30	0/-0.010	3	15	18.5	55	5 x D	355SUH0230	●
2.40	0/-0.010	3	15.6	19.2	55	5 x D	355SUH0240	●
2.50	0/-0.010	3	16.3	20.1	55	5 x D	355SUH0250	●
2.60	0/-0.010	3	16.9	20.8	55	5 x D	355SUH0260	●
2.70	0/-0.010	3	17.6	21.7	55	5 x D	355SUH0270	●
2.80	0/-0.010	3	18.2	22.4	55	5 x D	355SUH0280	●
2.90	0/-0.010	3	18.9	23.3	55	5 x D	355SUH0290	●
3.00	0/-0.010	3	19.5	24	55	5 x D	355SUH030003	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355SUH MINI

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	**50-70***			**40-60***			**30-50***			**20-40***		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**1.0**	19110	0.0108	210	15920	0.0097	150	12740	0.0086	110	9550	0.0076	72
	1.1	17370	0.0120	210	14480	0.0108	160	11580	0.0096	110	8690	0.0084	73
	1.2	15920	0.0132	210	13270	0.0119	160	10620	0.0106	110	7960	0.0092	74
	1.3	14700	0.0144	210	12250	0.0130	160	9800	0.0115	110	7350	0.0101	74
	1.4	13650	0.0156	210	11370	0.0140	160	9100	0.0125	110	6820	0.0109	74
	1.5	12740	0.0180	230	10620	0.0162	170	8490	0.0144	120	6370	0.0126	80
	1.6	11940	0.0204	240	9950	0.0184	180	7960	0.0163	130	5970	0.0143	85
	1.7	11240	0.0228	260	9370	0.0205	190	7490	0.0182	140	5620	0.0160	90
	1.8	10620	0.0252	270	8850	0.0227	200	7080	0.0202	140	5310	0.0176	94
	1.9	10060	0.0276	280	8380	0.0248	210	6700	0.0221	150	5030	0.0193	97
	2.0	9550	0.0300	290	7960	0.0270	210	6370	0.0240	150	4780	0.0210	100
	2.1	9100	0.0324	290	7580	0.0292	220	6070	0.0259	160	4550	0.0227	103
	2.2	8690	0.0348	300	7240	0.0313	230	5790	0.0278	160	4340	0.0244	106
	2.3	8310	0.0372	310	6920	0.0335	230	5540	0.0298	160	4150	0.0260	108
	2.4	7960	0.0396	320	6630	0.0356	240	5310	0.0317	170	3980	0.0277	110
	2.5	7640	0.0420	320	6370	0.0378	240	5100	0.0336	170	3820	0.0294	112
	2.6	7350	0.0444	330	6120	0.0400	240	4900	0.0355	170	3670	0.0311	114
	2.7	7080	0.0468	330	5900	0.0421	250	4720	0.0374	180	3540	0.0328	116
	2.8	6820	0.0492	340	5690	0.0443	250	4550	0.0394	180	3410	0.0344	117
	2.9	6590	0.0516	340	5490	0.0464	250	4390	0.0413	180	3290	0.0361	119
	3.0	6370	0.0540	340	5310	0.0486	260	4250	0.0432	180	3180	0.0378	120

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

	Material Group ISO 513	M1 M2			M3			M4			M5		
	Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
	Vc (m/min)	**20-40***			**20-30***			**20-30***			**15-25***		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**1.0**	9550	0.0081	80	7960	0.0069	55	7960	0.0057	45	6370	0.0049	31
	1.1	8690	0.0090	80	7240	0.0077	55	7240	0.0063	46	5790	0.0054	31
	1.2	7960	0.0099	80	6630	0.0084	56	6630	0.0069	46	5310	0.0059	32
	1.3	7350	0.0108	80	6120	0.0092	56	6120	0.0076	46	4900	0.0065	32
	1.4	6820	0.0117	80	5690	0.0099	57	5690	0.0082	47	4550	0.0070	32
	1.5	6370	0.0135	90	5310	0.0115	60	5310	0.0095	50	4250	0.0081	34
	1.6	5970	0.0153	90	4980	0.0130	60	4980	0.0107	53	3980	0.0092	37
	1.7	5620	0.0171	100	4680	0.0145	70	4680	0.0120	56	3750	0.0103	38
	1.8	5310	0.0189	100	4420	0.0161	70	4420	0.0132	58	3540	0.0113	40
	1.9	5030	0.0207	100	4190	0.0176	70	4190	0.0145	60	3350	0.0124	42
	2.0	4780	0.0225	110	3980	0.0191	80	3980	0.0158	60	3180	0.0135	43
	2.1	4550	0.0243	110	3790	0.0207	80	3790	0.0170	60	3030	0.0146	44
	2.2	4340	0.0261	110	3620	0.0222	80	3620	0.0183	70	2900	0.0157	45
	2.3	4150	0.0279	120	3460	0.0237	80	3460	0.0195	70	2770	0.0167	46
	2.4	3980	0.0297	120	3320	0.0252	80	3320	0.0208	70	2650	0.0178	47
	2.5	3820	0.0315	120	3180	0.0268	90	3180	0.0221	70	2550	0.0189	48
	2.6	3670	0.0333	120	3060	0.0283	90	3060	0.0233	70	2450	0.0200	49
	2.7	3540	0.0351	120	2950	0.0298	90	2950	0.0246	70	2360	0.0211	50
	2.8	3410	0.0369	130	2840	0.0314	90	2840	0.0258	70	2270	0.0221	50
	2.9	3290	0.0387	130	2750	0.0329	90	2750	0.0271	70	2200	0.0232	51
	3.0	3180	0.0405	130	2650	0.0344	90	2650	0.0284	80	2120	0.0243	52

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

355SUH MINI

	Material Group ISO 513	K1			K2			K3			K4		
	Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
	Vc (m/min)	50-70*			40-60*			30-50*			20-40*		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	1.0	19110	0.0108	210	15920	0.0097	150	12740	0.0086	110	9550	0.0076	70
	1.1	17370	0.0120	210	14480	0.0108	160	11580	0.0096	110	8690	0.0084	70
	1.2	15920	0.0132	210	13270	0.0119	160	10620	0.0106	110	7960	0.0092	70
	1.3	14700	0.0144	210	12250	0.0130	160	9800	0.0115	110	7350	0.0101	70
	1.4	13650	0.0156	210	11370	0.0140	160	9100	0.0125	110	6820	0.0109	70
	1.5	12740	0.0180	230	10620	0.0162	170	8490	0.0144	120	6370	0.0126	80
	1.6	11940	0.0204	240	9950	0.0184	180	7960	0.0163	130	5970	0.0143	90
	1.7	11240	0.0228	260	9370	0.0205	190	7490	0.0182	140	5620	0.0160	90
	1.8	10620	0.0252	270	8850	0.0227	200	7080	0.0202	140	5310	0.0176	90
	1.9	10060	0.0276	280	8380	0.0248	210	6700	0.0221	150	5030	0.0193	100
	2.0	9550	0.0300	290	7960	0.0270	210	6370	0.0240	150	4780	0.0210	100
	2.1	9100	0.0324	290	7580	0.0292	220	6070	0.0259	160	4550	0.0227	100
	2.2	8690	0.0348	300	7240	0.0313	230	5790	0.0278	160	4340	0.0244	110
	2.3	8310	0.0372	310	6920	0.0335	230	5540	0.0298	160	4150	0.0260	110
	2.4	7960	0.0396	320	6630	0.0356	240	5310	0.0317	170	3980	0.0277	110
	2.5	7640	0.0420	320	6370	0.0378	240	5100	0.0336	170	3820	0.0294	110
	2.6	7350	0.0444	330	6120	0.0400	240	4900	0.0355	170	3670	0.0311	110
	2.7	7080	0.0468	330	5900	0.0421	250	4720	0.0374	180	3540	0.0328	120
	2.8	6820	0.0492	340	5690	0.0443	250	4550	0.0394	180	3410	0.0344	120
	2.9	6590	0.0516	340	5490	0.0464	250	4390	0.0413	180	3290	0.0361	120
	3.0	6370	0.0540	340	5310	0.0486	260	4250	0.0432	180	3180	0.0378	120

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

	Material Group ISO 513	N1			N2			N3 N4			N5		
	Hardness/Rm												
	Vc (m/min)	80-120*			80-120*			80-120*			100-140*		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	1.0	31850	0.0135	430	31850	0.0122	390	31850	0.0108	340	38220	0.0149	570
	1.1	28950	0.0150	430	28950	0.0135	390	28950	0.0120	350	34740	0.0165	570
	1.2	26540	0.0165	440	26540	0.0149	390	26540	0.0132	350	31850	0.0182	580
	1.3	24500	0.0180	440	24500	0.0162	400	24500	0.0144	350	29400	0.0198	580
	1.4	22750	0.0195	440	22750	0.0176	400	22750	0.0156	350	27300	0.0215	590
	1.5	21230	0.0225	480	21230	0.0203	430	21230	0.0180	380	25480	0.0248	630
	1.6	19900	0.0255	510	19900	0.0230	460	19900	0.0204	410	23890	0.0281	670
	1.7	18730	0.0285	530	18730	0.0257	480	18730	0.0228	430	22480	0.0314	700
	1.8	17690	0.0315	560	17690	0.0284	500	17690	0.0252	450	21230	0.0347	740
	1.9	16760	0.0345	580	16760	0.0311	520	16760	0.0276	460	20110	0.0380	760
	2.0	15920	0.0375	600	15920	0.0338	540	15920	0.0300	480	19110	0.0413	790
	2.1	15170	0.0405	610	15170	0.0365	550	15170	0.0324	490	18200	0.0446	810
	2.2	14480	0.0435	630	14480	0.0392	570	14480	0.0348	500	17370	0.0479	830
	2.3	13850	0.0465	640	13850	0.0419	580	13850	0.0372	520	16620	0.0512	850
	2.4	13270	0.0495	660	13270	0.0446	590	13270	0.0396	530	15920	0.0545	870
	2.5	12740	0.0525	670	12740	0.0473	600	12740	0.0420	540	15290	0.0578	880
	2.6	12250	0.0555	680	12250	0.0500	610	12250	0.0444	540	14700	0.0611	900
	2.7	11800	0.0585	690	11800	0.0527	620	11800	0.0468	550	14150	0.0644	910
	2.8	11370	0.0615	700	11370	0.0554	630	11370	0.0492	560	13650	0.0677	920
	2.9	10980	0.0645	710	10980	0.0581	640	10980	0.0516	570	13180	0.0710	940
	3.0	10620	0.0675	720	10620	0.0608	650	10620	0.0540	570	12740	0.0743	950

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

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	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	20-40*			10-20*			30-50*			20-40*		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1.0	9550	0.0076	70	4780	0.0053	25	12740	0.0072	90	9550	0.0060	58
	1.1	8690	0.0084	70	4340	0.0059	26	11580	0.0080	90	8690	0.0067	58
	1.2	7960	0.0092	70	3980	0.0065	26	10620	0.0088	90	7960	0.0074	59
	1.3	7350	0.0101	70	3670	0.0071	26	9800	0.0096	90	7350	0.0081	59
	1.4	6820	0.0109	70	3410	0.0076	26	9100	0.0104	90	6820	0.0087	60
	1.5	6370	0.0126	80	3180	0.0088	28	8490	0.0120	100	6370	0.0101	60
	1.6	5970	0.0143	90	2990	0.0100	30	7960	0.0136	110	5970	0.0114	70
	1.7	5620	0.0160	90	2810	0.0112	31	7490	0.0152	110	5620	0.0128	70
	1.8	5310	0.0176	90	2650	0.0123	33	7080	0.0168	120	5310	0.0141	70
	1.9	5030	0.0193	100	2510	0.0135	34	6700	0.0184	120	5030	0.0155	80
	2.0	4780	0.0210	100	2390	0.0147	35	6370	0.0200	130	4780	0.0168	80
	2.1	4550	0.0227	100	2270	0.0159	36	6070	0.0215	130	4550	0.0181	80
	2.2	4340	0.0244	110	2170	0.0171	37	5790	0.0231	130	4340	0.0195	80
	2.3	4150	0.0260	110	2080	0.0182	38	5540	0.0247	140	4150	0.0208	90
	2.4	3980	0.0277	110	1990	0.0194	39	5310	0.0263	140	3980	0.0222	90
	2.5	3820	0.0294	110	1910	0.0206	39	5100	0.0279	140	3820	0.0235	90
	2.6	3670	0.0311	110	1840	0.0218	40	4900	0.0295	140	3670	0.0249	90
	2.7	3540	0.0328	120	1770	0.0229	41	4720	0.0311	150	3540	0.0262	90
	2.8	3410	0.0344	120	1710	0.0241	41	4550	0.0327	150	3410	0.0276	90
	2.9	3290	0.0361	120	1650	0.0253	42	4390	0.0343	150	3290	0.0289	100
	3.0	3180	0.0378	120	1590	0.0265	42	4250	0.0359	150	3180	0.0302	100

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

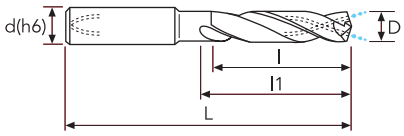
358SUH MINI

3 mm shank, short (8xD), polished flutes, SUH (through coolant)

8XD | OSAWA NORM | SUH MINI | MG PV300 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	drilling length	EDP No.	Stock
1.00	0/-0.010	3	9.5	11	50	8 x D	358SUH0100	●
1.10	0/-0.010	3	10.5	12	50	8 x D	358SUH0110	●
1.20	0/-0.010	3	11.4	12.9	50	8 x D	358SUH0120	●
1.30	0/-0.010	3	12.4	13.9	50	8 x D	358SUH0130	●
1.40	0/-0.010	3	13.3	14.8	50	8 x D	358SUH0140	●
1.50	0/-0.010	3	14.3	15.8	50	8 x D	358SUH0150	●
1.60	0/-0.010	3	15.2	16.7	50	8 x D	358SUH0160	●
1.70	0/-0.010	3	16.2	17.7	60	8 x D	358SUH0170	●
1.80	0/-0.010	3	17.1	18.6	60	8 x D	358SUH0180	●
1.90	0/-0.010	3	18.1	19.6	60	8 x D	358SUH0190	●
2.00	0/-0.010	3	19	22	60	8 x D	358SUH0200	●
2.10	0/-0.010	3	20	23.2	60	8 x D	358SUH0210	●
2.20	0/-0.010	3	20.9	24.2	60	8 x D	358SUH0220	●
2.30	0/-0.010	3	21.9	25.4	60	8 x D	358SUH0230	●
2.40	0/-0.010	3	22.8	26.4	60	8 x D	358SUH0240	●
2.50	0/-0.010	3	23.8	27.6	60	8 x D	358SUH0250	●
2.60	0/-0.010	3	24.7	28.6	60	8 x D	358SUH0260	●
2.70	0/-0.010	3	25.7	29.8	60	8 x D	358SUH0270	●
2.80	0/-0.010	3	26.6	30.8	60	8 x D	358SUH0280	●
2.90	0/-0.010	3	27.6	32	60	8 x D	358SUH0290	●
3.00	0/-0.010	3	28.5	33	60	8 x D	358SUH0300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

358SUH MINI

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	**50-70***			**40-60***			**30-50***			**20-40***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	19110	0.0090	170	15920	0.0081	130	12740	0.0072	90	9550	0.0063	60
1.1	17370	0.0100	170	14480	0.0090	130	11580	0.0080	93	8690	0.0070	61
1.2	15920	0.0110	180	13270	0.0099	131	10620	0.0088	93	7960	0.0077	61
1.3	14700	0.0120	180	12250	0.0108	132	9800	0.0096	94	7350	0.0084	62
1.4	13650	0.0130	180	11370	0.0117	133	9100	0.0104	95	6820	0.0091	62
1.5	12740	0.0150	190	10620	0.0135	143	8490	0.0120	102	6370	0.0105	67
1.6	11940	0.0170	200	9950	0.0153	152	7960	0.0136	108	5970	0.0119	71
1.7	11240	0.0190	210	9370	0.0171	160	7490	0.0152	114	5620	0.0133	75
1.8	10620	0.0210	220	8850	0.0189	167	7080	0.0168	119	5310	0.0147	78
1.9	10060	0.0230	230	8380	0.0207	173	6700	0.0184	123	5030	0.0161	81
2.0	9550	0.0250	240	7960	0.0225	179	6370	0.0200	127	4780	0.0175	84
2.1	9100	0.0270	250	7580	0.0243	184	6070	0.0216	131	4550	0.0189	86
2.2	8690	0.0290	250	7240	0.0261	189	5790	0.0232	134	4340	0.0203	88
2.3	8310	0.0310	260	6920	0.0279	193	5540	0.0248	137	4150	0.0217	90
2.4	7960	0.0330	260	6630	0.0297	197	5310	0.0264	140	3980	0.0231	92
2.5	7640	0.0350	270	6370	0.0315	201	5100	0.0280	143	3820	0.0245	94
2.6	7350	0.0370	270	6120	0.0333	204	4900	0.0296	145	3670	0.0259	95
2.7	7080	0.0390	280	5900	0.0351	207	4720	0.0312	147	3540	0.0273	97
2.8	6820	0.0410	280	5690	0.0369	210	4550	0.0328	149	3410	0.0287	98
2.9	6590	0.0430	280	5490	0.0387	212	4390	0.0344	151	3290	0.0301	99
3.0	6370	0.0450	290	5310	0.0405	215	4250	0.0360	153	3180	0.0315	100

Ø RUN OUT <0.02mm

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	**20-40***			**20-30***			**20-30***			**15-25***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	9550	0.0068	60	7960	0.0057	46	7960	0.0047	38	6370	0.0041	26
1.1	8690	0.0075	70	7240	0.0064	46	7240	0.0053	38	5790	0.0045	26
1.2	7960	0.0083	70	6630	0.0070	46	6630	0.0058	38	5310	0.0050	26
1.3	7350	0.0090	70	6120	0.0077	47	6120	0.0063	39	4900	0.0054	26
1.4	6820	0.0098	70	5690	0.0083	47	5690	0.0068	39	4550	0.0059	27
1.5	6370	0.0113	70	5310	0.0096	51	5310	0.0079	42	4250	0.0068	29
1.6	5970	0.0128	80	4980	0.0108	54	4980	0.0089	44	3980	0.0077	30
1.7	5620	0.0143	80	4680	0.0121	57	4680	0.0100	47	3750	0.0086	32
1.8	5310	0.0158	80	4420	0.0134	59	4420	0.0110	49	3540	0.0095	33
1.9	5030	0.0173	90	4190	0.0147	60	4190	0.0121	51	3350	0.0104	35
2.0	4780	0.0188	90	3980	0.0159	60	3980	0.0131	52	3180	0.0113	36
2.1	4550	0.0203	90	3790	0.0172	70	3790	0.0142	54	3030	0.0122	37
2.2	4340	0.0218	90	3620	0.0185	70	3620	0.0152	55	2900	0.0131	38
2.3	4150	0.0233	100	3460	0.0198	70	3460	0.0163	56	2770	0.0140	39
2.4	3980	0.0248	100	3320	0.0210	70	3320	0.0173	58	2650	0.0149	39
2.5	3820	0.0263	100	3180	0.0223	70	3180	0.0184	58	2550	0.0158	40
2.6	3670	0.0278	100	3060	0.0236	70	3060	0.0194	59	2450	0.0167	41
2.7	3540	0.0293	100	2950	0.0249	70	2950	0.0205	60	2360	0.0176	41
2.8	3410	0.0308	100	2840	0.0261	70	2840	0.0215	60	2270	0.0185	42
2.9	3290	0.0323	110	2750	0.0274	80	2750	0.0226	60	2200	0.0194	43
3.0	3180	0.0338	110	2650	0.0287	80	2650	0.0236	60	2120	0.0203	43

Ø RUN OUT <0.02mm

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

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	Material Group ISO 513	K1			K2			K3			K4		
	Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
	Vc (m/min)	**50-70***			**40-60***			**30-50***			**20-40***		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**1.0**	19110	0.0090	170	15920	0.0081	130	12740	0.0072	90	9550	0.0063	60
	1.1	17370	0.0100	170	14480	0.0090	130	11580	0.0080	90	8690	0.0070	60
	1.2	15920	0.0110	180	13270	0.0099	130	10620	0.0088	90	7960	0.0077	60
	1.3	14700	0.0120	180	12250	0.0108	130	9800	0.0096	90	7350	0.0084	60
	1.4	13650	0.0130	180	11370	0.0117	130	9100	0.0104	90	6820	0.0091	60
	1.5	12740	0.0150	190	10620	0.0135	140	8490	0.0120	100	6370	0.0105	70
	1.6	11940	0.0170	200	9950	0.0153	150	7960	0.0136	110	5970	0.0119	70
	1.7	11240	0.0190	210	9370	0.0171	160	7490	0.0152	110	5620	0.0133	70
	1.8	10620	0.0210	220	8850	0.0189	170	7080	0.0168	120	5310	0.0147	80
	1.9	10060	0.0230	230	8380	0.0207	170	6700	0.0184	120	5030	0.0161	80
	2.0	9550	0.0250	240	7960	0.0225	180	6370	0.0200	130	4780	0.0175	80
	2.1	9100	0.0270	250	7580	0.0243	180	6070	0.0216	130	4550	0.0189	90
	2.2	8690	0.0290	250	7240	0.0261	190	5790	0.0232	130	4340	0.0203	90
	2.3	8310	0.0310	260	6920	0.0279	190	5540	0.0248	140	4150	0.0217	90
	2.4	7960	0.0330	260	6630	0.0297	200	5310	0.0264	140	3980	0.0231	90
	2.5	7640	0.0350	270	6370	0.0315	200	5100	0.0280	140	3820	0.0245	90
	2.6	7350	0.0370	270	6120	0.0333	200	4900	0.0296	150	3670	0.0259	100
	2.7	7080	0.0390	280	5900	0.0351	210	4720	0.0312	150	3540	0.0273	100
	2.8	6820	0.0410	280	5690	0.0369	210	4550	0.0328	150	3410	0.0287	100
	2.9	6590	0.0430	280	5490	0.0387	210	4390	0.0344	150	3290	0.0301	100
	3.0	6370	0.0450	290	5310	0.0405	220	4250	0.0360	150	3180	0.0315	100

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

	Material Group ISO 513	N1			N2			N3 N4			N5		
	Hardness/Rm												
	Vc (m/min)	**80-120***			**80-120***			**80-120***			**100-140***		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**1.0**	31850	0.0113	360	31850	0.0101	320	31850	0.0090	290	38220	0.0124	470
	1.1	28950	0.0125	360	28950	0.0113	330	28950	0.0100	290	34740	0.0138	480
	1.2	26540	0.0138	360	26540	0.0124	330	26540	0.0110	290	31850	0.0151	480
	1.3	24500	0.0150	370	24500	0.0135	330	24500	0.0120	290	29400	0.0165	490
	1.4	22750	0.0163	370	22750	0.0146	330	22750	0.0130	300	27300	0.0179	490
	1.5	21230	0.0188	400	21230	0.0169	360	21230	0.0150	320	25480	0.0206	530
	1.6	19900	0.0213	420	19900	0.0191	380	19900	0.0170	340	23890	0.0234	560
	1.7	18730	0.0238	440	18730	0.0214	400	18730	0.0190	360	22480	0.0261	590
	1.8	17690	0.0263	460	17690	0.0236	420	17690	0.0210	370	21230	0.0289	610
	1.9	16760	0.0288	480	16760	0.0259	430	16760	0.0230	390	20110	0.0316	640
	2.0	15920	0.0313	500	15920	0.0281	450	15920	0.0250	400	19110	0.0344	660
	2.1	15170	0.0338	510	15170	0.0304	460	15170	0.0270	410	18200	0.0371	680
	2.2	14480	0.0363	520	14480	0.0326	470	14480	0.0290	420	17370	0.0399	690
	2.3	13850	0.0388	540	13850	0.0349	480	13850	0.0310	430	16620	0.0426	710
	2.4	13270	0.0413	550	13270	0.0371	490	13270	0.0330	440	15920	0.0454	720
	2.5	12740	0.0438	560	12740	0.0394	500	12740	0.0350	450	15290	0.0481	740
	2.6	12250	0.0463	570	12250	0.0416	510	12250	0.0370	450	14700	0.0509	750
	2.7	11800	0.0488	580	11800	0.0439	520	11800	0.0390	460	14150	0.0536	760
	2.8	11370	0.0513	580	11370	0.0461	520	11370	0.0410	470	13650	0.0564	770
	2.9	10980	0.0538	590	10980	0.0484	530	10980	0.0430	470	13180	0.0591	780
	3.0	10620	0.0563	600	10620	0.0506	540	10620	0.0450	480	12740	0.0619	790

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

358SUH MINI

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	20-40*			10-20*			30-50*			20-40*		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**1.0**	9550	0.0063	60	4780	0.0044	21	12740	0.0060	80	9550	0.0050	48
	1.1	8690	0.0070	60	4340	0.0049	21	11580	0.0067	80	8690	0.0056	49
	1.2	7960	0.0077	60	3980	0.0054	21	10620	0.0073	80	7960	0.0062	49
	1.3	7350	0.0084	60	3670	0.0059	22	9800	0.0080	80	7350	0.0067	49
	1.4	6820	0.0091	60	3410	0.0064	22	9100	0.0086	80	6820	0.0073	50
	1.5	6370	0.0105	70	3180	0.0074	23	8490	0.0100	80	6370	0.0084	54
	1.6	5970	0.0119	70	2990	0.0083	25	7960	0.0113	90	5970	0.0095	57
	1.7	5620	0.0133	70	2810	0.0093	26	7490	0.0126	90	5620	0.0106	60
	1.8	5310	0.0147	80	2650	0.0103	27	7080	0.0140	100	5310	0.0118	60
	1.9	5030	0.0161	80	2510	0.0113	28	6700	0.0153	100	5030	0.0129	60
	2.0	4780	0.0175	80	2390	0.0123	29	6370	0.0166	110	4780	0.0140	70
	2.1	4550	0.0189	90	2270	0.0132	30	6070	0.0180	110	4550	0.0151	70
	2.2	4340	0.0203	90	2170	0.0142	31	5790	0.0193	110	4340	0.0162	70
	2.3	4150	0.0217	90	2080	0.0152	32	5540	0.0206	110	4150	0.0174	70
	2.4	3980	0.0231	90	1990	0.0162	32	5310	0.0219	120	3980	0.0185	70
	2.5	3820	0.0245	90	1910	0.0172	33	5100	0.0233	120	3820	0.0196	70
	2.6	3670	0.0259	100	1840	0.0181	33	4900	0.0246	120	3670	0.0207	80
	2.7	3540	0.0273	100	1770	0.0191	34	4720	0.0259	120	3540	0.0218	80
	2.8	3410	0.0287	100	1710	0.0201	34	4550	0.0273	120	3410	0.0230	80
	2.9	3290	0.0301	100	1650	0.0211	35	4390	0.0286	130	3290	0.0241	80
	3.0	3180	0.0315	100	1590	0.0221	35	4250	0.0299	130	3180	0.0252	80

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

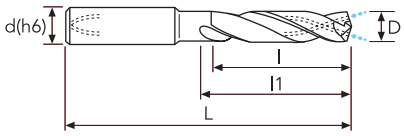
3512SUH MINI

3 mm shank, short (12xD), polished flutes, SUH (through coolant)

12XD | OSAWA NORM | SUH MINI | MG PV300 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	drilling length	EDP No.	Stock
1.00	0/-0.010	3	13.5	15	55	12 x D	3512SUH0100	●
1.10	0/-0.010	3	14.9	16.4	55	12 x D	3512SUH0110	●
1.20	0/-0.010	3	16.2	17.7	55	12 x D	3512SUH0120	●
1.30	0/-0.010	3	17.6	19.1	55	12 x D	3512SUH0130	●
1.40	0/-0.010	3	18.9	20.4	55	12 x D	3512SUH0140	●
1.50	0/-0.010	3	20.3	21.8	55	12 x D	3512SUH0150	●
1.60	0/-0.010	3	21.6	23.1	65	12 x D	3512SUH0160	●
1.70	0/-0.010	3	23	24.5	65	12 x D	3512SUH0170	●
1.80	0/-0.010	3	24.3	25.8	65	12 x D	3512SUH0180	●
1.90	0/-0.010	3	25.7	27.2	65	12 x D	3512SUH0190	●
2.00	0/-0.010	3	27	30	65	12 x D	3512SUH0200	●
2.10	0/-0.010	3	28.4	31.6	65	12 x D	3512SUH0210	●
2.20	0/-0.010	3	29.7	33	65	12 x D	3512SUH0220	●
2.30	0/-0.010	3	31.1	34.6	65	12 x D	3512SUH0230	●
2.40	0/-0.010	3	32.4	36	75	12 x D	3512SUH0240	●
2.50	0/-0.010	3	33.8	37.6	75	12 x D	3512SUH0250	●
2.60	0/-0.010	3	35.1	39	75	12 x D	3512SUH0260	●
2.70	0/-0.010	3	36.5	40.6	75	12 x D	3512SUH0270	●
2.80	0/-0.010	3	37.8	42	75	12 x D	3512SUH0280	●
2.90	0/-0.010	3	39.2	43.6	75	12 x D	3512SUH0290	●
3.00	0/-0.010	3	40.5	45	75	12 x D	3512SUH0300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3512SUH MINI

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	**50-70***			**40-60***			**30-50***			**20-40***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	19110	0.0077	150	15920	0.0069	110	12740	0.0061	80	9550	0.0054	51
1.1	17370	0.0085	150	14480	0.0077	110	11580	0.0068	80	8690	0.0060	52
1.2	15920	0.0094	150	13270	0.0084	110	10620	0.0075	80	7960	0.0065	52
1.3	14700	0.0102	150	12250	0.0092	110	9800	0.0082	80	7350	0.0071	52
1.4	13650	0.0111	150	11370	0.0099	110	9100	0.0088	80	6820	0.0077	53
1.5	12740	0.0128	160	10620	0.0115	120	8490	0.0102	90	6370	0.0089	57
1.6	11940	0.0145	170	9950	0.0130	130	7960	0.0116	90	5970	0.0101	60
1.7	11240	0.0162	180	9370	0.0145	140	7490	0.0129	100	5620	0.0113	60
1.8	10620	0.0179	190	8850	0.0161	140	7080	0.0143	100	5310	0.0125	70
1.9	10060	0.0196	200	8380	0.0176	150	6700	0.0156	100	5030	0.0137	70
2.0	9550	0.0213	200	7960	0.0191	150	6370	0.0170	110	4780	0.0149	70
2.1	9100	0.0230	210	7580	0.0207	160	6070	0.0184	110	4550	0.0161	70
2.2	8690	0.0247	210	7240	0.0222	160	5790	0.0197	110	4340	0.0173	70
2.3	8310	0.0264	220	6920	0.0237	160	5540	0.0211	120	4150	0.0184	80
2.4	7960	0.0281	220	6630	0.0252	170	5310	0.0224	120	3980	0.0196	80
2.5	7640	0.0298	230	6370	0.0268	170	5100	0.0238	120	3820	0.0208	80
2.6	7350	0.0315	230	6120	0.0283	170	4900	0.0252	120	3670	0.0220	80
2.7	7080	0.0332	230	5900	0.0298	180	4720	0.0265	130	3540	0.0232	80
2.8	6820	0.0349	240	5690	0.0314	180	4550	0.0279	130	3410	0.0244	80
2.9	6590	0.0366	240	5490	0.0329	180	4390	0.0292	130	3290	0.0256	80
3.0	6370	0.0383	240	5310	0.0344	180	4250	0.0306	130	3180	0.0268	90

Ø RUN OUT <0.02mm

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	**20-40***			**20-30***			**20-30***			**15-25***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	9550	0.0057	55	7960	0.0049	39	7960	0.0040	32	6370	0.0034	22
1.1	8690	0.0064	55	7240	0.0054	39	7240	0.0045	32	5790	0.0038	22
1.2	7960	0.0070	56	6630	0.0060	40	6630	0.0049	33	5310	0.0042	22
1.3	7350	0.0077	56	6120	0.0065	40	6120	0.0054	33	4900	0.0046	22
1.4	6820	0.0083	57	5690	0.0070	40	5690	0.0058	33	4550	0.0050	23
1.5	6370	0.0096	60	5310	0.0081	43	5310	0.0067	36	4250	0.0057	24
1.6	5970	0.0108	60	4980	0.0092	46	4980	0.0076	38	3980	0.0065	26
1.7	5620	0.0121	70	4680	0.0103	48	4680	0.0085	40	3750	0.0073	27
1.8	5310	0.0134	70	4420	0.0114	50	4420	0.0094	41	3540	0.0080	28
1.9	5030	0.0147	70	4190	0.0125	52	4190	0.0103	43	3350	0.0088	29
2.0	4780	0.0159	80	3980	0.0135	54	3980	0.0112	44	3180	0.0096	30
2.1	4550	0.0172	80	3790	0.0146	55	3790	0.0120	46	3030	0.0103	31
2.2	4340	0.0185	80	3620	0.0157	57	3620	0.0129	47	2900	0.0111	32
2.3	4150	0.0198	80	3460	0.0168	58	3460	0.0138	48	2770	0.0119	33
2.4	3980	0.0210	80	3320	0.0179	59	3320	0.0147	49	2650	0.0126	33
2.5	3820	0.0223	90	3180	0.0190	60	3180	0.0156	50	2550	0.0134	34
2.6	3670	0.0236	90	3060	0.0200	60	3060	0.0165	51	2450	0.0142	35
2.7	3540	0.0249	90	2950	0.0211	60	2950	0.0174	51	2360	0.0149	35
2.8	3410	0.0261	90	2840	0.0222	60	2840	0.0183	52	2270	0.0157	36
2.9	3290	0.0274	90	2750	0.0233	60	2750	0.0192	53	2200	0.0164	36
3.0	3180	0.0287	90	2650	0.0244	60	2650	0.0201	53	2120	0.0172	36

Ø RUN OUT <0.02mm

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

3512SUH MINI

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**50-70***			**40-60***			**30-50***			**20-40***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	19110	0.0077	150	15920	0.0069	110	12740	0.0061	80	9550	0.0054	51
1.1	17370	0.0085	150	14480	0.0077	110	11580	0.0068	80	8690	0.0060	52
1.2	15920	0.0094	150	13270	0.0084	110	10620	0.0075	80	7960	0.0065	52
1.3	14700	0.0102	150	12250	0.0092	110	9800	0.0082	80	7350	0.0071	52
1.4	13650	0.0111	150	11370	0.0099	110	9100	0.0088	80	6820	0.0077	53
1.5	12740	0.0128	160	10620	0.0115	120	8490	0.0102	90	6370	0.0089	57
1.6	11940	0.0145	170	9950	0.0130	130	7960	0.0116	90	5970	0.0101	60
1.7	11240	0.0162	180	9370	0.0145	140	7490	0.0129	100	5620	0.0113	60
1.8	10620	0.0179	190	8850	0.0161	140	7080	0.0143	100	5310	0.0125	70
1.9	10060	0.0196	200	8380	0.0176	150	6700	0.0156	100	5030	0.0137	70
2.0	9550	0.0213	200	7960	0.0191	150	6370	0.0170	110	4780	0.0149	70
2.1	9100	0.0230	210	7580	0.0207	160	6070	0.0184	110	4550	0.0161	70
2.2	8690	0.0247	210	7240	0.0222	160	5790	0.0197	110	4340	0.0173	70
2.3	8310	0.0264	220	6920	0.0237	160	5540	0.0211	120	4150	0.0184	80
2.4	7960	0.0281	220	6630	0.0252	170	5310	0.0224	120	3980	0.0196	80
2.5	7640	0.0298	230	6370	0.0268	170	5100	0.0238	120	3820	0.0208	80
2.6	7350	0.0315	230	6120	0.0283	170	4900	0.0252	120	3670	0.0220	80
2.7	7080	0.0332	230	5900	0.0298	180	4720	0.0265	130	3540	0.0232	80
2.8	6820	0.0349	240	5690	0.0314	180	4550	0.0279	130	3410	0.0244	80
2.9	6590	0.0366	240	5490	0.0329	180	4390	0.0292	130	3290	0.0256	80
3.0	6370	0.0383	240	5310	0.0344	180	4250	0.0306	130	3180	0.0268	90

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

Material Group ISO 513	N1			N2			N3 N4			N5		
Hardness/Rm												
Vc (m/min)	**80-120***			**80-120***			**80-120***			**100-140***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	31850	0.0096	300	31850	0.0086	270	31850	0.0077	240	38220	0.0105	400
1.1	28950	0.0106	310	28950	0.0096	280	28950	0.0085	250	34740	0.0117	410
1.2	26540	0.0117	310	26540	0.0105	280	26540	0.0094	250	31850	0.0129	410
1.3	24500	0.0128	310	24500	0.0115	280	24500	0.0102	250	29400	0.0140	410
1.4	22750	0.0138	310	22750	0.0124	280	22750	0.0111	250	27300	0.0152	410
1.5	21230	0.0159	340	21230	0.0143	300	21230	0.0128	270	25480	0.0175	450
1.6	19900	0.0181	360	19900	0.0163	320	19900	0.0145	290	23890	0.0199	470
1.7	18730	0.0202	380	18730	0.0182	340	18730	0.0162	300	22480	0.0222	500
1.8	17690	0.0223	390	17690	0.0201	360	17690	0.0179	320	21230	0.0245	520
1.9	16760	0.0244	410	16760	0.0220	370	16760	0.0196	330	20110	0.0269	540
2.0	15920	0.0266	420	15920	0.0239	380	15920	0.0213	340	19110	0.0292	560
2.1	15170	0.0287	440	15170	0.0258	390	15170	0.0230	350	18200	0.0316	570
2.2	14480	0.0308	450	14480	0.0277	400	14480	0.0247	360	17370	0.0339	590
2.3	13850	0.0329	460	13850	0.0296	410	13850	0.0264	360	16620	0.0362	600
2.4	13270	0.0351	470	13270	0.0316	420	13270	0.0281	370	15920	0.0386	610
2.5	12740	0.0372	470	12740	0.0335	430	12740	0.0298	380	15290	0.0409	630
2.6	12250	0.0393	480	12250	0.0354	430	12250	0.0315	390	14700	0.0432	640
2.7	11800	0.0414	490	11800	0.0373	440	11800	0.0332	390	14150	0.0456	640
2.8	11370	0.0436	500	11370	0.0392	450	11370	0.0349	400	13650	0.0479	650
2.9	10980	0.0457	500	10980	0.0411	450	10980	0.0366	400	13180	0.0503	660
3.0	10620	0.0478	510	10620	0.0430	460	10620	0.0383	410	12740	0.0526	670

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

3512SUH MINI

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	20-40*			10-20*			30-50*			20-40*		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1.0	9550	0.0054	51	4780	0.0037	18	12740	0.0051	60	9550	0.0043	41
	1.1	8690	0.0060	52	4340	0.0042	18	11580	0.0057	70	8690	0.0048	41
	1.2	7960	0.0065	52	3980	0.0046	18	10620	0.0062	70	7960	0.0052	42
	1.3	7350	0.0071	52	3670	0.0050	18	9800	0.0068	70	7350	0.0057	42
	1.4	6820	0.0077	53	3410	0.0054	18	9100	0.0073	70	6820	0.0062	42
	1.5	6370	0.0089	57	3180	0.0062	20	8490	0.0085	70	6370	0.0071	45
	1.6	5970	0.0101	60	2990	0.0071	21	7960	0.0096	80	5970	0.0081	48
	1.7	5620	0.0113	60	2810	0.0079	22	7490	0.0107	80	5620	0.0090	51
	1.8	5310	0.0125	70	2650	0.0087	23	7080	0.0119	80	5310	0.0100	53
	1.9	5030	0.0137	70	2510	0.0096	24	6700	0.0130	90	5030	0.0109	55
	2.0	4780	0.0149	70	2390	0.0104	25	6370	0.0141	90	4780	0.0119	57
	2.1	4550	0.0161	70	2270	0.0112	26	6070	0.0153	90	4550	0.0129	58
	2.2	4340	0.0173	70	2170	0.0121	26	5790	0.0164	90	4340	0.0138	60
	2.3	4150	0.0184	80	2080	0.0129	27	5540	0.0175	100	4150	0.0148	60
	2.4	3980	0.0196	80	1990	0.0137	27	5310	0.0187	100	3980	0.0157	60
	2.5	3820	0.0208	80	1910	0.0146	28	5100	0.0198	100	3820	0.0167	60
	2.6	3670	0.0220	80	1840	0.0154	28	4900	0.0209	100	3670	0.0176	60
	2.7	3540	0.0232	80	1770	0.0162	29	4720	0.0220	100	3540	0.0186	70
	2.8	3410	0.0244	80	1710	0.0171	29	4550	0.0232	110	3410	0.0195	70
	2.9	3290	0.0256	80	1650	0.0179	30	4390	0.0243	110	3290	0.0205	70
	3.0	3180	0.0268	90	1590	0.0187	30	4250	0.0254	110	3180	0.0214	70

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

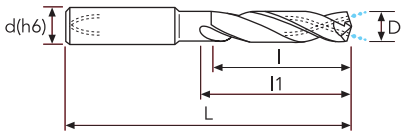
3520SUH MINI

3 mm shank, short (20xD), polished flutes, SUH (through coolant)

20XD | OSAWA NORM | SUH MINI | MG PV300 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	drilling length	EDP No.	Stock
1.00	0/-0.010	3	21.5	23	65	20 x D	3520SUH0100	●
1.10	0/-0.010	3	23.7	25.2	65	20 x D	3520SUH0110	○
1.20	0/-0.010	3	25.8	27.3	65	20 x D	3520SUH0120	●
1.30	0/-0.010	3	28	29.5	65	20 x D	3520SUH0130	●
1.40	0/-0.010	3	30.1	31.6	65	20 x D	3520SUH0140	○
1.50	0/-0.010	3	32.3	33.8	75	20 x D	3520SUH0150	●
1.60	0/-0.010	3	34.4	35.9	75	20 x D	3520SUH0160	●
1.70	0/-0.010	3	36.6	38.1	75	20 x D	3520SUH0170	●
1.80	0/-0.010	3	38.7	40.2	75	20 x D	3520SUH0180	●
1.90	0/-0.010	3	40.9	42.4	75	20 x D	3520SUH0190	○
2.00	0/-0.010	3	43	46	82	20 x D	3520SUH0200	●
2.10	0/-0.010	3	45.2	48.4	82	20 x D	3520SUH0210	○
2.20	0/-0.010	3	47.3	50.6	82	20 x D	3520SUH0220	●
2.30	0/-0.010	3	49.5	53	100	20 x D	3520SUH0230	●
2.40	0/-0.010	3	51.6	55.2	100	20 x D	3520SUH0240	○
2.50	0/-0.010	3	53.8	57.6	100	20 x D	3520SUH0250	●
2.60	0/-0.010	3	55.9	59.8	100	20 x D	3520SUH0260	○
2.70	0/-0.010	3	58.1	62.2	100	20 x D	3520SUH0270	○
2.80	0/-0.010	3	60.2	64.4	100	20 x D	3520SUH0280	●
2.90	0/-0.010	3	61.4	65.8	100	20 x D	3520SUH0290	○
3.00	0/-0.010	3	64.5	69	100	20 x D	3520SUH0300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3520SUH MINI

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	**45-65***			**40-50***			**30-40***			**20-30***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	17520	0.0063	110	14330	0.0057	80	11150	0.0050	56	7960	0.0044	35
1.1	15920	0.0070	110	13030	0.0063	80	10130	0.0056	57	7240	0.0049	35
1.2	14600	0.0077	110	11940	0.0069	80	9290	0.0062	57	6630	0.0054	36
1.3	13470	0.0084	110	11020	0.0076	80	8570	0.0067	58	6120	0.0059	36
1.4	12510	0.0091	110	10240	0.0082	80	7960	0.0073	58	5690	0.0064	36
1.5	11680	0.0105	120	9550	0.0095	90	7430	0.0084	60	5310	0.0074	39
1.6	10950	0.0119	130	8960	0.0107	100	6970	0.0095	70	4980	0.0083	41
1.7	10300	0.0133	140	8430	0.0120	100	6560	0.0106	70	4680	0.0093	44
1.8	9730	0.0147	140	7960	0.0132	110	6190	0.0118	70	4420	0.0103	45
1.9	9220	0.0161	150	7540	0.0145	110	5870	0.0129	80	4190	0.0113	47
2.0	8760	0.0175	150	7170	0.0158	110	5570	0.0140	80	3980	0.0123	49
2.1	8340	0.0189	160	6820	0.0170	120	5310	0.0151	80	3790	0.0132	50
2.2	7960	0.0203	160	6510	0.0183	120	5070	0.0162	80	3620	0.0142	51
2.3	7620	0.0217	170	6230	0.0195	120	4850	0.0174	80	3460	0.0152	53
2.4	7300	0.0231	170	5970	0.0208	120	4640	0.0185	90	3320	0.0162	54
2.5	7010	0.0245	170	5730	0.0221	130	4460	0.0196	90	3180	0.0172	55
2.6	6740	0.0259	170	5510	0.0233	130	4290	0.0207	90	3060	0.0181	55
2.7	6490	0.0273	180	5310	0.0246	130	4130	0.0218	90	2950	0.0191	56
2.8	6260	0.0287	180	5120	0.0258	130	3980	0.0230	90	2840	0.0201	57
2.9	6040	0.0301	180	4940	0.0271	130	3840	0.0241	90	2750	0.0211	58
3.0	5840	0.0315	180	4780	0.0284	140	3720	0.0252	90	2650	0.0221	58

Ø RUN OUT <0.02mm

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	**20-30***			**15-25***			**15-25***			**10-20***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	7960	0.0047	38	6370	0.0040	26	6370	0.0033	21	4780	0.0028	14
1.1	7240	0.0053	38	5790	0.0045	26	5790	0.0037	21	4340	0.0032	14
1.2	6630	0.0058	38	5310	0.0049	26	5310	0.0040	21	3980	0.0035	14
1.3	6120	0.0063	39	4900	0.0054	26	4900	0.0044	22	3670	0.0038	14
1.4	5690	0.0068	39	4550	0.0058	26	4550	0.0048	22	3410	0.0041	14
1.5	5310	0.0079	42	4250	0.0067	28	4250	0.0055	23	3180	0.0047	15
1.6	4980	0.0089	44	3980	0.0076	30	3980	0.0062	25	2990	0.0054	16
1.7	4680	0.0100	47	3750	0.0085	32	3750	0.0070	26	2810	0.0060	17
1.8	4420	0.0110	49	3540	0.0094	33	3540	0.0077	27	2650	0.0066	18
1.9	4190	0.0121	51	3350	0.0103	34	3350	0.0085	28	2510	0.0072	18
2.0	3980	0.0131	52	3180	0.0112	35	3180	0.0092	29	2390	0.0079	19
2.1	3790	0.0142	54	3030	0.0120	37	3030	0.0099	30	2270	0.0085	19
2.2	3620	0.0152	55	2900	0.0129	38	2900	0.0107	31	2170	0.0091	20
2.3	3460	0.0163	56	2770	0.0138	38	2770	0.0114	32	2080	0.0098	20
2.4	3320	0.0173	58	2650	0.0147	39	2650	0.0121	32	1990	0.0104	21
2.5	3180	0.0184	58	2550	0.0156	40	2550	0.0129	33	1910	0.0110	21
2.6	3060	0.0194	59	2450	0.0165	40	2450	0.0136	33	1840	0.0117	21
2.7	2950	0.0205	60	2360	0.0174	41	2360	0.0143	34	1770	0.0123	22
2.8	2840	0.0215	60	2270	0.0183	42	2270	0.0151	34	1710	0.0129	22
2.9	2750	0.0226	60	2200	0.0192	42	2200	0.0158	35	1650	0.0135	22
3.0	2650	0.0236	60	2120	0.0201	43	2120	0.0165	35	1590	0.0142	23

Ø RUN OUT <0.02mm

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

3520SUH MINI

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**45-65***			**40-50***			**30-40***			**20-30***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	17520	0.0063	110	14330	0.0057	80	11150	0.0050	56	7960	0.0044	35
1.1	15920	0.0070	110	13030	0.0063	80	10130	0.0056	57	7240	0.0049	35
1.2	14600	0.0077	110	11940	0.0069	80	9290	0.0062	57	6630	0.0054	36
1.3	13470	0.0084	110	11020	0.0076	80	8570	0.0067	58	6120	0.0059	36
1.4	12510	0.0091	110	10240	0.0082	80	7960	0.0073	58	5690	0.0064	36
1.5	11680	0.0105	120	9550	0.0095	90	7430	0.0084	62	5310	0.0074	39
1.6	10950	0.0119	130	8960	0.0107	100	6970	0.0095	66	4980	0.0083	41
1.7	10300	0.0133	140	8430	0.0120	100	6560	0.0106	70	4680	0.0093	44
1.8	9730	0.0147	140	7960	0.0132	110	6190	0.0118	70	4420	0.0103	45
1.9	9220	0.0161	150	7540	0.0145	110	5870	0.0129	80	4190	0.0113	47
2.0	8760	0.0175	150	7170	0.0158	110	5570	0.0140	80	3980	0.0123	49
2.1	8340	0.0189	160	6820	0.0170	120	5310	0.0151	80	3790	0.0132	50
2.2	7960	0.0203	160	6510	0.0183	120	5070	0.0162	80	3620	0.0142	51
2.3	7620	0.0217	170	6230	0.0195	120	4850	0.0174	80	3460	0.0152	53
2.4	7300	0.0231	170	5970	0.0208	120	4640	0.0185	90	3320	0.0162	54
2.5	7010	0.0245	170	5730	0.0221	130	4460	0.0196	90	3180	0.0172	55
2.6	6740	0.0259	170	5510	0.0233	130	4290	0.0207	90	3060	0.0181	55
2.7	6490	0.0273	180	5310	0.0246	130	4130	0.0218	90	2950	0.0191	56
2.8	6260	0.0287	180	5120	0.0258	130	3980	0.0230	90	2840	0.0201	57
2.9	6040	0.0301	180	4940	0.0271	130	3840	0.0241	90	2750	0.0211	58
3.0	5840	0.0315	180	4780	0.0284	140	3720	0.0252	90	2650	0.0221	58

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

Material Group ISO 513	N1			N2			N3 N4			N5		
Hardness/Rm												
Vc (m/min)	**80-100***			**80-120***			**80-120***			**80-120***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	28660	0.0079	230	28660	0.0071	200	28660	0.0063	180	38220	0.0087	330
1.1	26060	0.0088	230	26060	0.0079	210	26060	0.0070	180	34740	0.0096	330
1.2	23890	0.0096	230	23890	0.0087	210	23890	0.0077	180	31850	0.0106	340
1.3	22050	0.0105	230	22050	0.0095	210	22050	0.0084	190	29400	0.0116	340
1.4	20470	0.0114	230	20470	0.0102	210	20470	0.0091	190	27300	0.0125	340
1.5	19110	0.0131	250	19110	0.0118	230	19110	0.0105	200	25480	0.0144	370
1.6	17910	0.0149	270	17910	0.0134	240	17910	0.0119	210	23890	0.0164	390
1.7	16860	0.0166	280	16860	0.0150	250	16860	0.0133	220	22480	0.0183	410
1.8	15920	0.0184	290	15920	0.0165	260	15920	0.0147	230	21230	0.0202	430
1.9	15090	0.0201	300	15090	0.0181	270	15090	0.0161	240	20110	0.0221	450
2.0	14330	0.0219	310	14330	0.0197	280	14330	0.0175	250	19110	0.0241	460
2.1	13650	0.0236	320	13650	0.0213	290	13650	0.0189	260	18200	0.0260	470
2.2	13030	0.0254	330	13030	0.0228	300	13030	0.0203	260	17370	0.0279	480
2.3	12460	0.0271	340	12460	0.0244	300	12460	0.0217	270	16620	0.0298	500
2.4	11940	0.0289	340	11940	0.0260	310	11940	0.0231	280	15920	0.0318	510
2.5	11460	0.0306	350	11460	0.0276	320	11460	0.0245	280	15290	0.0337	520
2.6	11020	0.0324	360	11020	0.0291	320	11020	0.0259	290	14700	0.0356	520
2.7	10620	0.0341	360	10620	0.0307	330	10620	0.0273	290	14150	0.0375	530
2.8	10240	0.0359	370	10240	0.0323	330	10240	0.0287	290	13650	0.0395	540
2.9	9880	0.0376	370	9880	0.0339	330	9880	0.0301	300	13180	0.0414	550
3.0	9550	0.0394	380	9550	0.0354	340	9550	0.0315	300	12740	0.0433	550

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

3520SUH MINI

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	20-30*			10-20*			30-40*			20-30*		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1.0	7960	0.0044	35	6370	0.0031	20	11150	0.0042	47	7960	0.0035	28
	1.1	7240	0.0049	35	5790	0.0034	20	10130	0.0047	47	7240	0.0039	28
	1.2	6630	0.0054	36	5310	0.0038	20	9290	0.0051	48	6630	0.0043	29
	1.3	6120	0.0059	36	4900	0.0041	20	8570	0.0056	48	6120	0.0047	29
	1.4	5690	0.0064	36	4550	0.0045	20	7960	0.0061	48	5690	0.0051	29
Ø RUN OUT <0.02mm	**1.5**	5310	0.0074	39	4250	0.0051	22	7430	0.0070	52	5310	0.0059	31
	1.6	4980	0.0083	41	3980	0.0058	23	6970	0.0079	55	4980	0.0067	33
	1.7	4680	0.0093	44	3750	0.0065	24	6560	0.0088	58	4680	0.0074	35
	1.8	4420	0.0103	45	3540	0.0072	25	6190	0.0098	60	4420	0.0082	36
	1.9	4190	0.0113	47	3350	0.0079	26	5870	0.0107	60	4190	0.0090	38
	2.0	3980	0.0123	49	3180	0.0086	27	5570	0.0116	60	3980	0.0098	39
	2.1	3790	0.0132	50	3030	0.0093	28	5310	0.0126	70	3790	0.0106	40
	2.2	3620	0.0142	51	2900	0.0099	29	5070	0.0135	70	3620	0.0114	41
	2.3	3460	0.0152	53	2770	0.0106	29	4850	0.0144	70	3460	0.0122	42
	2.4	3320	0.0162	54	2650	0.0113	30	4640	0.0154	70	3320	0.0129	43
	2.5	3180	0.0172	55	2550	0.0120	31	4460	0.0163	70	3180	0.0137	44
	2.6	3060	0.0181	55	2450	0.0127	31	4290	0.0172	70	3060	0.0145	44
	2.7	2950	0.0191	56	2360	0.0134	32	4130	0.0182	70	2950	0.0153	45
	2.8	2840	0.0201	57	2270	0.0141	32	3980	0.0191	80	2840	0.0161	46
	2.9	2750	0.0211	58	2200	0.0147	32	3840	0.0200	80	2750	0.0169	46
	3.0	2650	0.0221	58	2120	0.0154	33	3720	0.0209	80	2650	0.0176	47

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

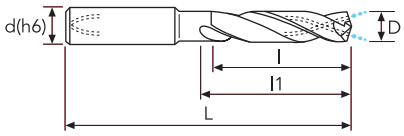
3525SUH MINI

3 mm shank, short (25xD), polished flutes, SUH (through coolant)

25XD | OSAWA NORM | SUH MINI | MG PV300 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	drilling length	EDP No.	Stock
1.00	0/-0.010	3	26.5	28	70	25 x D	3525SUH0100	●
1.10	0/-0.010	3	29.2	30.7	70	25 x D	3525SUH0110	○
1.20	0/-0.010	3	31.8	33.3	75	25 x D	3525SUH0120	○
1.30	0/-0.010	3	34.5	36	75	25 x D	3525SUH0130	○
1.40	0/-0.010	3	37.1	38.6	75	25 x D	3525SUH0140	○
1.50	0/-0.010	3	39.8	41.3	80	25 x D	3525SUH0150	●
1.60	0/-0.010	3	42.4	43.9	80	25 x D	3525SUH0160	○
1.70	0/-0.010	3	45.1	46.6	80	25 x D	3525SUH0170	○
1.80	0/-0.010	3	47.7	49.2	90	25 x D	3525SUH0180	○
1.90	0/-0.010	3	50.4	51.9	90	25 x D	3525SUH0190	○
2.00	0/-0.010	3	53	56	90	25 x D	3525SUH0200	●
2.10	0/-0.010	3	55.7	58.8	100	25 x D	3525SUH0210	○
2.20	0/-0.010	3	58.3	61.6	100	25 x D	3525SUH0220	○
2.30	0/-0.010	3	61	64.4	100	25 x D	3525SUH0230	○
2.40	0/-0.010	3	63.6	67.2	100	25 x D	3525SUH0240	○
2.50	0/-0.010	3	66.3	70	110	25 x D	3525SUH0250	●
2.60	0/-0.010	3	68.9	72.8	110	25 x D	3525SUH0260	○
2.70	0/-0.010	3	71.6	75.6	110	25 x D	3525SUH0270	○
2.80	0/-0.010	3	74.2	78.4	110	25 x D	3525SUH0280	○
2.90	0/-0.010	3	76.9	81.2	120	25 x D	3525SUH0290	○
3.00	0/-0.010	3	79.5	84	120	25 x D	3525SUH0300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3525SUH MINI

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	**45-55***			**35-45***			**25-35***			**15-25***		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**1.0**	15920	0.0054	90	12740	0.0049	60	9550	0.0043	41	6370	0.0038	24
	1.1	14480	0.0060	90	11580	0.0054	60	8690	0.0048	42	5790	0.0042	24
	1.2	13270	0.0066	90	10620	0.0059	60	7960	0.0053	42	5310	0.0046	25
	1.3	12250	0.0072	90	9800	0.0065	60	7350	0.0058	42	4900	0.0050	25
	1.4	11370	0.0078	90	9100	0.0070	60	6820	0.0062	43	4550	0.0055	25
	1.5	10620	0.0090	100	8490	0.0081	70	6370	0.0072	46	4250	0.0063	27
	1.6	9950	0.0102	100	7960	0.0092	70	5970	0.0082	49	3980	0.0071	28
	1.7	9370	0.0114	110	7490	0.0103	80	5620	0.0091	51	3750	0.0080	30
	1.8	8850	0.0126	110	7080	0.0113	80	5310	0.0101	54	3540	0.0088	31
	1.9	8380	0.0138	120	6700	0.0124	80	5030	0.0110	56	3350	0.0097	32
	2.0	7960	0.0150	120	6370	0.0135	90	4780	0.0120	57	3180	0.0105	33
	2.1	7580	0.0162	120	6070	0.0146	90	4550	0.0130	59	3030	0.0113	34
	2.2	7240	0.0174	130	5790	0.0157	90	4340	0.0139	60	2900	0.0122	35
	2.3	6920	0.0186	130	5540	0.0167	90	4150	0.0149	60	2770	0.0130	36
	2.4	6630	0.0198	130	5310	0.0178	90	3980	0.0158	60	2650	0.0139	37
	2.5	6370	0.0210	130	5100	0.0189	100	3820	0.0168	60	2550	0.0147	37
	2.6	6120	0.0222	140	4900	0.0200	100	3670	0.0178	70	2450	0.0155	38
	2.7	5900	0.0234	140	4720	0.0211	100	3540	0.0187	70	2360	0.0164	39
	2.8	5690	0.0246	140	4550	0.0221	100	3410	0.0197	70	2270	0.0172	39
	2.9	5490	0.0258	140	4390	0.0232	100	3290	0.0206	70	2200	0.0181	40
	3.0	5310	0.0270	140	4250	0.0243	100	3180	0.0216	70	2120	0.0189	40

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

	Material Group ISO 513	M1 M2			M3			M4			M5		
	Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
	Vc (m/min)	**15-25***			**10-20***			**10-20***			**8-12***		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**1.0**	6370	0.0041	26	4780	0.0034	16	4780	0.0028	14	3180	0.0024	8
	1.1	5790	0.0045	26	4343	0.0038	17	4343	0.0032	14	2895	0.0027	8
	1.2	5308	0.0050	26	3981	0.0042	17	3981	0.0035	14	2654	0.0030	8
	1.3	4900	0.0054	26	3675	0.0046	17	3675	0.0038	14	2450	0.0032	8
	1.4	4550	0.0059	27	3412	0.0050	17	3412	0.0041	14	2275	0.0035	8
	1.5	4246	0.0068	29	3185	0.0057	18	3185	0.0047	15	2123	0.0041	9
	1.6	3981	0.0077	30	2986	0.0065	19	2986	0.0054	16	1990	0.0046	9
	1.7	3747	0.0086	32	2810	0.0073	20	2810	0.0060	17	1873	0.0051	10
	1.8	3539	0.0095	33	2654	0.0080	21	2654	0.0066	18	1769	0.0057	10
	1.9	3352	0.0104	35	2514	0.0088	22	2514	0.0072	18	1676	0.0062	10
	2.0	3185	0.0113	36	2389	0.0096	23	2389	0.0079	19	1592	0.0068	11
	2.1	3033	0.0122	37	2275	0.0103	23	2275	0.0085	19	1517	0.0073	11
	2.2	2895	0.0131	38	2171	0.0111	24	2171	0.0091	20	1448	0.0078	11
	2.3	2769	0.0140	39	2077	0.0119	25	2077	0.0098	20	1385	0.0084	12
	2.4	2654	0.0149	39	1990	0.0126	25	1990	0.0104	21	1327	0.0089	12
	2.5	2548	0.0158	40	1911	0.0134	26	1911	0.0110	21	1274	0.0095	12
	2.6	2450	0.0167	41	1837	0.0142	26	1837	0.0117	21	1225	0.0100	12
	2.7	2359	0.0176	41	1769	0.0149	26	1769	0.0123	22	1180	0.0105	12
	2.8	2275	0.0185	42	1706	0.0157	27	1706	0.0129	22	1137	0.0111	13
	2.9	2196	0.0194	42	1647	0.0164	27	1647	0.0135	22	1098	0.0116	13
	3.0	2123	0.0203	43	1592	0.0172	27	1592	0.0142	23	1062	0.0122	13

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

3525SUH MINI

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	45-55*			35-45*			25-35*			15-25*		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	15920	0.0054	90	12740	0.0049	60	9550	0.0043	41	6370	0.0038	24
1.1	14480	0.0060	90	11580	0.0054	60	8690	0.0048	42	5790	0.0042	24
1.2	13270	0.0066	90	10620	0.0059	60	7960	0.0053	42	5310	0.0046	25
1.3	12250	0.0072	90	9800	0.0065	60	7350	0.0058	42	4900	0.0050	25
1.4	11370	0.0078	90	9100	0.0070	60	6820	0.0062	43	4550	0.0055	25
1.5	10620	0.0090	100	8490	0.0081	70	6370	0.0072	46	4250	0.0063	27
1.6	9950	0.0102	100	7960	0.0092	70	5970	0.0082	49	3980	0.0071	28
1.7	9370	0.0114	110	7490	0.0103	80	5620	0.0091	51	3750	0.0080	30
1.8	8850	0.0126	110	7080	0.0113	80	5310	0.0101	54	3540	0.0088	31
1.9	8380	0.0138	120	6700	0.0124	80	5030	0.0110	56	3350	0.0097	32
2.0	7960	0.0150	120	6370	0.0135	90	4780	0.0120	57	3180	0.0105	33
2.1	7580	0.0162	120	6070	0.0146	90	4550	0.0130	59	3030	0.0113	34
2.2	7240	0.0174	130	5790	0.0157	90	4340	0.0139	60	2900	0.0122	35
2.3	6920	0.0186	130	5540	0.0167	90	4150	0.0149	60	2770	0.0130	36
2.4	6630	0.0198	130	5310	0.0178	90	3980	0.0158	60	2650	0.0139	37
2.5	6370	0.0210	130	5100	0.0189	100	3820	0.0168	60	2550	0.0147	37
2.6	6120	0.0222	140	4900	0.0200	100	3670	0.0178	70	2450	0.0155	38
2.7	5900	0.0234	140	4720	0.0211	100	3540	0.0187	70	2360	0.0164	39
2.8	5690	0.0246	140	4550	0.0221	100	3410	0.0197	70	2270	0.0172	39
2.9	5490	0.0258	140	4390	0.0232	100	3290	0.0206	70	2200	0.0181	40
3.0	5310	0.0270	140	4250	0.0243	100	3180	0.0216	70	2120	0.0189	40

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

Material Group ISO 513	N1			N2			N3 N4			N5		
Hardness/Rm												
Vc (m/min)	60-80*			60-80*			60-80*			90-110*		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	22290	0.0068	150	22290	0.0061	140	22290	0.0054	120	31850	0.0074	240
1.1	20270	0.0075	150	20270	0.0068	140	20270	0.0060	120	28950	0.0083	240
1.2	18580	0.0083	150	18580	0.0074	140	18580	0.0066	120	26540	0.0091	240
1.3	17150	0.0090	150	17150	0.0081	140	17150	0.0072	120	24500	0.0099	240
1.4	15920	0.0098	160	15920	0.0088	140	15920	0.0078	120	22750	0.0107	240
1.5	14860	0.0113	170	14860	0.0101	150	14860	0.0090	130	21230	0.0124	260
1.6	13930	0.0128	180	13930	0.0115	160	13930	0.0102	140	19900	0.0140	280
1.7	13110	0.0143	190	13110	0.0128	170	13110	0.0114	150	18730	0.0157	290
1.8	12380	0.0158	190	12380	0.0142	180	12380	0.0126	160	17690	0.0173	310
1.9	11730	0.0173	200	11730	0.0155	180	11730	0.0138	160	16760	0.0190	320
2.0	11150	0.0188	210	11150	0.0169	190	11150	0.0150	170	15920	0.0206	330
2.1	10620	0.0203	220	10620	0.0182	190	10620	0.0162	170	15170	0.0223	340
2.2	10130	0.0218	220	10130	0.0196	200	10130	0.0174	180	14480	0.0239	350
2.3	9690	0.0233	230	9690	0.0209	200	9690	0.0186	180	13850	0.0256	350
2.4	9290	0.0248	230	9290	0.0223	210	9290	0.0198	180	13270	0.0272	360
2.5	8920	0.0263	230	8920	0.0236	210	8920	0.0210	190	12740	0.0289	370
2.6	8570	0.0278	240	8570	0.0250	210	8570	0.0222	190	12250	0.0305	370
2.7	8260	0.0293	240	8260	0.0263	220	8260	0.0234	190	11800	0.0322	380
2.8	7960	0.0308	240	7960	0.0277	220	7960	0.0246	200	11370	0.0338	380
2.9	7690	0.0323	250	7690	0.0290	220	7690	0.0258	200	10980	0.0355	390
3.0	7430	0.0338	250	7430	0.0304	230	7430	0.0270	200	10620	0.0371	390

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

3525SUH MINI

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	10-20*			10-20*			25-35*			10-20*		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1.0	6370	0.0038	24	4780	0.0026	13	9550	0.0036	34	6370	0.0030	19
	1.1	5790	0.0042	24	4340	0.0029	13	8690	0.0040	35	5790	0.0034	19
	1.2	5310	0.0046	25	3980	0.0032	13	7960	0.0044	35	5310	0.0037	20
	1.3	4900	0.0050	25	3670	0.0035	13	7350	0.0048	35	4900	0.0040	20
	1.4	4550	0.0055	25	3410	0.0038	13	6820	0.0052	35	4550	0.0044	20
Ø RUN OUT <0.02mm	**1.5**	4250	0.0063	27	3180	0.0044	14	6370	0.0060	38	4250	0.0050	21
	1.6	3980	0.0071	28	2990	0.0050	15	5970	0.0068	40	3980	0.0057	23
	1.7	3750	0.0080	30	2810	0.0056	16	5620	0.0076	43	3750	0.0064	24
	1.8	3540	0.0088	31	2650	0.0062	16	5310	0.0084	44	3540	0.0071	25
	1.9	3350	0.0097	32	2510	0.0068	17	5030	0.0092	46	3350	0.0077	26
	2.0	3180	0.0105	33	2390	0.0074	18	4780	0.0100	48	3180	0.0084	27
	2.1	3030	0.0113	34	2270	0.0079	18	4550	0.0108	49	3030	0.0091	27
	2.2	2900	0.0122	35	2170	0.0085	19	4340	0.0116	50	2900	0.0097	28
	2.3	2770	0.0130	36	2080	0.0091	19	4150	0.0124	51	2770	0.0104	29
	2.4	2650	0.0139	37	1990	0.0097	19	3980	0.0132	52	2650	0.0111	29
	2.5	2550	0.0147	37	1910	0.0103	20	3820	0.0140	53	2550	0.0118	30
	2.6	2450	0.0155	38	1840	0.0109	20	3670	0.0148	54	2450	0.0124	30
	2.7	2360	0.0164	39	1770	0.0115	20	3540	0.0156	55	2360	0.0131	31
	2.8	2270	0.0172	39	1710	0.0121	21	3410	0.0164	56	2270	0.0138	31
	2.9	2200	0.0181	40	1650	0.0126	21	3290	0.0172	56	2200	0.0144	32
	3.0	2120	0.0189	40	1590	0.0132	21	3180	0.0180	57	2120	0.0151	32

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

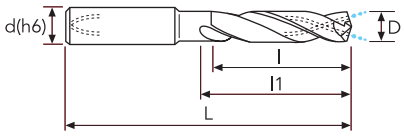
3530SUH MINI

3 mm shank, short (30xD), polished flutes, SUH (through coolant)

30XD | OSAWA NORM | SUH MINI | MG PV300 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	drilling length	EDP No.	Stock
1.00	0/-0.010	3	31.5	33	75	30 x D	3530SUH0100	●
1.10	0/-0.010	3	34.7	36.2	75	30 x D	3530SUH0110	○
1.20	0/-0.010	3	37.8	39.3	75	30 x D	3530SUH0120	○
1.30	0/-0.010	3	41	42.5	85	30 x D	3530SUH0130	○
1.40	0/-0.010	3	44.1	45.6	85	30 x D	3530SUH0140	○
1.50	0/-0.010	3	47.3	48.8	85	30 x D	3530SUH0150	●
1.60	0/-0.010	3	50.4	51.9	90	30 x D	3530SUH0160	○
1.70	0/-0.010	3	53.6	55.1	90	30 x D	3530SUH0170	○
1.80	0/-0.010	3	56.7	58.2	100	30 x D	3530SUH0180	○
1.90	0/-0.010	3	59.9	61.4	100	30 x D	3530SUH0190	○
2.00	0/-0.010	3	63	66	100	30 x D	3530SUH0200	●
2.10	0/-0.010	3	66.2	69.3	110	30 x D	3530SUH0210	○
2.20	0/-0.010	3	69.3	72.6	110	30 x D	3530SUH0220	○
2.30	0/-0.010	3	72.5	75.9	110	30 x D	3530SUH0230	○
2.40	0/-0.010	3	75.6	79.2	120	30 x D	3530SUH0240	○
2.50	0/-0.010	3	78.8	82.5	120	30 x D	3530SUH0250	●
2.60	0/-0.010	3	81.9	85.8	120	30 x D	3530SUH0260	○
2.70	0/-0.010	3	85.1	89.1	130	30 x D	3530SUH0270	○
2.80	0/-0.010	3	88.2	92.4	130	30 x D	3530SUH0280	○
2.90	0/-0.010	3	91.4	95.7	130	30 x D	3530SUH0290	○
3.00	0/-0.010	3	94.5	99	130	30 x D	3530SUH0300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3530SUH MINI

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	**45-55***			**35-45***			**25-35***			**15-25***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	15920	0.0050	80	12740	0.0045	57	9550	0.0040	38	6370	0.0035	22
1.1	14480	0.0055	80	11580	0.0050	57	8690	0.0044	38	5790	0.0039	22
1.2	13270	0.0061	80	10620	0.0054	58	7960	0.0048	39	5310	0.0042	22
1.3	12250	0.0066	80	9800	0.0059	58	7350	0.0053	39	4900	0.0046	23
1.4	11370	0.0072	80	9100	0.0064	59	6820	0.0057	39	4550	0.0050	23
1.5	10620	0.0083	90	8490	0.0074	60	6370	0.0066	42	4250	0.0058	25
1.6	9950	0.0094	90	7960	0.0084	70	5970	0.0075	45	3980	0.0065	26
1.7	9370	0.0105	100	7490	0.0094	70	5620	0.0084	47	3750	0.0073	27
1.8	8850	0.0116	100	7080	0.0104	70	5310	0.0092	49	3540	0.0081	29
1.9	8380	0.0127	110	6700	0.0114	80	5030	0.0101	51	3350	0.0089	30
2.0	7960	0.0138	110	6370	0.0124	80	4780	0.0110	53	3180	0.0096	31
2.1	7580	0.0149	110	6070	0.0134	80	4550	0.0119	54	3030	0.0104	31
2.2	7240	0.0160	120	5790	0.0144	80	4340	0.0128	55	2900	0.0112	32
2.3	6920	0.0171	120	5540	0.0153	90	4150	0.0136	57	2770	0.0119	33
2.4	6630	0.0182	120	5310	0.0163	90	3980	0.0145	58	2650	0.0127	34
2.5	6370	0.0193	120	5100	0.0173	90	3820	0.0154	59	2550	0.0135	34
2.6	6120	0.0204	120	4900	0.0183	90	3670	0.0163	60	2450	0.0142	35
2.7	5900	0.0215	130	4720	0.0193	90	3540	0.0172	60	2360	0.0150	35
2.8	5690	0.0226	130	4550	0.0203	90	3410	0.0180	60	2270	0.0158	36
2.9	5490	0.0237	130	4390	0.0213	90	3290	0.0189	60	2200	0.0166	36
3.0	5310	0.0248	130	4250	0.0223	90	3180	0.0198	60	2120	0.0173	37

Ø RUN OUT <0.02mm

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	**15-25***			**10-20***			**10-20***			**8-12***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	6370	0.0037	24	4780	0.0032	15	4780	0.0026	12	3180	0.0022	7
1.1	5790	0.0041	24	4343	0.0035	15	4343	0.0029	13	2895	0.0025	7
1.2	5308	0.0045	24	3981	0.0039	15	3981	0.0032	13	2654	0.0027	7
1.3	4900	0.0050	24	3675	0.0042	15	3675	0.0035	13	2450	0.0030	7
1.4	4550	0.0054	24	3412	0.0046	16	3412	0.0038	13	2275	0.0032	7
1.5	4246	0.0062	26	3185	0.0053	17	3185	0.0043	14	2123	0.0037	8
1.6	3981	0.0070	28	2986	0.0060	18	2986	0.0049	15	1990	0.0042	8
1.7	3747	0.0078	29	2810	0.0067	19	2810	0.0055	15	1873	0.0047	9
1.8	3539	0.0087	31	2654	0.0074	20	2654	0.0061	16	1769	0.0052	9
1.9	3352	0.0095	32	2514	0.0081	20	2514	0.0066	17	1676	0.0057	10
2.0	3185	0.0103	33	2389	0.0088	21	2389	0.0072	17	1592	0.0062	10
2.1	3033	0.0111	34	2275	0.0095	22	2275	0.0078	18	1517	0.0067	10
2.2	2895	0.0120	35	2171	0.0102	22	2171	0.0084	18	1448	0.0072	10
2.3	2769	0.0128	35	2077	0.0109	23	2077	0.0090	19	1385	0.0077	11
2.4	2654	0.0136	36	1990	0.0116	23	1990	0.0095	19	1327	0.0082	11
2.5	2548	0.0144	37	1911	0.0123	23	1911	0.0101	19	1274	0.0087	11
2.6	2450	0.0153	37	1837	0.0130	24	1837	0.0107	20	1225	0.0092	11
2.7	2359	0.0161	38	1769	0.0137	24	1769	0.0113	20	1180	0.0097	11
2.8	2275	0.0169	38	1706	0.0144	25	1706	0.0118	20	1137	0.0101	12
2.9	2196	0.0177	39	1647	0.0151	25	1647	0.0124	20	1098	0.0106	12
3.0	2123	0.0186	39	1592	0.0158	25	1592	0.0130	21	1062	0.0111	12

Ø RUN OUT <0.02mm

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

3530SUH MINI

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**45-55***			**35-45***			**25-35***			**15-25***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	15920	0.0050	80	12740	0.0045	57	9550	0.0040	38	6370	0.0035	22
1.1	14480	0.0055	80	11580	0.0050	57	8690	0.0044	38	5790	0.0039	22
1.2	13270	0.0061	80	10620	0.0054	58	7960	0.0048	39	5310	0.0042	22
1.3	12250	0.0066	80	9800	0.0059	58	7350	0.0053	39	4900	0.0046	23
1.4	11370	0.0072	80	9100	0.0064	59	6820	0.0057	39	4550	0.0050	23
1.5	10620	0.0083	90	8490	0.0074	60	6370	0.0066	42	4250	0.0058	25
1.6	9950	0.0094	90	7960	0.0084	70	5970	0.0075	45	3980	0.0065	26
1.7	9370	0.0105	100	7490	0.0094	70	5620	0.0084	47	3750	0.0073	27
1.8	8850	0.0116	100	7080	0.0104	70	5310	0.0092	49	3540	0.0081	29
1.9	8380	0.0127	110	6700	0.0114	80	5030	0.0101	51	3350	0.0089	30
2.0	7960	0.0138	110	6370	0.0124	80	4780	0.0110	53	3180	0.0096	31
2.1	7580	0.0149	110	6070	0.0134	80	4550	0.0119	54	3030	0.0104	31
2.2	7240	0.0160	120	5790	0.0144	80	4340	0.0128	55	2900	0.0112	32
2.3	6920	0.0171	120	5540	0.0153	90	4150	0.0136	57	2770	0.0119	33
2.4	6630	0.0182	120	5310	0.0163	90	3980	0.0145	58	2650	0.0127	34
2.5	6370	0.0193	120	5100	0.0173	90	3820	0.0154	59	2550	0.0135	34
2.6	6120	0.0204	120	4900	0.0183	90	3670	0.0163	60	2450	0.0142	35
2.7	5900	0.0215	130	4720	0.0193	90	3540	0.0172	61	2360	0.0150	35
2.8	5690	0.0226	130	4550	0.0203	90	3410	0.0180	62	2270	0.0158	36
2.9	5490	0.0237	130	4390	0.0213	90	3290	0.0189	62	2200	0.0166	36
3.0	5310	0.0248	130	4250	0.0223	90	3180	0.0198	63	2120	0.0173	37

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

Material Group ISO 513	N1			N2			N3 N4			N5		
Hardness/Rm												
Vc (m/min)	**60-80***			**60-80***			**60-80***			**90-110***		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1.0	22290	0.0062	140	22290	0.0056	120	22290	0.0050	110	31850	0.0068	220
1.1	20270	0.0069	140	20270	0.0062	130	20270	0.0055	110	28950	0.0076	220
1.2	18580	0.0076	140	18580	0.0068	130	18580	0.0061	110	26540	0.0083	220
1.3	17150	0.0083	140	17150	0.0074	130	17150	0.0066	110	24500	0.0091	220
1.4	15920	0.0089	140	15920	0.0080	130	15920	0.0072	110	22750	0.0098	220
1.5	14860	0.0103	150	14860	0.0093	140	14860	0.0083	120	21230	0.0113	240
1.6	13930	0.0117	160	13930	0.0105	150	13930	0.0094	130	19900	0.0129	260
1.7	13110	0.0131	170	13110	0.0118	150	13110	0.0105	140	18730	0.0144	270
1.8	12380	0.0144	180	12380	0.0130	160	12380	0.0116	140	17690	0.0159	280
1.9	11730	0.0158	190	11730	0.0142	170	11730	0.0127	150	16760	0.0174	290
2.0	11150	0.0172	190	11150	0.0155	170	11150	0.0138	150	15920	0.0189	300
2.1	10620	0.0186	200	10620	0.0167	180	10620	0.0149	160	15170	0.0204	310
2.2	10130	0.0199	200	10130	0.0179	180	10130	0.0160	160	14480	0.0219	320
2.3	9690	0.0213	210	9690	0.0192	190	9690	0.0171	170	13850	0.0234	320
2.4	9290	0.0227	210	9290	0.0204	190	9290	0.0182	170	13270	0.0250	330
2.5	8920	0.0241	210	8920	0.0217	190	8920	0.0193	170	12740	0.0265	340
2.6	8570	0.0254	220	8570	0.0229	200	8570	0.0204	170	12250	0.0280	340
2.7	8260	0.0268	220	8260	0.0241	200	8260	0.0215	180	11800	0.0295	350
2.8	7960	0.0282	220	7960	0.0254	200	7960	0.0226	180	11370	0.0310	350
2.9	7690	0.0296	230	7690	0.0266	200	7690	0.0237	180	10980	0.0325	360
3.0	7430	0.0309	230	7430	0.0278	210	7430	0.0248	180	10620	0.0340	360

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

3530SUH MINI

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	10-20*			10-20*			25-35*			10-20*		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1.0	6370	0.0035	22	4780	0.0024	12	9550	0.0033	31	6370	0.0028	18
	1.1	5790	0.0039	22	4340	0.0027	12	8690	0.0037	32	5790	0.0031	18
	1.2	5310	0.0042	22	3980	0.0030	12	7960	0.0040	32	5310	0.0034	18
	1.3	4900	0.0046	23	3670	0.0032	12	7350	0.0044	32	4900	0.0037	18
	1.4	4550	0.0050	23	3410	0.0035	12	6820	0.0048	32	4550	0.0040	18
Ø RUN OUT <0.02mm	**1.5**	4250	0.0058	25	3180	0.0040	13	6370	0.0055	35	4250	0.0046	20
	1.6	3980	0.0065	26	2990	0.0046	14	5970	0.0062	37	3980	0.0052	21
	1.7	3750	0.0073	27	2810	0.0051	14	5620	0.0069	39	3750	0.0059	22
	1.8	3540	0.0081	29	2650	0.0057	15	5310	0.0077	41	3540	0.0065	23
	1.9	3350	0.0089	30	2510	0.0062	16	5030	0.0084	42	3350	0.0071	24
	2.0	3180	0.0096	31	2390	0.0067	16	4780	0.0091	44	3180	0.0077	24
	2.1	3030	0.0104	31	2270	0.0073	17	4550	0.0099	45	3030	0.0083	25
	2.2	2900	0.0112	32	2170	0.0078	17	4340	0.0106	46	2900	0.0089	26
	2.3	2770	0.0119	33	2080	0.0084	17	4150	0.0113	47	2770	0.0095	26
	2.4	2650	0.0127	34	1990	0.0089	18	3980	0.0121	48	2650	0.0102	27
	2.5	2550	0.0135	34	1910	0.0094	18	3820	0.0128	49	2550	0.0108	27
	2.6	2450	0.0142	35	1840	0.0100	18	3670	0.0135	50	2450	0.0114	28
	2.7	2360	0.0150	35	1770	0.0105	19	3540	0.0143	50	2360	0.0120	28
	2.8	2270	0.0158	36	1710	0.0110	19	3410	0.0150	51	2270	0.0126	29
	2.9	2200	0.0166	36	1650	0.0116	19	3290	0.0157	52	2200	0.0132	29
	3.0	2120	0.0173	37	1590	0.0121	19	3180	0.0165	52	2120	0.0139	29

*if the machine tool or the equipment wouldn't allow to reach the requested rpm, please use the max. available rpm recalculating the Vf value (Vf=n available x fn)

TYPHOON HL

HIGH PERFORMANCE - LONG AND EXTRA-LONG

The Typhoon HL long and extra-long drills are the tool of choice for deep holes on ISO P, M, K, N, S.

La gamma Typhoon HL di punte lunghe ed extra-lunghe è progettata per la foratura di materiali ISO P, M, K, N, S.

Die Produktlinie Typhoon HL mit langen und extra-langen Bohrern wurde für das Bohren der Materialien ISO P, M, K, N, S entwickelt.

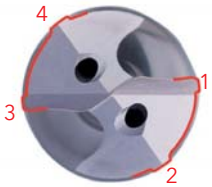
La gamme Typhoon HL de forets longs et extra longs est conçue pour le perçage de matériaux ISO P, M, K, N, S.

La gama Typhoon HL de brocas largas y extra-largas está diseñada para el taladro de materiales ISO P, M, K, N, S.

Серия Typhoon HL длинных и супердлинных свёрл предназначена для сверления отверстий в материалах по ISO P, M, K, N, S.

TYPHOON HL

HIGH PERFORMANCE - LONG AND EXTRA-LONG



- Suitable for deep and extra-deep drilling on ISO P, M, K, N, S materials
- Drill geometry: 4 margin lands for accurate and straight deep holes. Very stable and reliable even in case of work-pieces with slant exit holes and cross holes
- Chip pocket: highly polished to prevent welding and to improve the chip ejection
- Substrate and coating: specifically selected for high wear resistance, long and reliable life
- Drilling process: no steps for reliable and faster process
- Addressable industries: automotive, hydraulic component, mould and die, energy, general engineering
- Available from Ø3.1*mm to Ø10 mm
- Different cutting length types, from long (12xD) to extra-long (30xD).

- Forets conçus pour le perçage profond de matériaux ISO P, M, K, N, S
- Géométrie de l'arête : « 4 listels » pour l'exécution de trous profonds précis et droits
- Elle garantit stabilité et fiabilité même en présence de trous avec sortie inclinée ou de trous croisés
- Finition des goujoures : polie pour réduire le problème du collage et faciliter l'évacuation des copeaux
- Substrat et revêtement : spécifiques pour garantir durée et fiabilité
- Processus de perçage : le perçage sans step garantit un processus fiable et rapide
- Secteurs industriels : automotive, oléohydraulique, moules, énergie, mécanique générale
- Disponibles du Ø3.1*mm au Ø10 mm
- Différents types de longueur, de la longueur 12xD aux extra-longues 30xD

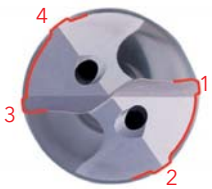
- Punte progettate per la foratura profonda di materiali ISO P, M, K, N, S
- Geometria del tagliente: 4 Margini per esecuzione di fori profondi precisi e rettilinei. Garantisce stabilità e affidabilità anche nel caso di fori con uscita inclinata o fori intersecanti
- Finitura gole: lappate per ridurre il problema dell'incollaggio e facilitare l'evacuazione dei trucioli
- Substrato e rivestimento: specifici per garantire durata e affidabilità
- Processo di foratura: la foratura senza step garantisce un processo affidabile e veloce
- Settori industriali: automotive, oleodinamica, stampi, energia, meccanica generale
- Disponibili dal Ø3.1*mm fino a Ø10 mm
- Differenti tipi di lunghezza, dalle lunghe (12xD) alle extra-lunghe (30xD)

- Brocas proyectadas para el taladro profundo de materiales ISO P, M, K, N, S
- Geometría del filo: 4 Márgenes para el mecanizado de agujeros profundos, precisos y rectilíneos. Garantiza estabilidad y fiabilidad incluso en caso de agujeros con salida inclinada o agujeros que se cruzan
- Acabado ranuras: lapeadas para reducir el problema del encolado y facilitar la evacuación de las virutas
- Sustrato y revestimiento: específicos para garantizar duración y fiabilidad
- Proceso de taladro: el taladro sin step garantiza un proceso fiable y rápido
- Sectores industriales: automoción, oleodinámico, moldes, energía, mecánica general
- Disponibles de Ø3.1*mm hasta Ø10 mm
- Diferentes tipos de longitud, desde las largas (12XD) hasta las extra-largas (30XD)

* < Ø3.1 = SUH MINI

TYPHOON HL

HIGH PERFORMANCE - LONG AND EXTRA-LONG



- Für das tiefe Bohren der Materialien ISO P, M, K, N, S entwickelte Bohrer
- Schneidkantengeometrie: 4 Fasen für die Herstellung von präzisen und geraden Tiefbohrungen. Zur Gewährleistung von Stabilität und Zuverlässigkeit, auch bei Bohrungen mit geneigtem Ausgang oder sich kreuzenden Bohrungen
- Schlichtbearbeitung der Nuten: geläppt, um Probleme durch Verkleben zu reduzieren und um die Späneabführung zu erleichtern
- Trägermaterial und Beschichtung: speziell zur Gewährleistung von Standzeit und Zuverlässigkeit
- Bohrverfahren: das stufenlose Bohren gewährleistet ein zuverlässiges und rasches Verfahren
- Industriesektoren: Automobilindustrie, Ölhydraulik, Formpressen, Energie, allgemeine Mechanik
- Erhältlich von Ø3.1*mm bis Ø10 mm
- Verschiedene Längen, von lang (12XD) bis extra-lang (30XD)

- Свёрла предназначены для сверления глубоких отверстий в материалах по ISO P, M, K, N, S
- Геометрия с 4 режущими кромками для выполнения точных и прямолинейных отверстий. Гарантирует стабильность и надёжность, даже, в случае обработки отверстий с выходом в наклонную плоскость или взаимопересекающихся отверстий
- Отполированные стружечные канавки: уменьшают вероятность приваривания стружки и облегчают ее вывод
- Специальное покрытие для повышения стойкости инструмента
- Процесс сверления отверстий: сверление без ступенчатых отходов, гарантирующее производительность
- Промышленные отрасли: автомобилестроение, детали гидравлики, пресс-формы, энергетика, общее машиностроение
- Доступны диаметром от Ø3.1*мм до Ø10 мм
- Различные длины: от длинных (12XD) до супердлинных (30XD)

* < Ø3.1 = SUH MINI

TYPHOON HL

HIGH PERFORMANCE - LONG AND EXTRA-LONG

MACHINING OF DEEP HOLES PERPENDICULAR TO THE SURFACE

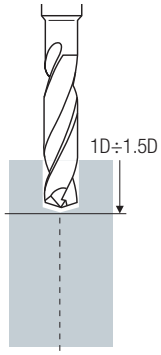
ESECUZIONE FORI PROFONDI ORTOGONALI ALLA SUPERFICIE

HERSTELLUNG TIEFER RECHTWINKLIGER BOHRUNGEN

EXÉCUTION DE TROUS PROFONDS ORTHOGONAUX À LA SURFACE

MECANIZADO DE AGUJEROS PROFUNDOS PERPENDICULARES A LA SUPERFÍCIE

СВЕРЛЕНИЕ ГЛУБОКИХ ОТВЕРСТИЙ ПЕРПЕНДИКУЛЯРНО ОБРАБАТЫВАЕМОЙ ПОВЕХНОСТИ



STEP 1

As pilot drill (1xD,1.5xD), please use 353HTA or 353HPU with head angle 140° (HL=135°) and m7 tolerance (HL=h7).

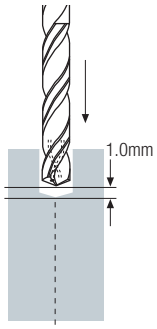
Utiliser un foret 353HTA ou 353HPU avec un angle en bout de 140° (HL=135°) et une tolérance m7 (HL=h7), pour effectuer un trou pilote (1xD÷1.5xD) très précis.

Utilizzare una punta 353HTA o 353HPU con angolo in testa di 140° (HL=135°) e tolleranza m7 (HL=h7), per eseguire un foro pilota (1xD÷1.5xD) molto preciso.

Utilice una broca 353HTA o 353HPU con ángulo punta de 140° (HL=135°) y tolerancia m7 (HL=h7), para realizar un agujero piloto (1xD÷1,5xD) muy preciso.

Einen Bohrer 353HTA oder 353HPU mit einem Spitzenwinkel von 140° (HL=135°) und Toleranz m7 (HL=h7) für die Herstellung einer äußerst präzisen Richtbohrung (1xD÷1.5xD) verwenden.

Для пилотного отверстия (1xD÷1.5xD) используйте сверло 353HTA или 353HPU с углом при вершине 140° (HL=135°) и допуском на диаметр m7 (HL=h7).



STEP 2

With coolant feed OFF, enter the pilot hole with HL drill at Vc=20 m/min and fn=0.3 mm/rev. Position the HL drill at 1 mm from the end of the pilot hole, then start supplying the coolant and start drilling.

Sans actionner la lubrification interne, entrer avec le foret long série HL à l'intérieur du trou. Vc=20 m/min, fn=0.3 mm/rév. Placer le foret HL jusqu'à 1 mm du fond du trou pilote. Actionner la lubrification interne à haute pression et commencer le perçage.

Senza azionare il refrigerante interno, entrare con la punta lunga serie HL all'interno del foro. Vc=20 m/min, fn=0.3 mm/rev. Posizionare la punta HL sino a 1 mm dal fondo del foro pilota. Azionare il refrigerante interno ad alta pressione e cominciare la foratura.

Sin accionar el refrigerante interno, entre con la broca larga de la serie HL dentro del agujero. Vc=20 m/min, fn=0.3 mm/rev. Posicione la punta HL hasta 1 mm del fondo del agujero piloto. Accione el refrigerante interno a alta presión y comience el taladro.

Ohne Aktivierung der internen Kühlung, einen langen Bohrer der Serie HL in die Bohrung einführen. Vc=20 m/min, fn=0.3 mm/U den Bohrer HL bis 1 mm vom Ende der Richtbohrung ansetzen. Die interne Kühlung mit Hochdruck aktivieren und mit der Bohrung beginnen.

Без включения СОЖ, введите длинное сверло серии HL внутрь пилотного отверстия с режимами Vc=20 м/мин и fn=0.3 мм/об. Спозиционируйте сверло HL на расстоянии 1 мм от дна отверстия. Включите подачу СОЖ и начните сверление.

STEP 3

Make continue drilling operation without steps for chip ejection.
In case of through holes, reduce the feed by 30% before the hole exit (approx. 1 mm).
Stop the coolant feed.

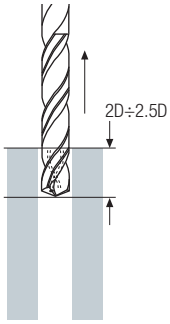
Percer sans step pour l'évacuation des copeaux.
En présence de trous débouchants, 1 mm avant d'avoir terminé le trou, réduire l'avancement du 30 %. Arrêter la lubrification.

Forare senza step per scarico trucioli.
Nel caso di fori passanti, 1 mm prima di aver completato il foro, ridurre l'avanzamento del 30%.
Fermare il refrigerante.

Taladre sin step para la descarga de virutas.
En el caso de agujeros pasantes, 1 mm antes de haber completado el agujero, reduzca el avance un 30%. Pare el refrigerante.

Für die Späneabführung Stufenlos bohren. Bei Durchgangsbohrungen 1 mm vor Fertigstellung der Bohrung den Vorschub um 30% reduzieren. Die Kühlung deaktivieren.

Сверлите без остановок и выводов инструмента.
В случае обработки сквозного отверстия, снизьте подачу на 30%, за 1 мм до выхода. Отключите подачу СОЖ.



STEP 4

Withdraw the drill using max rpm and double fn, until 2xD from the hole entrance.

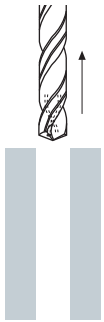
Retirer le foret en utilisant le maximum de tours disponibles et le double de l'avancement conseillé jusqu'à une profondeur 2xD.

Ritirare la punta utilizzando il massimo dei giri disponibili e il doppio dell'avanzamento consigliato sino ad una profondità 2xD.

Retire la broca utilizando el máximo de rpm disponibles y el doble del avance aconsejado hasta una profundidad 2xD.

Den Bohrer zurückziehen, dabei die maximal verfügbare Drehzahl und den doppelten Wert des empfohlenen Vorschubs bis zu einer Tiefe 2xD einsetzen.

Выньте сверло до уровня 2xD, используя максимальную частоту вращения и двойную подачу.



STEP 5

Completing the exit from the hole by using slow and constant speed.

Terminer la dernière partie du perçage avec une vitesse réduite et constante.

Completare l'ultimo tratto di arretramento con velocità ridotta e costante.

Complete el último tramo de retroceso con velocidad reducida y constante.

Den letzten Abschnitt beim Zurückziehen mit reduzierter und konstanter Geschwindigkeit fertigstellen.

Полностью выньте сверло на заниженных режимах.

MACHINING OF DEEP HOLES ON SLANTED OR IRREGULAR SURFACES

ESECUZIONE FORI PROFONDI SU SUPERFICI IRREGOLARI O OBLIQUE

HERSTELLUNG TIEFER BOHRUNGEN AUF SCHRÄGEN ODER UNREGELMÄSSIGEN OBERFLÄCHEN

EXÉCUTION DE TROUS PROFONDS SUR DES SURFACES IRRÉGULIÈRES OU OBLIQUES

MECANIZADO DE AGUJEROS PROFUNDOS SOBRE SUPERFÍCIES IRREGULARES U OBLICUAS

ОБРАБОТКА ГЛУБОКИХ ОТВЕРСТИЙ НА НАКЛОННЫХ ИЛИ НЕРОВНЫХ ПЛОСКОСТЯХ

STEP 1

Prepare a flat surface of the same size as the drilling diameter.

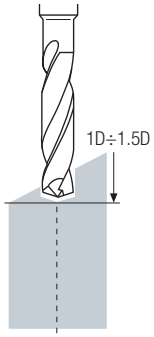
Réaliser une surface plane en utilisant une fraise avec une arête frontale. Le plan réalisé doit avoir les mêmes dimensions que le diamètre de perçage profond.

Realizzare una superficie piana utilizzando una fresa con tagliente frontale. Il piano realizzato deve avere le stesse dimensioni del diametro di foratura profonda.

Realizar una superficie plana usando una fresa con filo frontal. El plano realizado tiene que tener las mismas dimensiones que el diámetro de taladro profundo.

Eine ebene Oberfläche, durch einen Fräser mit stirnseitiger Schneidkante, herstellen. Die hergestellte Oberfläche muss dieselben Abmessungen des Durchmessers der tiefen Bohrung aufweisen.

Подготовьте ровную поверхность с помощью концевой фрезы. Эта поверхность должна быть того же размера, что и диаметр будущего глубокого отверстия.



STEP 2

As pilot drill (1xD,1.5xD), please use 353HTA or 353HPU with head angle 140° (HL=135°) and m7 tolerance (HL=h7).

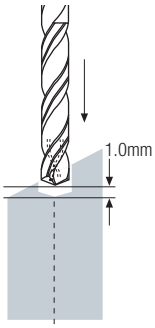
Utiliser un foret 353HTA ou 353HPU avec un angle en bout de 140° (HL=135°) et une tolérance m7 (HL=h7), pour effectuer un trou pilote (1xD÷1.5xD) très précis.

Utilizzare una punta 353HTA o 353HPU con angolo in testa di 140° (HL=135°) e tolleranza m7 (HL=h7), per eseguire un foro pilota (1xD÷1.5xD) molto preciso.

Utilice una broca 353HTA o 353HPU con ángulo punta de 140° (HL=135°) y tolerancia m7 (HL=h7), para realizar un agujero piloto (1xD÷1,5xD) muy preciso.

Einen Bohrer 353HTA oder 353HPU mit einem Spitzenwinkel von 140° (HL=135°) und Toleranz m7 (HL=h7) für die Herstellung einer äußerst präzisen Richtbohrung (1xD÷1.5xD) verwenden.

Для пилотного отверстия (1xD÷1.5xD) используйте сверло 353HTA или 353HPU с углом при вершине 140° (HL=135°) и допуском на диаметр m7 (HL=h7).



STEP 3

With coolant feed OFF, enter the pilot hole with HL drill at Vc=20 m/min and fn=0.3 mm/rev. Position the HL drill at 1 mm from the end of the pilot hole, then start supplying the coolant and start drilling.

Sans actionner la lubrification interne, entrer avec le foret long série HL à l'intérieur du trou. Vc=20 m/min, fn=0.3 mm/rév. Placer le foret HL jusqu'à 1 mm du fond du trou pilote. Actionner la lubrification interne à haute pression et commencer le perçage.

Senza azionare il refrigerante interno, entrare con la punta lunga serie HL all'interno del foro. Vc=20 m/min, fn=0.3 mm/rev. Posizionare la punta HL sino a 1 mm dal fondo del foro pilota. Azionare il refrigerante interno ad alta pressione e cominciare la foratura.

Sin accionar el refrigerante interno, entre con la broca larga de la serie HL dentro del agujero. Vc=20 m/min, fn=0.3 mm/rev. Posicione la broca HL hasta 1 mm del fondo del agujero piloto. Accione el refrigerante interno a alta presión y comience el taladro.

Ohne Aktivierung der internen Kühlung, einen langen Bohrer der Serie HL in die Bohrung einführen. Vc=20 m/min, fn=0.3 mm/Umdr. Den Bohrer HL bis 1 mm vom Ende der Richtbohrung ansetzen. Die interne Kühlung mit Hochdruck aktivieren und mit der Bohrung beginnen.

Без включения СОЖ, введите длинное сверло серии HL внутрь пилотного отверстия с режимами Vc=20 м/мин и fn=0.3 мм/об. Спозиционируйте сверло HL на расстоянии 1 мм от дна отверстия. Включите подачу СОЖ и начните сверление.

STEP 4

Make continue drilling operation without steps for chip ejection.
In case of through holes, reduce the feed by 30% before the hole exit (approx 1 mm).
Stop the coolant feed.

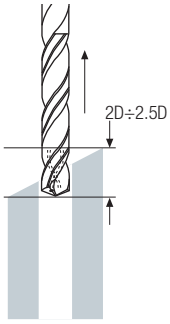
Percer sans step pour l'évacuation des copeaux.
En présence de trous débouchants, 1 mm avant d'avoir terminé le trou, réduire l'avancement du 30 %. Arrêter la lubrification.

Forare senza step per scarico trucioli.
Nel caso di fori passanti, 1 mm prima di aver completato il foro, ridurre l'avanzamento del 30%
Fermare il refrigerante.

Taladre sin step para la descarga de virutas.
En el caso de agujeros pasantes, 1 mm antes de haber completado el agujero, reduzca el avance un 30%.
Pare el refrigerante.

Für die Späneabführung Stufenlos bohren.
Bei Durchgangsbohrungen 1 mm vor Fertigstellung der Bohrung den Vorschub um 30% reduzieren.
Die Kühlung deaktivieren.

Сверлите без остановок и выводов инструмента.
В случае обработки сквозного отверстия, снизьте подачу на 30%, за 1 мм до выхода.
Отключите подачу СОЖ.



STEP 5

Withdraw the drill using max rpm and double fn, until 2xD÷2.5xD from the hole entrance.

Retirer le foret en utilisant le maximum de tours disponibles et le double de l'avancement conseillé jusqu'à une profondeur 2xD÷2.5xD.

Ritirare la punta utilizzando il massimo dei giri disponibili e il doppio dell'avanzamento consigliato sino ad una profondità 2xD÷2.5xD.

Retire la broca utilizando el máximo de rpm disponibles y el doble del avance aconsejado hasta una profundidad de 2xD÷2.5xD.

Den Bohrer zurückziehen, dabei die maximal verfügbare Drehzahl und den doppelten Wert des empfohlenen Vorschubs bis zu einer Tiefe 2xD÷2.5xD einsetzen.

Выньте сверло до уровня 2xD÷2.5xD, используя максимальную частоту вращения и двойную подачу.

STEP 6

Completing the exit from the hole by using slow and constant speed.

Terminer la dernière partie du perçage avec une vitesse réduite et constante.

Completare l'ultimo tratto di arretramento con velocità ridotta e costante.

Complete el último tramo de retroceso con velocidad reducida y constante.

Den letzten Abschnitt beim Zurückziehen mit reduzierter und konstanter Geschwindigkeit fertigstellen.

Полностью выньте сверло на заниженных режимах.

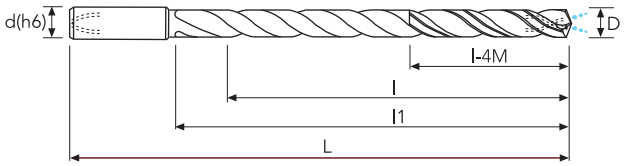
3512HL

4-margin lands, long (12xD), polished flutes,
HL (through coolant)

12XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
3.10*	0/-0.012	4	45	50	85	15.5	12 x D	3512HL0310	●
3.20	0/-0.012	4	45	50	85	16	12 x D	3512HL0320	●
3.30	0/-0.012	4	45	50	85	16.5	12 x D	3512HL0330	●
3.40	0/-0.012	4	48	54	90	17	12 x D	3512HL0340	○
3.50	0/-0.012	4	48	54	90	17.5	12 x D	3512HL0350	●
3.60	0/-0.012	4	48	54	90	18	12 x D	3512HL0360	○
3.70	0/-0.012	4	48	54	90	18.5	12 x D	3512HL0370	●
3.80	0/-0.012	4	57	64	100	19	12 x D	3512HL0380	●
3.90	0/-0.012	4	57	64	100	19.5	12 x D	3512HL0390	○
4.00	0/-0.012	4	57	64	100	20	12 x D	3512HL0400	●
4.10	0/-0.012	5	57	64	100	20.5	12 x D	3512HL0410	●
4.20	0/-0.012	5	57	64	100	21	12 x D	3512HL0420	●
4.30	0/-0.012	5	57	64	100	21.5	12 x D	3512HL0430	●
4.40	0/-0.012	5	57	64	100	22	12 x D	3512HL0440	○
4.50	0/-0.012	5	57	64	100	22.5	12 x D	3512HL0450	●
4.60	0/-0.012	5	57	64	100	23	12 x D	3512HL0460	○
4.70	0/-0.012	5	57	64	100	23.5	12 x D	3512HL0470	○
4.80	0/-0.012	5	67	74	110	24	12 x D	3512HL0480	●
4.90	0/-0.012	5	72	81	120	24.5	12 x D	3512HL0490	○
5.00	0/-0.012	5	72	81	120	25	12 x D	3512HL0500	●
5.10	0/-0.012	6	72	81	120	25.5	12 x D	3512HL0510	●
5.20	0/-0.012	6	72	81	120	26	12 x D	3512HL0520	●
5.30	0/-0.012	6	72	81	120	26.5	12 x D	3512HL0530	●
5.40	0/-0.012	6	72	81	120	27	12 x D	3512HL0540	○
5.50	0/-0.012	6	72	81	120	27.5	12 x D	3512HL0550	●
5.60	0/-0.012	6	72	81	120	28	12 x D	3512HL0560	●
5.70	0/-0.012	6	72	81	120	28.5	12 x D	3512HL0570	○
5.80	0/-0.012	6	72	81	120	29	12 x D	3512HL0580	●
5.90	0/-0.012	6	72	81	120	29.5	12 x D	3512HL0590	○
6.00	0/-0.012	6	72	81	120	30	12 x D	3512HL0600	●
6.10	0/-0.015	8	88	97	135	30.5	12 x D	3512HL0610	●
6.20	0/-0.015	8	88	97	135	31	12 x D	3512HL0620	●
6.30	0/-0.015	8	88	97	135	31.5	12 x D	3512HL0630	●
6.40	0/-0.015	8	96	108	145	32	12 x D	3512HL0640	○
6.50	0/-0.015	8	96	108	145	32.5	12 x D	3512HL0650	●
6.60	0/-0.015	8	96	108	145	33	12 x D	3512HL0660	○
6.70	0/-0.015	8	96	108	145	33.5	12 x D	3512HL0670	●
6.80	0/-0.015	8	96	108	145	34	12 x D	3512HL0680	●
6.90	0/-0.015	8	96	108	145	34.5	12 x D	3512HL0690	●

* Ø1÷Ø3 = 3512 SUH MINI page 148

● stock standard ○ non-standard stock ▽ stock exhaustion

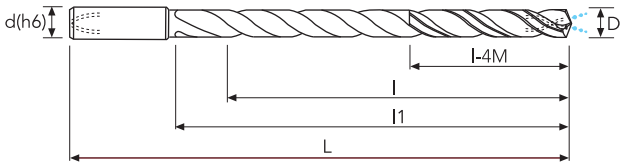
3512HL

4-margin lands, long (12xD), polished flutes, HL (through coolant)

12XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
7.00	0/-0.015	8	96	108	145	35	12 x D	3512HL0700	●
7.10	0/-0.015	8	96	108	145	35.5	12 x D	3512HL0710	●
7.20	0/-0.015	8	96	108	145	36	12 x D	3512HL0720	●
7.30	0/-0.015	8	96	108	145	36.5	12 x D	3512HL0730	○
7.40	0/-0.015	8	96	108	145	37	12 x D	3512HL0740	○
7.50	0/-0.015	8	96	108	145	37.5	12 x D	3512HL0750	●
7.60	0/-0.015	8	96	108	145	38	12 x D	3512HL0760	○
7.70	0/-0.015	8	96	108	145	38.5	12 x D	3512HL0770	○
7.80	0/-0.015	8	96	108	145	39	12 x D	3512HL0780	●
7.90	0/-0.015	8	96	108	145	39.5	12 x D	3512HL0790	○
8.00	0/-0.015	8	96	108	145	40	12 x D	3512HL0800	●
8.10	0/-0.015	10	115	127	170	40.5	12 x D	3512HL0810	●
8.20	0/-0.015	10	120	135	180	41	12 x D	3512HL0820	●
8.30	0/-0.015	10	120	135	180	41.5	12 x D	3512HL0830	●
8.40	0/-0.015	10	120	135	180	42	12 x D	3512HL0840	○
8.50	0/-0.015	10	120	135	180	42.5	12 x D	3512HL0850	●
8.60	0/-0.015	10	120	135	180	43	12 x D	3512HL0860	●
8.70	0/-0.015	10	120	135	180	43.5	12 x D	3512HL0870	●
8.80	0/-0.015	10	120	135	180	44	12 x D	3512HL0880	●
8.90	0/-0.015	10	120	135	180	44.5	12 x D	3512HL0890	○
9.00	0/-0.015	10	120	135	180	45	12 x D	3512HL0900	●
9.10	0/-0.015	10	120	135	180	45.5	12 x D	3512HL0910	●
9.20	0/-0.015	10	120	135	180	46	12 x D	3512HL0920	●
9.30	0/-0.015	10	120	135	180	46.5	12 x D	3512HL0930	●
9.40	0/-0.015	10	120	135	180	47	12 x D	3512HL0940	○
9.50	0/-0.015	10	120	135	180	47.5	12 x D	3512HL0950	●
9.60	0/-0.015	10	120	135	180	48	12 x D	3512HL0960	○
9.70	0/-0.015	10	120	135	180	48.5	12 x D	3512HL0970	○
9.80	0/-0.015	10	120	135	180	49	12 x D	3512HL0980	●
9.90	0/-0.015	10	120	135	180	49.5	12 x D	3512HL0990	○
10.00	0/-0.015	10	120	135	180	50	12 x D	3512HL1000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

3512HL

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	70-90			60-80			50-70			40-60		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	8490	0.065	550	7430	0.059	430	6370	0.052	330	5310	0.046	240
3.5	7280	0.075	550	6369	0.068	430	5460	0.060	330	4550	0.053	240
4.0	6370	0.090	570	5573	0.081	450	4780	0.072	340	3980	0.063	250
4.5	5660	0.105	590	4954	0.095	470	4250	0.084	360	3540	0.074	260
5.0	5100	0.120	610	4459	0.108	480	3820	0.096	370	3180	0.084	270
5.5	4630	0.135	630	4053	0.122	490	3470	0.108	370	2900	0.095	270
6.0	4250	0.150	640	3715	0.135	500	3180	0.120	380	2650	0.105	280
6.5	3920	0.165	650	3430	0.149	510	2940	0.132	390	2450	0.116	280
7.0	3640	0.180	660	3185	0.162	520	2730	0.144	390	2270	0.126	290
7.5	3400	0.195	660	2972	0.176	520	2550	0.156	400	2120	0.137	290
8.0	3180	0.210	670	2787	0.189	530	2390	0.168	400	1990	0.147	290
8.5	3000	0.225	680	2623	0.203	530	2250	0.180	410	1870	0.158	290
9.0	2830	0.240	680	2477	0.216	540	2120	0.192	410	1770	0.168	300
9.5	2680	0.255	680	2347	0.230	540	2010	0.204	410	1680	0.179	300
10.0	2550	0.270	690	2229	0.243	540	1910	0.216	410	1590	0.189	300

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	45-55			30-50			30-40			25-35		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	5310	0.049	260	4250	0.041	180	3720	0.034	130	3180	0.029	90
3.5	4550	0.056	260	3640	0.048	170	3180	0.039	130	2730	0.034	90
4.0	3980	0.068	270	3180	0.057	180	2790	0.047	130	2390	0.041	100
4.5	3540	0.079	280	2830	0.067	190	2480	0.055	140	2120	0.047	100
5.0	3180	0.090	290	2550	0.077	200	2230	0.063	140	1910	0.054	100
5.5	2900	0.101	290	2320	0.086	200	2030	0.071	140	1740	0.061	110
6.0	2650	0.113	300	2120	0.096	200	1860	0.079	150	1590	0.068	110
6.5	2450	0.124	300	1960	0.105	210	1710	0.087	150	1470	0.074	110
7.0	2270	0.135	310	1820	0.115	210	1590	0.095	150	1360	0.081	110
7.5	2120	0.146	310	1700	0.124	210	1490	0.102	150	1270	0.088	110
8.0	1990	0.158	310	1590	0.134	210	1390	0.110	150	1190	0.095	110
8.5	1870	0.169	320	1500	0.143	220	1310	0.118	150	1120	0.101	110
9.0	1770	0.180	320	1420	0.153	220	1240	0.126	160	1060	0.108	110
9.5	1680	0.191	320	1340	0.163	220	1170	0.134	160	1010	0.115	120
10.0	1590	0.203	320	1270	0.172	220	1110	0.142	160	960	0.122	120

3512HL

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**70-90**			**60-80**			**50-70**			**40-60**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	8490	0.065	550	7430	0.059	430	6370	0.052	330	5310	0.046	240
3.5	7280	0.075	550	6370	0.068	430	5460	0.060	330	4550	0.053	240
4.0	6370	0.090	570	5570	0.081	450	4780	0.072	340	3980	0.063	250
4.5	5660	0.105	590	4950	0.095	470	4250	0.084	360	3540	0.074	260
5.0	5100	0.120	610	4460	0.108	480	3820	0.096	370	3180	0.084	270
5.5	4630	0.135	630	4050	0.122	490	3470	0.108	370	2900	0.095	270
6.0	4250	0.150	640	3720	0.135	500	3180	0.120	380	2650	0.105	280
6.5	3920	0.165	650	3430	0.149	510	2940	0.132	390	2450	0.116	280
7.0	3640	0.180	660	3180	0.162	520	2730	0.144	390	2270	0.126	290
7.5	3400	0.195	660	2970	0.176	520	2550	0.156	400	2120	0.137	290
8.0	3180	0.210	670	2790	0.189	530	2390	0.168	400	1990	0.147	290
8.5	3000	0.225	680	2620	0.203	530	2250	0.180	410	1870	0.158	290
9.0	2830	0.240	680	2480	0.216	540	2120	0.192	410	1770	0.168	300
9.5	2680	0.255	680	2350	0.230	540	2010	0.204	410	1680	0.179	300
10.0	2550	0.270	690	2230	0.243	540	1910	0.216	410	1590	0.189	300

Material Group ISO 513	N1			N2			N3 N4					
Hardness/Rm												
Vc (m/min)	**70-90**			**60-80**			**60-80**					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
3.0	8490	0.081	690	7430	0.073	540	7430	0.065	480			
3.5	7280	0.094	680	6370	0.084	540	6370	0.075	480			
4.0	6370	0.113	720	5570	0.101	560	5570	0.090	500			
4.5	5660	0.131	740	4950	0.118	580	4950	0.105	520			
5.0	5100	0.150	770	4460	0.135	600	4460	0.120	540			
5.5	4630	0.169	780	4050	0.152	620	4050	0.135	550			
6.0	4250	0.188	800	3720	0.169	630	3720	0.150	560			
6.5	3920	0.206	810	3430	0.186	640	3430	0.165	570			
7.0	3640	0.225	820	3180	0.203	640	3180	0.180	570			
7.5	3400	0.244	830	2970	0.219	650	2970	0.195	580			
8.0	3180	0.263	830	2790	0.236	660	2790	0.210	590			
8.5	3000	0.281	840	2620	0.253	660	2620	0.225	590			
9.0	2830	0.300	850	2480	0.270	670	2480	0.240	600			
9.5	2680	0.319	850	2350	0.287	670	2350	0.255	600			
10.0	2550	0.338	860	2230	0.304	680	2230	0.270	600			

3512HL

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	30-40			20-30			30-40			20-30		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**3.0**	3720	0.046	170	2650	0.032	80	3720	0.043	160	2650	0.036	100
	3.5	3180	0.053	170	2270	0.037	80	3180	0.050	160	2270	0.042	100
	4.0	2790	0.063	180	1990	0.044	90	2790	0.060	170	1990	0.050	100
	4.5	2480	0.074	180	1770	0.051	90	2480	0.070	170	1770	0.059	100
	5.0	2230	0.084	190	1590	0.059	90	2230	0.080	180	1590	0.067	110
	5.5	2030	0.095	190	1450	0.066	100	2030	0.090	180	1450	0.076	110
	6.0	1860	0.105	200	1330	0.074	100	1860	0.100	190	1330	0.084	110
	6.5	1710	0.116	200	1220	0.081	100	1710	0.110	190	1220	0.092	110
	7.0	1590	0.126	200	1140	0.088	100	1590	0.120	190	1140	0.101	110
	7.5	1490	0.137	200	1060	0.096	100	1490	0.130	190	1060	0.109	120
	8.0	1390	0.147	200	1000	0.103	100	1390	0.140	190	1000	0.118	120
	8.5	1310	0.158	210	940	0.110	100	1310	0.150	200	940	0.126	120
	9.0	1240	0.168	210	880	0.118	100	1240	0.160	200	880	0.134	120
	9.5	1170	0.179	210	840	0.125	100	1170	0.170	200	840	0.143	120
	10.0	1110	0.189	210	800	0.132	110	1110	0.180	200	800	0.151	120

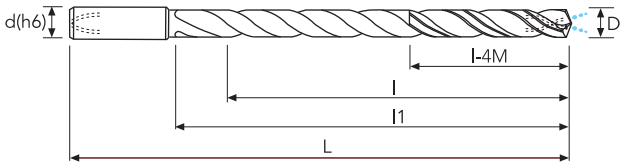
3515HL

4-margin lands, long (15xD), polished flutes, HL (through coolant)

15XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
3.10	0/-0.012	4	50	55	90	15.5	15 x D	3515HL0310	○
3.20	0/-0.012	4	50	55	90	16	15 x D	3515HL0320	○
3.30	0/-0.012	4	52	56	90	16.5	15 x D	3515HL0330	○
3.40	0/-0.012	4	53	58	95	17	15 x D	3515HL0340	○
3.50	0/-0.012	4	55	60	95	17.5	15 x D	3515HL0350	●
3.60	0/-0.012	4	56	61	95	18	15 x D	3515HL0360	○
3.70	0/-0.012	4	58	63	100	18.5	15 x D	3515HL0370	○
3.80	0/-0.012	4	60	65	100	19	15 x D	3515HL0380	○
3.90	0/-0.012	4	60	66	100	19.5	15 x D	3515HL0390	○
4.00	0/-0.012	4	62	68	105	20	15 x D	3515HL0400	●
4.10	0/-0.012	5	64	70	105	20.5	15 x D	3515HL0410	○
4.20	0/-0.012	5	65	71	110	21	15 x D	3515HL0420	○
4.30	0/-0.012	5	67	73	110	21.5	15 x D	3515HL0430	○
4.40	0/-0.012	5	68	75	110	22	15 x D	3515HL0440	○
4.50	0/-0.012	5	70	76	115	22.5	15 x D	3515HL0450	●
4.60	0/-0.012	5	71	78	115	23	15 x D	3515HL0460	○
4.70	0/-0.012	5	73	80	115	23.5	15 x D	3515HL0470	○
4.80	0/-0.012	5	75	82	115	24	15 x D	3515HL0480	○
4.90	0/-0.012	5	76	83	120	24.5	15 x D	3515HL0490	○
5.00	0/-0.012	5	77	85	120	25	15 x D	3515HL0500	●
5.10	0/-0.012	6	79	86	125	25.5	15 x D	3515HL0510	○
5.20	0/-0.012	6	80	88	125	26	15 x D	3515HL0520	○
5.30	0/-0.012	6	82	89	130	26.5	15 x D	3515HL0530	○
5.40	0/-0.012	6	83	91	130	27	15 x D	3515HL0540	○
5.50	0/-0.012	6	85	93	130	27.5	15 x D	3515HL0550	●
5.60	0/-0.012	6	86	94	135	28	15 x D	3515HL0560	○
5.70	0/-0.012	6	88	96	135	28.5	15 x D	3515HL0570	○
5.80	0/-0.012	6	89	98	135	29	15 x D	3515HL0580	○
5.90	0/-0.012	6	91	99	140	29.5	15 x D	3515HL0590	○
6.00	0/-0.012	6	92	101	140	30	15 x D	3515HL0600	●
6.10	0/-0.015	8	94	103	140	30.5	15 x D	3515HL0610	○
6.20	0/-0.015	8	95	104	140	31	15 x D	3515HL0620	○
6.30	0/-0.015	8	98	108	145	31.5	15 x D	3515HL0630	○
6.40	0/-0.015	8	100	110	145	32	15 x D	3515HL0640	○
6.50	0/-0.015	8	100	110	150	32.5	15 x D	3515HL0650	●
6.60	0/-0.015	8	101	111	150	33	15 x D	3515HL0660	○
6.70	0/-0.015	8	103	113	150	33.5	15 x D	3515HL0670	○
6.80	0/-0.015	8	104	114	155	34	15 x D	3515HL0680	○
6.90	0/-0.015	8	106	116	155	34.5	15 x D	3515HL0690	○

● stock standard ○ non-standard stock ▽ stock exhaustion

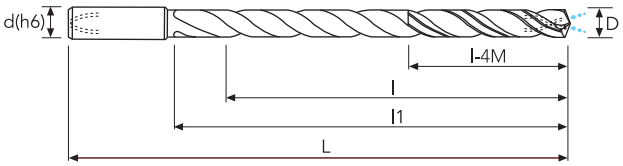
3515HL

4-margin lands, long (15xD), polished flutes,
HL (through coolant)

15XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
7.00	0/-0.015	8	107	118	160	35	15 x D	3515HL0700	●
7.10	0/-0.015	8	109	119	160	35.5	15 x D	3515HL0710	○
7.20	0/-0.015	8	110	121	160	36	15 x D	3515HL0720	○
7.30	0/-0.015	8	112	122	165	36.5	15 x D	3515HL0730	○
7.40	0/-0.015	8	113	124	165	37	15 x D	3515HL0740	○
7.50	0/-0.015	8	115	126	165	37.5	15 x D	3515HL0750	●
7.60	0/-0.015	8	116	127	170	38	15 x D	3515HL0760	○
7.70	0/-0.015	8	118	129	170	38.5	15 x D	3515HL0770	○
7.80	0/-0.015	8	119	131	170	39	15 x D	3515HL0780	○
7.90	0/-0.015	8	121	132	175	39.5	15 x D	3515HL0790	○
8.00	0/-0.015	8	122	134	175	40	15 x D	3515HL0800	●
8.10	0/-0.015	10	125	137	180	40.5	15 x D	3515HL0810	○
8.20	0/-0.015	10	125	137	180	41	15 x D	3515HL0820	○
8.30	0/-0.015	10	127	139	180	41.5	15 x D	3515HL0830	○
8.40	0/-0.015	10	128	141	185	42	15 x D	3515HL0840	○
8.50	0/-0.015	10	130	142	185	42.5	15 x D	3515HL0850	●
8.60	0/-0.015	10	131	144	185	43	15 x D	3515HL0860	○
8.70	0/-0.015	10	133	146	190	43.5	15 x D	3515HL0870	○
8.80	0/-0.015	10	134	147	190	44	15 x D	3515HL0880	○
8.90	0/-0.015	10	136	149	190	44.5	15 x D	3515HL0890	○
9.00	0/-0.015	10	137	151	195	45	15 x D	3515HL0900	●
9.10	0/-0.015	10	139	152	195	45.5	15 x D	3515HL0910	○
9.20	0/-0.015	10	140	154	195	46	15 x D	3515HL0920	○
9.30	0/-0.015	10	142	155	200	46.5	15 x D	3515HL0930	○
9.40	0/-0.015	10	143	157	200	47	15 x D	3515HL0940	○
9.50	0/-0.015	10	145	159	200	47.5	15 x D	3515HL0950	●
9.60	0/-0.015	10	146	160	205	48	15 x D	3515HL0960	○
9.70	0/-0.015	10	148	162	205	48.5	15 x D	3515HL0970	○
9.80	0/-0.015	10	149	164	205	49	15 x D	3515HL0980	○
9.90	0/-0.015	10	151	165	210	49.5	15 x D	3515HL0990	○
10.00	0/-0.015	10	152	167	210	50	15 x D	3515HL1000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3515HL

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	70-90			60-80			50-70			40-60		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	8490	0.062	520	7430	0.056	410	6370	0.049	310	5310	0.043	230
3.5	7280	0.071	520	6370	0.064	410	5460	0.057	310	4550	0.050	230
4.0	6370	0.086	540	5570	0.077	430	4780	0.068	330	3980	0.060	240
4.5	5660	0.100	560	4950	0.090	440	4250	0.080	340	3540	0.070	250
5.0	5100	0.114	580	4460	0.103	460	3820	0.091	350	3180	0.080	250
5.5	4630	0.128	590	4050	0.115	470	3470	0.103	360	2900	0.090	260
6.0	4250	0.143	610	3720	0.128	480	3180	0.114	360	2650	0.100	260
6.5	3920	0.157	610	3430	0.141	480	2940	0.125	370	2450	0.110	270
7.0	3640	0.171	620	3180	0.154	490	2730	0.137	370	2270	0.120	270
7.5	3400	0.185	630	2970	0.167	500	2550	0.148	380	2120	0.130	270
8.0	3180	0.200	630	2790	0.180	500	2390	0.160	380	1990	0.140	280
8.5	3000	0.214	640	2620	0.192	500	2250	0.171	380	1870	0.150	280
9.0	2830	0.228	650	2480	0.205	510	2120	0.182	390	1770	0.160	280
9.5	2680	0.242	650	2350	0.218	510	2010	0.194	390	1680	0.170	280
10.0	2550	0.257	650	2230	0.231	510	1910	0.205	390	1590	0.180	290

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	45-55			30-50			30-40			25-35		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	5310	0.046	250	4250	0.039	170	3720	0.032	120	3180	0.028	90
3.5	4550	0.053	240	3640	0.045	170	3180	0.037	120	2730	0.032	90
4.0	3980	0.064	260	3180	0.055	170	2790	0.045	130	2390	0.038	90
4.5	3540	0.075	260	2830	0.064	180	2480	0.052	130	2120	0.045	100
5.0	3180	0.086	270	2550	0.073	190	2230	0.060	130	1910	0.051	100
5.5	2900	0.096	280	2320	0.082	190	2030	0.067	140	1740	0.058	100
6.0	2650	0.107	280	2120	0.091	190	1860	0.075	140	1590	0.064	100
6.5	2450	0.118	290	1960	0.100	200	1710	0.082	140	1470	0.071	100
7.0	2270	0.128	290	1820	0.109	200	1590	0.090	140	1360	0.077	100
7.5	2120	0.139	290	1700	0.118	200	1490	0.097	140	1270	0.083	110
8.0	1990	0.150	300	1590	0.127	200	1390	0.105	150	1190	0.090	110
8.5	1870	0.160	300	1500	0.136	200	1310	0.112	150	1120	0.096	110
9.0	1770	0.171	300	1420	0.145	210	1240	0.120	150	1060	0.103	110
9.5	1680	0.182	310	1340	0.154	210	1170	0.127	150	1010	0.109	110
10.0	1590	0.192	310	1270	0.164	210	1110	0.135	150	960	0.115	110

3515HL

	Material Group ISO 513	K1			K2			K3			K4		
	Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
	Vc (m/min)	70-90			60-80			50-70			40-60		
Ø RUN OUT <0.02mm	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	3.0	8490	0.062	520	7430	0.056	410	6370	0.049	310	5310	0.043	230
	3.5	7280	0.071	520	6370	0.064	410	5460	0.057	310	4550	0.050	230
	4.0	6370	0.086	540	5570	0.077	430	4780	0.068	330	3980	0.060	240
	4.5	5660	0.100	560	4950	0.090	440	4250	0.080	340	3540	0.070	250
	5.0	5100	0.114	580	4460	0.103	460	3820	0.091	350	3180	0.080	250
	5.5	4630	0.128	590	4050	0.115	470	3470	0.103	360	2900	0.090	260
	6.0	4250	0.143	610	3720	0.128	480	3180	0.114	360	2650	0.100	260
	6.5	3920	0.157	610	3430	0.141	480	2940	0.125	370	2450	0.110	270
	7.0	3640	0.171	620	3180	0.154	490	2730	0.137	370	2270	0.120	270
	7.5	3400	0.185	630	2970	0.167	500	2550	0.148	380	2120	0.130	270
	8.0	3180	0.200	630	2790	0.180	500	2390	0.160	380	1990	0.140	280
	8.5	3000	0.214	640	2620	0.192	500	2250	0.171	380	1870	0.150	280
	9.0	2830	0.228	650	2480	0.205	510	2120	0.182	390	1770	0.160	280
	9.5	2680	0.242	650	2350	0.218	510	2010	0.194	390	1680	0.170	280
	10.0	2550	0.257	650	2230	0.231	510	1910	0.205	390	1590	0.180	290

	Material Group ISO 513	N1			N2			N3 N4					
	Hardness/Rm												
	Vc (m/min)	70-90			60-80			60-80					
Ø RUN OUT <0.02mm	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
	3.0	8490	0.077	660	7430	0.069	520	7430	0.062	460			
	3.5	7280	0.089	650	6370	0.080	510	6370	0.071	450			
	4.0	6370	0.107	680	5570	0.096	540	5570	0.086	480			
	4.5	5660	0.125	710	4950	0.112	560	4950	0.100	490			
	5.0	5100	0.143	730	4460	0.128	570	4460	0.114	510			
	5.5	4630	0.160	740	4050	0.144	580	4050	0.128	520			
	6.0	4250	0.178	760	3720	0.160	600	3720	0.143	530			
	6.5	3920	0.196	770	3430	0.176	600	3430	0.157	540			
	7.0	3640	0.214	780	3180	0.192	610	3180	0.171	540			
	7.5	3400	0.232	790	2970	0.208	620	2970	0.185	550			
	8.0	3180	0.249	790	2790	0.224	630	2790	0.200	560			
	8.5	3000	0.267	800	2620	0.240	630	2620	0.214	560			
	9.0	2830	0.285	810	2480	0.257	640	2480	0.228	570			
	9.5	2680	0.303	810	2350	0.273	640	2350	0.242	570			
	10.0	2550	0.321	820	2230	0.289	640	2230	0.257	570			

3515HL

Material Group ISO 513	S1 S2			S3			S4			S5		
Hardness/Rm	< 35 HRC			35-45 HRC								
Vc (m/min)	30-40			20-30			30-40			20-30		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	3720	0.043	160	2650	0.030	80	3720	0.041	150	2650	0.035	90
3.5	3180	0.050	160	2270	0.035	80	3180	0.047	150	2270	0.040	90
4.0	2790	0.060	170	1990	0.042	80	2790	0.057	160	1990	0.048	100
4.5	2480	0.070	170	1770	0.049	90	2480	0.066	160	1770	0.056	100
5.0	2230	0.080	180	1590	0.056	90	2230	0.076	170	1590	0.064	100
5.5	2030	0.090	180	1450	0.063	90	2030	0.085	170	1450	0.072	100
6.0	1860	0.100	190	1330	0.070	90	1860	0.095	180	1330	0.080	110
6.5	1710	0.110	190	1220	0.077	90	1710	0.104	180	1220	0.088	110
7.0	1590	0.120	190	1140	0.084	100	1590	0.114	180	1140	0.096	110
7.5	1490	0.130	190	1060	0.091	100	1490	0.123	180	1060	0.104	110
8.0	1390	0.140	190	1000	0.098	100	1390	0.133	180	1000	0.112	110
8.5	1310	0.150	200	940	0.105	100	1310	0.142	190	940	0.120	110
9.0	1240	0.160	200	880	0.112	100	1240	0.152	190	880	0.128	110
9.5	1170	0.170	200	840	0.119	100	1170	0.161	190	840	0.136	110
10.0	1110	0.180	200	800	0.126	100	1110	0.171	190	800	0.144	110

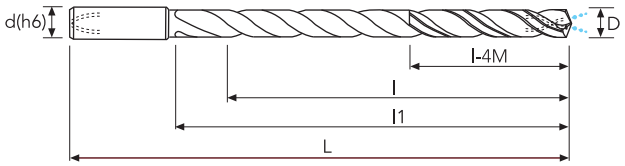
3520HL

4-margin lands, long (20xD), polished flutes,
HL (through coolant)

20XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
3.10*	0/-0.012	4	64	69	105	15.5	20 x D	3520HL0310	○
3.20	0/-0.012	4	66	71	105	16	20 x D	3520HL0320	●
3.30	0/-0.012	4	68	73	110	16.5	20 x D	3520HL0330	●
3.40	0/-0.012	4	70	75	110	17	20 x D	3520HL0340	○
3.50	0/-0.012	4	72	77	110	17.5	20 x D	3520HL0350	●
3.60	0/-0.012	4	74	79	115	18	20 x D	3520HL0360	○
3.70	0/-0.012	4	76	82	115	18.5	20 x D	3520HL0370	○
3.80	0/-0.012	4	78	84	120	19	20 x D	3520HL0380	●
3.90	0/-0.012	4	80	86	120	19.5	20 x D	3520HL0390	○
4.00	0/-0.012	4	82	88	125	20	20 x D	3520HL0400	●
4.10	0/-0.012	5	84	90	125	20.5	20 x D	3520HL0410	○
4.20	0/-0.012	5	86	92	130	21	20 x D	3520HL0420	●
4.30	0/-0.012	5	88	94	130	21.5	20 x D	3520HL0430	○
4.40	0/-0.012	5	90	97	135	22	20 x D	3520HL0440	○
4.50	0/-0.012	5	92	99	135	22.5	20 x D	3520HL0450	●
4.60	0/-0.012	5	94	101	140	23	20 x D	3520HL0460	○
4.70	0/-0.012	5	96	103	140	23.5	20 x D	3520HL0470	○
4.80	0/-0.012	5	98	105	140	24	20 x D	3520HL0480	●
4.90	0/-0.012	5	100	107	145	24.5	20 x D	3520HL0490	○
5.00	0/-0.012	5	102	110	145	25	20 x D	3520HL0500	●
5.10	0/-0.012	6	104	112	150	25.5	20 x D	3520HL0510	○
5.20	0/-0.012	6	106	114	155	26	20 x D	3520HL0520	○
5.30	0/-0.012	6	108	116	155	26.5	20 x D	3520HL0530	○
5.40	0/-0.012	6	110	118	155	27	20 x D	3520HL0540	○
5.50	0/-0.012	6	112	120	160	27.5	20 x D	3520HL0550	●
5.60	0/-0.012	6	114	122	160	28	20 x D	3520HL0560	○
5.70	0/-0.012	6	116	125	165	28.5	20 x D	3520HL0570	○
5.80	0/-0.012	6	118	127	165	29	20 x D	3520HL0580	●
5.90	0/-0.012	6	120	129	170	29.5	20 x D	3520HL0590	○
6.00	0/-0.012	6	122	131	170	30	20 x D	3520HL0600	●
6.10	0/-0.015	8	124	133	170	30.5	20 x D	3520HL0610	○
6.20	0/-0.015	8	126	135	175	31	20 x D	3520HL0620	○
6.30	0/-0.015	8	128	137	175	31.5	20 x D	3520HL0630	○
6.40	0/-0.015	8	130	140	180	32	20 x D	3520HL0640	○
6.50	0/-0.015	8	132	142	180	32.5	20 x D	3520HL0650	●
6.60	0/-0.015	8	134	144	185	33	20 x D	3520HL0660	○
6.70	0/-0.015	8	136	146	185	33.5	20 x D	3520HL0670	○
6.80	0/-0.015	8	138	148	185	34	20 x D	3520HL0680	●
6.90	0/-0.015	8	140	150	190	34.5	20 x D	3520HL0690	○

* Ø1÷Ø3 = 3520 SUH MINI page 152

● stock standard ○ non-standard stock ▽ stock exhaustion

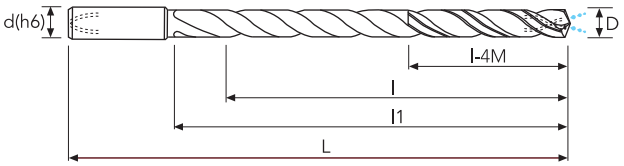
3520HL

4-margin lands, long (20xD), polished flutes, HL (through coolant)

20XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
7.00	0/-0.015	8	142	153	195	35	20 x D	3520HL0700	●
7.10	0/-0.015	8	144	155	195	35.5	20 x D	3520HL0710	○
7.20	0/-0.015	8	146	157	200	36	20 x D	3520HL0720	○
7.30	0/-0.015	8	148	159	200	36.5	20 x D	3520HL0730	○
7.40	0/-0.015	8	150	161	200	37	20 x D	3520HL0740	○
7.50	0/-0.015	8	152	163	205	37.5	20 x D	3520HL0750	●
7.60	0/-0.015	8	154	165	205	38	20 x D	3520HL0760	○
7.70	0/-0.015	8	156	168	210	38.5	20 x D	3520HL0770	○
7.80	0/-0.015	8	158	170	210	39	20 x D	3520HL0780	○
7.90	0/-0.015	8	160	172	215	39.5	20 x D	3520HL0790	○
8.00	0/-0.015	8	162	174	215	40	20 x D	3520HL0800	●
8.10	0/-0.015	10	164	176	220	40.5	20 x D	3520HL0810	○
8.20	0/-0.015	10	166	178	220	41	20 x D	3520HL0820	○
8.30	0/-0.015	10	168	180	225	41.5	20 x D	3520HL0830	○
8.40	0/-0.015	10	170	183	225	42	20 x D	3520HL0840	○
8.50	0/-0.015	10	172	185	230	42.5	20 x D	3520HL0850	●
8.60	0/-0.015	10	174	187	230	43	20 x D	3520HL0860	○
8.70	0/-0.015	10	176	189	230	43.5	20 x D	3520HL0870	○
8.80	0/-0.015	10	178	191	235	44	20 x D	3520HL0880	●
8.90	0/-0.015	10	180	193	235	44.5	20 x D	3520HL0890	○
9.00	0/-0.015	10	182	196	240	45	20 x D	3520HL0900	●
9.10	0/-0.015	10	184	198	240	45.5	20 x D	3520HL0910	○
9.20	0/-0.015	10	186	200	245	46	20 x D	3520HL0920	○
9.30	0/-0.015	10	188	202	245	46.5	20 x D	3520HL0930	○
9.40	0/-0.015	10	190	204	245	47	20 x D	3520HL0940	○
9.50	0/-0.015	10	192	206	250	47.5	20 x D	3520HL0950	●
9.60	0/-0.015	10	194	208	250	48	20 x D	3520HL0960	○
9.70	0/-0.015	10	196	211	255	48.5	20 x D	3520HL0970	○
9.80	0/-0.015	10	198	213	255	49	20 x D	3520HL0980	○
9.90	0/-0.015	10	200	215	260	49.5	20 x D	3520HL0990	○
10.00	0/-0.015	10	202	217	260	50	20 x D	3520HL1000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3520HL

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	60-80			50-70			40-60			30-50		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3.0	7430	0.055	410	6369	0.050	320	5308	0.044	230	4246	0.039	160
	3.5	6370	0.064	410	5460	0.057	310	4550	0.051	230	3640	0.045	160
	4.0	5570	0.077	430	4777	0.069	330	3981	0.061	240	3185	0.054	170
	4.5	4950	0.089	440	4246	0.080	340	3539	0.071	250	2831	0.062	180
	5.0	4460	0.102	450	3822	0.092	350	3185	0.082	260	2548	0.071	180
	5.5	4050	0.115	460	3474	0.103	360	2895	0.092	270	2316	0.080	190
	6.0	3720	0.128	470	3185	0.115	370	2654	0.102	270	2123	0.089	190
	6.5	3430	0.140	480	2940	0.126	370	2450	0.112	270	1960	0.098	190
	7.0	3180	0.153	490	2730	0.138	380	2275	0.122	280	1820	0.107	190
	7.5	2970	0.166	490	2548	0.149	380	2123	0.133	280	1699	0.116	200
	8.0	2790	0.179	500	2389	0.161	380	1990	0.143	280	1592	0.125	200
	8.5	2620	0.191	500	2248	0.172	390	1873	0.153	290	1499	0.134	200
	9.0	2480	0.204	510	2123	0.184	390	1769	0.163	290	1415	0.143	200
	9.5	2350	0.217	510	2011	0.195	390	1676	0.173	290	1341	0.152	200
	10.0	2230	0.230	510	1911	0.207	390	1592	0.184	290	1274	0.161	200

	Material Group ISO 513	M1 M2			M3			M4			M5		
	Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
	Vc (m/min)	30-50			30-40			25-35			20-30		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	3.0	4780	0.041	200	3720	0.035	130	3180	0.029	90	2650	0.025	70
	3.5	4090	0.048	200	3180	0.041	130	2730	0.033	90	2275	0.029	70
	4.0	3580	0.057	210	2790	0.049	140	2390	0.040	100	1990	0.034	70
	4.5	3180	0.067	210	2480	0.057	140	2120	0.047	100	1769	0.040	70
	5.0	2870	0.077	220	2230	0.065	150	1910	0.054	100	1592	0.046	70
	5.5	2610	0.086	220	2030	0.073	150	1740	0.060	100	1448	0.052	70
	6.0	2390	0.096	230	1860	0.081	150	1590	0.067	110	1327	0.057	80
	6.5	2200	0.105	230	1710	0.089	150	1470	0.074	110	1225	0.063	80
	7.0	2050	0.115	240	1590	0.098	160	1360	0.080	110	1137	0.069	80
	7.5	1910	0.124	240	1490	0.106	160	1270	0.087	110	1062	0.075	80
	8.0	1790	0.134	240	1390	0.114	160	1190	0.094	110	995	0.080	80
	8.5	1690	0.143	240	1310	0.122	160	1120	0.100	110	937	0.086	80
	9.0	1590	0.153	240	1240	0.130	160	1060	0.107	110	885	0.092	80
	9.5	1510	0.163	250	1170	0.138	160	1010	0.114	110	838	0.098	80
	10.0	1430	0.172	250	1110	0.146	160	960	0.120	120	796	0.103	80

3520HL

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	60-80			50-70			40-60			30-50		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	7430	0.055	410	6370	0.050	320	5310	0.044	230	4250	0.039	160
3.5	6370	0.064	410	5460	0.057	310	4550	0.051	230	3640	0.045	160
4.0	5570	0.077	430	4780	0.069	330	3980	0.061	240	3180	0.054	170
4.5	4950	0.089	440	4250	0.080	340	3540	0.071	250	2830	0.062	180
5.0	4460	0.102	450	3820	0.092	350	3180	0.082	260	2550	0.071	180
5.5	4050	0.115	460	3470	0.103	360	2900	0.092	270	2320	0.080	190
6.0	3720	0.128	470	3180	0.115	360	2650	0.102	270	2120	0.089	190
6.5	3430	0.140	480	2940	0.126	370	2450	0.112	270	1960	0.098	190
7.0	3180	0.153	490	2730	0.138	380	2270	0.122	280	1820	0.107	190
7.5	2970	0.166	490	2550	0.149	380	2120	0.133	280	1700	0.116	200
8.0	2790	0.179	500	2390	0.161	380	1990	0.143	280	1590	0.125	200
8.5	2620	0.191	500	2250	0.172	390	1870	0.153	290	1500	0.134	200
9.0	2480	0.204	510	2120	0.184	390	1770	0.163	290	1420	0.143	200
9.5	2350	0.217	510	2010	0.195	390	1680	0.173	290	1340	0.152	200
10.0	2230	0.230	510	1910	0.207	390	1590	0.184	290	1270	0.161	200

Material Group ISO 513	N1			N2			N3 N4					
Hardness/Rm												
Vc (m/min)	60-80			50-70			50-70					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
3.0	7430	0.069	510	6370	0.062	400	6370	0.055	350			
3.5	6370	0.080	510	5460	0.072	390	5460	0.064	350			
4.0	5570	0.096	530	4780	0.086	410	4780	0.077	370			
4.5	4950	0.112	550	4250	0.100	430	4250	0.089	380			
5.0	4460	0.128	570	3820	0.115	440	3820	0.102	390			
5.5	4050	0.143	580	3470	0.129	450	3470	0.115	400			
6.0	3720	0.159	590	3180	0.143	460	3180	0.128	410			
6.5	3430	0.175	600	2940	0.158	460	2940	0.140	410			
7.0	3180	0.191	610	2730	0.172	470	2730	0.153	420			
7.5	2970	0.207	620	2550	0.186	480	2550	0.166	420			
8.0	2790	0.223	620	2390	0.201	480	2390	0.179	430			
8.5	2620	0.239	630	2250	0.215	480	2250	0.191	430			
9.0	2480	0.255	630	2120	0.230	490	2120	0.204	430			
9.5	2350	0.271	640	2010	0.244	490	2010	0.217	440			
10.0	2230	0.287	640	1910	0.258	490	1910	0.230	440			

3520HL

Material Group ISO 513	S1 S2			S3			S4			S5		
Hardness/Rm	< 35 HRC			35-45 HRC								
Vc (m/min)	25-35			15-25			25-35			15-25		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	3180	0.039	120	2120	0.027	57	3180	0.037	120	2120	0.031	66
3.5	2730	0.045	120	1820	0.031	57	2730	0.042	120	1820	0.036	65
4.0	2390	0.054	130	1590	0.037	60	2390	0.051	120	1590	0.043	68
4.5	2120	0.062	130	1420	0.044	62	2120	0.059	130	1420	0.050	70
5.0	1910	0.071	140	1270	0.050	63	1910	0.068	130	1270	0.057	70
5.5	1740	0.080	140	1160	0.056	65	1740	0.076	130	1160	0.064	70
6.0	1590	0.089	140	1060	0.062	66	1590	0.085	130	1060	0.071	80
6.5	1470	0.098	140	980	0.069	67	1470	0.093	140	980	0.079	80
7.0	1360	0.107	150	910	0.075	68	1360	0.102	140	910	0.086	80
7.5	1270	0.116	150	850	0.081	69	1270	0.110	140	850	0.093	80
8.0	1190	0.125	150	800	0.087	70	1190	0.119	140	800	0.100	80
8.5	1120	0.134	150	750	0.094	70	1120	0.127	140	750	0.107	80
9.0	1060	0.143	150	710	0.100	70	1060	0.136	140	710	0.114	80
9.5	1010	0.152	150	670	0.106	70	1010	0.144	150	670	0.121	80
10.0	960	0.161	150	640	0.112	70	960	0.153	150	640	0.129	80

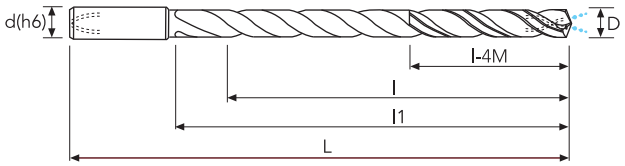
3525HL

4-margin lands, long (25xD), polished flutes, HL (through coolant)

25XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
3.10*	0/-0.012	4	79	83	120	15.5	25 x D	3525HL0310	○
3.20	0/-0.012	4	81	86	120	16	25 x D	3525HL0320	○
3.30	0/-0.012	4	84	88	125	16.5	25 x D	3525HL0330	○
3.40	0/-0.012	4	86	91	125	17	25 x D	3525HL0340	○
3.50	0/-0.012	4	89	94	130	17.5	25 x D	3525HL0350	●
3.60	0/-0.012	4	91	96	130	18	25 x D	3525HL0360	○
3.70	0/-0.012	4	94	99	135	18.5	25 x D	3525HL0370	○
3.80	0/-0.012	4	96	102	135	19	25 x D	3525HL0380	○
3.90	0/-0.012	4	99	104	140	19.5	25 x D	3525HL0390	○
4.00	0/-0.012	4	101	107	140	20	25 x D	3525HL0400	●
4.10	0/-0.012	5	104	110	145	20.5	25 x D	3525HL0410	○
4.20	0/-0.012	5	106	112	150	21	25 x D	3525HL0420	○
4.30	0/-0.012	5	109	115	150	21.5	25 x D	3525HL0430	○
4.40	0/-0.012	5	111	118	155	22	25 x D	3525HL0440	○
4.50	0/-0.012	5	114	120	155	22.5	25 x D	3525HL0450	●
4.60	0/-0.012	5	116	123	160	23	25 x D	3525HL0460	○
4.70	0/-0.012	5	119	126	165	23.5	25 x D	3525HL0470	○
4.80	0/-0.012	5	121	128	165	24	25 x D	3525HL0480	○
4.90	0/-0.012	5	124	131	170	24.5	25 x D	3525HL0490	○
5.00	0/-0.012	5	126	134	170	25	25 x D	3525HL0500	●
5.10	0/-0.012	6	129	136	175	25.5	25 x D	3525HL0510	○
5.20	0/-0.012	6	131	139	180	26	25 x D	3525HL0520	○
5.30	0/-0.012	6	134	141	180	26.5	25 x D	3525HL0530	○
5.40	0/-0.012	6	136	144	185	27	25 x D	3525HL0540	○
5.50	0/-0.012	6	139	147	185	27.5	25 x D	3525HL0550	●
5.60	0/-0.012	6	141	149	190	28	25 x D	3525HL0560	○
5.70	0/-0.012	6	144	152	190	28.5	25 x D	3525HL0570	○
5.80	0/-0.012	6	146	155	195	29	25 x D	3525HL0580	○
5.90	0/-0.012	6	149	157	195	29.5	25 x D	3525HL0590	○
6.00	0/-0.012	6	151	160	200	30	25 x D	3525HL0600	●
6.10	0/-0.015	8	154	163	200	30.5	25 x D	3525HL0610	○
6.20	0/-0.015	8	156	165	205	31	25 x D	3525HL0620	○
6.30	0/-0.015	8	159	168	205	31.5	25 x D	3525HL0630	○
6.40	0/-0.015	8	161	171	210	32	25 x D	3525HL0640	○
6.50	0/-0.015	8	164	173	210	32.5	25 x D	3525HL0650	●
6.60	0/-0.015	8	166	176	215	33	25 x D	3525HL0660	○
6.70	0/-0.015	8	169	179	220	33.5	25 x D	3525HL0670	○
6.80	0/-0.015	8	171	181	220	34	25 x D	3525HL0680	○
6.90	0/-0.015	8	174	184	225	34.5	25 x D	3525HL0690	○

* Ø1÷Ø3 = 3525 SUH MINI page 156

● stock standard ○ non-standard stock ▽ stock exhaustion

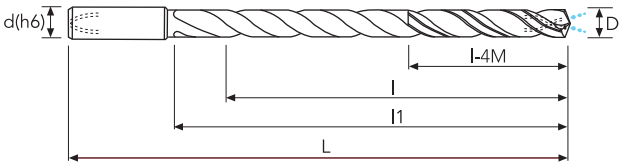
3525HL

4-margin lands, long (25xD), polished flutes,
HL (through coolant)

25XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
7.00	0/-0.015	8	176	187	230	35	25 x D	3525HL0700	●
7.10	0/-0.015	8	179	189	230	35.5	25 x D	3525HL0710	○
7.20	0/-0.015	8	181	192	235	36	25 x D	3525HL0720	○
7.30	0/-0.015	8	184	194	235	36.5	25 x D	3525HL0730	○
7.40	0/-0.015	8	186	197	240	37	25 x D	3525HL0740	○
7.50	0/-0.015	8	189	200	240	37.5	25 x D	3525HL0750	○
7.60	0/-0.015	8	191	202	245	38	25 x D	3525HL0760	○
7.70	0/-0.015	8	194	205	245	38.5	25 x D	3525HL0770	○
7.80	0/-0.015	8	196	208	250	39	25 x D	3525HL0780	○
7.90	0/-0.015	8	199	210	250	39.5	25 x D	3525HL0790	○
8.00	0/-0.015	8	201	213	255	40	25 x D	3525HL0800	●
8.10	0/-0.015	10	204	216	260	40.5	25 x D	3525HL0810	○
8.20	0/-0.015	10	206	218	260	41	25 x D	3525HL0820	○
8.30	0/-0.015	10	209	221	265	41.5	25 x D	3525HL0830	○
8.40	0/-0.015	10	211	224	265	42	25 x D	3525HL0840	○
8.50	0/-0.015	10	214	226	270	42.5	25 x D	3525HL0850	○
8.60	0/-0.015	10	216	229	270	43	25 x D	3525HL0860	○
8.70	0/-0.015	10	219	232	275	43.5	25 x D	3525HL0870	○
8.80	0/-0.015	10	221	234	275	44	25 x D	3525HL0880	○
8.90	0/-0.015	10	224	237	280	44.5	25 x D	3525HL0890	○
9.00	0/-0.015	10	226	240	285	45	25 x D	3525HL0900	○
9.10	0/-0.015	10	229	242	285	45.5	25 x D	3525HL0910	○
9.20	0/-0.015	10	231	245	290	46	25 x D	3525HL0920	○
9.30	0/-0.015	10	234	247	290	46.5	25 x D	3525HL0930	○
9.40	0/-0.015	10	236	250	295	47	25 x D	3525HL0940	○
9.50	0/-0.015	10	239	253	295	47.5	25 x D	3525HL0950	○

● stock standard ○ non-standard stock ▽ stock exhaustion

3525HL

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	55-75			45-65			35-55			30-40		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	6900	0.052	360	5840	0.047	270	4780	0.042	200	3720	0.036	140
3.5	5910	0.060	350	5000	0.054	270	4090	0.048	200	3180	0.042	130
4.0	5180	0.072	370	4380	0.065	280	3580	0.058	210	2790	0.050	140
4.5	4600	0.084	390	3890	0.076	290	3180	0.067	210	2480	0.059	150
5.0	4140	0.096	400	3500	0.086	300	2870	0.077	220	2230	0.067	150
5.5	3760	0.108	410	3180	0.097	310	2610	0.086	230	2030	0.076	150
6.0	3450	0.120	410	2920	0.108	320	2390	0.096	230	1860	0.084	160
6.5	3180	0.132	420	2690	0.119	320	2200	0.106	230	1710	0.092	160
7.0	2960	0.144	430	2500	0.130	320	2050	0.115	240	1590	0.101	160
7.5	2760	0.156	430	2340	0.140	330	1910	0.125	240	1490	0.109	160
8.0	2590	0.168	440	2190	0.151	330	1790	0.134	240	1390	0.118	160
8.5	2440	0.180	440	2060	0.162	330	1690	0.144	240	1310	0.126	170
9.0	2300	0.192	440	1950	0.173	340	1590	0.154	240	1240	0.134	170
9.5	2180	0.204	440	1840	0.184	340	1510	0.163	250	1170	0.143	170

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	30-50			30-40			25-35			20-30		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	4780	0.039	190	3720	0.033	120	3180	0.027	90	2650	0.023	62
3.5	4090	0.045	180	3180	0.038	120	2730	0.032	90	2270	0.027	61
4.0	3580	0.054	190	2790	0.046	130	2390	0.038	90	1990	0.032	64
4.5	3180	0.063	200	2480	0.054	130	2120	0.044	90	1770	0.038	67
5.0	2870	0.072	210	2230	0.061	140	1910	0.050	100	1590	0.043	69
5.5	2610	0.081	210	2030	0.069	140	1740	0.057	100	1450	0.049	70
6.0	2390	0.090	220	1860	0.077	140	1590	0.063	100	1330	0.054	70
6.5	2200	0.099	220	1710	0.084	140	1470	0.069	100	1220	0.059	70
7.0	2050	0.108	220	1590	0.092	150	1360	0.076	100	1140	0.065	70
7.5	1910	0.117	220	1490	0.099	150	1270	0.082	100	1060	0.070	70
8.0	1790	0.126	230	1390	0.107	150	1190	0.088	100	1000	0.076	80
8.5	1690	0.135	230	1310	0.115	150	1120	0.095	110	940	0.081	80
9.0	1590	0.144	230	1240	0.122	150	1060	0.101	110	880	0.086	80
9.5	1510	0.153	230	1170	0.130	150	1010	0.107	110	840	0.092	80

3525HL

	Material Group ISO 513	K1			K2			K3			K4		
	Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
	Vc (m/min)	55-75			45-65			35-55			30-40		
Ø RUN OUT <0.02mm	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	3.0	6900	0.052	360	5840	0.047	270	4780	0.042	200	3720	0.036	140
	3.5	5910	0.060	350	5000	0.054	270	4090	0.048	200	3180	0.042	130
	4.0	5180	0.072	370	4380	0.065	280	3580	0.058	210	2790	0.050	140
	4.5	4600	0.084	390	3890	0.076	290	3180	0.067	210	2480	0.059	150
	5.0	4140	0.096	400	3500	0.086	300	2870	0.077	220	2230	0.067	150
	5.5	3760	0.108	410	3180	0.097	310	2610	0.086	230	2030	0.076	150
	6.0	3450	0.120	410	2920	0.108	320	2390	0.096	230	1860	0.084	160
	6.5	3180	0.132	420	2690	0.119	320	2200	0.106	230	1710	0.092	160
	7.0	2960	0.144	430	2500	0.130	320	2050	0.115	240	1590	0.101	160
	7.5	2760	0.156	430	2340	0.140	330	1910	0.125	240	1490	0.109	160
	8.0	2590	0.168	440	2190	0.151	330	1790	0.134	240	1390	0.118	160
	8.5	2440	0.180	440	2060	0.162	330	1690	0.144	240	1310	0.126	170
	9.0	2300	0.192	440	1950	0.173	340	1590	0.154	240	1240	0.134	170
	9.5	2180	0.204	440	1840	0.184	340	1510	0.163	250	1170	0.143	170

	Material Group ISO 513	N1			N2			N3 N4					
	Hardness/Rm												
	Vc (m/min)	60-80			50-70			50-70					
Ø RUN OUT <0.02mm	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
	3.0	7430	0.065	480	6370	0.059	370	6370	0.052	330			
	3.5	6370	0.075	480	5460	0.068	370	5460	0.060	330			
	4.0	5570	0.090	500	4780	0.081	390	4780	0.072	340			
	4.5	4950	0.105	520	4250	0.095	400	4250	0.084	360			
	5.0	4460	0.120	540	3820	0.108	410	3820	0.096	370			
	5.5	4050	0.135	550	3470	0.122	420	3470	0.108	370			
	6.0	3720	0.150	560	3180	0.135	430	3180	0.120	380			
	6.5	3430	0.165	570	2940	0.149	440	2940	0.132	390			
	7.0	3180	0.180	570	2730	0.162	440	2730	0.144	390			
	7.5	2970	0.195	580	2550	0.176	450	2550	0.156	400			
	8.0	2790	0.210	590	2390	0.189	450	2390	0.168	400			
	8.5	2620	0.225	590	2250	0.203	460	2250	0.180	410			
	9.0	2480	0.240	600	2120	0.216	460	2120	0.192	410			
	9.5	2350	0.255	600	2010	0.230	460	2010	0.204	410			

3525HL

Material Group ISO 513	S1 S2			S3			S4			S5		
Hardness/Rm	< 35 HRC			35-45 HRC								
Vc (m/min)	25-35			15-25			25-35			15-25		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	3180	0.036	120	2120	0.025	54	3180	0.035	110	2120	0.029	60
3.5	2730	0.042	110	1820	0.029	54	2730	0.040	110	1820	0.034	60
4.0	2390	0.050	120	1590	0.035	56	2390	0.048	110	1590	0.040	60
4.5	2120	0.059	120	1420	0.041	58	2120	0.056	120	1420	0.047	70
5.0	1910	0.067	130	1270	0.047	60	1910	0.064	120	1270	0.054	70
5.5	1740	0.076	130	1160	0.053	61	1740	0.072	120	1160	0.060	70
6.0	1590	0.084	130	1060	0.059	62	1590	0.080	130	1060	0.067	70
6.5	1470	0.092	140	980	0.065	63	1470	0.088	130	980	0.074	70
7.0	1360	0.101	140	910	0.071	64	1360	0.096	130	910	0.081	70
7.5	1270	0.109	140	850	0.076	65	1270	0.104	130	850	0.087	70
8.0	1190	0.118	140	800	0.082	66	1190	0.112	130	800	0.094	80
8.5	1120	0.126	140	750	0.088	66	1120	0.120	130	750	0.101	80
9.0	1060	0.134	140	710	0.094	67	1060	0.128	140	710	0.108	80
9.5	1010	0.143	140	670	0.100	67	1010	0.136	140	670	0.114	80

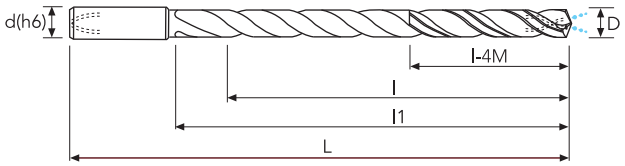
3530HL

4-margin lands, long (30xD), polished flutes,
HL (through coolant)

30XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
3.10*	0/-0.012	4	94	99	135	15.5	30 x D	3530HL0310	○
3.20	0/-0.012	4	97	102	135	16	30 x D	3530HL0320	○
3.30	0/-0.012	4	100	105	140	16.5	30 x D	3530HL0330	○
3.40	0/-0.012	4	103	108	145	17	30 x D	3530HL0340	○
3.50	0/-0.012	4	106	111	145	17.5	30 x D	3530HL0350	●
3.60	0/-0.012	4	109	114	150	18	30 x D	3530HL0360	○
3.70	0/-0.012	4	112	118	155	18.5	30 x D	3530HL0370	○
3.80	0/-0.012	4	115	121	155	19	30 x D	3530HL0380	○
3.90	0/-0.012	4	118	124	160	19.5	30 x D	3530HL0390	○
4.00	0/-0.012	4	121	127	160	20	30 x D	3530HL0400	●
4.10	0/-0.012	5	124	130	165	20.5	30 x D	3530HL0410	○
4.20	0/-0.012	5	127	133	170	21	30 x D	3530HL0420	○
4.30	0/-0.012	5	130	136	175	21.5	30 x D	3530HL0430	○
4.40	0/-0.012	5	133	140	175	22	30 x D	3530HL0440	○
4.50	0/-0.012	5	136	143	180	22.5	30 x D	3530HL0450	●
4.60	0/-0.012	5	139	146	185	23	30 x D	3530HL0460	○
4.70	0/-0.012	5	142	149	185	23.5	30 x D	3530HL0470	○
4.80	0/-0.012	5	145	152	190	24	30 x D	3530HL0480	○
4.90	0/-0.012	5	148	155	190	24.5	30 x D	3530HL0490	○
5.00	0/-0.012	5	151	159	195	25	30 x D	3530HL0500	●
5.10	0/-0.012	6	154	162	200	25.5	30 x D	3530HL0510	○
5.20	0/-0.012	6	157	165	205	26	30 x D	3530HL0520	○
5.30	0/-0.012	6	160	168	205	26.5	30 x D	3530HL0530	○
5.40	0/-0.012	6	163	171	210	27	30 x D	3530HL0540	○
5.50	0/-0.012	6	166	174	215	27.5	30 x D	3530HL0550	●
5.60	0/-0.012	6	169	177	215	28	30 x D	3530HL0560	○
5.70	0/-0.012	6	172	181	220	28.5	30 x D	3530HL0570	○
5.80	0/-0.012	6	175	184	225	29	30 x D	3530HL0580	○
5.90	0/-0.012	6	178	187	225	29.5	30 x D	3530HL0590	○
6.00	0/-0.012	6	181	190	230	30	30 x D	3530HL0600	●
6.10	0/-0.015	8	184	193	230	30.5	30 x D	3530HL0610	○
6.20	0/-0.015	8	187	196	135	31	30 x D	3530HL0620	○
6.30	0/-0.015	8	190	199	240	31.5	30 x D	3530HL0630	○
6.40	0/-0.015	8	193	203	240	32	30 x D	3530HL0640	○
6.50	0/-0.015	8	196	206	245	32.5	30 x D	3530HL0650	●
6.60	0/-0.015	8	199	209	250	33	30 x D	3530HL0660	○
6.70	0/-0.015	8	202	212	250	33.5	30 x D	3530HL0670	○
6.80	0/-0.015	8	205	215	255	34	30 x D	3530HL0680	○
6.90	0/-0.015	8	208	218	255	34.5	30 x D	3530HL0690	○

* Ø1÷Ø3 = 3530 SUH MINI page 160

● stock standard ○ non-standard stock ▽ stock exhaustion

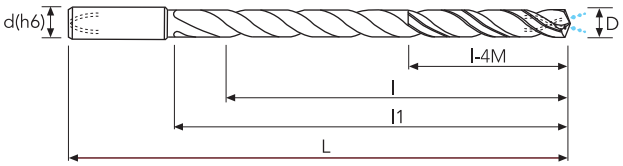
3530HL

4-margin lands, long (30xD), polished flutes,
HL (through coolant)

30XD | OSAWA NORM | HL | MG PV250 | 135° | 30°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h7)	D Tol.	d(h6)	l	l1	L	l-4M	drilling length	EDP No.	Stock
7.00	0/-0.015	8	211	222	265	35	30 x D	3530HL0700	○
7.10	0/-0.015	8	214	225	265	35.5	30 x D	3530HL0710	○
7.20	0/-0.015	8	217	228	270	36	30 x D	3530HL0720	○
7.30	0/-0.015	8	220	231	270	36.5	30 x D	3530HL0730	○
7.40	0/-0.015	8	223	234	275	37	30 x D	3530HL0740	○
7.50	0/-0.015	8	226	237	280	37.5	30 x D	3530HL0750	○
7.60	0/-0.015	8	229	240	280	38	30 x D	3530HL0760	○
7.70	0/-0.015	8	232	244	285	38.5	30 x D	3530HL0770	○
7.80	0/-0.015	8	235	247	290	39	30 x D	3530HL0780	○
7.90	0/-0.015	8	238	250	290	39.5	30 x D	3530HL0790	○
8.00	0/-0.015	8	241	253	295	40	30 x D	3530HL0800	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3530HL

	Material Group ISO 513	P1 P2			P3 P4			P5			P6		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
	Vc (m/min)	50-70			40-60			30-50			25-35		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	3.0	6370	0.046	290	5310	0.041	220	4250	0.036	150	3180	0.032	100
	3.5	5460	0.053	287	4550	0.047	210	3640	0.042	150	2730	0.037	100
	4.0	4780	0.063	301	3980	0.057	230	3180	0.050	160	2390	0.044	110
	4.5	4250	0.074	312	3540	0.066	230	2830	0.059	170	2120	0.051	110
	5.0	3820	0.084	321	3180	0.076	240	2550	0.067	170	1910	0.059	110
	5.5	3470	0.095	328	2900	0.085	250	2320	0.076	180	1740	0.066	120
	6.0	3180	0.105	334	2650	0.095	250	2120	0.084	180	1590	0.074	120
	6.5	2940	0.116	340	2450	0.104	250	1960	0.092	180	1470	0.081	120
	7.0	2730	0.126	344	2270	0.113	260	1820	0.101	180	1360	0.088	120
	7.5	2550	0.137	348	2120	0.123	260	1700	0.109	190	1270	0.096	120
	8.0	2390	0.147	351	1990	0.132	260	1590	0.118	190	1190	0.103	120

	Material Group ISO 513	M1 M2			M3			M4			M5		
	Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
	Vc (m/min)	35-45			25-35			20-30			15-25		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	3.0	4250	0.034	150	3180	0.029	90	2650	0.024	63	2120	0.020	43
	3.5	3640	0.039	140	2730	0.033	90	2270	0.028	63	1820	0.024	43
	4.0	3180	0.047	150	2390	0.040	100	1990	0.033	66	1590	0.028	45
	4.5	2830	0.055	160	2120	0.047	100	1770	0.039	68	1420	0.033	47
	5.0	2550	0.063	160	1910	0.054	100	1590	0.044	70	1270	0.038	48
	5.5	2320	0.071	160	1740	0.060	100	1450	0.050	70	1160	0.043	49
	6.0	2120	0.079	170	1590	0.067	110	1330	0.055	70	1060	0.047	50
	6.5	1960	0.087	170	1470	0.074	110	1220	0.061	70	980	0.052	51
	7.0	1820	0.095	170	1360	0.080	110	1140	0.066	80	910	0.057	52
	7.5	1700	0.102	170	1270	0.087	110	1060	0.072	80	850	0.061	52
	8.0	1590	0.110	180	1190	0.094	110	1000	0.077	80	800	0.066	53

3530HL

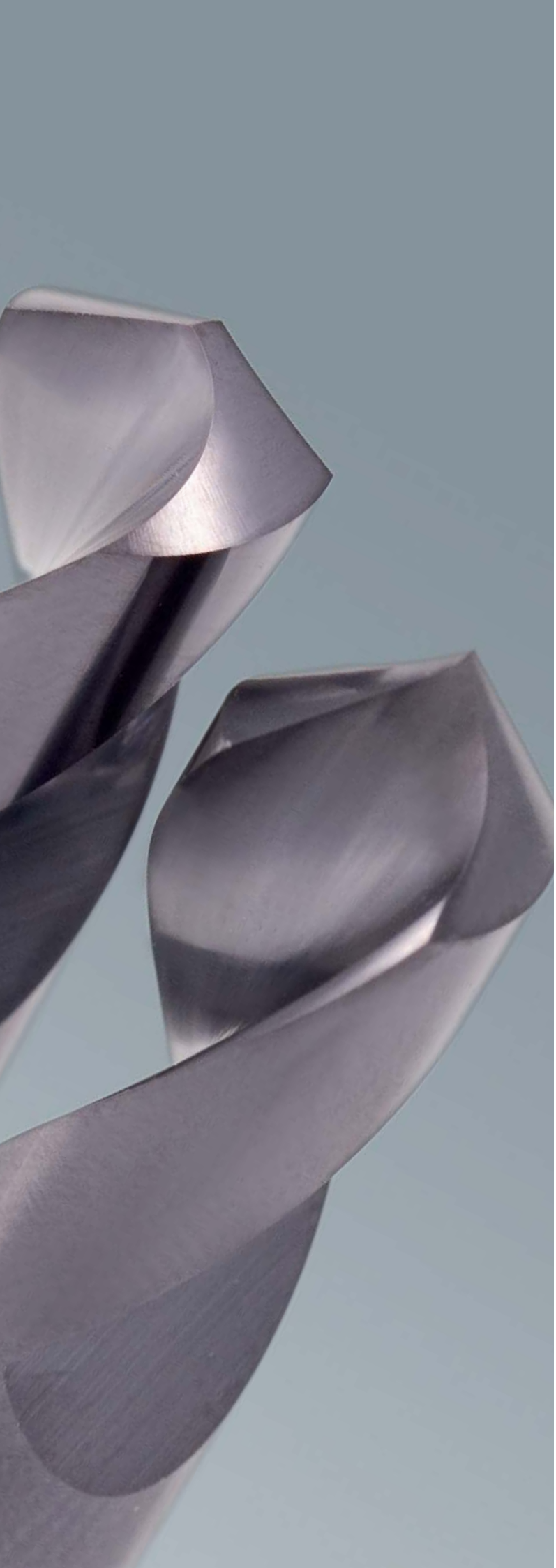
Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**50-70**			**40-60**			**30-50**			**25-35**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
3.0	6370	0.046	290	5310	0.041	220	4250	0.036	150	3180	0.032	100
3.5	5460	0.053	290	4550	0.047	210	3640	0.042	150	2730	0.037	100
4.0	4780	0.063	300	3980	0.057	230	3180	0.050	160	2390	0.044	110
4.5	4250	0.074	310	3540	0.066	230	2830	0.059	170	2120	0.051	110
5.0	3820	0.084	320	3180	0.076	240	2550	0.067	170	1910	0.059	110
5.5	3470	0.095	330	2900	0.085	250	2320	0.076	180	1740	0.066	120
6.0	3180	0.105	330	2650	0.095	250	2120	0.084	180	1590	0.074	120
6.5	2940	0.116	340	2450	0.104	250	1960	0.092	180	1470	0.081	120
7.0	2730	0.126	340	2270	0.113	260	1820	0.101	180	1360	0.088	120
7.5	2550	0.137	350	2120	0.123	260	1700	0.109	190	1270	0.096	120
8.0	2390	0.147	350	1990	0.132	260	1590	0.118	190	1190	0.103	120

Material Group ISO 513	N1			N2			N3 N4					
Hardness/Rm												
Vc (m/min)	**50-70**			**40-60**			**40-60**					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
3.0	6370	0.057	360	5310	0.051	270	5310	0.046	240			
3.5	5460	0.066	360	4550	0.059	270	4550	0.053	240			
4.0	4780	0.079	380	3980	0.071	280	3980	0.063	250			
4.5	4250	0.092	390	3540	0.083	290	3540	0.074	260			
5.0	3820	0.105	400	3180	0.095	300	3180	0.084	270			
5.5	3470	0.118	410	2900	0.106	310	2900	0.095	270			
6.0	3180	0.131	420	2650	0.118	310	2650	0.105	280			
6.5	2940	0.144	420	2450	0.130	320	2450	0.116	280			
7.0	2730	0.158	430	2270	0.142	320	2270	0.126	290			
7.5	2550	0.171	440	2120	0.154	330	2120	0.137	290			
8.0	2390	0.184	440	1990	0.165	330	1990	0.147	290			

CUTTING PARAMETERS

3530HL

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	25-35			15-25			25-35			15-25		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
Ø RUN OUT <0.02mm	**3.0**	3180	0.032	100	2120	0.022	47	3180	0.030	100	2120	0.025	54
	3.5	2730	0.037	100	1820	0.026	47	2730	0.035	100	1820	0.029	54
	4.0	2390	0.044	110	1590	0.031	49	2390	0.042	100	1590	0.035	56
	4.5	2120	0.051	110	1420	0.036	51	2120	0.049	100	1420	0.041	58
	5.0	1910	0.059	110	1270	0.041	52	1910	0.056	110	1270	0.047	60
	5.5	1740	0.066	120	1160	0.046	54	1740	0.063	110	1160	0.053	61
	6.0	1590	0.074	120	1060	0.051	55	1590	0.070	110	1060	0.059	62
	6.5	1470	0.081	120	980	0.057	55	1470	0.077	110	980	0.065	63
	7.0	1360	0.088	120	910	0.062	56	1360	0.084	110	910	0.071	64
	7.5	1270	0.096	120	850	0.067	57	1270	0.091	120	850	0.076	65
	8.0	1190	0.103	120	800	0.072	58	1190	0.098	120	800	0.082	66



C-SD-TA
NC SPOTTING

90° - 120° starting drills for NC centering and chamfering on a wide range of materials.

Punte da centri a 90° e 120° per NC. Centratura e svasatura su una vasta gamma di materiali.

Anbohrer mit Spitzenwinkel 90° und 120° für NC Maschinen. Zentrierung und Ansenkung auf einem sehr breiten Spektrum von Materialien.

Forets à centrer et chanfreiner 90°-120°, pour une grande variété de matériaux.

Brocas para puntear y escariar 90°-120° sobre una gran variedad de materiales.

Центровочные свёрла с углами при вершине 90°-120° для сверления центровых отверстий и зенкования в широкой гамме материалов на станках с ЧПУ.

C-SD-TA

solid carbide NC starting drills, 90°-120°

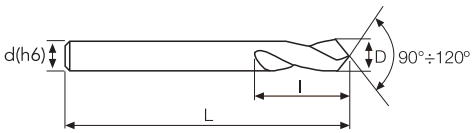
OSAWA NORM | SD | MG PV200 | 90-120° | 30°

90°

120°

P	M	K	N	S	H
★	★	★	★	☆	

★ 1st choice ☆ suitable



						C-SD-TA 90°		C-SD-TA 120°	
D(h6)	D Tol.	D(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
6.00	0/-0.008	6	16		50	CSDTA060A	●	CSDTA060B	●
8.00	0/-0.009	8	20		64	CSDTA080A	●	CSDTA080B	●
10.00	0/-0.009	10	25		70	CSDTA100A	●	CSDTA100B	●
12.00	0/-0.011	12	25		75	CSDTA120A	●	CSDTA120B	●
16.00	0/-0.011	16	26		90	CSDTA160A	●	CSDTA160B	●

● stock standard ○ non-standard stock ▽ stock exhaustion

C-SD-TA

Material Group ISO 513	P1 P2			P3 P4			P5			P6		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			900-1200 N/mm²			1200-1400 N/mm²		
Vc (m/min)	**90-110**			**70-90**			**60-80**			**50-70**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
6	5310	0.140	740	4250	0.126	540	3720	0.112	420	3180	0.098	310
7	4550	0.160	730	3640	0.144	520	3180	0.128	410	2730	0.112	310
8	3980	0.180	720	3180	0.162	520	2790	0.144	400	2390	0.126	300
9	3540	0.200	710	2830	0.180	510	2480	0.160	400	2120	0.140	300
10	3180	0.220	700	2550	0.198	500	2230	0.176	390	1910	0.154	290
11	2900	0.240	700	2320	0.216	500	2030	0.192	390	1740	0.168	290
12	2650	0.260	690	2120	0.234	500	1860	0.208	390	1590	0.182	290
13	2450	0.280	690	1960	0.252	490	1710	0.224	380	1470	0.196	290
14	2270	0.300	680	1820	0.270	490	1590	0.240	380	1360	0.210	290
15	2120	0.320	680	1700	0.288	490	1490	0.256	380	1270	0.224	280
16	1990	0.340	680	1590	0.306	490	1390	0.272	380	1190	0.238	280

Material Group ISO 513	M1 M2			M3			M4			M5		
Hardness/Rm	< 750 N/mm²			550-850 N/mm²			650-950 N/mm²			850-1200 N/mm²		
Vc (m/min)	**50-70**			**40-60**			**30-40**			**20-30**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
6	3180	0.091	290	2650	0.073	190	1860	0.064	120	1330	0.055	70
7	2730	0.104	280	2270	0.083	190	1590	0.073	120	1140	0.062	70
8	2390	0.117	280	1990	0.094	190	1390	0.082	110	1000	0.070	70
9	2120	0.130	280	1770	0.104	180	1240	0.091	110	880	0.078	70
10	1910	0.143	270	1590	0.114	180	1110	0.100	110	800	0.086	70
11	1740	0.156	270	1450	0.125	180	1010	0.109	110	720	0.094	70
12	1590	0.169	270	1330	0.135	180	930	0.118	110	660	0.101	70
13	1470	0.182	270	1220	0.146	180	860	0.127	110	610	0.109	70
14	1360	0.195	270	1140	0.156	180	800	0.137	110	570	0.117	70
15	1270	0.208	260	1060	0.166	180	740	0.146	110	530	0.125	70
16	1190	0.221	260	1000	0.177	180	700	0.155	110	500	0.133	70

Material Group ISO 513	K1			K2			K3			K4		
Hardness/Rm	150-250 HB			150-350 HB			120-260 HB			250-500 HB		
Vc (m/min)	**90-110**			**70-90**			**60-80**			**50-70**		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
6	5310	0.140	740	4250	0.126	540	3720	0.112	420	3180	0.098	310
7	4550	0.160	730	3640	0.144	520	3180	0.128	410	2730	0.112	310
8	3980	0.180	720	3180	0.162	520	2790	0.144	400	2390	0.126	300
9	3540	0.200	710	2830	0.180	510	2480	0.160	400	2120	0.140	300
10	3180	0.220	700	2550	0.198	500	2230	0.176	390	1910	0.154	290
11	2900	0.240	700	2320	0.216	500	2030	0.192	390	1740	0.168	290
12	2650	0.260	690	2120	0.234	500	1860	0.208	390	1590	0.182	290
13	2450	0.280	690	1960	0.252	490	1710	0.224	380	1470	0.196	290
14	2270	0.300	680	1820	0.270	490	1590	0.240	380	1360	0.210	290
15	2120	0.320	680	1700	0.288	490	1490	0.256	380	1270	0.224	280
16	1990	0.340	680	1590	0.306	490	1390	0.272	380	1190	0.238	280

CUTTING PARAMETERS

C-SD-TA

	Material Group ISO 513	N1			N2			N3 N4			N5		
	Hardness/Rm												
	Vc (m/min)	160-200			140-180			130-170			160-200		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	6	9550	0.175	1670	8490	0.158	1340	7960	0.140	1110	9550	0.158	1500
	7	8190	0.200	1640	7280	0.180	1310	6820	0.160	1090	8190	0.180	1470
	8	7170	0.225	1610	6370	0.203	1290	5970	0.180	1070	7170	0.203	1450
	9	6370	0.250	1590	5660	0.225	1270	5310	0.200	1060	6370	0.225	1430
	10	5730	0.275	1580	5100	0.248	1260	4780	0.220	1050	5730	0.248	1420
	11	5210	0.300	1560	4630	0.270	1250	4340	0.240	1040	5210	0.270	1410
	12	4780	0.325	1550	4250	0.293	1240	3980	0.260	1030	4780	0.293	1400
	13	4410	0.350	1540	3920	0.315	1230	3670	0.280	1030	4410	0.315	1390
	14	4090	0.375	1530	3640	0.338	1230	3410	0.300	1020	4090	0.338	1380
	15	3820	0.400	1530	3400	0.360	1220	3180	0.320	1020	3820	0.360	1380
	16	3580	0.425	1520	3180	0.383	1220	2990	0.340	1020	3580	0.383	1370

	Material Group ISO 513	S1 S2			S3			S4			S5		
	Hardness/Rm	< 35 HRC			35-45 HRC								
	Vc (m/min)	30-50			20-40			45-65			35-55		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	6	2120	0.063	130	1590	0.044	70	2920	0.060	170	2390	0.050	120
	7	1820	0.072	130	1360	0.050	70	2500	0.068	170	2050	0.058	120
	8	1590	0.081	130	1190	0.057	70	2190	0.077	170	1790	0.065	120
	9	1420	0.090	130	1060	0.063	70	1950	0.086	170	1590	0.072	110
	10	1270	0.099	130	960	0.069	70	1750	0.094	160	1430	0.079	110
	11	1160	0.108	130	870	0.076	70	1590	0.103	160	1300	0.086	110
	12	1060	0.117	120	800	0.082	70	1460	0.111	160	1190	0.094	110
	13	980	0.126	120	730	0.088	60	1350	0.120	160	1100	0.101	110
	14	910	0.135	120	680	0.095	60	1250	0.128	160	1020	0.108	110
	15	850	0.144	120	640	0.101	60	1170	0.137	160	960	0.115	110
	16	800	0.153	120	600	0.107	60	1090	0.145	160	900	0.122	110

HSS DRILLS

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DIN1870 . 294

Legenda Verzeichnis Légende Leyenda Условные обозначения

STOCK		
●	stock standard stock standard Standard Lager	stock standard stock estándar складская позиция
○	non-standard stock stock non standard nicht Standard Lager	stock non standard stock no estándar не складская позиция
▽	stock exhaustion esaurimento stock Vorraterschöpfung	épuisement du stock agotamiento de stock складские остатки

APPLICATION GUIDELINES INDICAZIONI PER L'APPLICAZIONE LEITFADEN ZUR ANWENDUNG INDICATIONS POUR L'APPLICATION INDICACIONES PARA SU APLICACIÓN УКАЗАНИЯ ПО ПРИМЕНЕНИЮ		
★	1st choice 1a scelta 1. Wahl	1er choix 1ª elección 1-й выбор
☆	suitable adatto geeignet	adapté adecuado пригоден

SHANK ATTACCO SCHAFT QUEUE MANGO ХВОСТОВИК		
	cylindrical shank attacco cilindrico zylindrischer Schaft	queue cylindrique mango cilíndrico цилиндрическое крепление
	Morse Taper shank attacco Cono Morse MK Schaft	queue conique mango Cono Morse конус Морзе

GEOMETRY GEOMETRIA GEOMETRIE GÉOMÉTRIE GEOMETRÍA ГЕОМЕТРИЯ		
	high performance, selfcentering alto rendimento, autocentrante hochleistung, selbstzentrierende	haute performance, auto centreur alto rendimiento, autocentrante высокопроизводительные, самоцентрующиеся
	for stainless steel and general application per acciaio inossidabile e applicazioni generiche für rostfreien Stahl und allgemeine Anwendung	pour acier inoxydable et applications génériques para acero inoxidable y aplicaciones genéricas для нержавеющих сталей и общего назначения
	HSS general purpose HSS uso generico HSS allgemeine Anwendung	HSS applications génériques HSS uso genérico HSS общего назначения
	HSS Tin Pointed	
	HSS/Co Tin Pointed	

Legenda Verzeichnis Légende Leyenda Условные обозначения

GEOMETRY GEOMETRIA GEOMETRIE GÉOMÉTRIE GEOMETRÍA ГЕОМЕТРИЯ		
	for stainless steel and general application per acciaio inossidabile e applicazioni generiche für rostfreien Stahl und allgemeine Anwendung	pour acier inoxydable et applications génériques para acero inoxidable y aplicaciones genéricas для нержавеющих сталей и общего назначения
	for deep holes per fori profondi für tiefe Löcher	pour trous profonds para agujeros profundos для глубоких отверстий
	for brass per ottone für Messing	pour laiton para latón для латуни
	for aluminium per alluminio für Aluminium	pour aluminium para aluminio для алюминия

MATERIAL MATERIALE WERKSTOFF MATIÈRE MATERIAL МАТЕРИАЛ		
	high speed steel acciaio super rapido Hochleistungsschnellschnittstahl	acier rapide acero súper rápido быстрорежущая сталь
	high speed steel - 5% ÷ 8% Co acciaio super rapido - 5% ÷ 8% Co Hochleistungsschnellschnittstahl - 5% ÷ 8% Co	acier rapide - 5% ÷ 8% Co acero súper rápido - 5% ÷ 8% Co быстрорежущая сталь - 5% ÷ 8% Co
	HSS/Co + EV	

SURFACE TREATMENT TRATTAMENTO SUPERFICIALE OBERFLÄCHENBEHANDLUNG TRAITMENT DE SURFACE TRATAMIENTO SUPERFICIAL ОБРАБОТКА ПОВЕРХНОСТИ		
	uncoated non rivestito unbeschichtet	non revêtu no revestido без покрытия
	vaporization vaporizzazione Dämpfung	traitment vapeur vaporización окисление
	heat treatment trattamento termico thermische Behandlung	traitment thermique tratamiento térmico термическая обработка

Legenda Verzeichnis Légende Leyenda Условные обозначения

COATINGS RIVESTIMENTI BESCHICHTUNGEN REVÊTEMENTS RECUBRIMIENTOS ПОКРЫТИЕ		TiN	PV10	PV15
hardness (HV) durezza (HV) Härte (HV)	dureté (HV) dureza (HV) твёрдость (HV)	2300	3300	TiAlN + WC/C
friction coefficient coefficiente d'attrito Reibungskoeffizient	coefficent de frottement coeficiente de rozamiento коэффициент трения	0.4	0.35	0.2
thickness (µ) spessore (µ) dicke (µ)	épaisseur (µ) espesor (µ) толщина (мкм)	1÷4	1÷5	2÷5
max working temperature (°C) temperatura max (°C) hochste Temperatur (°C)	température maximale (°C) temperatura máx (°C) макс. температура (°C)	600°	900°	1000°

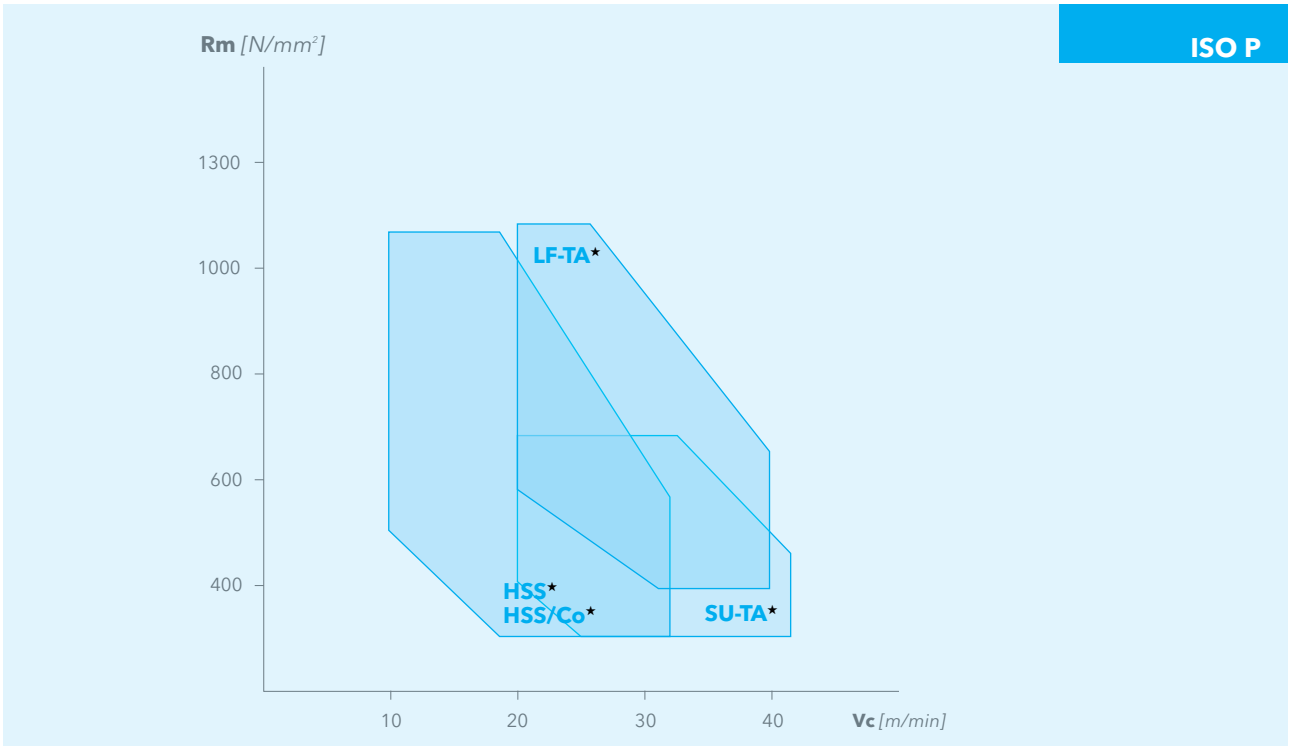
	ITEM No.	PAGE	
LFTA high performance	**218LFTA**	214	
	238LFTA	218	
SUTA high perfromance	**980SUTA**	224	
	990SUTA	228	
HSS-HSS/Co general purpose	**118N**	234	
	218NVA	239	
	1386STI	243	
	138N	248	
	138NTI	248	
	138HB	254	
	138WB	258	
	2386STI	262	
	238NVA	267	
	234NVA	272	
	234LS	276	
	234LSTH	276	
	2691LS	279	
	2691LSTH	279	
	1692LS	281	
	1693LS	283	
	145N	285	
	145NTI	285	
	245N	290	
	241LS	292	
	2701LS	294	
	2702LS	296	

Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

RANGE	DRILLING DEPTH	NORM	TYPE	MATERIAL / COATING	HRC	POINT ANGLE	HELIX ANGLE	CHAMFER	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
2-20	extra short	DIN1897	LF	HSS/Co PV10		130°	35°-40°		★	☆	★	☆		
2-20	short	DIN338	LF	HSS/Co PV10		130°	35°-40°		★	☆	★	☆		
2-13	extra short	OSAWA	SU	HSSE PV10		120°	38°		★	★		★	☆	
2-20	short	OSAWA	SU	HSSE PV10		120°	38°		★	★		★	☆	
1-16	extra short	DIN1897	N	HSS OX		118°	25°-30°		★		☆	☆		
1-20	extra short	DIN1897	NH	HSS/Co HT		130°	30°		★	★	☆	☆	☆	
1-13	short	DIN338	SPLIT POINT	HSS TiN		118°	30°		★	☆	★	☆	☆	
0.2-20	short	DIN338	N	HSS OX		118°	25°-30°		★		☆	☆		
1-16	short	DIN338	N	HSS TiN		118°	25°-30°		★		☆	☆		
1.5-10	short	DIN338	H	HSS BR		118°	12°-15°					★		
1.5-10	short	DIN338	W	HSS BR		130°	35°-40°					★		
1-13	short	DIN338	SPLIT POINT	HSS/Co TiN		135°	33°		★	★	★	☆	☆	
1-20	short	DIN338	NH	HSS/Co HT		130°	30°		★	★	☆	☆	☆	
0.5-12	long	DIN340	NH	HSS/Co HT		130°	30°		★	★	☆	☆	☆	
2-13	long	DIN340	LS	HSS/Co OX		130°	35°-40°		★	☆	★			
2-13	long	DIN340	LS	HSS/Co PV15		130°	35°-40°		★	☆	★			
2-13	extra long	DIN1869/1	LS	HSS/Co BR		130°	35°-40°		★	☆	★			
2-13	extra long	DIN1869/1	LS	HSS/Co PV15		130°	35°-40°		★	☆	★			
3-12	extra long	DIN1869/2	LS	HSS BR		130°	35°-40°		★		★			
3.5-12	extra long	DIN1869/3	LS	HSS BR		130°	35°-40°		★		★			
5-60	short	DIN345	N	HSS OX		118°	25°-30°		★		☆	☆		
13-30	short	DIN345	N	HSS TiN		118°	25°-30°		★		☆	☆		
13-30	short	DIN345	NH	HSS/Co OX		118°	30°		★	★	☆	☆	☆	
13-30	long	DIN341	LS	HSS/Co OX		130°	35°-40°		★	☆	★			
13-30	extra long	DIN1870/1	LS	HSS/Co OX		130°	35°-40°		★	☆	★			
13-30	extra long	DIN1870/2	LS	HSS/Co OX		130°	35°-40°		★	☆	★			

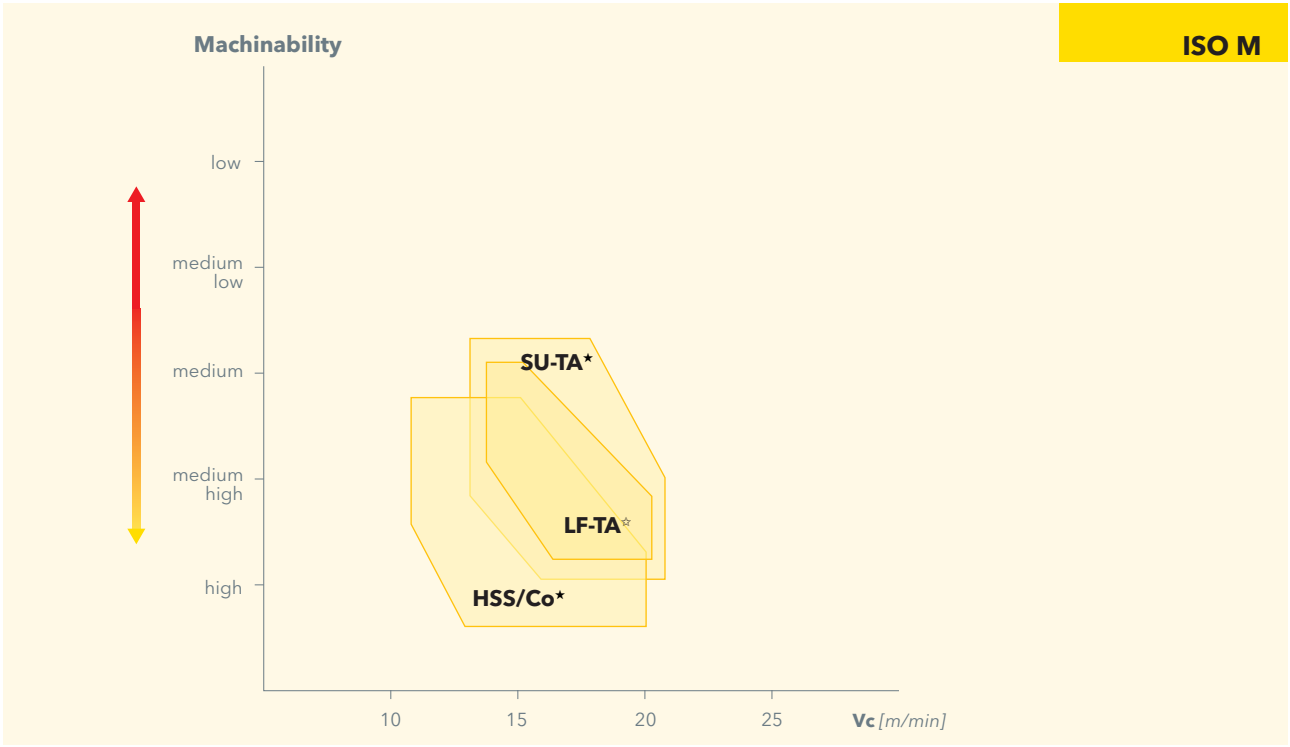
★ 1st choice ☆ suitable

STEEL APPLICATION



★ 1st choice ☆ suitable

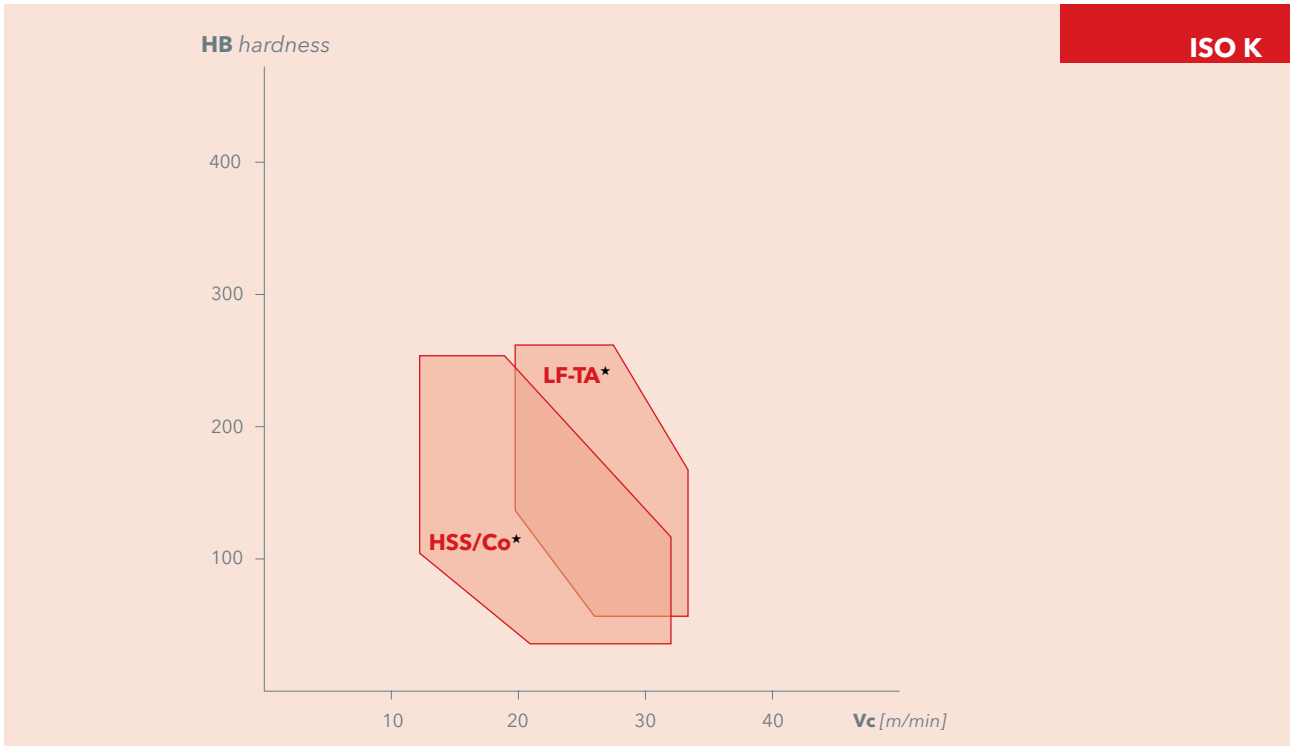
STAINLESS STEEL APPLICATION



★ 1st choice ☆ suitable

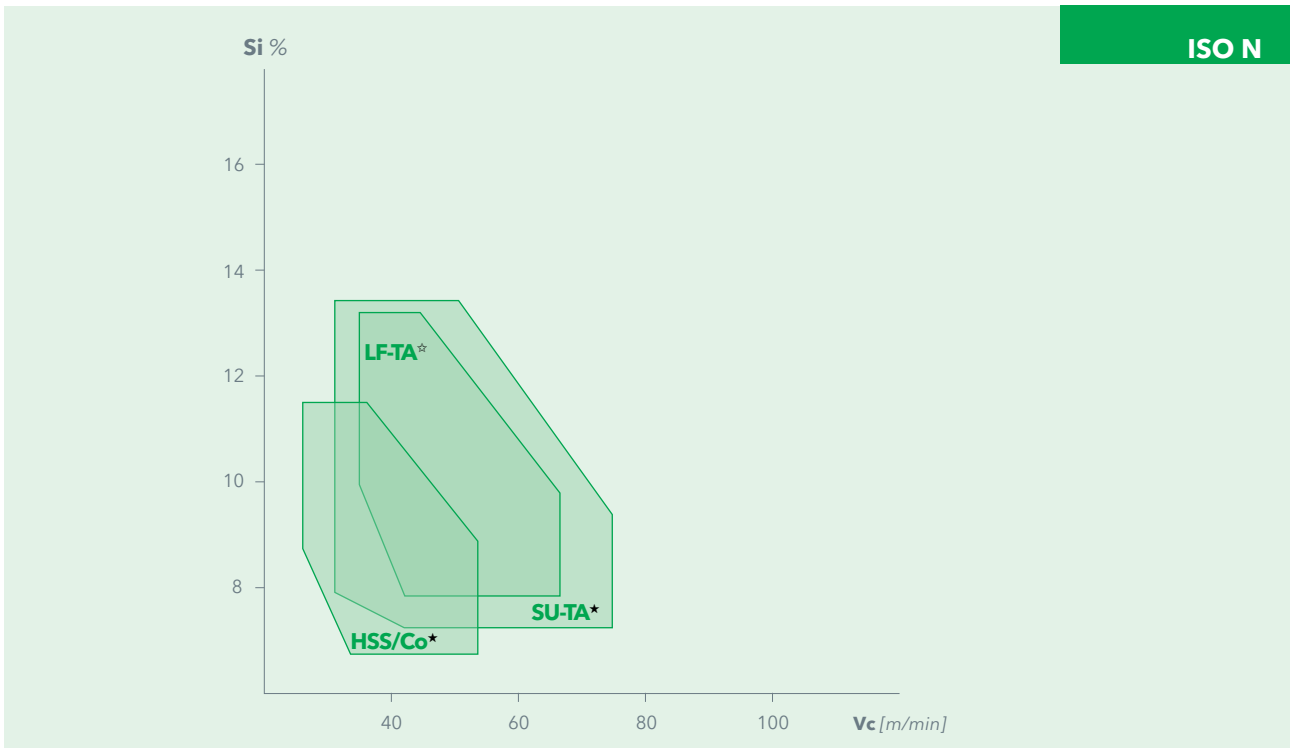
LFTA : high performance (page 213)
SUTA : high performance (page 223)
HSS-HSS/Co : general purpose (page 233)

CAST IRON APPLICATION



★ 1st choice ☆ suitable

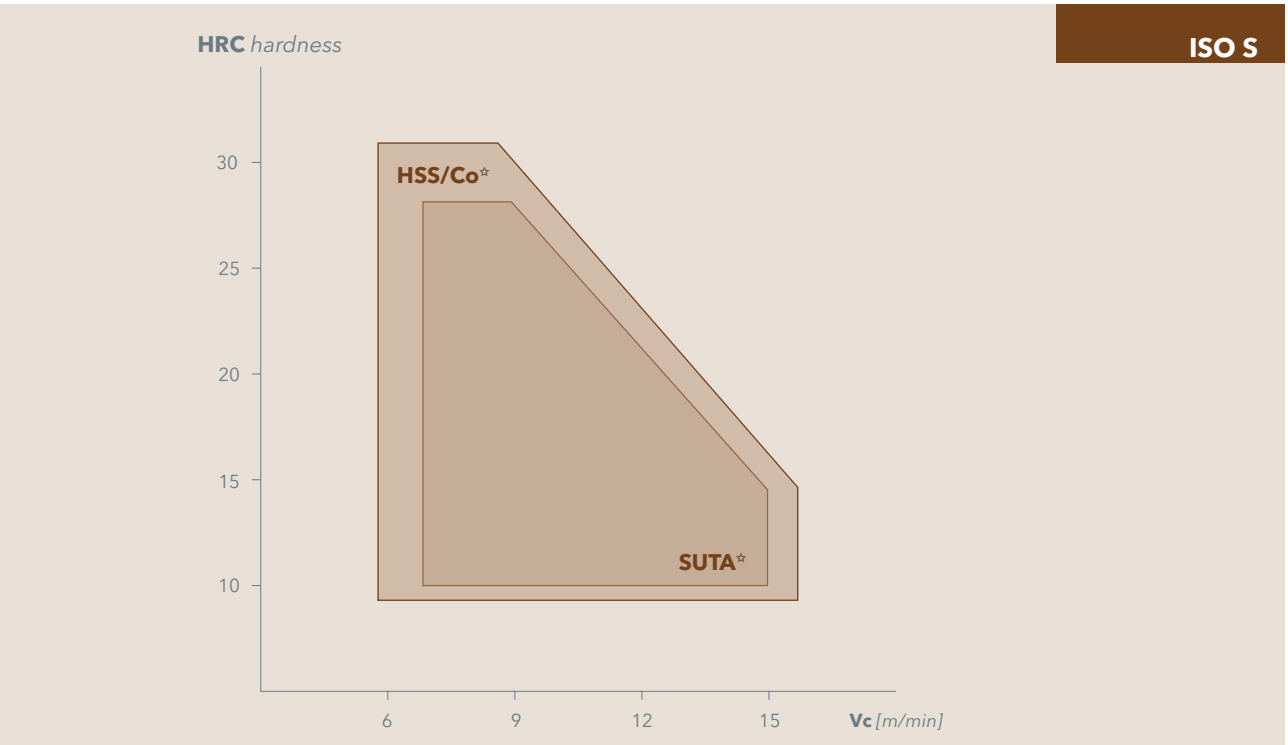
NON-FERROUS MATERIALS APPLICATION



★ 1st choice ☆ suitable

LFTA : high performance (page 213)
SUTA : high performance (page 223)
HSS-HSS/Co : general purpose (page 233)

SUPER ALLOYS APPLICATION



★ 1st choice ☆ suitable

SUTA : high performance (page 223)
HSS-HSS/Co : general purpose (page 233)

LFTA
HIGH PERFORMANCE

High performance and self-centering geometry. Featuring top quality HSS/Co+PV10 and very versatile cutting geometry, enables outstanding performance on a wide range of materials.

Alto rendimento e affilatura autocentrante. Costruita con HSS/Co+PV10 di alta qualità e caratterizzata da una geometria di taglio molto versatile, garantisce elevate prestazioni su una vasta gamma di materiali.

Hohe Leistungen und selbstzentrierende Schnittgeometrie. Aus hervorragendem HSS/Co mit PV10 Beschichtung. Dank der vielseitigen Geometrie, sind hohe Leistungen auf einem sehr breiten Spektrum von Materialien möglich.

Haute performance et affûtage auto-centré. Fabriquée en HSS/Co+PV10 de la plus haute qualité et caractérisée par une géométrie de coupe très polyvalente, elle garantit des performances excellentes dans une grande variété de matériaux.

Broca de alto rendimiento con afilado autocentrante. Fabricada en HSS/Co con recubrimiento PV10, gracias a su geometría de corte muy versátil, permite lograr un altísimo rendimiento en una gama muy amplia de materiales.

Высокопроизводительная и самоцентрующаяся геометрия. Использование HSS/Co высочайшего качества с покрытием PV10 и универсальная геометрия, позволяет получить повышенную производительность на широком спектре обрабатываемых материалов.

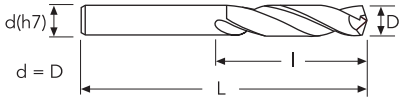
218LFTA

self-centering, general purpose, extra-short

DIN 1897 | LF | HSS/CO PV10 | 130° | 35-40°

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
2.00	0/-0.014	2	12	38	5	P218LFTA0200	●
2.10	0/-0.014	2.1	12	38	5	P218LFTA0210	●
2.20	0/-0.014	2.2	13	40	5	P218LFTA0220	●
2.30	0/-0.014	2.3	13	40	5	P218LFTA0230	●
2.40	0/-0.014	2.4	14	43	5	P218LFTA0240	●
2.50	0/-0.014	2.5	14	43	5	P218LFTA0250	●
2.60	0/-0.014	2.6	14	43	5	P218LFTA0260	●
2.70	0/-0.014	2.7	16	46	5	P218LFTA0270	●
2.80	0/-0.014	2.8	16	46	5	P218LFTA0280	●
2.90	0/-0.014	2.9	16	46	5	P218LFTA0290	●
3.00	0/-0.014	3	16	46	5	P218LFTA0300	●
3.10	0/-0.018	3.1	18	49	5	P218LFTA0310	●
3.20	0/-0.018	3.2	18	49	5	P218LFTA0320	●
3.30	0/-0.018	3.3	18	49	5	P218LFTA0330	●
3.40	0/-0.018	3.4	20	52	5	P218LFTA0340	●
3.50	0/-0.018	3.5	20	52	5	P218LFTA0350	●
3.60	0/-0.018	3.6	20	52	5	P218LFTA0360	●
3.70	0/-0.018	3.7	20	52	5	P218LFTA0370	●
3.80	0/-0.018	3.8	22	55	5	P218LFTA0380	●
3.90	0/-0.018	3.9	22	55	5	P218LFTA0390	●
4.00	0/-0.018	4	22	55	5	P218LFTA0400	●
4.10	0/-0.018	4.1	22	55	5	P218LFTA0410	●
4.20	0/-0.018	4.2	22	55	5	P218LFTA0420	●
4.30	0/-0.018	4.3	24	58	5	P218LFTA0430	●
4.40	0/-0.018	4.4	24	58	5	P218LFTA0440	●
4.50	0/-0.018	4.5	24	58	5	P218LFTA0450	●
4.60	0/-0.018	4.6	24	58	5	P218LFTA0460	●
4.70	0/-0.018	4.7	24	58	5	P218LFTA0470	●
4.80	0/-0.018	4.8	26	62	5	P218LFTA0480	●
4.90	0/-0.018	4.9	26	62	5	P218LFTA0490	●
5.00	0/-0.018	5	26	62	5	P218LFTA0500	●
5.10	0/-0.018	5.1	26	62	5	P218LFTA0510	●
5.20	0/-0.018	5.2	26	62	5	P218LFTA0520	●
5.30	0/-0.018	5.3	26	62	5	P218LFTA0530	●
5.40	0/-0.018	5.4	28	66	5	P218LFTA0540	●
5.50	0/-0.018	5.5	28	66	5	P218LFTA0550	●
5.60	0/-0.018	5.6	28	66	5	P218LFTA0560	●
5.70	0/-0.018	5.7	28	66	5	P218LFTA0570	●
5.80	0/-0.018	5.8	28	66	5	P218LFTA0580	●

● stock standard ○ non-standard stock ▽ stock exhaustion

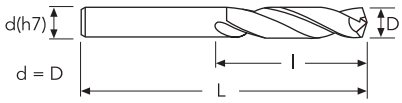
218LFTA

self-centering, general purpose, extra-short

DIN 1897 | LF | HSS/CO PV10 | 130° | 35-40°

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
5.90	0/-0.018	5.9	28	66	5	P218LFTA0590	●
6.00	0/-0.018	6	28	66	5	P218LFTA0600	●
6.10	0/-0.022	6.1	31	70	5	P218LFTA0610	●
6.20	0/-0.022	6.2	31	70	5	P218LFTA0620	●
6.30	0/-0.022	6.3	31	70	5	P218LFTA0630	●
6.40	0/-0.022	6.4	31	70	5	P218LFTA0640	●
6.50	0/-0.022	6.5	31	70	5	P218LFTA0650	●
6.60	0/-0.022	6.6	31	70	5	P218LFTA0660	●
6.70	0/-0.022	6.7	31	70	5	P218LFTA0670	●
6.80	0/-0.022	6.8	34	74	5	P218LFTA0680	●
6.90	0/-0.022	6.9	34	74	5	P218LFTA0690	●
7.00	0/-0.022	7	34	74	5	P218LFTA0700	●
7.10	0/-0.022	7.1	34	74	5	P218LFTA0710	●
7.20	0/-0.022	7.2	34	74	5	P218LFTA0720	●
7.30	0/-0.022	7.3	34	74	5	P218LFTA0730	●
7.40	0/-0.022	7.4	34	74	5	P218LFTA0740	●
7.50	0/-0.022	7.5	34	74	5	P218LFTA0750	●
7.60	0/-0.022	7.6	37	79	5	P218LFTA0760	●
7.70	0/-0.022	7.7	37	79	5	P218LFTA0770	●
7.80	0/-0.022	7.8	37	79	5	P218LFTA0780	●
7.90	0/-0.022	7.9	37	79	5	P218LFTA0790	●
8.00	0/-0.022	8	37	79	5	P218LFTA0800	●
8.10	0/-0.022	8.1	37	79	5	P218LFTA0810	●
8.20	0/-0.022	8.2	37	79	5	P218LFTA0820	●
8.30	0/-0.022	8.3	37	79	5	P218LFTA0830	●
8.40	0/-0.022	8.4	37	79	5	P218LFTA0840	●
8.50	0/-0.022	8.5	37	79	5	P218LFTA0850	●
8.60	0/-0.022	8.6	40	84	5	P218LFTA0860	●
8.70	0/-0.022	8.7	40	84	5	P218LFTA0870	●
8.80	0/-0.022	8.8	40	84	5	P218LFTA0880	●
8.90	0/-0.022	8.9	40	84	5	P218LFTA0890	●
9.00	0/-0.022	9	40	84	5	P218LFTA0900	●
9.10	0/-0.022	9.1	40	84	5	P218LFTA0910	●
9.20	0/-0.022	9.2	40	84	5	P218LFTA0920	●
9.30	0/-0.022	9.3	40	84	5	P218LFTA0930	●
9.40	0/-0.022	9.4	40	84	5	P218LFTA0940	●
9.50	0/-0.022	9.5	40	84	5	P218LFTA0950	●
9.60	0/-0.022	9.6	43	89	5	P218LFTA0960	●
9.70	0/-0.022	9.7	43	89	5	P218LFTA0970	●

● stock standard ○ non-standard stock ▽ stock exhaustion

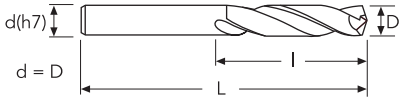
218LFTA

self-centering, general purpose, extra-short

DIN 1897 | LF | HSS/CO PV10 | 130° | 35-40°

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
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9.90	0/-0.022	9.9	43	89	5	P218LFTA0990	●
10.00	0/-0.022	10	43	89	5	P218LFTA1000	●
10.20	0/-0.027	10.2	43	89	1	P218LFTA1020	●
10.30	0/-0.027	10.3	43	89	1	P218LFTA1030	●
10.50	0/-0.027	10.5	43	89	1	P218LFTA1050	●
10.80	0/-0.027	10.8	47	95	1	P218LFTA1080	●
11.00	0/-0.027	11	47	95	1	P218LFTA1100	●
11.20	0/-0.027	11.2	47	95	1	P218LFTA1120	●
11.30	0/-0.027	11.3	47	95	1	P218LFTA1130	●
11.50	0/-0.027	11.5	47	95	1	P218LFTA1150	●
11.80	0/-0.027	11.8	47	95	1	P218LFTA1180	●
12.00	0/-0.027	12	51	102	1	P218LFTA1200	●
12.20	0/-0.027	12.2	51	102	1	P218LFTA1220	●
12.50	0/-0.027	12.5	51	102	1	P218LFTA1250	●
12.80	0/-0.027	12.8	51	102	1	P218LFTA1280	●
13.00	0/-0.027	13	51	102	1	P218LFTA1300	●
13.30	0/-0.027	13.3	54	107	1	P218LFTA1330	●
13.50	0/-0.027	13.5	54	107	1	P218LFTA1350	●
13.80	0/-0.027	13.8	54	107	1	P218LFTA1380	●
14.00	0/-0.027	14	54	107	1	P218LFTA1400	●
14.50	0/-0.027	14.5	56	111	1	P218LFTA1450	●
14.80	0/-0.027	14.8	56	111	1	P218LFTA1480	●
15.00	0/-0.027	15	56	111	1	P218LFTA1500	●
15.30	0/-0.027	15.3	56	111	1	P218LFTA1530	●
15.50	0/-0.027	15.5	58	115	1	P218LFTA1550	●
15.80	0/-0.027	15.8	58	115	1	P218LFTA1580	●
16.00	0/-0.027	16	58	115	1	P218LFTA1600	●
16.50	0/-0.027	16.5	60	119	1	P218LFTA1650	●
17.00	0/-0.027	17	60	119	1	P218LFTA1700	●
17.50	0/-0.027	17.5	62	123	1	P218LFTA1750	●
18.00	0/-0.027	18	62	123	1	P218LFTA1800	●
18.50	0/-0.033	18.5	64	127	1	P218LFTA1850	●
19.00	0/-0.033	19	64	127	1	P218LFTA1900	●
19.50	0/-0.033	19.5	66	131	1	P218LFTA1950	●
20.00	0/-0.033	20	66	131	1	P218LFTA2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

218LFTA

	Material Group ISO 513	P1 P2			P3 P4			M1 M2					
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²					
	Vc (m/min)	40-50			30-40			18-22					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
	2	7170	0.060	430	5570	0.051	280	3180	0.042	130			
	3	4780	0.084	400	3720	0.071	270	2120	0.059	120			
	4	3580	0.108	390	2790	0.092	260	1590	0.076	120			
	5	2870	0.132	380	2230	0.112	250	1270	0.092	120			
	6	2390	0.156	370	1860	0.133	250	1060	0.109	120			
	7	2050	0.180	370	1590	0.153	240	910	0.126	110			
	8	1790	0.204	370	1390	0.173	240	800	0.143	110			
	9	1590	0.228	360	1240	0.194	240	710	0.160	110			
	10	1430	0.252	360	1110	0.214	240	640	0.176	110			
	11	1300	0.276	360	1010	0.235	240	580	0.179	100			
	12	1190	0.300	360	930	0.255	240	530	0.195	100			
	13	1100	0.324	360	860	0.275	240	490	0.204	100			
	14	1020	0.348	350	800	0.296	240	450	0.219	100			
	15	960	0.372	360	740	0.316	230	420	0.223	90			
	16	900	0.396	360	700	0.337	240	400	0.238	100			
	17	840	0.420	350	660	0.357	240	370	0.252	90			
	18	800	0.444	360	620	0.377	230	350	0.266	90			
	19	750	0.468	350	590	0.398	230	340	0.281	100			
	20	720	0.492	350	560	0.418	230	320	0.295	90			

	Material Group ISO 513	K1 K2			N1 N2			N3 N4					
	Hardness/Rm	150-350 HB											
	Vc (m/min)	30-40			65-75			45-55					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
	2	5570	0.057	320	11150	0.066	740	7960	0.060	480			
	3	3720	0.080	300	7430	0.092	690	5310	0.084	450			
	4	2790	0.103	290	5570	0.119	660	3980	0.108	430			
	5	2230	0.125	280	4460	0.145	650	3180	0.132	420			
	6	1860	0.148	280	3720	0.172	640	2650	0.156	410			
	7	1590	0.171	270	3180	0.198	630	2270	0.180	410			
	8	1390	0.194	270	2790	0.224	630	1990	0.204	410			
	9	1240	0.217	270	2480	0.251	620	1770	0.228	400			
	10	1110	0.239	270	2230	0.277	620	1590	0.252	400			
	11	1010	0.262	260	2030	0.304	620	1450	0.276	400			
	12	930	0.285	270	1860	0.330	610	1330	0.300	400			
	13	860	0.308	260	1710	0.356	610	1220	0.324	400			
	14	800	0.331	260	1590	0.383	610	1140	0.348	400			
	15	740	0.353	260	1490	0.409	610	1060	0.372	390			
	16	700	0.376	260	1390	0.436	610	1000	0.396	400			
	17	660	0.399	260	1310	0.462	610	940	0.420	390			
	18	620	0.422	260	1240	0.488	610	880	0.444	390			
	19	590	0.445	260	1170	0.515	600	840	0.468	390			
	20	560	0.467	260	1110	0.541	600	800	0.492	390			

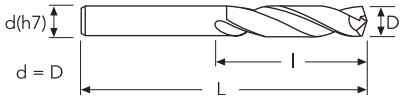
238LFTA

self-centering, general purpose, short

DIN 338 | LF | HSS/CO PV10 | 130° | 35-40°

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
2.00	0/-0.014	2	24	49	5	P238LFTA0200	●
2.10	0/-0.014	2.1	24	49	5	P238LFTA0210	●
2.20	0/-0.014	2.2	27	53	5	P238LFTA0220	●
2.30	0/-0.014	2.3	27	53	5	P238LFTA0230	●
2.40	0/-0.014	2.4	30	57	5	P238LFTA0240	●
2.50	0/-0.014	2.5	30	57	5	P238LFTA0250	●
2.60	0/-0.014	2.6	30	57	5	P238LFTA0260	●
2.70	0/-0.014	2.7	33	61	5	P238LFTA0270	●
2.80	0/-0.014	2.8	33	61	5	P238LFTA0280	●
2.90	0/-0.014	2.9	33	61	5	P238LFTA0290	●
3.00	0/-0.014	3	33	61	5	P238LFTA0300	●
3.10	0/-0.018	3.1	36	65	5	P238LFTA0310	●
3.20	0/-0.018	3.2	36	65	5	P238LFTA0320	●
3.30	0/-0.018	3.3	36	65	5	P238LFTA0330	●
3.40	0/-0.018	3.4	39	70	5	P238LFTA0340	●
3.50	0/-0.018	3.5	39	70	5	P238LFTA0350	●
3.60	0/-0.018	3.6	39	70	5	P238LFTA0360	●
3.70	0/-0.018	3.7	39	70	5	P238LFTA0370	●
3.80	0/-0.018	3.8	43	75	5	P238LFTA0380	●
3.90	0/-0.018	3.9	43	75	5	P238LFTA0390	●
4.00	0/-0.018	4	43	75	5	P238LFTA0400	●
4.10	0/-0.018	4.1	43	75	5	P238LFTA0410	●
4.20	0/-0.018	4.2	43	75	5	P238LFTA0420	●
4.30	0/-0.018	4.3	47	80	5	P238LFTA0430	●
4.40	0/-0.018	4.4	47	80	5	P238LFTA0440	●
4.50	0/-0.018	4.5	47	80	5	P238LFTA0450	●
4.60	0/-0.018	4.6	47	80	5	P238LFTA0460	●
4.70	0/-0.018	4.7	47	80	5	P238LFTA0470	●
4.80	0/-0.018	4.8	52	86	5	P238LFTA0480	●
4.90	0/-0.018	4.9	52	86	5	P238LFTA0490	●
5.00	0/-0.018	5	52	86	5	P238LFTA0500	●
5.10	0/-0.018	5.1	52	86	5	P238LFTA0510	●
5.20	0/-0.018	5.2	52	86	5	P238LFTA0520	●
5.30	0/-0.018	5.3	52	86	5	P238LFTA0530	●
5.40	0/-0.018	5.4	57	93	5	P238LFTA0540	●
5.50	0/-0.018	5.5	57	93	5	P238LFTA0550	●
5.60	0/-0.018	5.6	57	93	5	P238LFTA0560	●
5.70	0/-0.018	5.7	57	93	5	P238LFTA0570	●
5.80	0/-0.018	5.8	57	93	5	P238LFTA0580	●

● stock standard ○ non-standard stock ▽ stock exhaustion

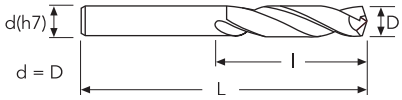
238LFTA

self-centering, general purpose, short

DIN 338 | LF | HSS/CO PV10 | 130° | 35-40°

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
5.90	0/-0.018	5.9	57	93	5	P238LFTA0590	●
6.00	0/-0.018	6	57	93	5	P238LFTA0600	●
6.10	0/-0.022	6.1	63	101	1	P238LFTA0610	●
6.20	0/-0.022	6.2	63	101	1	P238LFTA0620	●
6.30	0/-0.022	6.3	63	101	1	P238LFTA0630	●
6.40	0/-0.022	6.4	63	101	1	P238LFTA0640	●
6.50	0/-0.022	6.5	63	101	1	P238LFTA0650	●
6.60	0/-0.022	6.6	63	101	1	P238LFTA0660	●
6.70	0/-0.022	6.7	63	101	1	P238LFTA0670	●
6.80	0/-0.022	6.8	69	109	1	P238LFTA0680	●
6.90	0/-0.022	6.9	69	109	1	P238LFTA0690	●
7.00	0/-0.022	7	69	109	1	P238LFTA0700	●
7.10	0/-0.022	7.1	69	109	1	P238LFTA0710	●
7.20	0/-0.022	7.2	69	109	1	P238LFTA0720	●
7.30	0/-0.022	7.3	69	109	1	P238LFTA0730	●
7.40	0/-0.022	7.4	69	109	1	P238LFTA0740	●
7.50	0/-0.022	7.5	69	109	1	P238LFTA0750	●
7.60	0/-0.022	7.6	75	117	1	P238LFTA0760	●
7.70	0/-0.022	7.7	75	117	1	P238LFTA0770	●
7.80	0/-0.022	7.8	75	117	1	P238LFTA0780	●
7.90	0/-0.022	7.9	75	117	1	P238LFTA0790	●
8.00	0/-0.022	8	75	117	1	P238LFTA0800	●
8.10	0/-0.022	8.1	75	117	1	P238LFTA0810	●
8.20	0/-0.022	8.2	75	117	1	P238LFTA0820	●
8.30	0/-0.022	8.3	75	117	1	P238LFTA0830	●
8.40	0/-0.022	8.4	75	117	1	P238LFTA0840	●
8.50	0/-0.022	8.5	75	117	1	P238LFTA0850	●
8.60	0/-0.022	8.6	81	125	1	P238LFTA0860	●
8.70	0/-0.022	8.7	81	125	1	P238LFTA0870	●
8.80	0/-0.022	8.8	81	125	1	P238LFTA0880	●
8.90	0/-0.022	8.9	81	125	1	P238LFTA0890	●
9.00	0/-0.022	9	81	125	1	P238LFTA0900	●
9.10	0/-0.022	9.1	81	125	1	P238LFTA0910	●
9.20	0/-0.022	9.2	81	125	1	P238LFTA0920	●
9.30	0/-0.022	9.3	81	125	1	P238LFTA0930	●
9.40	0/-0.022	9.4	81	125	1	P238LFTA0940	●
9.50	0/-0.022	9.5	81	125	1	P238LFTA0950	●
9.60	0/-0.022	9.6	87	133	1	P238LFTA0960	●
9.70	0/-0.022	9.7	87	133	1	P238LFTA0970	●

● stock standard ○ non-standard stock ▽ stock exhaustion

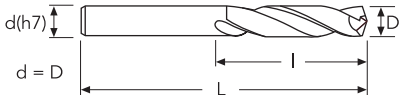
238LFTA

self-centering, general purpose, short

DIN 338 | LF | HSS/CO PV10 | 130° | 35-40°

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
9.80	0/-0.022	9.8	87	133	1	P238LFTA0980	●
9.90	0/-0.022	9.9	87	133	1	P238LFTA0990	●
10.00	0/-0.022	10	87	133	1	P238LFTA1000	●
10.20	0/-0.027	10.2	87	133	1	P238LFTA1020	●
10.30	0/-0.027	10.3	87	133	1	P238LFTA1030	●
10.50	0/-0.027	10.5	87	133	1	P238LFTA1050	●
10.80	0/-0.027	10.8	94	142	1	P238LFTA1080	●
11.00	0/-0.027	11	94	142	1	P238LFTA1100	●
11.20	0/-0.027	11.2	94	142	1	P238LFTA1120	●
11.30	0/-0.027	11.3	94	142	1	P238LFTA1130	●
11.50	0/-0.027	11.5	94	142	1	P238LFTA1150	●
11.80	0/-0.027	11.8	94	142	1	P238LFTA1180	●
12.00	0/-0.027	12	101	151	1	P238LFTA1200	●
12.20	0/-0.027	12.2	101	151	1	P238LFTA1220	●
12.50	0/-0.027	12.5	101	151	1	P238LFTA1250	●
12.80	0/-0.027	12.8	101	151	1	P238LFTA1280	●
13.00	0/-0.027	13	101	151	1	P238LFTA1300	●
13.30	0/-0.027	13.3	108	160	1	P238LFTA1330	●
13.50	0/-0.027	13.5	108	160	1	P238LFTA1350	●
13.80	0/-0.027	13.8	108	160	1	P238LFTA1380	●
14.00	0/-0.027	14	108	160	1	P238LFTA1400	●
14.50	0/-0.027	14.5	114	169	1	P238LFTA1450	●
14.80	0/-0.027	14.8	114	169	1	P238LFTA1480	●
15.00	0/-0.027	15	114	169	1	P238LFTA1500	●
15.30	0/-0.027	15.3	120	178	1	P238LFTA1530	●
15.50	0/-0.027	15.5	120	178	1	P238LFTA1550	●
15.80	0/-0.027	15.8	120	178	1	P238LFTA1580	●
16.00	0/-0.027	16	120	178	1	P238LFTA1600	●
16.50	0/-0.027	16.5	125	184	1	P238LFTA1650	●
17.00	0/-0.027	17	125	184	1	P238LFTA1700	●
17.50	0/-0.027	17.5	130	191	1	P238LFTA1750	●
18.00	0/-0.027	18	130	191	1	P238LFTA1800	●
18.50	0/-0.033	18.5	135	198	1	P238LFTA1850	●
19.00	0/-0.033	19	135	198	1	P238LFTA1900	●
19.50	0/-0.033	19.5	140	205	1	P238LFTA1950	●
20.00	0/-0.033	20	140	205	1	P238LFTA2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

238LFTA

Material Group ISO 513	P1 P2			P3 P4			M1 M2					
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²					
Vc (m/min)	**30-40**			**20-30**			**14-18**					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
2	5570	0.054	300	3980	0.046	180	2550	0.038	100			
3	3720	0.076	280	2650	0.064	170	1700	0.053	90			
4	2790	0.097	270	1990	0.083	160	1270	0.068	90			
5	2230	0.119	260	1590	0.101	160	1020	0.083	80			
6	1860	0.140	260	1330	0.119	160	850	0.098	80			
7	1590	0.162	260	1140	0.138	160	730	0.113	80			
8	1390	0.184	260	1000	0.156	160	640	0.129	80			
9	1240	0.205	250	880	0.174	150	570	0.144	80			
10	1110	0.227	250	800	0.193	150	510	0.159	80			
11	1010	0.248	250	720	0.211	150	460	0.161	70			
12	930	0.270	250	660	0.230	150	420	0.176	70			
13	860	0.292	250	610	0.248	150	390	0.184	70			
14	800	0.313	250	570	0.266	150	360	0.197	70			
15	740	0.335	250	530	0.285	150	340	0.201	70			
16	700	0.356	250	500	0.303	150	320	0.214	70			
17	660	0.378	250	470	0.321	150	300	0.227	70			
18	620	0.400	250	440	0.340	150	280	0.240	70			
19	590	0.421	250	420	0.358	150	270	0.253	70			
20	560	0.443	250	400	0.376	150	250	0.266	70			

Material Group ISO 513	K1 K2			N1 N2			N3 N4					
Hardness/Rm	150-350 HB											
Vc (m/min)	**25-35**			**50-60**			**35-45**					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
2	4780	0.051	250	8760	0.059	520	6370	0.054	340			
3	3180	0.072	230	5840	0.083	490	4250	0.076	320			
4	2390	0.092	220	4380	0.107	470	3180	0.097	310			
5	1910	0.113	220	3500	0.131	460	2550	0.119	300			
6	1590	0.133	210	2920	0.154	450	2120	0.140	300			
7	1360	0.154	210	2500	0.178	450	1820	0.162	290			
8	1190	0.174	210	2190	0.202	440	1590	0.184	290			
9	1060	0.195	210	1950	0.226	440	1420	0.205	290			
10	960	0.215	210	1750	0.249	440	1270	0.227	290			
11	870	0.236	210	1590	0.273	430	1160	0.248	290			
12	800	0.257	210	1460	0.297	430	1060	0.270	290			
13	730	0.277	200	1350	0.321	430	980	0.292	290			
14	680	0.298	200	1250	0.345	430	910	0.313	290			
15	640	0.318	200	1170	0.368	430	850	0.335	280			
16	600	0.339	200	1090	0.392	430	800	0.356	290			
17	560	0.359	200	1030	0.416	430	750	0.378	280			
18	530	0.380	200	970	0.440	430	710	0.400	280			
19	500	0.400	200	920	0.463	430	670	0.421	280			
20	480	0.421	200	880	0.487	430	640	0.443	280			

SUTA
HIGH PERFORMANCE

High performance and self-centering geometry. Featuring premium HSSE+PV10 coating and special edge design, enables very low cutting pressure and outstanding performance on stainless steel, steel and non-ferrous materials.

Alto rendimento e affilatura autocentrante. Costruita con i migliori HSSE+PV10 e speciale geometria del tagliente, garantisce un bassissimo sforzo di taglio e prestazioni eccezionali nella foratura di acciaio inossidabile, acciaio e materiali non ferrosi.

Hohe Leistungen und selbstzentrierende Schnittgeometrie. Aus hervorragendem HSSE mit PV10 Beschichtung. Dank des sehr geringen Schneiddrucks, sind unschlagbare Leistungen auf rostfreien Stählen, Stählen und NE-Metall-Werkstoffe möglich.

Haute performance et affûtage autocentré. Fabriquée avec les meilleurs HSSE+PV10 et une géométrie spécifique de l'arête, elle permet de minimiser les efforts de coupe en garantissant des performances exceptionnelles dans le perçage des aciers inoxydables, des aciers et des matériaux non ferreux.

Broca de alto rendimiento con afilado autocentrante. Fabricada en HSSE Premium con recubrimiento PV10 y geometría especial, minimiza el esfuerzo de corte y permite lograr un altísimo rendimiento en aceros inoxidables, aceros y materiales no ferrosos.

Высокопроизводительная и самоцентрующаяся геометрия. Высококачественная быстрорежущая сталь с покрытием PV10 и специальная геометрия режущих кромок обеспечивает низкие силы резания и непревзойденную производительность при работе по нержавеющей стали, конструкционной стали и цветным металлам.

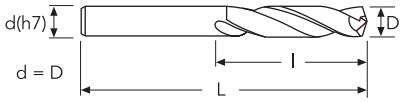
980SUTA

self centering, stainless steel, extra-short

OSAWA NORM | SU | HSSE PV10 | 120° | 38°

P	M	K	N	S	H
★	★		★	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
2.00	0/-0.014	2	12	44	1	P980SUTA0200	●
2.10	0/-0.014	2.1	12	44	1	P980SUTA0210	●
2.20	0/-0.014	2.2	13	45	1	P980SUTA0220	●
2.30	0/-0.014	2.3	13	45	1	P980SUTA0230	●
2.40	0/-0.014	2.4	14	46	1	P980SUTA0240	●
2.50	0/-0.014	2.5	14	46	1	P980SUTA0250	●
2.60	0/-0.014	2.6	14	46	1	P980SUTA0260	●
2.70	0/-0.014	2.7	16	48	1	P980SUTA0270	●
2.80	0/-0.014	2.8	16	48	1	P980SUTA0280	●
2.90	0/-0.014	2.9	16	48	1	P980SUTA0290	●
3.00	0/-0.014	3	16	48	1	P980SUTA0300	●
3.10	0/-0.018	3.1	18	50	1	P980SUTA0310	●
3.20	0/-0.018	3.2	18	50	1	P980SUTA0320	●
3.30	0/-0.018	3.3	18	50	1	P980SUTA0330	●
3.40	0/-0.018	3.4	20	52	1	P980SUTA0340	●
3.50	0/-0.018	3.5	20	52	1	P980SUTA0350	●
3.60	0/-0.018	3.6	20	52	1	P980SUTA0360	●
3.70	0/-0.018	3.7	20	52	1	P980SUTA0370	●
3.80	0/-0.018	3.8	22	54	1	P980SUTA0380	●
3.90	0/-0.018	3.9	22	54	1	P980SUTA0390	●
4.00	0/-0.018	4	22	54	1	P980SUTA0400	●
4.10	0/-0.018	4.1	22	66	1	P980SUTA0410	●
4.20	0/-0.018	4.2	22	66	1	P980SUTA0420	●
4.30	0/-0.018	4.3	24	68	1	P980SUTA0430	●
4.40	0/-0.018	4.4	24	68	1	P980SUTA0440	●
4.50	0/-0.018	4.5	24	68	1	P980SUTA0450	●
4.60	0/-0.018	4.6	24	68	1	P980SUTA0460	●
4.70	0/-0.018	4.7	24	68	1	P980SUTA0470	●
4.80	0/-0.018	4.8	26	70	1	P980SUTA0480	●
4.90	0/-0.018	4.9	26	70	1	P980SUTA0490	●
5.00	0/-0.018	5	26	70	1	P980SUTA0500	●
5.10	0/-0.018	5.1	26	70	1	P980SUTA0510	●
5.20	0/-0.018	5.2	26	70	1	P980SUTA0520	●
5.30	0/-0.018	5.3	26	70	1	P980SUTA0530	●
5.40	0/-0.018	5.4	28	72	1	P980SUTA0540	●
5.50	0/-0.018	5.5	28	72	1	P980SUTA0550	●
5.60	0/-0.018	5.6	28	72	1	P980SUTA0560	●
5.70	0/-0.018	5.7	28	72	1	P980SUTA0570	●
5.80	0/-0.018	5.8	28	72	1	P980SUTA0580	●

● stock standard ○ non-standard stock ▽ stock exhaustion

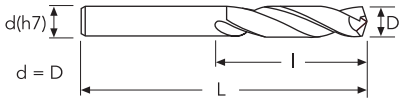
980SUTA

self centering, stainless steel, extra-short

OSAWA NORM | SU | HSSE PV10 | 120° | 38°

P	M	K	N	S	H
★	★		★	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
5.90	0/-0.018	5.9	28	72	1	P980SUTA0590	●
6.00	0/-0.018	6	28	72	1	P980SUTA0600	●
6.10	0/-0.022	6.1	31	75	1	P980SUTA0610	●
6.20	0/-0.022	6.2	31	75	1	P980SUTA0620	●
6.30	0/-0.022	6.3	31	75	1	P980SUTA0630	●
6.40	0/-0.022	6.4	31	75	1	P980SUTA0640	●
6.50	0/-0.022	6.5	31	75	1	P980SUTA0650	●
6.60	0/-0.022	6.6	31	75	1	P980SUTA0660	●
6.70	0/-0.022	6.7	31	75	1	P980SUTA0670	●
6.80	0/-0.022	6.8	34	78	1	P980SUTA0680	●
6.90	0/-0.022	6.9	34	78	1	P980SUTA0690	●
7.00	0/-0.022	7	34	78	1	P980SUTA0700	●
7.10	0/-0.022	7.1	34	78	1	P980SUTA0710	●
7.20	0/-0.022	7.2	34	78	1	P980SUTA0720	●
7.30	0/-0.022	7.3	34	78	1	P980SUTA0730	●
7.40	0/-0.022	7.4	34	78	1	P980SUTA0740	●
7.50	0/-0.022	7.5	34	78	1	P980SUTA0750	●
7.60	0/-0.022	7.6	37	81	1	P980SUTA0760	●
7.70	0/-0.022	7.7	37	81	1	P980SUTA0770	●
7.80	0/-0.022	7.8	37	81	1	P980SUTA0780	●
7.90	0/-0.022	7.9	37	81	1	P980SUTA0790	●
8.00	0/-0.022	8	37	81	1	P980SUTA0800	●
8.10	0/-0.022	8.1	37	87	1	P980SUTA0810	●
8.20	0/-0.022	8.2	37	87	1	P980SUTA0820	●
8.30	0/-0.022	8.3	37	87	1	P980SUTA0830	●
8.40	0/-0.022	8.4	37	87	1	P980SUTA0840	●
8.50	0/-0.022	8.5	37	87	1	P980SUTA0850	●
8.60	0/-0.022	8.6	40	90	1	P980SUTA0860	●
8.70	0/-0.022	8.7	40	90	1	P980SUTA0870	●
8.80	0/-0.022	8.8	40	90	1	P980SUTA0880	●
8.90	0/-0.022	8.9	40	90	1	P980SUTA0890	●
9.00	0/-0.022	9	40	90	1	P980SUTA0900	●
9.10	0/-0.022	9.1	40	90	1	P980SUTA0910	●
9.20	0/-0.022	9.2	40	90	1	P980SUTA0920	●
9.30	0/-0.022	9.3	40	90	1	P980SUTA0930	●
9.40	0/-0.022	9.4	40	90	1	P980SUTA0940	●
9.50	0/-0.022	9.5	40	90	1	P980SUTA0950	●
9.60	0/-0.022	9.6	43	93	1	P980SUTA0960	●
9.70	0/-0.022	9.7	43	93	1	P980SUTA0970	●

● stock standard ○ non-standard stock ▽ stock exhaustion

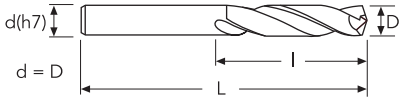
980SUTA

self centering, stainless steel, extra-short

OSAWA NORM | SU | HSSE PV10 | 120° | 38°

P	M	K	N	S	H
★	★		★	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
9.80	0/-0.022	9.8	43	93	1	P980SUTA0980	●
9.90	0/-0.022	9.9	43	93	1	P980SUTA0990	●
10.00	0/-0.022	10	43	93	1	P980SUTA1000	●
10.10	0/-0.022	10.1	43	100	1	P980SUTA1010	●
10.20	0/-0.022	10.2	43	100	1	P980SUTA1020	●
10.30	0/-0.022	10.3	43	100	1	P980SUTA1030	●
10.40	0/-0.022	10.4	43	100	1	P980SUTA1040	●
10.50	0/-0.022	10.5	43	100	1	P980SUTA1050	●
10.60	0/-0.022	10.6	43	100	1	P980SUTA1060	●
10.70	0/-0.022	10.7	47	104	1	P980SUTA1070	●
10.80	0/-0.022	10.8	47	104	1	P980SUTA1080	●
10.90	0/-0.022	10.9	47	104	1	P980SUTA1090	●
11.00	0/-0.022	11	47	104	1	P980SUTA1100	●
11.10	0/-0.022	11.1	47	104	1	P980SUTA1110	●
11.20	0/-0.022	11.2	47	104	1	P980SUTA1120	●
11.30	0/-0.022	11.3	47	104	1	P980SUTA1130	●
11.40	0/-0.022	11.4	47	104	1	P980SUTA1140	●
11.50	0/-0.022	11.5	47	104	1	P980SUTA1150	●
11.60	0/-0.022	11.6	47	104	1	P980SUTA1160	●
11.70	0/-0.022	11.7	47	104	1	P980SUTA1170	●
11.80	0/-0.022	11.8	47	104	1	P980SUTA1180	●
11.90	0/-0.022	11.9	51	108	1	P980SUTA1190	●
12.00	0/-0.022	12	51	108	1	P980SUTA1200	●
12.10	0/-0.022	12.1	51	108	1	P980SUTA1210	●
12.20	0/-0.022	12.2	51	108	1	P980SUTA1220	●
12.30	0/-0.022	12.3	51	108	1	P980SUTA1230	●
12.40	0/-0.022	12.4	51	108	1	P980SUTA1240	●
12.50	0/-0.022	12.5	51	108	1	P980SUTA1250	●
12.60	0/-0.022	12.6	51	108	1	P980SUTA1260	●
12.70	0/-0.022	12.7	51	108	1	P980SUTA1270	●
12.80	0/-0.022	12.8	51	108	1	P980SUTA1280	●
12.90	0/-0.022	12.9	51	108	1	P980SUTA1290	●
13.00	0/-0.022	13	51	108	1	P980SUTA1300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

980SUTA

Material Group ISO 513	P1 P2			M1 M2			M3					
Hardness/Rm	500-700 N/mm²			< 750 N/mm²			550-850 N/mm²					
Vc (m/min)	35-45			18-22			12-16					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
2	6370	0.060	380	3180	0.060	190	2230	0.042	90			
3	4250	0.080	340	2120	0.080	170	1490	0.056	80			
4	3180	0.100	320	1590	0.100	160	1110	0.070	80			
5	2550	0.120	310	1270	0.120	150	890	0.084	70			
6	2120	0.140	300	1060	0.140	150	740	0.098	70			
7	1820	0.160	290	910	0.160	150	640	0.112	70			
8	1590	0.180	290	800	0.180	140	560	0.126	70			
9	1420	0.200	280	710	0.200	140	500	0.140	70			
10	1270	0.230	290	640	0.230	150	450	0.161	70			
11	1160	0.260	300	580	0.260	150	410	0.169	70			
12	1060	0.300	320	530	0.300	160	370	0.195	70			
13	980	0.340	330	490	0.340	170	340	0.221	80			
14	910	0.360	330	450	0.360	160	320	0.234	70			
15	850	0.380	320	420	0.380	160	300	0.247	70			
16	800	0.400	320	400	0.400	160	280	0.260	70			
17	750	0.425	320	370	0.425	160	260	0.276	70			
18	710	0.450	320	350	0.450	160	250	0.293	70			
19	670	0.460	310	340	0.460	160	230	0.299	70			
20	640	0.470	300	320	0.470	150	220	0.306	70			

Material Group ISO 513	N1 N2 N4			N3			S1 S2			S4		
Hardness/Rm							< 30 HRC					
Vc (m/min)	60-80			30-40			8-12			12-16		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
2	11150	0.066	740	5570	0.051	280	1590	0.024	38	2230	0.042	90
3	7430	0.088	650	3720	0.068	250	1060	0.032	34	1490	0.056	80
4	5570	0.120	670	2790	0.085	240	800	0.040	32	1110	0.070	80
5	4460	0.144	640	2230	0.102	230	640	0.060	38	890	0.084	70
6	3720	0.182	680	1860	0.119	220	530	0.070	37	740	0.098	70
7	3180	0.208	660	1590	0.136	220	450	0.096	43	640	0.128	80
8	2790	0.252	700	1390	0.153	210	400	0.108	43	560	0.144	80
9	2480	0.280	690	1240	0.170	210	350	0.120	42	500	0.160	80
10	2230	0.322	720	1110	0.196	220	320	0.138	44	450	0.184	80
11	2030	0.364	740	1010	0.221	220	290	0.156	45	410	0.208	90
12	1860	0.420	780	930	0.255	240	270	0.180	49	370	0.240	90
13	1710	0.476	810	860	0.289	250	240	0.204	49	340	0.272	90
14	1590	0.504	800	800	0.306	240	230	0.216	50	320	0.288	90
15	1490	0.532	790	740	0.323	240	210	0.228	48	300	0.304	90
16	1390	0.560	780	700	0.340	240	200	0.240	48	280	0.320	90
17	1310	0.595	780	660	0.361	240	190	0.255	48	260	0.340	90
18	1240	0.630	780	620	0.383	240	180	0.270	49	250	0.360	90
19	1170	0.644	750	590	0.391	230	170	0.276	47	230	0.368	80
20	1110	0.658	730	560	0.400	220	160	0.282	45	220	0.376	80

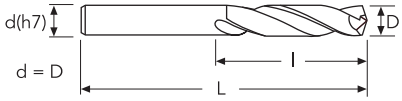
990SUTA

self centering, stainless steel, short

OSAWA NORM | SU | HSSE PV10 | 120° | 38°

P	M	K	N	S	H
★	★		★	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
2.00	0/-0.014	2	24	56	1	P990SUTA0200	●
2.10	0/-0.014	2.1	24	56	1	P990SUTA0210	●
2.20	0/-0.014	2.2	27	59	1	P990SUTA0220	●
2.30	0/-0.014	2.3	27	59	1	P990SUTA0230	●
2.40	0/-0.014	2.4	30	62	1	P990SUTA0240	●
2.50	0/-0.014	2.5	30	62	1	P990SUTA0250	●
2.60	0/-0.014	2.6	30	62	1	P990SUTA0260	●
2.70	0/-0.014	2.7	33	65	1	P990SUTA0270	●
2.80	0/-0.014	2.8	33	65	1	P990SUTA0280	●
2.90	0/-0.014	2.9	33	65	1	P990SUTA0290	●
3.00	0/-0.014	3	33	65	1	P990SUTA0300	●
3.10	0/-0.018	3.1	36	68	1	P990SUTA0310	●
3.20	0/-0.018	3.2	36	68	1	P990SUTA0320	●
3.30	0/-0.018	3.3	36	68	1	P990SUTA0330	●
3.40	0/-0.018	3.4	39	71	1	P990SUTA0340	●
3.50	0/-0.018	3.5	39	71	1	P990SUTA0350	●
3.60	0/-0.018	3.6	39	71	1	P990SUTA0360	●
3.70	0/-0.018	3.7	39	71	1	P990SUTA0370	●
3.80	0/-0.018	3.8	43	75	1	P990SUTA0380	●
3.90	0/-0.018	3.9	43	75	1	P990SUTA0390	●
4.00	0/-0.018	4	43	75	1	P990SUTA0400	●
4.10	0/-0.018	4.1	43	87	1	P990SUTA0410	●
4.20	0/-0.018	4.2	43	87	1	P990SUTA0420	●
4.30	0/-0.018	4.3	47	91	1	P990SUTA0430	●
4.40	0/-0.018	4.4	47	91	1	P990SUTA0440	●
4.50	0/-0.018	4.5	47	91	1	P990SUTA0450	●
4.60	0/-0.018	4.6	47	91	1	P990SUTA0460	●
4.70	0/-0.018	4.7	47	91	1	P990SUTA0470	●
4.80	0/-0.018	4.8	52	96	1	P990SUTA0480	●
4.90	0/-0.018	4.9	52	96	1	P990SUTA0490	●
5.00	0/-0.018	5	52	96	1	P990SUTA0500	●
5.10	0/-0.018	5.1	52	96	1	P990SUTA0510	●
5.20	0/-0.018	5.2	52	96	1	P990SUTA0520	●
5.30	0/-0.018	5.3	52	96	1	P990SUTA0530	●
5.40	0/-0.018	5.4	57	101	1	P990SUTA0540	●
5.50	0/-0.018	5.5	57	101	1	P990SUTA0550	●
5.60	0/-0.018	5.6	57	101	1	P990SUTA0560	●
5.70	0/-0.018	5.7	57	101	1	P990SUTA0570	●
5.80	0/-0.018	5.8	57	101	1	P990SUTA0580	●

● stock standard ○ non-standard stock ▽ stock exhaustion

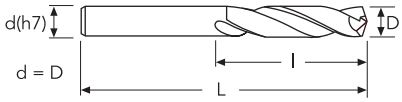
990SUTA

self centering, stainless steel, short

OSAWA NORM | SU | HSSE PV10 | 120° | 38°

P	M	K	N	S	H
★	★		★	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
5.90	0/-0.018	5.9	57	101	1	P990SUTA0590	●
6.00	0/-0.018	6	57	101	1	P990SUTA0600	●
6.10	0/-0.022	6.1	63	107	1	P990SUTA0610	●
6.20	0/-0.022	6.2	63	107	1	P990SUTA0620	●
6.30	0/-0.022	6.3	63	107	1	P990SUTA0630	●
6.40	0/-0.022	6.4	63	107	1	P990SUTA0640	●
6.50	0/-0.022	6.5	63	107	1	P990SUTA0650	●
6.60	0/-0.022	6.6	63	107	1	P990SUTA0660	●
6.70	0/-0.022	6.7	63	107	1	P990SUTA0670	●
6.80	0/-0.022	6.8	69	113	1	P990SUTA0680	●
6.90	0/-0.022	6.9	69	113	1	P990SUTA0690	●
7.00	0/-0.022	7	69	113	1	P990SUTA0700	●
7.10	0/-0.022	7.1	69	113	1	P990SUTA0710	●
7.20	0/-0.022	7.2	69	113	1	P990SUTA0720	●
7.30	0/-0.022	7.3	69	113	1	P990SUTA0730	●
7.40	0/-0.022	7.4	69	113	1	P990SUTA0740	●
7.50	0/-0.022	7.5	69	113	1	P990SUTA0750	●
7.60	0/-0.022	7.6	75	119	1	P990SUTA0760	●
7.70	0/-0.022	7.7	75	119	1	P990SUTA0770	●
7.80	0/-0.022	7.8	75	119	1	P990SUTA0780	●
7.90	0/-0.022	7.9	75	119	1	P990SUTA0790	●
8.00	0/-0.022	8	75	119	1	P990SUTA0800	●
8.10	0/-0.022	8.1	75	125	1	P990SUTA0810	●
8.20	0/-0.022	8.2	75	125	1	P990SUTA0820	●
8.30	0/-0.022	8.3	75	125	1	P990SUTA0830	●
8.40	0/-0.022	8.4	75	125	1	P990SUTA0840	●
8.50	0/-0.022	8.5	75	125	1	P990SUTA0850	●
8.60	0/-0.022	8.6	81	131	1	P990SUTA0860	●
8.70	0/-0.022	8.7	81	131	1	P990SUTA0870	●
8.80	0/-0.022	8.8	81	131	1	P990SUTA0880	●
8.90	0/-0.022	8.9	81	131	1	P990SUTA0890	●
9.00	0/-0.022	9	81	131	1	P990SUTA0900	●
9.10	0/-0.022	9.1	81	131	1	P990SUTA0910	●
9.20	0/-0.022	9.2	81	131	1	P990SUTA0920	●
9.30	0/-0.022	9.3	81	131	1	P990SUTA0930	●
9.40	0/-0.022	9.4	81	131	1	P990SUTA0940	●
9.50	0/-0.022	9.5	81	131	1	P990SUTA0950	●
9.60	0/-0.022	9.6	87	137	1	P990SUTA0960	●
9.70	0/-0.022	9.7	87	137	1	P990SUTA0970	●

● stock standard ○ non-standard stock ▽ stock exhaustion

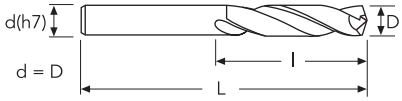
990SUTA

self centering, stainless steel, short

OSAWA NORM | SU | HSSE PV10 | 120° | 38°

P	M	K	N	S	H
★	★		★	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
9.80	0/-0.022	9.8	87	137	1	P990SUTA0980	●
9.90	0/-0.022	9.9	87	137	1	P990SUTA0990	●
10.00	0/-0.022	10	87	137	1	P990SUTA1000	●
10.10	0/-0.027	10.1	87	144	1	P990SUTA1010	●
10.20	0/-0.027	10.2	87	144	1	P990SUTA1020	●
10.30	0/-0.027	10.3	87	144	1	P990SUTA1030	●
10.40	0/-0.027	10.4	87	144	1	P990SUTA1040	●
10.50	0/-0.027	10.5	87	144	1	P990SUTA1050	●
10.60	0/-0.027	10.6	87	144	1	P990SUTA1060	●
10.70	0/-0.027	10.7	94	151	1	P990SUTA1070	●
10.80	0/-0.027	10.8	94	151	1	P990SUTA1080	●
10.90	0/-0.027	10.9	94	151	1	P990SUTA1090	●
11.00	0/-0.027	11	94	151	1	P990SUTA1100	●
11.10	0/-0.027	11.1	94	151	1	P990SUTA1110	●
11.20	0/-0.027	11.2	94	151	1	P990SUTA1120	●
11.30	0/-0.027	11.3	94	151	1	P990SUTA1130	●
11.40	0/-0.027	11.4	94	151	1	P990SUTA1140	●
11.50	0/-0.027	11.5	94	151	1	P990SUTA1150	●
11.60	0/-0.027	11.6	94	151	1	P990SUTA1160	●
11.70	0/-0.027	11.7	94	151	1	P990SUTA1170	●
11.80	0/-0.027	11.8	94	151	1	P990SUTA1180	●
11.90	0/-0.027	11.9	101	158	1	P990SUTA1190	●
12.00	0/-0.027	12	101	158	1	P990SUTA1200	●
12.10	0/-0.027	12.1	101	158	1	P990SUTA1210	●
12.20	0/-0.027	12.2	101	158	1	P990SUTA1220	●
12.30	0/-0.027	12.3	101	158	1	P990SUTA1230	●
12.40	0/-0.027	12.4	101	158	1	P990SUTA1240	●
12.50	0/-0.027	12.5	101	158	1	P990SUTA1250	●
12.60	0/-0.027	12.6	101	158	1	P990SUTA1260	●
12.70	0/-0.027	12.7	101	158	1	P990SUTA1270	●
12.80	0/-0.027	12.8	101	158	1	P990SUTA1280	●
12.90	0/-0.027	12.9	101	158	1	P990SUTA1290	●
13.00	0/-0.027	13	101	158	1	P990SUTA1300	●
13.50	0/-0.027	13.5	106	166	1	P990SUTA1350	●
14.00	0/-0.027	14	106	166	1	P990SUTA1400	●
14.10	0/-0.027	14.1	109	169	1	P990SUTA1410	●
14.50	0/-0.027	14.5	109	169	1	P990SUTA1450	●
15.00	0/-0.027	15	109	169	1	P990SUTA1500	●
15.50	0/-0.027	15.5	112	172	1	P990SUTA1550	●

● stock standard ○ non-standard stock ▽ stock exhaustion

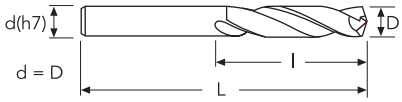
990SUTA

self centering, stainless steel, short

OSAWA NORM | SU | HSSE PV10 | 120° | 38°

P	M	K	N	S	H
★	★		★	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
15.60	0/-0.027	15.6	112	172	1	P990SUTA1560	●
16.00	0/-0.027	16	112	172	1	P990SUTA1600	●
16.50	0/-0.027	16.5	115	181	1	P990SUTA1650	●
17.00	0/-0.027	17	115	181	1	P990SUTA1700	●
17.50	0/-0.027	17.5	118	184	1	P990SUTA1750	●
17.6	0/-0.027	17.6	118	184	1	P990SUTA1760	●
18.00	0/-0.027	18	118	184	1	P990SUTA1800	●
18.50	0/-0.033	18.5	122	188	1	P990SUTA1850	●
19.00	0/-0.033	19	122	188	1	P990SUTA1900	●
19.50	0/-0.033	19.5	125	191	1	P990SUTA1950	●
20.00	0/-0.033	20	125	191	1	P990SUTA2000	●

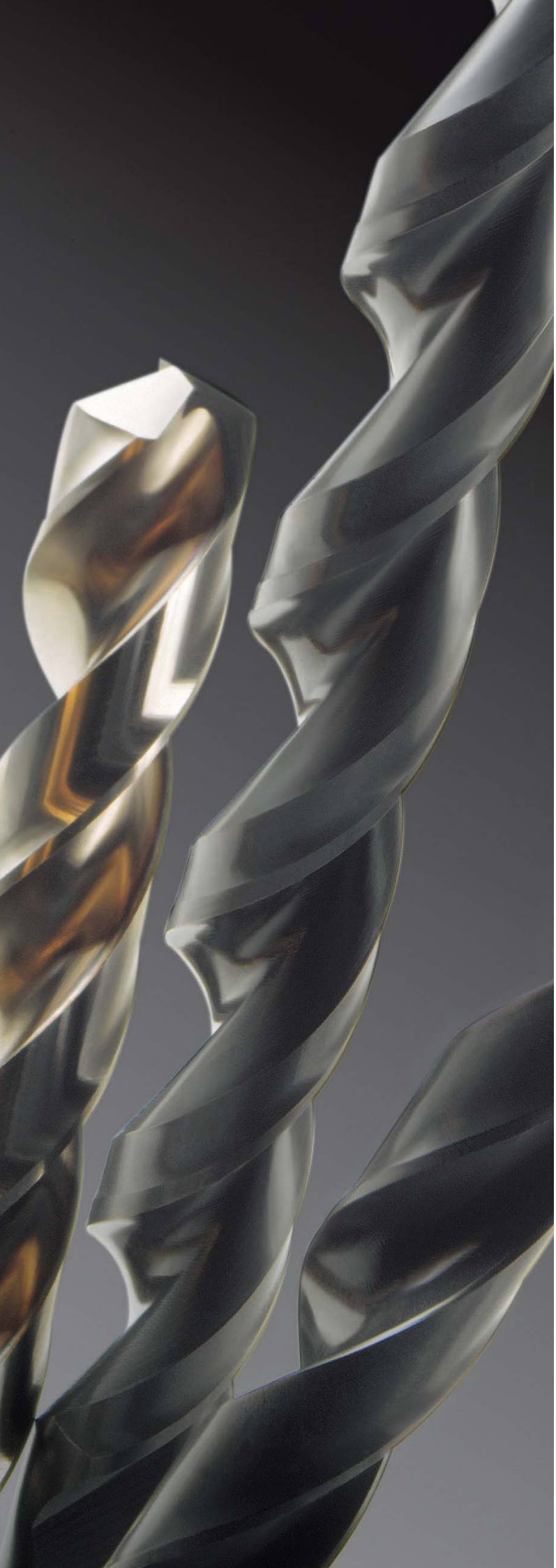
● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

990SUTA

Material Group ISO 513	P1 P2			M1 M2			M3					
Hardness/Rm	500-700 N/mm²			< 750 N/mm²			550-850 N/mm²					
Vc (m/min)	35-45			18-22			12-16					
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
2	6370	0.057	360	3180	0.057	180	2230	0.040	90			
3	4250	0.076	320	2120	0.076	160	1490	0.053	80			
4	3180	0.095	300	1590	0.095	150	1110	0.067	70			
5	2550	0.114	290	1270	0.114	140	890	0.080	70			
6	2120	0.133	280	1060	0.133	140	740	0.093	70			
7	1820	0.152	280	910	0.152	140	640	0.106	70			
8	1590	0.171	270	800	0.171	140	560	0.120	70			
9	1420	0.190	270	710	0.190	130	500	0.133	70			
10	1270	0.219	280	640	0.219	140	450	0.153	70			
11	1160	0.247	290	580	0.247	140	410	0.161	70			
12	1060	0.285	300	530	0.285	150	370	0.185	70			
13	980	0.323	320	490	0.323	160	340	0.203	70			
14	910	0.342	310	450	0.342	150	320	0.215	70			
15	850	0.361	310	420	0.361	150	300	0.217	60			
16	800	0.380	300	400	0.380	150	280	0.228	60			
17	750	0.404	300	370	0.404	150	260	0.242	60			
18	710	0.428	300	350	0.428	150	250	0.257	60			
19	670	0.437	290	340	0.437	150	230	0.262	60			
20	640	0.447	290	320	0.447	140	220	0.268	60			

Material Group ISO 513	N1 N2			N3 N4			S1 S2			S4		
Hardness/Rm							< 30 HRC					
Vc (m/min)	60-80			30-40			8-12			12-16		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
2	11150	0.063	700	5570	0.048	270	1590	0.023	36	2230	0.040	90
3	7430	0.084	620	3720	0.065	240	1060	0.030	32	1490	0.053	80
4	5570	0.105	580	2790	0.081	230	800	0.038	30	1110	0.067	70
5	4460	0.125	560	2230	0.097	220	640	0.057	36	890	0.080	70
6	3720	0.146	540	1860	0.113	210	530	0.067	35	740	0.093	70
7	3180	0.167	530	1590	0.129	210	450	0.091	41	640	0.122	80
8	2790	0.188	520	1390	0.145	200	400	0.103	41	560	0.137	80
9	2480	0.209	520	1240	0.162	200	350	0.114	40	500	0.152	80
10	2230	0.240	540	1110	0.186	210	320	0.131	42	450	0.175	80
11	2030	0.272	550	1010	0.210	210	290	0.148	43	410	0.198	80
12	1860	0.314	580	930	0.242	230	270	0.171	46	370	0.228	80
13	1710	0.355	610	860	0.275	240	240	0.194	47	340	0.258	90
14	1590	0.376	600	800	0.291	230	230	0.205	47	320	0.274	90
15	1490	0.397	590	740	0.307	230	210	0.217	45	300	0.289	90
16	1390	0.418	580	700	0.323	230	200	0.228	46	280	0.304	90
17	1310	0.444	580	660	0.343	230	190	0.242	46	260	0.323	80
18	1240	0.470	580	620	0.363	230	180	0.257	46	250	0.342	90
19	1170	0.481	560	590	0.371	220	170	0.262	45	230	0.350	80
20	1110	0.491	550	560	0.380	210	160	0.268	43	220	0.357	80



HSS-HSS/CO
GENERAL PURPOSE

A wide variety of geometries and standards, as well as a profitable mix of performance and price.

Un'ampia varietà di geometrie e standard costruttivi, con una vantaggiosa combinazione di rendimento e convenienza, sono i punti di forza delle punte in HSS e HSS/Co Osawa.

Die breite Palette an Geometrien und genormten Baumaßen bieten eine außergewöhnlich vorteilhafte Verbindung von Preis und Leistung: unschlagbare Stärken der Osawa Bohrer aus HSS und HSS/Co.

La gamme de forets HSS et HSS/Co Osawa offre une grande variété de géométries standards permettant une combinaison très rentable de performance et de prix.

Una amplia variedad de geometrías y estándares de fabricación, y una ventajosa combinación de rendimiento y conveniencia, son los puntos de fuerza de las brocas HSS y HSS/Co Osawa.

Исходный материал наивысшего качества в комбинации с современным покрытием и специальной геометрией. Отличное сочетание производительности и стоимости.

118N

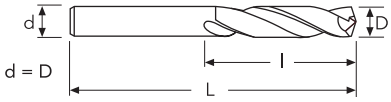
N type for general purpose, extra-short

DIN 1897 | N | HSS OX * | 118° | 25-30°

* < Ø2 mm = BR

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
1.00	0/-0.014	1	6	26	10	P118NB0100	●
1.10	0/-0.014	1.1	7	28	10	P118NB0110	●
1.20	0/-0.014	1.2	8	30	10	P118NB0120	●
1.25	0/-0.014	1.25	8	30	10	P118NB0125	●
1.30	0/-0.014	1.3	8	30	10	P118NB0130	●
1.40	0/-0.014	1.4	9	32	10	P118NB0140	●
1.50	0/-0.014	1.5	9	32	10	P118NB0150	●
1.60	0/-0.014	1.6	10	34	10	P118NB0160	●
1.70	0/-0.014	1.7	10	34	10	P118NB0170	●
1.75	0/-0.014	1.75	11	36	10	P118NB0175	●
1.80	0/-0.014	1.8	11	36	10	P118NB0180	●
1.90	0/-0.014	1.9	11	36	10	P118NB0190	●
2.00	0/-0.014	2	12	38	10	P118N0200	●
2.10	0/-0.014	2.1	12	38	10	P118N0210	●
2.20	0/-0.014	2.2	13	40	10	P118N0220	●
2.25	0/-0.014	2.25	13	40	10	P118N0225	●
2.30	0/-0.014	2.3	13	40	10	P118N0230	●
2.40	0/-0.014	2.4	14	43	10	P118N0240	●
2.50	0/-0.014	2.5	14	43	10	P118N0250	●
2.60	0/-0.014	2.6	14	43	10	P118N0260	●
2.70	0/-0.014	2.7	16	46	10	P118N0270	●
2.75	0/-0.014	2.75	16	46	10	P118N0275	●
2.80	0/-0.014	2.8	16	46	10	P118N0280	●
2.90	0/-0.014	2.9	16	46	10	P118N0290	●
3.00	0/-0.014	3	16	46	10	P118N0300	●
3.10	0/-0.018	3.1	18	49	10	P118N0310	●
3.20	0/-0.018	3.2	18	49	10	P118N0320	●
3.25	0/-0.018	3.25	18	49	10	P118N0325	●
3.30	0/-0.018	3.3	18	49	10	P118N0330	●
3.40	0/-0.018	3.4	20	52	10	P118N0340	●
3.50	0/-0.018	3.5	20	52	10	P118N0350	●
3.60	0/-0.018	3.6	20	52	10	P118N0360	●
3.70	0/-0.018	3.7	20	52	10	P118N0370	●
3.75	0/-0.018	3.75	20	52	10	P118N0375	●
3.80	0/-0.018	3.8	22	55	10	P118N0380	●
3.90	0/-0.018	3.9	22	55	10	P118N0390	●
4.00	0/-0.018	4	22	55	10	P118N0400	●
4.10	0/-0.018	4.1	22	55	10	P118N0410	●
4.20	0/-0.018	4.2	22	55	10	P118N0420	●

● stock standard ○ non-standard stock ▽ stock exhaustion

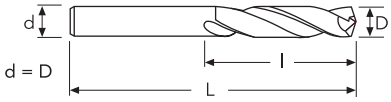
118N

N type for general purpose, extra-short

DIN 1897 | N | HSS OX | 118° | 25-30°

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
4.25	0/-0.018	4.25	22	55	10	P118N0425	●
4.30	0/-0.018	4.3	24	58	10	P118N0430	●
4.40	0/-0.018	4.4	24	58	10	P118N0440	○
4.50	0/-0.018	4.5	24	58	10	P118N0450	●
4.60	0/-0.018	4.6	24	58	10	P118N0460	●
4.70	0/-0.018	4.7	24	58	10	P118N0470	●
4.75	0/-0.018	4.75	24	58	10	P118N0475	●
4.80	0/-0.018	4.8	26	62	10	P118N0480	●
4.90	0/-0.018	4.9	26	62	10	P118N0490	●
5.00	0/-0.018	5	26	62	10	P118N0500	●
5.10	0/-0.018	5.1	26	62	10	P118N0510	●
5.20	0/-0.018	5.2	26	62	10	P118N0520	●
5.25	0/-0.018	5.25	26	62	10	P118N0525	●
5.30	0/-0.018	5.3	26	62	10	P118N0530	●
5.40	0/-0.018	5.4	28	66	10	P118N0540	●
5.50	0/-0.018	5.5	28	66	10	P118N0550	●
5.60	0/-0.018	5.6	28	66	10	P118N0560	●
5.70	0/-0.018	5.7	28	66	10	P118N0570	●
5.75	0/-0.018	5.75	28	66	10	P118N0575	●
5.80	0/-0.018	5.8	28	66	10	P118N0580	●
5.90	0/-0.018	5.9	28	66	10	P118N0590	○
6.00	0/-0.018	6	28	66	10	P118N0600	●
6.10	0/-0.022	6.1	31	70	10	P118N0610	●
6.20	0/-0.022	6.2	31	70	10	P118N0620	●
6.25	0/-0.022	6.25	31	70	10	P118N0625	●
6.30	0/-0.022	6.3	31	70	10	P118N0630	●
6.40	0/-0.022	6.4	31	70	10	P118N0640	●
6.50	0/-0.022	6.5	31	70	10	P118N0650	●
6.60	0/-0.022	6.6	31	70	5	P118N0660	○
6.70	0/-0.022	6.7	31	70	5	P118N0670	●
6.75	0/-0.022	6.75	34	74	5	P118N0675	●
6.80	0/-0.022	6.8	34	74	5	P118N0680	●
6.90	0/-0.022	6.9	34	74	5	P118N0690	●
7.00	0/-0.022	7	34	74	5	P118N0700	●
7.10	0/-0.022	7.1	34	74	5	P118N0710	●
7.20	0/-0.022	7.2	34	74	5	P118N0720	●
7.25	0/-0.022	7.25	34	74	5	P118N0725	●
7.30	0/-0.022	7.3	34	74	5	P118N0730	●
7.40	0/-0.022	7.4	34	74	5	P118N0740	○

● stock standard ○ non-standard stock ▽ stock exhaustion

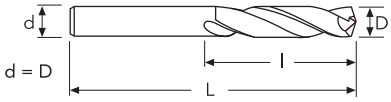
118N

N type for general purpose, extra-short

DIN 1897 | N | HSS OX | 118° | 25-30°

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
7.50	0/-0.022	7.5	34	74	5	P118N0750	●
7.60	0/-0.022	7.6	37	79	5	P118N0760	●
7.70	0/-0.022	7.7	37	79	5	P118N0770	○
7.75	0/-0.022	7.75	37	79	5	P118N0775	●
7.80	0/-0.022	7.8	37	79	5	P118N0780	●
7.90	0/-0.022	7.9	37	79	5	P118N0790	○
8.00	0/-0.022	8	37	79	5	P118N0800	●
8.10	0/-0.022	8.1	37	79	5	P118N0810	●
8.20	0/-0.022	8.2	37	79	5	P118N0820	●
8.25	0/-0.022	8.25	37	79	5	P118N0825	●
8.30	0/-0.022	8.3	37	79	5	P118N0830	○
8.40	0/-0.022	8.4	37	79	5	P118N0840	○
8.50	0/-0.022	8.5	37	79	5	P118N0850	●
8.60	0/-0.022	8.6	40	84	5	P118N0860	●
8.70	0/-0.022	8.7	40	84	5	P118N0870	○
8.75	0/-0.022	8.75	40	84	5	P118N0875	●
8.80	0/-0.022	8.8	40	84	5	P118N0880	○
8.90	0/-0.022	8.9	40	84	5	P118N0890	●
9.00	0/-0.022	9	40	84	5	P118N0900	●
9.10	0/-0.022	9.1	40	84	5	P118N0910	●
9.20	0/-0.022	9.2	40	84	5	P118N0920	○
9.25	0/-0.022	9.25	40	84	5	P118N0925	○
9.30	0/-0.022	9.3	40	84	5	P118N0930	○
9.40	0/-0.022	9.4	40	84	5	P118N0940	○
9.50	0/-0.022	9.5	40	84	5	P118N0950	●
9.60	0/-0.022	9.6	43	89	5	P118N0960	○
9.70	0/-0.022	9.7	43	89	5	P118N0970	○
9.75	0/-0.022	9.75	43	89	5	P118N0975	○
9.80	0/-0.022	9.8	43	89	5	P118N0980	○
9.90	0/-0.022	9.9	43	89	5	P118N0990	○
10.00	0/-0.022	10	43	89	5	P118N1000	●
10.25	0/-0.027	10.25	43	89	5	P118N1025	●
10.50	0/-0.027	10.5	43	89	5	P118N1050	●
10.75	0/-0.027	10.75	47	95	5	P118N1075	●
11.00	0/-0.027	11	47	95	5	P118N1100	●
11.25	0/-0.027	11.25	47	95	5	P118N1125	●
11.50	0/-0.027	11.5	47	95	5	P118N1150	●
11.75	0/-0.027	11.75	47	95	5	P118N1175	●
12.00	0/-0.027	12	51	102	5	P118N1200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

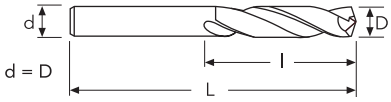
118N

N type for general purpose, extra-short

DIN 1897 | N | HSS OX | 118° | 25-30°

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
12.25	0/-0.027	12.25	51	102	5	P118N1225	●
12.50	0/-0.027	12.5	51	102	5	P118N1250	●
12.75	0/-0.027	12.75	51	102	5	P118N1275	●
13.00	0/-0.027	13	51	102	5	P118N1300	●
13.25	0/-0.027	13.25	54	107	1	P118N1325	●
13.50	0/-0.027	13.5	54	107	1	P118N1350	●
13.75	0/-0.027	13.75	54	107	1	P118N1375	●
14.00	0/-0.027	14	54	107	1	P118N1400	●
14.25	0/-0.027	14.25	56	111	1	P118N1425	●
14.50	0/-0.027	14.5	56	111	1	P118N1450	●
14.75	0/-0.027	14.75	56	111	1	P118N1475	●
15.00	0/-0.027	15	56	111	1	P118N1500	●
15.25	0/-0.027	15.25	58	115	1	P118N1525	●
15.50	0/-0.027	15.5	58	115	1	P118N1550	●
15.75	0/-0.027	15.75	58	115	1	P118N1575	○
16.00	0/-0.027	16	58	115	1	P118N1600	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

118N

	Material Group ISO 513	P1 P2			P3 P4			K1 K2			N1 N5			N2 N3 N4		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			150-350 HB								
	Vc (m/min)	25-35			20-30			25-35			50-70			40-60		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1	9550	0.017	160	7960	0.014	120	9550	0.019	180	19110	0.024	450	15920	0.017	270
	1.5	6370	0.035	220	5310	0.030	160	6370	0.039	250	12740	0.049	620	10620	0.035	370
	2	4780	0.050	240	3980	0.043	170	4780	0.055	260	9550	0.070	670	7960	0.050	400
	2.5	3820	0.070	270	3180	0.060	190	3820	0.077	290	7640	0.098	750	6370	0.070	450
	3	3180	0.080	250	2650	0.068	180	3180	0.088	280	6370	0.112	710	5310	0.080	420
	3.5	2730	0.090	250	2270	0.077	170	2730	0.099	270	5460	0.126	690	4550	0.090	410
	4	2390	0.100	240	1990	0.085	170	2390	0.110	260	4780	0.140	670	3980	0.100	400
	5	1910	0.110	210	1590	0.094	150	1910	0.121	230	3820	0.154	590	3180	0.110	350
	6	1590	0.120	190	1330	0.102	140	1590	0.132	210	3180	0.168	530	2650	0.120	320
	7	1360	0.130	180	1140	0.111	130	1360	0.143	190	2730	0.182	500	2270	0.130	300
	8	1190	0.140	170	1000	0.119	120	1190	0.154	180	2390	0.196	470	1990	0.140	280
	9	1060	0.160	170	880	0.136	120	1060	0.176	190	2120	0.224	470	1770	0.160	280
	10	960	0.170	160	800	0.145	120	960	0.187	180	1910	0.238	450	1590	0.170	270
	11	870	0.180	160	720	0.153	110	870	0.198	170	1740	0.252	440	1450	0.180	260
	12	800	0.190	150	660	0.162	110	800	0.209	170	1590	0.266	420	1330	0.190	250
	13	730	0.200	150	610	0.170	100	730	0.220	160	1470	0.280	410	1220	0.200	240
	14	680	0.210	140	570	0.179	100	680	0.231	160	1360	0.294	400	1140	0.210	240
	15	640	0.220	140	530	0.187	100	640	0.242	150	1270	0.308	390	1060	0.220	230
	16	600	0.240	140	500	0.204	100	600	0.264	160	1190	0.336	400	1000	0.240	240

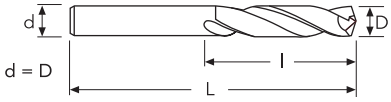
218NVA

NVA type for tough materials, extra-short

DIN 1897 | NH | HSS/CO HT | 130° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
1.00	0/-0.014	1	6	26	10	P218NVA0100	●
1.10	0/-0.014	1.1	7	28	10	P218NVA0110	○
1.20	0/-0.014	1.2	8	30	10	P218NVA0120	●
1.30	0/-0.014	1.3	8	30	10	P218NVA0130	●
1.40	0/-0.014	1.4	9	32	10	P218NVA0140	○
1.50	0/-0.014	1.5	9	32	10	P218NVA0150	●
1.60	0/-0.014	1.6	10	34	10	P218NVA0160	●
1.70	0/-0.014	1.7	10	34	10	P218NVA0170	○
1.80	0/-0.014	1.8	11	36	10	P218NVA0180	○
1.90	0/-0.014	1.9	11	36	10	P218NVA0190	●
2.00	0/-0.014	2	12	38	10	P218NVA0200	●
2.10	0/-0.014	2.1	12	38	10	P218NVA0210	●
2.20	0/-0.014	2.2	13	40	10	P218NVA0220	○
2.30	0/-0.014	2.3	13	40	10	P218NVA0230	●
2.40	0/-0.014	2.4	14	43	10	P218NVA0240	●
2.50	0/-0.014	2.5	14	43	10	P218NVA0250	●
2.60	0/-0.014	2.6	14	43	10	P218NVA0260	●
2.70	0/-0.014	2.7	16	46	10	P218NVA0270	○
2.80	0/-0.014	2.8	16	46	10	P218NVA0280	●
2.90	0/-0.014	2.9	16	46	10	P218NVA0290	○
3.00	0/-0.014	3	16	46	10	P218NVA0300	●
3.10	0/-0.018	3.1	18	49	10	P218NVA0310	○
3.20	0/-0.018	3.2	18	49	10	P218NVA0320	●
3.30	0/-0.018	3.3	18	49	10	P218NVA0330	●
3.40	0/-0.018	3.4	20	52	10	P218NVA0340	●
3.50	0/-0.018	3.5	20	52	10	P218NVA0350	●
3.60	0/-0.018	3.6	20	52	10	P218NVA0360	○
3.70	0/-0.018	3.7	20	52	10	P218NVA0370	●
3.80	0/-0.018	3.8	22	55	10	P218NVA0380	●
3.90	0/-0.018	3.9	22	55	10	P218NVA0390	○
4.00	0/-0.018	4	22	55	10	P218NVA0400	●
4.10	0/-0.018	4.1	22	55	10	P218NVA0410	●
4.20	0/-0.018	4.2	22	55	10	P218NVA0420	●
4.30	0/-0.018	4.3	24	58	10	P218NVA0430	●
4.40	0/-0.018	4.4	24	58	10	P218NVA0440	○
4.50	0/-0.018	4.5	24	58	10	P218NVA0450	●
4.60	0/-0.018	4.6	24	58	10	P218NVA0460	●
4.70	0/-0.018	4.7	24	58	10	P218NVA0470	○
4.80	0/-0.018	4.8	26	62	10	P218NVA0480	●

● stock standard ○ non-standard stock ▽ stock exhaustion

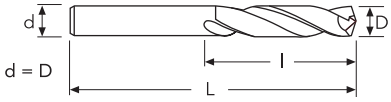
218NVA

NVA type for tough materials, extra-short

DIN 1897 | NH | HSS/CO HT | 130° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
4.90	0/-0.018	4.9	26	62	10	P218NVA0490	○
5.00	0/-0.018	5	26	62	10	P218NVA0500	●
5.10	0/-0.018	5.1	26	62	10	P218NVA0510	●
5.20	0/-0.018	5.2	26	62	10	P218NVA0520	●
5.30	0/-0.018	5.3	26	62	10	P218NVA0530	○
5.40	0/-0.018	5.4	28	66	10	P218NVA0540	○
5.50	0/-0.018	5.5	28	66	10	P218NVA0550	●
5.60	0/-0.018	5.6	28	66	10	P218NVA0560	●
5.70	0/-0.018	5.7	28	66	10	P218NVA0570	○
5.80	0/-0.018	5.8	28	66	10	P218NVA0580	○
5.90	0/-0.018	5.9	28	66	10	P218NVA0590	○
6.00	0/-0.018	6	28	66	10	P218NVA0600	●
6.10	0/-0.022	6.1	31	70	10	P218NVA0610	○
6.20	0/-0.022	6.2	31	70	10	P218NVA0620	○
6.30	0/-0.022	6.3	31	70	10	P218NVA0630	○
6.40	0/-0.022	6.4	31	70	10	P218NVA0640	○
6.50	0/-0.022	6.5	31	70	10	P218NVA0650	●
6.60	0/-0.022	6.6	31	70	5	P218NVA0660	○
6.70	0/-0.022	6.7	31	70	5	P218NVA0670	●
6.80	0/-0.022	6.8	34	74	5	P218NVA0680	●
6.90	0/-0.022	6.9	34	74	5	P218NVA0690	●
7.00	0/-0.022	7	34	74	5	P218NVA0700	●
7.10	0/-0.022	7.1	34	74	5	P218NVA0710	○
7.20	0/-0.022	7.2	34	74	5	P218NVA0720	○
7.30	0/-0.022	7.3	34	74	5	P218NVA0730	○
7.40	0/-0.022	7.4	34	74	5	P218NVA0740	○
7.50	0/-0.022	7.5	34	74	5	P218NVA0750	●
7.60	0/-0.022	7.6	37	79	5	P218NVA0760	○
7.70	0/-0.022	7.7	37	79	5	P218NVA0770	○
7.80	0/-0.022	7.8	37	79	5	P218NVA0780	●
7.90	0/-0.022	7.9	37	79	5	P218NVA0790	○
8.00	0/-0.022	8	37	79	5	P218NVA0800	●
8.10	0/-0.022	8.1	37	79	5	P218NVA0810	○
8.20	0/-0.022	8.2	37	79	5	P218NVA0820	●
8.30	0/-0.022	8.3	37	79	5	P218NVA0830	●
8.40	0/-0.022	8.4	37	79	5	P218NVA0840	○
8.50	0/-0.022	8.5	37	79	5	P218NVA0850	●
8.60	0/-0.022	8.6	40	84	5	P218NVA0860	●
8.70	0/-0.022	8.7	40	84	5	P218NVA0870	●

● stock standard ○ non-standard stock ▽ stock exhaustion

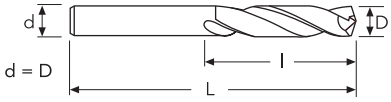
218NVA

NVA type for tough materials, extra-short

DIN 1897 | NH | HSS/CO HT | 130° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
8.80	0/-0.022	8.8	40	84	5	P218NVA0880	○
8.90	0/-0.022	8.9	40	84	5	P218NVA0890	○
9.00	0/-0.022	9	40	84	5	P218NVA0900	●
9.10	0/-0.022	9.1	40	84	5	P218NVA0910	○
9.20	0/-0.022	9.2	40	84	5	P218NVA0920	●
9.30	0/-0.022	9.3	40	84	5	P218NVA0930	○
9.40	0/-0.022	9.4	40	84	5	P218NVA0940	●
9.50	0/-0.022	9.5	40	84	5	P218NVA0950	●
9.60	0/-0.022	9.6	43	89	5	P218NVA0960	○
9.70	0/-0.022	9.7	43	89	5	P218NVA0970	○
9.80	0/-0.022	9.8	43	89	5	P218NVA0980	●
9.90	0/-0.022	9.9	43	89	5	P218NVA0990	○
10.00	0/-0.022	10	43	89	5	P218NVA1000	●
10.20	0/-0.027	10.2	43	89	5	P218NVA1020	●
10.25	0/-0.027	10.25	43	89	5	P218NVA1025	●
10.50	0/-0.027	10.5	43	89	5	P218NVA1050	●
11.00	0/-0.027	11	47	95	5	P218NVA1100	●
11.50	0/-0.027	11.5	47	95	5	P218NVA1150	●
12.00	0/-0.027	12	51	102	5	P218NVA1200	●
12.50	0/-0.027	12.5	51	102	5	P218NVA1250	●
13.00	0/-0.027	13	51	102	5	P218NVA1300	●
13.50	0/-0.027	13.5	54	107	1	P218NVA1350	●
14.00	0/-0.027	14	54	107	1	P218NVA1400	●
14.50	0/-0.027	14.5	56	111	1	P218NVA1450	●
15.00	0/-0.027	15	56	111	1	P218NVA1500	●
15.50	0/-0.027	15.5	58	115	1	P218NVA1550	●
16.00	0/-0.027	16	58	115	1	P218NVA1600	●
16.50	0/-0.027	16.5	60	119	1	P218NVA1650	●
17.00	0/-0.027	17	60	119	1	P218NVA1700	●
17.50	0/-0.027	17.5	62	123	1	P218NVA1750	●
18.00	0/-0.027	18	62	123	1	P218NVA1800	●
18.50	0/-0.033	18.5	64	127	1	P218NVA1850	●
19.00	0/-0.033	19	64	127	1	P218NVA1900	●
19.50	0/-0.033	19.5	66	131	1	P218NVA1950	●
20.00	0/-0.033	20	66	131	1	P218NVA2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

218NVA

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			M3 M4			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			550-850 N/mm²			150-350 HB		
	Vc (m/min)	25-35			20-30			12-18			8-12			25-35		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1	9550	0.017	160	7960	0.014	120	4780	0.012	57	3180	0.009	27	9550	0.019	180
	1.5	6370	0.035	220	5310	0.030	160	3180	0.025	80	2120	0.018	37	6370	0.039	250
	2	4780	0.050	240	3980	0.043	170	2390	0.035	80	1590	0.025	40	4780	0.055	260
	2.5	3820	0.070	270	3180	0.060	190	1910	0.049	90	1270	0.035	44	3820	0.077	290
	3	3180	0.080	250	2650	0.068	180	1590	0.056	90	1060	0.040	42	3180	0.088	280
	3.5	2730	0.090	250	2270	0.077	170	1360	0.063	90	910	0.045	41	2730	0.099	270
	4	2390	0.100	240	1990	0.085	170	1190	0.070	80	800	0.050	40	2390	0.110	260
	5	1910	0.110	210	1590	0.094	150	960	0.077	70	640	0.055	35	1910	0.121	230
	6	1590	0.120	190	1330	0.102	140	800	0.084	70	530	0.060	32	1590	0.132	210
	7	1360	0.130	180	1140	0.111	130	680	0.091	60	450	0.065	29	1360	0.143	190
	8	1190	0.140	170	1000	0.119	120	600	0.098	60	400	0.070	28	1190	0.154	180
	9	1060	0.160	170	880	0.136	120	530	0.112	60	350	0.080	28	1060	0.176	190
	10	960	0.170	160	800	0.145	120	480	0.119	60	320	0.085	27	960	0.187	180
	11	870	0.180	160	720	0.153	110	430	0.126	54	290	0.090	26	870	0.198	170
	12	800	0.190	150	660	0.162	110	400	0.133	53	270	0.095	26	800	0.209	170
	13	730	0.200	150	610	0.170	100	370	0.140	52	240	0.100	24	730	0.220	160
	14	680	0.210	140	570	0.179	100	340	0.147	50	230	0.105	24	680	0.231	160
	15	640	0.220	140	530	0.187	100	320	0.154	49	210	0.110	23	640	0.242	150
	16	600	0.240	140	500	0.204	100	300	0.168	50	200	0.120	24	600	0.264	160
	17	560	0.260	150	470	0.221	100	280	0.182	51	190	0.130	25	560	0.286	160
	18	530	0.280	150	440	0.238	100	270	0.196	53	180	0.140	25	530	0.308	160
	19	500	0.300	150	420	0.255	110	250	0.210	53	170	0.150	26	500	0.330	170
	20	480	0.320	150	400	0.272	110	240	0.224	54	160	0.160	26	480	0.352	170

	Material Group ISO 513	K3 K4			N1 N5			N2 N3 N4			S1 S2 S4		
	Hardness/Rm	< 350 HB									< 35 HRC		
	Vc (m/min)	20-30			50-70			40-60			8-12		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1	7960	0.013	100	19110	0.024	450	15920	0.017	270	3180	0.007	22
	1.5	5310	0.026	140	12740	0.049	620	10620	0.035	370	2120	0.014	30
	2	3980	0.038	150	9550	0.070	670	7960	0.050	400	1590	0.020	32
	2.5	3180	0.053	170	7640	0.098	750	6370	0.070	450	1270	0.028	36
	3	2650	0.060	160	6370	0.112	710	5310	0.080	420	1060	0.032	34
	3.5	2270	0.068	150	5460	0.126	690	4550	0.090	410	910	0.036	33
	4	1990	0.075	150	4780	0.140	670	3980	0.100	400	800	0.040	32
	5	1590	0.083	130	3820	0.154	590	3180	0.110	350	640	0.044	28
	6	1330	0.090	120	3180	0.168	530	2650	0.120	320	530	0.048	25
	7	1140	0.098	110	2730	0.182	500	2270	0.130	300	450	0.052	23
	8	1000	0.105	110	2390	0.196	470	1990	0.140	280	400	0.056	22
	9	880	0.120	110	2120	0.224	470	1770	0.160	280	350	0.064	22
	10	800	0.128	100	1910	0.238	450	1590	0.170	270	320	0.068	22
	11	720	0.135	100	1740	0.252	440	1450	0.180	260	290	0.072	21
	12	660	0.143	90	1590	0.266	420	1330	0.190	250	270	0.076	21
	13	610	0.150	90	1470	0.280	410	1220	0.200	240	240	0.080	19
	14	570	0.158	90	1360	0.294	400	1140	0.210	240	230	0.084	19
	15	530	0.165	90	1270	0.308	390	1060	0.220	230	210	0.088	18
	16	500	0.180	90	1190	0.336	400	1000	0.240	240	200	0.096	19
	17	470	0.195	90	1120	0.364	410	940	0.260	240	190	0.104	20
	18	440	0.210	90	1060	0.392	420	880	0.280	250	180	0.112	20
	19	420	0.225	90	1010	0.420	420	840	0.300	250	170	0.120	20
	20	400	0.240	100	960	0.448	430	800	0.320	260	160	0.128	20

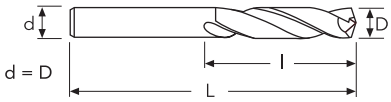
1386STI

STI type for general purpose, split point, TiN pointed, short

DIN 338 | SPLIT POINT | HSS TiN | 118° | 30°

P	M	K	N	S	H
★	☆	★	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
1.00	0/-0.014	1	12	34	10	P1385NTI0100	●
1.10	0/-0.014	1.1	14	36	10	P1385NTI0110	●
1.20	0/-0.014	1.2	16	38	10	P1385NTI0120	●
1.30	0/-0.014	1.3	16	38	10	P1385NTI0130	●
1.40	0/-0.014	1.4	18	40	10	P1385NTI0140	●
1.50	0/-0.014	1.5	18	40	10	P1385NTI0150	●
1.60	0/-0.014	1.6	20	43	10	P1386STI0160	●
1.70	0/-0.014	1.7	20	43	10	P1386STI0170	●
1.80	0/-0.014	1.8	22	46	10	P1386STI0180	●
1.90	0/-0.014	1.9	22	46	10	P1386STI0190	●
2.00	0/-0.014	2	24	49	10	P1386STI0200	●
2.10	0/-0.014	2.1	24	49	10	P1386STI0210	●
2.20	0/-0.014	2.2	27	53	10	P1386STI0220	●
2.30	0/-0.014	2.3	27	53	10	P1386STI0230	●
2.40	0/-0.014	2.4	30	57	10	P1386STI0240	●
2.50	0/-0.014	2.5	30	57	10	P1386STI0250	●
2.60	0/-0.014	2.6	30	57	10	P1386STI0260	●
2.70	0/-0.014	2.7	33	61	10	P1386STI0270	●
2.80	0/-0.014	2.8	33	61	10	P1386STI0280	●
2.90	0/-0.014	2.9	33	61	10	P1386STI0290	●
3.00	0/-0.014	3	33	61	10	P1386STI0300	●
3.10	0/-0.018	3.1	36	65	10	P1386STI0310	●
3.20	0/-0.018	3.2	36	65	10	P1386STI0320	●
3.30	0/-0.018	3.3	36	65	10	P1386STI0330	●
3.40	0/-0.018	3.4	39	70	10	P1386STI0340	●
3.50	0/-0.018	3.5	39	70	10	P1386STI0350	●
3.60	0/-0.018	3.6	39	70	10	P1386STI0360	●
3.70	0/-0.018	3.7	39	70	10	P1386STI0370	●
3.80	0/-0.018	3.8	43	75	10	P1386STI0380	●
3.90	0/-0.018	3.9	43	75	10	P1386STI0390	●
4.00	0/-0.018	4	43	75	10	P1386STI0400	●
4.10	0/-0.018	4.1	43	75	10	P1386STI0410	●
4.20	0/-0.018	4.2	43	75	10	P1386STI0420	●
4.30	0/-0.018	4.3	47	80	10	P1386STI0430	●
4.40	0/-0.018	4.4	47	80	10	P1386STI0440	●
4.50	0/-0.018	4.5	47	80	10	P1386STI0450	●
4.60	0/-0.018	4.6	47	80	10	P1386STI0460	●
4.70	0/-0.018	4.7	47	80	10	P1386STI0470	●
4.80	0/-0.018	4.8	52	86	10	P1386STI0480	●

● stock standard ○ non-standard stock ▽ stock exhaustion

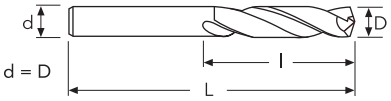
1386STI

STI type for general purpose, split point, TiN pointed, short

DIN 338 | SPLIT POINT | HSS TiN | 118° | 30°

P	M	K	N	S	H
★	☆	★	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
4.90	0/-0.018	4.9	52	86	10	P1386STI0490	●
5.00	0/-0.018	5	52	86	10	P1386STI0500	●
5.10	0/-0.018	5.1	52	86	10	P1386STI0510	●
5.20	0/-0.018	5.2	52	86	10	P1386STI0520	●
5.30	0/-0.018	5.3	52	86	10	P1386STI0530	●
5.40	0/-0.018	5.4	57	93	10	P1386STI0540	●
5.50	0/-0.018	5.5	57	93	10	P1386STI0550	●
5.60	0/-0.018	5.6	57	93	10	P1386STI0560	●
5.70	0/-0.018	5.7	57	93	10	P1386STI0570	●
5.80	0/-0.018	5.8	57	93	10	P1386STI0580	●
5.90	0/-0.018	5.9	57	93	10	P1386STI0590	●
6.00	0/-0.018	6	57	93	10	P1386STI0600	●
6.10	0/-0.022	6.1	63	101	10	P1386STI0610	●
6.20	0/-0.022	6.2	63	101	10	P1386STI0620	●
6.30	0/-0.022	6.3	63	101	10	P1386STI0630	●
6.40	0/-0.022	6.4	63	101	10	P1386STI0640	●
6.50	0/-0.022	6.5	63	101	10	P1386STI0650	●
6.60	0/-0.022	6.6	63	101	5	P1386STI0660	●
6.70	0/-0.022	6.7	63	101	5	P1386STI0670	●
6.80	0/-0.022	6.8	69	109	5	P1386STI0680	●
6.90	0/-0.022	6.9	69	109	5	P1386STI0690	●
7.00	0/-0.022	7	69	109	5	P1386STI0700	●
7.10	0/-0.022	7.1	69	109	5	P1386STI0710	●
7.20	0/-0.022	7.2	69	109	5	P1386STI0720	●
7.30	0/-0.022	7.3	69	109	5	P1386STI0730	●
7.40	0/-0.022	7.4	69	109	5	P1386STI0740	●
7.50	0/-0.022	7.5	69	109	5	P1386STI0750	●
7.60	0/-0.022	7.6	75	117	5	P1386STI0760	●
7.70	0/-0.022	7.7	75	117	5	P1386STI0770	●
7.80	0/-0.022	7.8	75	117	5	P1386STI0780	●
7.90	0/-0.022	7.9	75	117	5	P1386STI0790	●
8.00	0/-0.022	8	75	117	5	P1386STI0800	●
8.10	0/-0.022	8.1	75	117	5	P1386STI0810	●
8.20	0/-0.022	8.2	75	117	5	P1386STI0820	●
8.30	0/-0.022	8.3	75	117	5	P1386STI0830	●
8.40	0/-0.022	8.4	75	117	5	P1386STI0840	●
8.50	0/-0.022	8.5	75	117	5	P1386STI0850	●
8.60	0/-0.022	8.6	81	125	5	P1386STI0860	●
8.70	0/-0.022	8.7	81	125	5	P1386STI0870	●

● stock standard ○ non-standard stock ▽ stock exhaustion

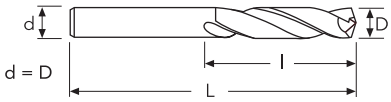
1386STI

STI type for general purpose, split point, TiN pointed, short

DIN 338 | SPLIT POINT | HSS TiN | 118° | 30°

P	M	K	N	S	H
★	☆	★	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
8.80	0/-0.022	8.8	81	125	5	P1386STI0880	●
8.90	0/-0.022	8.9	81	125	5	P1386STI0890	●
9.00	0/-0.022	9	81	125	5	P1386STI0900	●
9.10	0/-0.022	9.1	81	125	5	P1386STI0910	●
9.20	0/-0.022	9.2	81	125	5	P1386STI0920	●
9.30	0/-0.022	9.3	81	125	5	P1386STI0930	●
9.40	0/-0.022	9.4	81	125	5	P1386STI0940	●
9.50	0/-0.022	9.5	81	125	5	P1386STI0950	●
9.60	0/-0.022	9.6	87	133	5	P1386STI0960	●
9.70	0/-0.022	9.7	87	133	5	P1386STI0970	●
9.80	0/-0.022	9.8	87	133	5	P1386STI0980	●
9.90	0/-0.022	9.9	87	133	5	P1386STI0990	●
10.00	0/-0.022	10	87	133	5	P1386STI1000	●
10.10	0/-0.027	10.1	87	133	5	P1386STI1010	●
10.20	0/-0.027	10.2	87	133	5	P1386STI1020	●
10.30	0/-0.027	10.3	87	133	5	P1386STI1030	●
10.40	0/-0.027	10.4	87	133	5	P1386STI1040	●
10.50	0/-0.027	10.5	87	133	5	P1386STI1050	●
10.60	0/-0.027	10.6	87	133	5	P1386STI1060	●
10.70	0/-0.027	10.7	94	142	5	P1386STI1070	●
10.80	0/-0.027	10.8	94	142	5	P1386STI1080	●
10.90	0/-0.027	10.9	94	142	5	P1386STI1090	●
11.00	0/-0.027	11	94	142	5	P1386STI1100	●
11.10	0/-0.027	11.1	94	142	5	P1386STI1110	●
11.20	0/-0.027	11.2	94	142	5	P1386STI1120	●
11.30	0/-0.027	11.3	94	142	5	P1386STI1130	●
11.40	0/-0.027	11.4	94	142	5	P1386STI1140	●
11.50	0/-0.027	11.5	94	142	5	P1386STI1150	●
11.60	0/-0.027	11.6	94	142	5	P1386STI1160	●
11.70	0/-0.027	11.7	94	142	5	P1386STI1170	●
11.80	0/-0.027	11.8	94	142	5	P1386STI1180	●
11.90	0/-0.027	11.9	101	151	5	P1386STI1190	●
12.00	0/-0.027	12	101	151	5	P1386STI1200	●
12.10	0/-0.027	12.1	101	151	5	P1386STI1210	●
12.20	0/-0.027	12.2	101	151	5	P1386STI1220	●
12.30	0/-0.027	12.3	101	151	5	P1386STI1230	●
12.40	0/-0.027	12.4	101	151	5	P1386STI1240	●
12.50	0/-0.027	12.5	101	151	5	P1386STI1250	●
12.60	0/-0.027	12.6	101	151	5	P1386STI1260	●

● stock standard ○ non-standard stock ▽ stock exhaustion

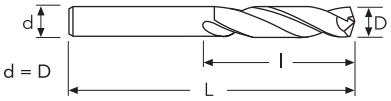
1386STI

STI type for general purpose, split point, TiN pointed, short

DIN 338 | SPLIT POINT | HSS TiN | 118° | 30°

P	M	K	N	S	H
★	☆	★	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
12.70	0/-0.027	12.7	101	151	5	P1386STI1270	●
12.80	0/-0.027	12.8	101	151	5	P1386STI1280	●
12.90	0/-0.027	12.9	101	151	5	P1386STI1290	●
13.00	0/-0.027	13	101	151	5	P1386STI1300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

1386STIA01A
Set 50 pcs.
1386STI DIN338 HSS TIN POINTED
Ø1 mm÷Ø5.9 mm x 0.1 mm

1386STIA01B
Set 41 pcs.
1386STI DIN338 HSS TIN POINTED
Ø6 mm÷Ø10 mm x 0.1 mm

1386STIA05C
Set 25 pcs.
1386STI DIN338 HSS TIN POINTED
Ø1 mm÷Ø13 mm x 0.5 mm

1386STI

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			150-350 HB		
	Vc (m/min)	30-40			25-35			15-25			30-40		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1	11150	0.017	190	9550	0.014	140	6370	0.012	80	11150	0.019	210
	1.5	7430	0.035	260	6370	0.030	190	4250	0.025	100	7430	0.039	290
	2	5570	0.050	280	4780	0.043	200	3180	0.035	110	5570	0.055	310
	2.5	4460	0.075	330	3820	0.064	240	2550	0.053	130	4460	0.083	370
	3	3720	0.090	330	3180	0.077	240	2120	0.063	130	3720	0.099	370
	3.5	3180	0.105	330	2730	0.089	240	1820	0.074	130	3180	0.116	370
	4	2790	0.110	310	2390	0.094	220	1590	0.077	120	2790	0.121	340
	5	2230	0.125	280	1910	0.106	200	1270	0.088	110	2230	0.138	310
	6	1860	0.160	300	1590	0.136	220	1060	0.112	120	1860	0.176	330
	7	1590	0.175	280	1360	0.149	200	910	0.123	110	1590	0.193	310
	8	1390	0.200	280	1190	0.170	200	800	0.140	110	1390	0.220	310
	9	1240	0.210	260	1060	0.179	190	710	0.147	100	1240	0.231	290
	10	1110	0.220	240	960	0.187	180	640	0.154	100	1110	0.242	270
	11	1010	0.235	240	870	0.200	170	580	0.165	100	1010	0.259	260
	12	930	0.250	230	800	0.213	170	530	0.175	90	930	0.275	260
	13	860	0.265	230	730	0.225	160	490	0.186	90	860	0.292	250

	Material Group ISO 513	N1 N5			N2 N3 N4			S1 S2 S4					
	Hardness/Rm							< 35 HRC					
	Vc (m/min)	60-80			50-70			12-18					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
	1	22290	0.024	530	19110	0.017	320	4780	0.007	35			
	1.5	14860	0.049	730	12740	0.035	450	3180	0.014	45			
	2	11150	0.070	780	9550	0.050	480	2390	0.020	50			
	2.5	8920	0.105	940	7640	0.075	570	1910	0.030	55			
	3	7430	0.126	940	6370	0.090	570	1590	0.036	55			
	3.5	6370	0.147	940	5460	0.105	570	1360	0.042	55			
	4	5570	0.154	860	4780	0.110	530	1190	0.044	50			
	5	4460	0.175	780	3820	0.125	480	960	0.050	50			
	6	3720	0.224	830	3180	0.160	510	800	0.064	50			
	7	3180	0.245	780	2730	0.175	480	680	0.070	50			
	8	2790	0.280	780	2390	0.200	480	600	0.080	50			
	9	2480	0.294	730	2120	0.210	450	530	0.084	45			
	10	2230	0.308	690	1910	0.220	420	480	0.088	40			
	11	2030	0.329	670	1740	0.235	410	430	0.094	40			
	12	1860	0.350	650	1590	0.250	400	400	0.100	40			
	13	1710	0.371	630	1470	0.265	390	370	0.106	40			

138N-138NTI

N type for general purpose, short (138N),
N type for general purpose, TiN coated, short (138NTI)

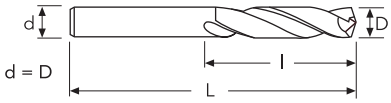
* < Ø2 mm = BR

138N

138NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



						138N		138NTI	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
0.20	0/-0.014	0.2	2.5	19	10	P138NB0020	●		
0.30	0/-0.014	0.3	3	19	10	P138NB0030	●		
0.40	0/-0.014	0.4	5	20	10	P138NB0040	●		
0.50	0/-0.014	0.5	6	22	10	P138NB0050	●		
0.60	0/-0.014	0.6	7	24	10	P138NB0060	●		
0.70	0/-0.014	0.7	9	28	10	P138NB0070	●		
0.80	0/-0.014	0.8	10	30	10	P138NB0080	●		
0.90	0/-0.014	0.9	11	32	10	P138NB0090	●		
1.00	0/-0.014	1	12	34	10	P138NB0100	●	P138NTI0100	●
1.10	0/-0.014	1.1	14	36	10	P138NB0110	●	P138NTI0110	●
1.20	0/-0.014	1.2	16	38	10	P138NB0120	●	P138NTI0120	●
1.25	0/-0.014	1.25	16	38	10	P138NB0125	●		
1.30	0/-0.014	1.3	16	38	10	P138NB0130	●	P138NTI0130	●
1.40	0/-0.014	1.4	18	40	10	P138NB0140	●	P138NTI0140	●
1.50	0/-0.014	1.5	18	40	10	P138NB0150	●	P138NTI0150	●
1.60	0/-0.014	1.6	20	43	10	P138NB0160	●	P138NTI0160	●
1.70	0/-0.014	1.7	20	43	10	P138NB0170	●	P138NTI0170	●
1.75	0/-0.014	1.75	22	46	10	P138NB0175	●		
1.80	0/-0.014	1.8	22	46	10	P138NB0180	●	P138NTI0180	●
1.90	0/-0.014	1.9	22	46	10	P138NB0190	●	P138NTI0190	●
2.00	0/-0.014	2	24	49	10	P138N0200	●	P138NTI0200	●
2.10	0/-0.014	2.1	24	49	10	P138N0210	●	P138NTI0210	●
2.20	0/-0.014	2.2	27	53	10	P138N0220	●	P138NTI0220	●
2.25	0/-0.014	2.25	27	53	10	P138N0225	●		
2.30	0/-0.014	2.3	27	53	10	P138N0230	●	P138NTI0230	●
2.40	0/-0.014	2.4	30	57	10	P138N0240	●	P138NTI0240	●
2.50	0/-0.014	2.5	30	57	10	P138N0250	●	P138NTI0250	●
2.60	0/-0.014	2.6	30	57	10	P138N0260	●	P138NTI0260	●
2.70	0/-0.014	2.7	33	61	10	P138N0270	●	P138NTI0270	●
2.75	0/-0.014	2.75	33	61	10	P138N0275	●		
2.80	0/-0.014	2.8	33	61	10	P138N0280	●	P138NTI0280	●
2.90	0/-0.014	2.9	33	61	10	P138N0290	●	P138NTI0290	●
3.00	0/-0.014	3	33	61	10	P138N0300	●	P138NTI0300	●
3.10	0/-0.018	3.1	36	65	10	P138N0310	●	P138NTI0310	●
3.20	0/-0.018	3.2	36	65	10	P138N0320	●	P138NTI0320	●
3.25	0/-0.018	3.25	36	65	10	P138N0325	●		
3.30	0/-0.018	3.3	36	65	10	P138N0330	●	P138NTI0330	●
3.40	0/-0.018	3.4	39	70	10	P138N0340	●	P138NTI0340	●
3.50	0/-0.018	3.5	39	70	10	P138N0350	●	P138NTI0350	●

● stock standard ○ non-standard stock ▽ stock exhaustion

138N-138NTI

N type for general purpose, short (138N),
N type for general purpose, TiN coated, short (138NTI)

DIN 338 | N | HSS OX | HSS TiN | 118° | 25-30°

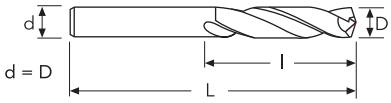
138N 138NTI

138N

138NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable

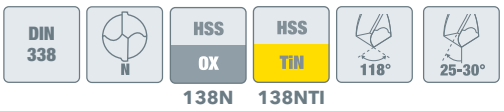


						138N		138NTI	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
3.60	0/-0.018	3.6	39	70	10	P138N0360	●	P138NTI0360	●
3.70	0/-0.018	3.7	39	70	10	P138N0370	●	P138NTI0370	●
3.75	0/-0.018	3.75	39	70	10	P138N0375	●		
3.80	0/-0.018	3.8	43	75	10	P138N0380	●	P138NTI0380	●
3.90	0/-0.018	3.9	43	75	10	P138N0390	●	P138NTI0390	●
4.00	0/-0.018	4	43	75	10	P138N0400	●	P138NTI0400	●
4.10	0/-0.018	4.1	43	75	10	P138N0410	●	P138NTI0410	●
4.20	0/-0.018	4.2	43	75	10	P138N0420	●	P138NTI0420	●
4.25	0/-0.018	4.25	43	75	10	P138N0425	●		
4.30	0/-0.018	4.3	47	80	10	P138N0430	●	P138NTI0430	●
4.40	0/-0.018	4.4	47	80	10	P138N0440	●	P138NTI0440	●
4.50	0/-0.018	4.5	47	80	10	P138N0450	●	P138NTI0450	●
4.60	0/-0.018	4.6	47	80	10	P138N0460	●	P138NTI0460	●
4.70	0/-0.018	4.7	47	80	10	P138N0470	●	P138NTI0470	●
4.75	0/-0.018	4.75	47	80	10	P138N0475	●		
4.80	0/-0.018	4.8	52	86	10	P138N0480	●	P138NTI0480	●
4.90	0/-0.018	4.9	52	86	10	P138N0490	●	P138NTI0490	●
5.00	0/-0.018	5	52	86	10	P138N0500	●	P138NTI0500	●
5.10	0/-0.018	5.1	52	86	10	P138N0510	●	P138NTI0510	●
5.20	0/-0.018	5.2	52	86	10	P138N0520	●	P138NTI0520	●
5.25	0/-0.018	5.25	52	86	10	P138N0525	●		
5.30	0/-0.018	5.3	52	86	10	P138N0530	●	P138NTI0530	●
5.40	0/-0.018	5.4	57	93	10	P138N0540	●	P138NTI0540	●
5.50	0/-0.018	5.5	57	93	10	P138N0550	●	P138NTI0550	●
5.60	0/-0.018	5.6	57	93	10	P138N0560	●	P138NTI0560	●
5.70	0/-0.018	5.7	57	93	10	P138N0570	●	P138NTI0570	●
5.75	0/-0.018	5.75	57	93	10	P138N0575	●		
5.80	0/-0.018	5.8	57	93	10	P138N0580	●	P138NTI0580	●
5.90	0/-0.018	5.9	57	93	10	P138N0590	●	P138NTI0590	●
6.00	0/-0.018	6	57	93	10	P138N0600	●	P138NTI0600	●
6.10	0/-0.022	6.1	63	101	10	P138N0610	●	P138NTI0610	●
6.20	0/-0.022	6.2	63	101	10	P138N0620	●	P138NTI0620	●
6.25	0/-0.022	6.25	63	101	10	P138N0625	●		
6.30	0/-0.022	6.3	63	101	10	P138N0630	●	P138NTI0630	●
6.40	0/-0.022	6.4	63	101	10	P138N0640	●	P138NTI0640	●
6.50	0/-0.022	6.5	63	101	10	P138N0650	●	P138NTI0650	●
6.60	0/-0.022	6.6	63	101	5	P138N0660	●	P138NTI0660	●
6.70	0/-0.022	6.7	63	101	5	P138N0670	●	P138NTI0670	●
6.75	0/-0.022	6.75	69	109	5	P138N0675	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

138N-138NTI

N type for general purpose, short (138N),
N type for general purpose, TiN coated, short (138NTI)

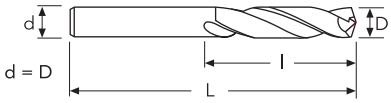


138N

138NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



						138N		138NTI	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
6.80	0/-0.022	6.8	69	109	5	P138N0680	●	P138NTI0680	●
6.90	0/-0.022	6.9	69	109	5	P138N0690	●	P138NTI0690	●
7.00	0/-0.022	7	69	109	5	P138N0700	●	P138NTI0700	●
7.10	0/-0.022	7.1	69	109	5	P138N0710	●	P138NTI0710	●
7.20	0/-0.022	7.2	69	109	5	P138N0720	●	P138NTI0720	●
7.25	0/-0.022	7.25	69	109	5	P138N0725	●		
7.30	0/-0.022	7.3	69	109	5	P138N0730	●	P138NTI0730	●
7.40	0/-0.022	7.4	69	109	5	P138N0740	●	P138NTI0740	●
7.50	0/-0.022	7.5	69	109	5	P138N0750	●	P138NTI0750	●
7.60	0/-0.022	7.6	75	117	5	P138N0760	●	P138NTI0760	●
7.70	0/-0.022	7.7	75	117	5	P138N0770	●	P138NTI0770	●
7.75	0/-0.022	7.75	75	117	5	P138N0775	●		
7.80	0/-0.022	7.8	75	117	5	P138N0780	●	P138NTI0780	●
7.90	0/-0.022	7.9	75	117	5	P138N0790	●	P138NTI0790	●
8.00	0/-0.022	8	75	117	5	P138N0800	●	P138NTI0800	●
8.10	0/-0.022	8.1	75	117	5	P138N0810	●	P138NTI0810	●
8.20	0/-0.022	8.2	75	117	5	P138N0820	●	P138NTI0820	●
8.25	0/-0.022	8.25	75	117	5	P138N0825	●		
8.30	0/-0.022	8.3	75	117	5	P138N0830	●	P138NTI0830	●
8.40	0/-0.022	8.4	75	117	5	P138N0840	●	P138NTI0840	●
8.50	0/-0.022	8.5	75	117	5	P138N0850	●	P138NTI0850	●
8.60	0/-0.022	8.6	81	125	5	P138N0860	●	P138NTI0860	●
8.70	0/-0.022	8.7	81	125	5	P138N0870	●	P138NTI0870	●
8.75	0/-0.022	8.75	81	125	5	P138N0875	●		
8.80	0/-0.022	8.8	81	125	5	P138N0880	●	P138NTI0880	●
8.90	0/-0.022	8.9	81	125	5	P138N0890	●	P138NTI0890	●
9.00	0/-0.022	9	81	125	5	P138N0900	●	P138NTI0900	●
9.10	0/-0.022	9.1	81	125	5	P138N0910	●	P138NTI0910	●
9.20	0/-0.022	9.2	81	125	5	P138N0920	●	P138NTI0920	●
9.25	0/-0.022	9.25	81	125	5	P138N0925	●		
9.30	0/-0.022	9.3	81	125	5	P138N0930	●	P138NTI0930	●
9.40	0/-0.022	9.4	81	125	5	P138N0940	●	P138NTI0940	●
9.50	0/-0.022	9.5	81	125	5	P138N0950	●	P138NTI0950	●
9.60	0/-0.022	9.6	87	133	5	P138N0960	●	P138NTI0960	●
9.70	0/-0.022	9.7	87	133	5	P138N0970	●	P138NTI0970	●
9.75	0/-0.022	9.75	87	133	5	P138N0975	●		
9.80	0/-0.022	9.8	87	133	5	P138N0980	●	P138NTI0980	●
9.90	0/-0.022	9.9	87	133	5	P138N0990	●	P138NTI0990	●
10.00	0/-0.022	10	87	133	5	P138N1000	●	P138NTI1000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

138N-138NTI

N type for general purpose, short (138N),
N type for general purpose, TiN coated, short (138NTI)

DIN 338 | N | HSS OX | HSS TiN | 118° | 25-30°

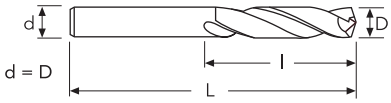
138N 138NTI

138N

138NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable

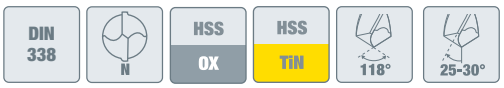


						138N		138NTI	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
10.10	0/-0.027	10.1	87	133	5	P138N1010	●		
10.20	0/-0.027	10.2	87	133	5	P138N1020	●	P138NTI1020	●
10.25	0/-0.027	10.25	87	133	5	P138N1025	●		
10.30	0/-0.027	10.3	87	133	5	P138N1030	●		
10.40	0/-0.027	10.4	87	133	5	P138N1040	●		
10.50	0/-0.027	10.5	87	133	5	P138N1050	●	P138NTI1050	●
10.60	0/-0.027	10.6	87	133	5	P138N1060	●		
10.70	0/-0.027	10.7	94	142	5	P138N1070	●		
10.75	0/-0.027	10.75	94	142	5	P138N1075	●		
10.80	0/-0.027	10.8	94	142	5	P138N1080	●		
10.90	0/-0.027	10.9	94	142	5	P138N1090	●		
11.00	0/-0.027	11	94	142	5	P138N1100	●	P138NTI1100	●
11.10	0/-0.027	11.1	94	142	5	P138N1110	●		
11.20	0/-0.027	11.2	94	142	5	P138N1120	●		
11.25	0/-0.027	11.25	94	142	5	P138N1125	●		
11.30	0/-0.027	11.3	94	142	5	P138N1130	●		
11.40	0/-0.027	11.4	94	142	5	P138N1140	●		
11.50	0/-0.027	11.5	94	142	5	P138N1150	●	P138NTI1150	●
11.60	0/-0.027	11.6	94	142	5	P138N1160	●		
11.70	0/-0.027	11.7	94	142	5	P138N1170	●		
11.75	0/-0.027	11.75	94	142	5	P138N1175	●		
11.80	0/-0.027	11.8	94	142	5	P138N1180	●		
11.90	0/-0.027	11.9	101	151	5	P138N1190	●		
12.00	0/-0.027	12	101	151	5	P138N1200	●	P138NTI1200	●
12.10	0/-0.027	12.1	101	151	5	P138N1210	●		
12.20	0/-0.027	12.2	101	151	5	P138N1220	●		
12.25	0/-0.027	12.25	101	151	5	P138N1225	●		
12.30	0/-0.027	12.3	101	151	5	P138N1230	●		
12.40	0/-0.027	12.4	101	151	5	P138N1240	●		
12.50	0/-0.027	12.5	101	151	5	P138N1250	●	P138NTI1250	●
12.60	0/-0.027	12.6	101	151	5	P138N1260	●		
12.70	0/-0.027	12.7	101	151	5	P138N1270	●		
12.75	0/-0.027	12.75	101	151	5	P138N1275	●		
12.80	0/-0.027	12.8	101	151	5	P138N1280	●		
12.90	0/-0.027	12.9	101	151	5	P138N1290	●		
13.00	0/-0.027	13	101	151	5	P138N1300	●	P138NTI1300	●
13.25	0/-0.027	13.25	108	160	1	P138N1325	●		
13.50	0/-0.027	13.5	108	160	1	P138N1350	●	P138NTI1350	●
13.75	0/-0.027	13.75	108	160	1	P138N1375	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

138N-138NTI

N type for general purpose, short (138N),
N type for general purpose, TiN coated, short (138NTI)

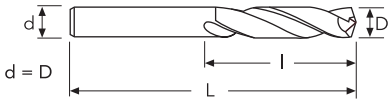


138N

138NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



						138N		138NTI	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
14.00	0/-0.027	14	108	160	1	P138N1400	●	P138NTI1400	●
14.25	0/-0.027	14.25	114	169	1	P138N1425	●		
14.50	0/-0.027	14.5	114	169	1	P138N1450	●	P138NTI1450	●
14.75	0/-0.027	14.75	114	169	1	P138N1475	●		
15.00	0/-0.027	15	114	169	1	P138N1500	●	P138NTI1500	●
15.25	0/-0.027	15.25	120	178	1	P138N1525	●		
15.50	0/-0.027	15.5	120	178	1	P138N1550	●	P138NTI1550	●
15.75	0/-0.027	15.75	120	178	1	P138N1575	●		
16.00	0/-0.027	16	120	178	1	P138N1600	●	P138NTI1600	●
16.25	0/-0.027	16.25	125	184	1	P138N1625	●		
16.50	0/-0.027	16.5	125	184	1	P138N1650	●		
16.75	0/-0.027	16.75	125	184	1	P138N1675	●		
17.00	0/-0.027	17	125	184	1	P138N1700	●		
17.50	0/-0.027	17.5	130	191	1	P138N1750	●		
18.00	0/-0.027	18	130	191	1	P138N1800	●		
18.50	0/-0.033	18.5	135	198	1	P138N1850	●		
19.00	0/-0.033	19	135	198	1	P138N1900	●		
19.50	0/-0.033	19.5	140	205	1	P138N1950	●		
20.00	0/-0.033	20	140	205	1	P138N2000	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

138NA01A
Set 50 pcs.
138N DIN338 HSS
Ø1 mm÷Ø5.9 mm x 0.1 mm

138NA01B
Set 41 pcs.
138N DIN338 HSS
Ø6 mm÷Ø10 mm x 0.1 mm

138NA05C
Set 25 pcs.
138N DIN338 HSS
Ø1 mm÷Ø13 mm x 0.5 mm

138N

Material Group ISO 513	P1 P2			P3 P4			K1 K2			N1 N5			N2 N3 N4		
Hardness/Rm															
Vc (m/min)	25-35			20-30			25-35			50-70			40-60		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
0.2	47770	0.007	330	39810	0.006	240	47770	0.008	370	95540	0.010	940	79620	0.007	560
0.5	19110	0.011	210	15920	0.009	150	19110	0.012	230	38220	0.015	590	31850	0.011	350
0.8	11940	0.013	160	9950	0.011	110	11940	0.014	170	23890	0.018	430	19900	0.013	260
1	9550	0.017	160	7960	0.014	120	9550	0.019	180	19110	0.024	450	15920	0.017	270
1.5	6370	0.035	220	5310	0.030	160	6370	0.039	250	12740	0.049	620	10620	0.035	370
2	4780	0.050	240	3980	0.043	170	4780	0.055	260	9550	0.070	670	7960	0.050	400
2.5	3820	0.060	230	3180	0.051	160	3820	0.066	250	7640	0.084	640	6370	0.060	380
3	3180	0.070	220	2650	0.060	160	3180	0.077	240	6370	0.098	620	5310	0.070	370
3.5	2730	0.080	220	2270	0.068	150	2730	0.088	240	5460	0.112	610	4550	0.080	360
4	2390	0.090	220	1990	0.077	150	2390	0.099	240	4780	0.126	600	3980	0.090	360
5	1910	0.100	190	1590	0.085	140	1910	0.110	210	3820	0.140	530	3180	0.100	320
6	1590	0.110	170	1330	0.094	120	1590	0.121	190	3180	0.154	490	2650	0.110	290
7	1360	0.120	160	1140	0.102	120	1360	0.132	180	2730	0.168	460	2270	0.120	270
8	1190	0.130	150	1000	0.111	110	1190	0.143	170	2390	0.182	430	1990	0.130	260
9	1060	0.140	150	880	0.119	100	1060	0.154	160	2120	0.196	420	1770	0.140	250
10	960	0.160	150	800	0.136	110	960	0.176	170	1910	0.224	430	1590	0.160	250
11	870	0.170	150	720	0.145	100	870	0.187	160	1740	0.238	410	1450	0.170	250
12	800	0.180	140	660	0.153	100	800	0.198	160	1590	0.252	400	1330	0.180	240
13	730	0.190	140	610	0.162	100	730	0.209	150	1470	0.266	390	1220	0.190	230
14	680	0.200	140	570	0.170	100	680	0.220	150	1360	0.280	380	1140	0.200	230
15	640	0.210	130	530	0.179	90	640	0.231	150	1270	0.294	370	1060	0.210	220
16	600	0.220	130	500	0.187	90	600	0.242	150	1190	0.308	370	1000	0.220	220
17	560	0.230	130	470	0.196	90	560	0.253	140	1120	0.322	360	940	0.230	220
18	530	0.240	130	440	0.204	90	530	0.264	140	1060	0.336	360	880	0.240	210
19	500	0.250	130	420	0.213	90	500	0.275	140	1010	0.350	350	840	0.250	210
20	480	0.260	120	400	0.221	90	480	0.286	140	960	0.364	350	800	0.260	210

138NTI

Material Group ISO 513	P1 P2			P3 P4			K1 K2			N1 N5			N2 N3 N4		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			150-350 HB								
Vc (m/min)	30-40			25-35			30-40			60-80			50-70		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1	11150	0.017	190	9550	0.014	140	11150	0.019	210	22290	0.024	530	19110	0.017	320
1.5	7430	0.035	260	6370	0.030	190	7430	0.039	290	14860	0.049	730	12740	0.035	450
2	5570	0.050	280	4780	0.043	200	5570	0.055	310	11150	0.070	780	9550	0.050	480
2.5	4460	0.060	270	3820	0.051	190	4460	0.066	290	8920	0.084	750	7640	0.060	460
3	3720	0.070	260	3180	0.060	190	3720	0.077	290	7430	0.098	730	6370	0.070	450
3.5	3180	0.080	250	2730	0.068	190	3180	0.088	280	6370	0.112	710	5460	0.080	440
4	2790	0.090	250	2390	0.077	180	2790	0.099	280	5570	0.126	700	4780	0.090	430
5	2230	0.100	220	1910	0.085	160	2230	0.110	250	4460	0.140	620	3820	0.100	380
6	1860	0.110	200	1590	0.094	150	1860	0.121	230	3720	0.154	570	3180	0.110	350
7	1590	0.120	190	1360	0.102	140	1590	0.132	210	3180	0.168	530	2730	0.120	330
8	1390	0.130	180	1190	0.111	130	1390	0.143	200	2790	0.182	510	2390	0.130	310
9	1240	0.140	170	1060	0.119	130	1240	0.154	190	2480	0.196	490	2120	0.140	300
10	1110	0.160	180	960	0.136	130	1110	0.176	200	2230	0.224	500	1910	0.160	310
11	1010	0.170	170	870	0.145	130	1010	0.187	190	2030	0.238	480	1740	0.170	300
12	930	0.180	170	800	0.153	120	930	0.198	180	1860	0.252	470	1590	0.180	290
13	860	0.190	160	730	0.162	120	860	0.209	180	1710	0.266	450	1470	0.190	280
14	800	0.200	160	680	0.170	120	800	0.220	180	1590	0.280	450	1360	0.200	270
15	740	0.210	160	640	0.179	110	740	0.231	170	1490	0.294	440	1270	0.210	270
16	700	0.220	150	600	0.187	110	700	0.242	170	1390	0.308	430	1190	0.220	260

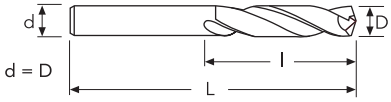
138HB

HB type for brass, short

DIN 338 | H | HSS BR | 118° | 12-15°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
1.50	0/-0.014	1.5	18	40	10	P138HB0150	●
1.60	0/-0.014	1.6	20	43	10	P138HB0160	●
1.70	0/-0.014	1.7	20	43	10	P138HB0170	●
1.80	0/-0.014	1.8	22	46	10	P138HB0180	●
1.90	0/-0.014	1.9	22	46	10	P138HB0190	●
2.00	0/-0.014	2	24	49	10	P138HB0200	●
2.10	0/-0.014	2.1	24	49	10	P138HB0210	●
2.20	0/-0.014	2.2	27	53	10	P138HB0220	●
2.30	0/-0.014	2.3	27	53	10	P138HB0230	●
2.40	0/-0.014	2.4	30	57	10	P138HB0240	●
2.50	0/-0.014	2.5	30	57	10	P138HB0250	●
2.60	0/-0.014	2.6	30	57	10	P138HB0260	●
2.70	0/-0.014	2.7	33	61	10	P138HB0270	●
2.80	0/-0.014	2.8	33	61	10	P138HB0280	●
2.90	0/-0.014	2.9	33	61	10	P138HB0290	●
3.00	0/-0.014	3	33	61	10	P138HB0300	●
3.10	0/-0.018	3.1	36	65	10	P138HB0310	●
3.20	0/-0.018	3.2	36	65	10	P138HB0320	●
3.30	0/-0.018	3.3	36	65	10	P138HB0330	●
3.40	0/-0.018	3.4	39	70	10	P138HB0340	●
3.50	0/-0.018	3.5	39	70	10	P138HB0350	●
3.60	0/-0.018	3.6	39	70	10	P138HB0360	●
3.70	0/-0.018	3.7	39	70	10	P138HB0370	●
3.80	0/-0.018	3.8	43	75	10	P138HB0380	●
3.90	0/-0.018	3.9	43	75	10	P138HB0390	●
4.00	0/-0.018	4	43	75	10	P138HB0400	●
4.10	0/-0.018	4.1	43	75	10	P138HB0410	●
4.20	0/-0.018	4.2	43	75	10	P138HB0420	●
4.30	0/-0.018	4.3	47	80	10	P138HB0430	●
4.40	0/-0.018	4.4	47	80	10	P138HB0440	○
4.50	0/-0.018	4.5	47	80	10	P138HB0450	●
4.60	0/-0.018	4.6	47	80	10	P138HB0460	●
4.70	0/-0.018	4.7	47	80	10	P138HB0470	●
4.80	0/-0.018	4.8	52	86	10	P138HB0480	●
4.90	0/-0.018	4.9	52	86	10	P138HB0490	○
5.00	0/-0.018	5	52	86	10	P138HB0500	●
5.10	0/-0.018	5.1	52	86	10	P138HB0510	○
5.20	0/-0.018	5.2	52	86	10	P138HB0520	○
5.30	0/-0.018	5.3	52	86	10	P138HB0530	○

● stock standard ○ non-standard stock ▽ stock exhaustion

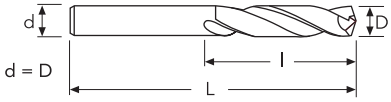
138HB

HB type for brass, short

DIN 338 | H | HSS BR | 118° | 12-15°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
5.40	0/-0.018	5.4	57	93	10	P138HB0540	○
5.50	0/-0.018	5.5	57	93	10	P138HB0550	●
5.60	0/-0.018	5.6	57	93	10	P138HB0560	○
5.70	0/-0.018	5.7	57	93	10	P138HB0570	○
5.80	0/-0.018	5.8	57	93	10	P138HB0580	○
5.90	0/-0.018	5.9	57	93	10	P138HB0590	○
6.00	0/-0.018	6	57	93	10	P138HB0600	●
6.10	0/-0.022	6.1	63	101	10	P138HB0610	○
6.20	0/-0.022	6.2	63	101	10	P138HB0620	○
6.30	0/-0.022	6.3	63	101	10	P138HB0630	○
6.40	0/-0.022	6.4	63	101	10	P138HB0640	○
6.50	0/-0.022	6.5	63	101	10	P138HB0650	●
6.60	0/-0.022	6.6	63	101	5	P138HB0660	○
6.70	0/-0.022	6.7	63	101	5	P138HB0670	○
6.80	0/-0.022	6.8	69	109	5	P138HB0680	○
6.90	0/-0.022	6.9	69	109	5	P138HB0690	○
7.00	0/-0.022	7	69	109	5	P138HB0700	●
7.10	0/-0.022	7.1	69	109	5	P138HB0710	○
7.20	0/-0.022	7.2	69	109	5	P138HB0720	○
7.30	0/-0.022	7.3	69	109	5	P138HB0730	○
7.40	0/-0.022	7.4	69	109	5	P138HB0740	○
7.50	0/-0.022	7.5	69	109	5	P138HB0750	●
7.60	0/-0.022	7.6	75	117	5	P138HB0760	○
7.70	0/-0.022	7.7	75	117	5	P138HB0770	○
7.80	0/-0.022	7.8	75	117	5	P138HB0780	●
7.90	0/-0.022	7.9	75	117	5	P138HB0790	○
8.00	0/-0.022	8	75	117	5	P138HB0800	●
8.10	0/-0.022	8.1	75	117	5	P138HB0810	○
8.20	0/-0.022	8.2	75	117	5	P138HB0820	○
8.30	0/-0.022	8.3	75	117	5	P138HB0830	○
8.40	0/-0.022	8.4	75	117	5	P138HB0840	○
8.50	0/-0.022	8.5	75	117	5	P138HB0850	●
8.60	0/-0.022	8.6	81	125	5	P138HB0860	○
8.70	0/-0.022	8.7	81	125	5	P138HB0870	○
8.80	0/-0.022	8.8	81	125	5	P138HB0880	○
8.90	0/-0.022	8.9	81	125	5	P138HB0890	○
9.00	0/-0.022	9	81	125	5	P138HB0900	●
9.10	0/-0.022	9.1	81	125	5	P138HB0910	○
9.20	0/-0.022	9.2	81	125	5	P138HB0920	○

● stock standard ○ non-standard stock ▽ stock exhaustion

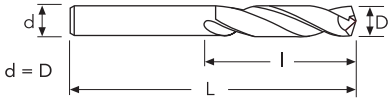
138HB

HB type for brass, short

DIN 338 | H | HSS BR | 118° | 12-15°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
9.30	0/-0.022	9.3	81	125	5	P138HB0930	○
9.40	0/-0.022	9.4	81	125	5	P138HB0940	○
9.50	0/-0.022	9.5	81	125	5	P138HB0950	●
9.60	0/-0.022	9.6	87	133	5	P138HB0960	○
9.70	0/-0.022	9.7	87	133	5	P138HB0970	○
9.80	0/-0.022	9.8	87	133	5	P138HB0980	○
9.90	0/-0.022	9.9	87	133	5	P138HB0990	○
10.00	0/-0.022	10	87	133	5	P138HB1000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

138HB

	Material Group ISO 513	N4											
	Hardness/Rm												
	Vc (m/min)	40-60											
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)									
	1.5	10620	0.065	690									
	2	7960	0.080	640									
	2.5	6370	0.090	570									
	3	5310	0.100	530									
	3.5	4550	0.110	500									
	4	3980	0.120	480									
	4.5	3540	0.130	460									
	5	3180	0.140	450									
	6	2650	0.160	420									
	7	2270	0.180	410									
	8	1990	0.200	400									
	9	1770	0.220	390									
	10	1590	0.250	400									

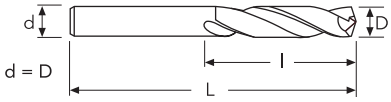
138WB

WB type for aluminium, short

DIN 338 | W | HSS BR | 130° | 35-40°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
1.50	0/-0.014	1.5	18	40	10	P138WB0150	●
1.60	0/-0.014	1.6	20	43	10	P138WB0160	○
1.70	0/-0.014	1.7	20	43	10	P138WB0170	○
1.80	0/-0.014	1.8	22	46	10	P138WB0180	○
1.90	0/-0.014	1.9	22	46	10	P138WB0190	○
2.00	0/-0.014	2	24	49	10	P138WB0200	●
2.10	0/-0.014	2.1	24	49	10	P138WB0210	○
2.20	0/-0.014	2.2	27	53	10	P138WB0220	●
2.30	0/-0.014	2.3	27	53	10	P138WB0230	○
2.40	0/-0.014	2.4	30	57	10	P138WB0240	●
2.50	0/-0.014	2.5	30	57	10	P138WB0250	●
2.60	0/-0.014	2.6	30	57	10	P138WB0260	●
2.70	0/-0.014	2.7	33	61	10	P138WB0270	○
2.80	0/-0.014	2.8	33	61	10	P138WB0280	●
2.90	0/-0.014	2.9	33	61	10	P138WB0290	○
3.00	0/-0.014	3	33	61	10	P138WB0300	●
3.10	0/-0.018	3.1	36	65	10	P138WB0310	●
3.20	0/-0.018	3.2	36	65	10	P138WB0320	●
3.30	0/-0.018	3.3	36	65	10	P138WB0330	●
3.40	0/-0.018	3.4	39	70	10	P138WB0340	●
3.50	0/-0.018	3.5	39	70	10	P138WB0350	●
3.60	0/-0.018	3.6	39	70	10	P138WB0360	●
3.70	0/-0.018	3.7	39	70	10	P138WB0370	●
3.80	0/-0.018	3.8	43	75	10	P138WB0380	●
3.90	0/-0.018	3.9	43	75	10	P138WB0390	●
4.00	0/-0.018	4	43	75	10	P138WB0400	●
4.10	0/-0.018	4.1	43	75	10	P138WB0410	●
4.20	0/-0.018	4.2	43	75	10	P138WB0420	●
4.30	0/-0.018	4.3	47	80	10	P138WB0430	○
4.40	0/-0.018	4.4	47	80	10	P138WB0440	○
4.50	0/-0.018	4.5	47	80	10	P138WB0450	●
4.60	0/-0.018	4.6	47	80	10	P138WB0460	●
4.70	0/-0.018	4.7	47	80	10	P138WB0470	○
4.80	0/-0.018	4.8	52	86	10	P138WB0480	●
4.90	0/-0.018	4.9	52	86	10	P138WB0490	●
5.00	0/-0.018	5	52	86	10	P138WB0500	●
5.10	0/-0.018	5.1	52	86	10	P138WB0510	○
5.20	0/-0.018	5.2	52	86	10	P138WB0520	●
5.30	0/-0.018	5.3	52	86	10	P138WB0530	○

● stock standard ○ non-standard stock ▽ stock exhaustion

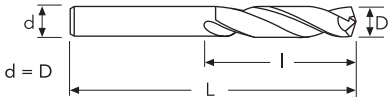
138WB

WB type for aluminium, short

DIN 338 | W | HSS BR | 130° | 35-40°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
5.40	0/-0.018	5.4	57	93	10	P138WB0540	○
5.50	0/-0.018	5.5	57	93	10	P138WB0550	●
5.60	0/-0.018	5.6	57	93	10	P138WB0560	●
5.70	0/-0.018	5.7	57	93	10	P138WB0570	○
5.80	0/-0.018	5.8	57	93	10	P138WB0580	○
5.90	0/-0.018	5.9	57	93	10	P138WB0590	○
6.00	0/-0.018	6	57	93	10	P138WB0600	●
6.10	0/-0.022	6.1	63	101	10	P138WB0610	○
6.20	0/-0.022	6.2	63	101	10	P138WB0620	○
6.30	0/-0.022	6.3	63	101	10	P138WB0630	○
6.40	0/-0.022	6.4	63	101	10	P138WB0640	○
6.50	0/-0.022	6.5	63	101	10	P138WB0650	●
6.60	0/-0.022	6.6	63	101	5	P138WB0660	○
6.70	0/-0.022	6.7	63	101	5	P138WB0670	○
6.80	0/-0.022	6.8	69	109	5	P138WB0680	●
6.90	0/-0.022	6.9	69	109	5	P138WB0690	○
7.00	0/-0.022	7	69	109	5	P138WB0700	●
7.10	0/-0.022	7.1	69	109	5	P138WB0710	○
7.20	0/-0.022	7.2	69	109	5	P138WB0720	○
7.30	0/-0.022	7.3	69	109	5	P138WB0730	○
7.40	0/-0.022	7.4	69	109	5	P138WB0740	○
7.50	0/-0.022	7.5	69	109	5	P138WB0750	●
7.60	0/-0.022	7.6	75	117	5	P138WB0760	○
7.70	0/-0.022	7.7	75	117	5	P138WB0770	○
7.80	0/-0.022	7.8	75	117	5	P138WB0780	○
7.90	0/-0.022	7.9	75	117	5	P138WB0790	○
8.00	0/-0.022	8	75	117	5	P138WB0800	●
8.10	0/-0.022	8.1	75	117	5	P138WB0810	○
8.20	0/-0.022	8.2	75	117	5	P138WB0820	●
8.30	0/-0.022	8.3	75	117	5	P138WB0830	○
8.40	0/-0.022	8.4	75	117	5	P138WB0840	○
8.50	0/-0.022	8.5	75	117	5	P138WB0850	●
8.60	0/-0.022	8.6	81	125	5	P138WB0860	○
8.70	0/-0.022	8.7	81	125	5	P138WB0870	○
8.80	0/-0.022	8.8	81	125	5	P138WB0880	○
8.90	0/-0.022	8.9	81	125	5	P138WB0890	○
9.00	0/-0.022	9	81	125	5	P138WB0900	●
9.10	0/-0.022	9.1	81	125	5	P138WB0910	○
9.20	0/-0.022	9.2	81	125	5	P138WB0920	○

● stock standard ○ non-standard stock ▽ stock exhaustion

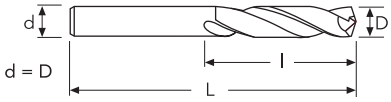
138WB

WB type for aluminium, short

DIN 338 | W | HSS BR | 130° | 35-40°

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
9.30	0/-0.022	9.3	81	125	5	P138WB0930	○
9.40	0/-0.022	9.4	81	125	5	P138WB0940	○
9.50	0/-0.022	9.5	81	125	5	P138WB0950	●
9.60	0/-0.022	9.6	87	133	5	P138WB0960	○
9.70	0/-0.022	9.7	87	133	5	P138WB0970	○
9.80	0/-0.022	9.8	87	133	5	P138WB0980	○
9.90	0/-0.022	9.9	87	133	5	P138WB0990	○
10.00	0/-0.022	10	87	133	5	P138WB1000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

138WB

	Material Group ISO 513	N1			N2			N3					
	Hardness/Rm												
	Vc (m/min)	40-60			30-50			25-45					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
	1.5	10620	0.070	740	8490	0.063	530	7430	0.060	440			
	2	7962	0.080	640	6369	0.072	460	5573	0.068	380			
	2.5	6369	0.090	570	5096	0.081	410	4459	0.077	340			
	3	5308	0.100	530	4246	0.090	380	3715	0.085	320			
	3.5	4550	0.110	500	3640	0.099	360	3185	0.094	300			
	4	3981	0.120	480	3185	0.108	340	2787	0.102	280			
	4.5	3539	0.130	460	2831	0.117	330	2477	0.111	270			
	5	3185	0.140	450	2548	0.126	320	2229	0.119	270			
	6	2654	0.160	420	2123	0.144	310	1858	0.136	250			
	7	2275	0.180	410	1820	0.162	290	1592	0.153	240			
	8	1990	0.200	400	1592	0.180	290	1393	0.170	240			
	9	1769	0.220	390	1415	0.198	280	1238	0.187	230			
	10	1592	0.250	400	1274	0.225	290	1115	0.213	240			

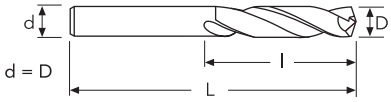
2386STI

STI type for tough materials, split point, TiN pointed, short

DIN 338 | SPLIT POINT | HSS/Co | TiN | 135° | 33°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
1.00	0/-0.014	1	12	34	10	P2385NTI0100	●
1.10	0/-0.014	1.1	14	36	10	P2385NTI0110	●
1.20	0/-0.014	1.2	16	38	10	P2385NTI0120	●
1.30	0/-0.014	1.3	16	38	10	P2385NTI0130	●
1.40	0/-0.014	1.4	18	40	10	P2385NTI0140	●
1.50	0/-0.014	1.5	18	40	10	P2385NTI0150	●
1.60	0/-0.014	1.6	20	43	10	P2386STI0160	●
1.70	0/-0.014	1.7	20	43	10	P2386STI0170	●
1.80	0/-0.014	1.8	22	46	10	P2386STI0180	●
1.90	0/-0.014	1.9	22	46	10	P2386STI0190	●
2.00	0/-0.014	2	24	49	10	P2386STI0200	●
2.10	0/-0.014	2.1	24	49	10	P2386STI0210	●
2.20	0/-0.014	2.2	27	53	10	P2386STI0220	●
2.30	0/-0.014	2.3	27	53	10	P2386STI0230	●
2.40	0/-0.014	2.4	30	57	10	P2386STI0240	●
2.50	0/-0.014	2.5	30	57	10	P2386STI0250	●
2.60	0/-0.014	2.6	30	57	10	P2386STI0260	●
2.70	0/-0.014	2.7	33	61	10	P2386STI0270	●
2.80	0/-0.014	2.8	33	61	10	P2386STI0280	●
2.90	0/-0.014	2.9	33	61	10	P2386STI0290	●
3.00	0/-0.014	3	33	61	10	P2386STI0300	●
3.10	0/-0.018	3.1	36	65	10	P2386STI0310	●
3.20	0/-0.018	3.2	36	65	10	P2386STI0320	●
3.30	0/-0.018	3.3	36	65	10	P2386STI0330	●
3.40	0/-0.018	3.4	39	70	10	P2386STI0340	●
3.50	0/-0.018	3.5	39	70	10	P2386STI0350	●
3.60	0/-0.018	3.6	39	70	10	P2386STI0360	●
3.70	0/-0.018	3.7	39	70	10	P2386STI0370	●
3.80	0/-0.018	3.8	43	75	10	P2386STI0380	●
3.90	0/-0.018	3.9	43	75	10	P2386STI0390	●
4.00	0/-0.018	4	43	75	10	P2386STI0400	●
4.10	0/-0.018	4.1	43	75	10	P2386STI0410	●
4.20	0/-0.018	4.2	43	75	10	P2386STI0420	●
4.30	0/-0.018	4.3	47	80	10	P2386STI0430	●
4.40	0/-0.018	4.4	47	80	10	P2386STI0440	●
4.50	0/-0.018	4.5	47	80	10	P2386STI0450	●
4.60	0/-0.018	4.6	47	80	10	P2386STI0460	●
4.70	0/-0.018	4.7	47	80	10	P2386STI0470	●
4.80	0/-0.018	4.8	52	86	10	P2386STI0480	●

● stock standard ○ non-standard stock ▽ stock exhaustion

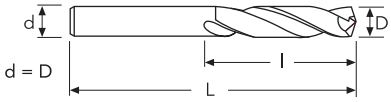
2386STI

STI type for tough materials, split point, TiN pointed, short

DIN 338 | SPLIT POINT | HSS/Co TiN | 135° | 33°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
4.90	0/-0.018	4.9	52	86	10	P2386STI0490	●
5.00	0/-0.018	5	52	86	10	P2386STI0500	●
5.10	0/-0.018	5.1	52	86	10	P2386STI0510	●
5.20	0/-0.018	5.2	52	86	10	P2386STI0520	●
5.30	0/-0.018	5.3	52	86	10	P2386STI0530	●
5.40	0/-0.018	5.4	57	93	10	P2386STI0540	●
5.50	0/-0.018	5.5	57	93	10	P2386STI0550	●
5.60	0/-0.018	5.6	57	93	10	P2386STI0560	●
5.70	0/-0.018	5.7	57	93	10	P2386STI0570	●
5.80	0/-0.018	5.8	57	93	10	P2386STI0580	●
5.90	0/-0.018	5.9	57	93	10	P2386STI0590	●
6.00	0/-0.018	6	57	93	10	P2386STI0600	●
6.10	0/-0.022	6.1	63	101	10	P2386STI0610	●
6.20	0/-0.022	6.2	63	101	10	P2386STI0620	●
6.30	0/-0.022	6.3	63	101	10	P2386STI0630	●
6.40	0/-0.022	6.4	63	101	10	P2386STI0640	●
6.50	0/-0.022	6.5	63	101	10	P2386STI0650	●
6.60	0/-0.022	6.6	63	101	5	P2386STI0660	●
6.70	0/-0.022	6.7	63	101	5	P2386STI0670	●
6.80	0/-0.022	6.8	69	109	5	P2386STI0680	●
6.90	0/-0.022	6.9	69	109	5	P2386STI0690	●
7.00	0/-0.022	7	69	109	5	P2386STI0700	●
7.10	0/-0.022	7.1	69	109	5	P2386STI0710	●
7.20	0/-0.022	7.2	69	109	5	P2386STI0720	●
7.30	0/-0.022	7.3	69	109	5	P2386STI0730	●
7.40	0/-0.022	7.4	69	109	5	P2386STI0740	●
7.50	0/-0.022	7.5	69	109	5	P2386STI0750	●
7.60	0/-0.022	7.6	75	117	5	P2386STI0760	●
7.70	0/-0.022	7.7	75	117	5	P2386STI0770	●
7.80	0/-0.022	7.8	75	117	5	P2386STI0780	●
7.90	0/-0.022	7.9	75	117	5	P2386STI0790	●
8.00	0/-0.022	8	75	117	5	P2386STI0800	●
8.10	0/-0.022	8.1	75	117	5	P2386STI0810	●
8.20	0/-0.022	8.2	75	117	5	P2386STI0820	●
8.30	0/-0.022	8.3	75	117	5	P2386STI0830	●
8.40	0/-0.022	8.4	75	117	5	P2386STI0840	●
8.50	0/-0.022	8.5	75	117	5	P2386STI0850	●
8.60	0/-0.022	8.6	81	125	5	P2386STI0860	●
8.70	0/-0.022	8.7	81	125	5	P2386STI0870	●

● stock standard ○ non-standard stock ▽ stock exhaustion

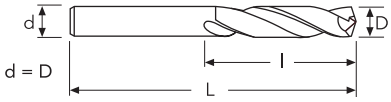
2386STI

STI type for tough materials, split point, TiN pointed, short

DIN 338 | SPLIT POINT | HSS/Co TiN | 135° | 33°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
8.80	0/-0.022	8.8	81	125	5	P2386STI0880	●
8.90	0/-0.022	8.9	81	125	5	P2386STI0890	●
9.00	0/-0.022	9	81	125	5	P2386STI0900	●
9.10	0/-0.022	9.1	81	125	5	P2386STI0910	●
9.20	0/-0.022	9.2	81	125	5	P2386STI0920	●
9.30	0/-0.022	9.3	81	125	5	P2386STI0930	●
9.40	0/-0.022	9.4	81	125	5	P2386STI0940	●
9.50	0/-0.022	9.5	81	125	5	P2386STI0950	●
9.60	0/-0.022	9.6	87	133	5	P2386STI0960	●
9.70	0/-0.022	9.7	87	133	5	P2386STI0970	●
9.80	0/-0.022	9.8	87	133	5	P2386STI0980	●
9.90	0/-0.022	9.9	87	133	5	P2386STI0990	●
10.00	0/-0.022	10	87	133	5	P2386STI1000	●
10.10	0/-0.027	10.1	87	133	5	P2386STI1010	●
10.20	0/-0.027	10.2	87	133	5	P2386STI1020	●
10.30	0/-0.027	10.3	87	133	5	P2386STI1030	●
10.40	0/-0.027	10.4	87	133	5	P2386STI1040	●
10.50	0/-0.027	10.5	87	133	5	P2386STI1050	●
10.60	0/-0.027	10.6	87	133	5	P2386STI1060	●
10.70	0/-0.027	10.7	94	142	5	P2386STI1070	●
10.80	0/-0.027	10.8	94	142	5	P2386STI1080	●
10.90	0/-0.027	10.9	94	142	5	P2386STI1090	●
11.00	0/-0.027	11	94	142	5	P2386STI1100	●
11.10	0/-0.027	11.1	94	142	5	P2386STI1110	●
11.20	0/-0.027	11.2	94	142	5	P2386STI1120	●
11.30	0/-0.027	11.3	94	142	5	P2386STI1130	●
11.40	0/-0.027	11.4	94	142	5	P2386STI1140	●
11.50	0/-0.027	11.5	94	142	5	P2386STI1150	●
11.60	0/-0.027	11.6	94	142	5	P2386STI1160	●
11.70	0/-0.027	11.7	94	142	5	P2386STI1170	●
11.80	0/-0.027	11.8	94	142	5	P2386STI1180	●
11.90	0/-0.027	11.9	101	151	5	P2386STI1190	●
12.00	0/-0.027	12	101	151	5	P2386STI1200	●
12.10	0/-0.027	12.1	101	151	5	P2386STI1210	●
12.20	0/-0.027	12.2	101	151	5	P2386STI1220	●
12.30	0/-0.027	12.3	101	151	5	P2386STI1230	●
12.40	0/-0.027	12.4	101	151	5	P2386STI1240	●
12.50	0/-0.027	12.5	101	151	5	P2386STI1250	●
12.60	0/-0.027	12.6	101	151	5	P2386STI1260	●

● stock standard ○ non-standard stock ▽ stock exhaustion

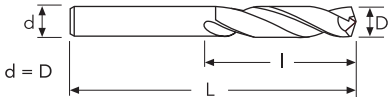
2386STI

STI type for tough materials, split point, TiN pointed, short

DIN 338 | SPLIT POINT | HSS/Co TiN | 135° | 33°

P	M	K	N	S	H
★	★	★	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
12.70	0/-0.027	12.7	101	151	5	P2386STI1270	●
12.80	0/-0.027	12.8	101	151	5	P2386STI1280	●
12.90	0/-0.027	12.9	101	151	5	P2386STI1290	●
13.00	0/-0.027	13	101	151	5	P2386STI1300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

2386STIA01A
Set 50pcs.
2386STI DIN338 HSS/Co TIN POINTED
Ø1 mm÷Ø5.9 mm x 0.1 mm

2386STIA01B
Set 41pcs.
2386STI DIN338 HSS/Co TIN POINTED
Ø6 mm÷Ø10 mm x 0.1 mm

2386STIA05C
Set 25pcs.
2386STI DIN338 HSS/Co TIN POINTED
Ø1 mm÷Ø13 mm x 0.5 mm

CUTTING PARAMETERS

2386STI

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			M3			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			550-850 N/mm²			150-350 HB		
	Vc (m/min)	30-40			25-35			15-25			12-18			30-40		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1	11150	0.017	190	9550	0.014	140	6370	0.012	80	4780	0.009	40	11150	0.019	210
	1.5	7430	0.035	260	6370	0.030	190	4250	0.025	100	3180	0.018	55	7430	0.039	290
	2	5570	0.050	280	4780	0.043	200	3180	0.035	110	2390	0.025	60	5570	0.055	310
	2.5	4460	0.075	330	3820	0.064	240	2550	0.053	130	1910	0.038	70	4460	0.083	370
	3	3720	0.090	330	3180	0.077	240	2120	0.063	130	1590	0.045	70	3720	0.099	370
	3.5	3180	0.105	330	2730	0.089	240	1820	0.074	130	1360	0.053	70	3180	0.116	370
	4	2790	0.110	310	2390	0.094	220	1590	0.077	120	1190	0.055	65	2790	0.121	340
	5	2230	0.125	280	1910	0.106	200	1270	0.088	110	960	0.063	60	2230	0.138	310
	6	1860	0.160	300	1590	0.136	220	1060	0.112	120	800	0.080	65	1860	0.176	330
	7	1590	0.175	280	1360	0.149	200	910	0.123	110	680	0.088	60	1590	0.193	310
	8	1390	0.200	280	1190	0.170	200	800	0.140	110	600	0.100	60	1390	0.220	310
	9	1240	0.210	260	1060	0.179	190	710	0.147	100	530	0.105	55	1240	0.231	290
	10	1110	0.220	240	960	0.187	180	640	0.154	100	480	0.110	55	1110	0.242	270
	11	1010	0.235	240	870	0.200	170	580	0.165	100	430	0.118	50	1010	0.259	260
	12	930	0.250	230	800	0.213	170	530	0.175	90	400	0.125	50	930	0.275	260
	13	860	0.265	230	730	0.225	160	490	0.186	90	370	0.133	50	860	0.292	250

	Material Group ISO 513	K3 K4			N1 N5			N2 N3 N4			S1 S2 S4		
	Hardness/Rm	< 350 HB									< 35 HRC		
	Vc (m/min)	25-35			60-80			50-70			12-18		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	1	9550	0.013	120	22290	0.024	530	19110	0.017	320	4780	0.007	35
	1.5	6370	0.026	170	14860	0.049	730	12740	0.035	450	3180	0.014	45
	2	4780	0.038	180	11150	0.070	780	9550	0.050	480	2390	0.020	50
	2.5	3820	0.056	210	8920	0.105	940	7640	0.075	570	1910	0.030	55
	3	3180	0.068	210	7430	0.126	940	6370	0.090	570	1590	0.036	55
	3.5	2730	0.079	210	6370	0.147	940	5460	0.105	570	1360	0.042	55
	4	2390	0.083	200	5570	0.154	860	4780	0.110	530	1190	0.044	50
	5	1910	0.094	180	4460	0.175	780	3820	0.125	480	960	0.050	50
	6	1590	0.120	190	3720	0.224	830	3180	0.160	510	800	0.064	50
	7	1360	0.131	180	3180	0.245	780	2730	0.175	480	680	0.070	50
	8	1190	0.150	180	2790	0.280	780	2390	0.200	480	600	0.080	50
	9	1060	0.158	170	2480	0.294	730	2120	0.210	450	530	0.084	45
	10	960	0.165	160	2230	0.308	690	1910	0.220	420	480	0.088	40
	11	870	0.176	150	2030	0.329	670	1740	0.235	410	430	0.094	40
	12	800	0.188	150	1860	0.350	650	1590	0.250	400	400	0.100	40
	13	730	0.199	150	1710	0.371	630	1470	0.265	390	370	0.106	40

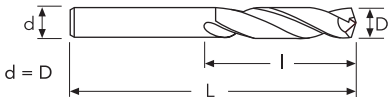
238NVA

NVA type for tough materials, short

DIN 338 | NH | HSS/CO HT | 130° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable

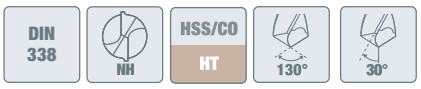


D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
1.00	0/-0.014	1	12	34	10	P238NVA0100	●
1.10	0/-0.014	1.1	14	36	10	P238NVA0110	●
1.20	0/-0.014	1.2	16	38	10	P238NVA0120	●
1.25	0/-0.014	1.25	16	38	10	P238NVA0125	●
1.30	0/-0.014	1.3	16	38	10	P238NVA0130	●
1.40	0/-0.014	1.4	18	40	10	P238NVA0140	●
1.50	0/-0.014	1.5	18	40	10	P238NVA0150	●
1.60	0/-0.014	1.6	20	43	10	P238NVA0160	●
1.70	0/-0.014	1.7	20	43	10	P238NVA0170	●
1.75	0/-0.014	1.75	22	46	10	P238NVA0175	●
1.80	0/-0.014	1.8	22	46	10	P238NVA0180	●
1.90	0/-0.014	1.9	22	46	10	P238NVA0190	●
2.00	0/-0.014	2	24	49	10	P238NVA0200	●
2.10	0/-0.014	2.1	24	49	10	P238NVA0210	●
2.20	0/-0.014	2.2	27	53	10	P238NVA0220	●
2.25	0/-0.014	2.25	27	53	10	P238NVA0225	●
2.30	0/-0.014	2.3	27	53	10	P238NVA0230	●
2.40	0/-0.014	2.4	30	57	10	P238NVA0240	●
2.50	0/-0.014	2.5	30	57	10	P238NVA0250	●
2.60	0/-0.014	2.6	30	57	10	P238NVA0260	●
2.70	0/-0.014	2.7	33	61	10	P238NVA0270	●
2.75	0/-0.014	2.75	33	61	10	P238NVA0275	●
2.80	0/-0.014	2.8	33	61	10	P238NVA0280	●
2.90	0/-0.014	2.9	33	61	10	P238NVA0290	●
3.00	0/-0.014	3	33	61	10	P238NVA0300	●
3.10	0/-0.018	3.1	36	65	10	P238NVA0310	●
3.20	0/-0.018	3.2	36	65	10	P238NVA0320	●
3.25	0/-0.018	3.25	36	65	10	P238NVA0325	●
3.30	0/-0.018	3.3	36	65	10	P238NVA0330	●
3.40	0/-0.018	3.4	39	70	10	P238NVA0340	●
3.50	0/-0.018	3.5	39	70	10	P238NVA0350	●
3.60	0/-0.018	3.6	39	70	10	P238NVA0360	●
3.70	0/-0.018	3.7	39	70	10	P238NVA0370	●
3.75	0/-0.018	3.75	39	70	10	P238NVA0375	●
3.80	0/-0.018	3.8	43	75	10	P238NVA0380	●
3.90	0/-0.018	3.9	43	75	10	P238NVA0390	●
4.00	0/-0.018	4	43	75	10	P238NVA0400	●
4.10	0/-0.018	4.1	43	75	10	P238NVA0410	●
4.20	0/-0.018	4.2	43	75	10	P238NVA0420	●

● stock standard ○ non-standard stock ▽ stock exhaustion

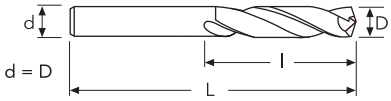
238NVA

NVA type for tough materials, short



P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
4.25	0/-0.018	4.25	43	75	10	P238NVA0425	●
4.30	0/-0.018	4.3	47	80	10	P238NVA0430	●
4.40	0/-0.018	4.4	47	80	10	P238NVA0440	●
4.50	0/-0.018	4.5	47	80	10	P238NVA0450	●
4.60	0/-0.018	4.6	47	80	10	P238NVA0460	●
4.70	0/-0.018	4.7	47	80	10	P238NVA0470	●
4.75	0/-0.018	4.75	47	80	10	P238NVA0475	●
4.80	0/-0.018	4.8	52	86	10	P238NVA0480	●
4.90	0/-0.018	4.9	52	86	10	P238NVA0490	●
5.00	0/-0.018	5	52	86	10	P238NVA0500	●
5.10	0/-0.018	5.1	52	86	10	P238NVA0510	●
5.20	0/-0.018	5.2	52	86	10	P238NVA0520	●
5.25	0/-0.018	5.25	52	86	10	P238NVA0525	●
5.30	0/-0.018	5.3	52	86	10	P238NVA0530	●
5.40	0/-0.018	5.4	57	93	10	P238NVA0540	●
5.50	0/-0.018	5.5	57	93	10	P238NVA0550	●
5.60	0/-0.018	5.6	57	93	10	P238NVA0560	●
5.70	0/-0.018	5.7	57	93	10	P238NVA0570	●
5.75	0/-0.018	5.75	57	93	10	P238NVA0575	●
5.80	0/-0.018	5.8	57	93	10	P238NVA0580	●
5.90	0/-0.018	5.9	57	93	10	P238NVA0590	●
6.00	0/-0.018	6	57	93	10	P238NVA0600	●
6.10	0/-0.022	6.1	63	101	10	P238NVA0610	●
6.20	0/-0.022	6.2	63	101	10	P238NVA0620	●
6.25	0/-0.022	6.25	63	101	10	P238NVA0625	●
6.30	0/-0.022	6.3	63	101	10	P238NVA0630	●
6.40	0/-0.022	6.4	63	101	10	P238NVA0640	●
6.50	0/-0.022	6.5	63	101	10	P238NVA0650	●
6.60	0/-0.022	6.6	63	101	5	P238NVA0660	●
6.70	0/-0.022	6.7	63	101	5	P238NVA0670	●
6.75	0/-0.022	6.75	69	109	5	P238NVA0675	●
6.80	0/-0.022	6.8	69	109	5	P238NVA0680	●
6.90	0/-0.022	6.9	69	109	5	P238NVA0690	●
7.00	0/-0.022	7	69	109	5	P238NVA0700	●
7.10	0/-0.022	7.1	69	109	5	P238NVA0710	●
7.20	0/-0.022	7.2	69	109	5	P238NVA0720	●
7.25	0/-0.022	7.25	69	109	5	P238NVA0725	●
7.30	0/-0.022	7.3	69	109	5	P238NVA0730	●
7.40	0/-0.022	7.4	69	109	5	P238NVA0740	●

● stock standard ○ non-standard stock ▽ stock exhaustion

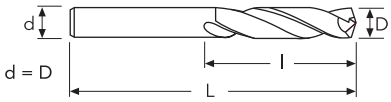
238NVA

NVA type for tough materials, short

DIN 338 | NH | HSS/CO HT | 130° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
7.50	0/-0.022	7.5	69	109	5	P238NVA0750	●
7.60	0/-0.022	7.6	75	117	5	P238NVA0760	●
7.70	0/-0.022	7.7	75	117	5	P238NVA0770	●
7.75	0/-0.022	7.75	75	117	5	P238NVA0775	●
7.80	0/-0.022	7.8	75	117	5	P238NVA0780	●
7.90	0/-0.022	7.9	75	117	5	P238NVA0790	●
8.00	0/-0.022	8	75	117	5	P238NVA0800	●
8.10	0/-0.022	8.1	75	117	5	P238NVA0810	●
8.20	0/-0.022	8.2	75	117	5	P238NVA0820	●
8.25	0/-0.022	8.25	75	117	5	P238NVA0825	●
8.30	0/-0.022	8.3	75	117	5	P238NVA0830	●
8.40	0/-0.022	8.4	75	117	5	P238NVA0840	●
8.50	0/-0.022	8.5	75	117	5	P238NVA0850	●
8.60	0/-0.022	8.6	81	125	5	P238NVA0860	●
8.70	0/-0.022	8.7	81	125	5	P238NVA0870	●
8.75	0/-0.022	8.75	81	125	5	P238NVA0875	●
8.80	0/-0.022	8.8	81	125	5	P238NVA0880	●
8.90	0/-0.022	8.9	81	125	5	P238NVA0890	●
9.00	0/-0.022	9	81	125	5	P238NVA0900	●
9.10	0/-0.022	9.1	81	125	5	P238NVA0910	●
9.20	0/-0.022	9.2	81	125	5	P238NVA0920	●
9.25	0/-0.022	9.25	81	125	5	P238NVA0925	●
9.30	0/-0.022	9.3	81	125	5	P238NVA0930	●
9.40	0/-0.022	9.4	81	125	5	P238NVA0940	●
9.50	0/-0.022	9.5	81	125	5	P238NVA0950	●
9.60	0/-0.022	9.6	87	133	5	P238NVA0960	●
9.70	0/-0.022	9.7	87	133	5	P238NVA0970	●
9.75	0/-0.022	9.75	87	133	5	P238NVA0975	●
9.80	0/-0.022	9.8	87	133	5	P238NVA0980	●
9.90	0/-0.022	9.9	87	133	5	P238NVA0990	●
10.00	0/-0.022	10	87	133	5	P238NVA1000	●
10.20	0/-0.027	10.2	87	133	5	P238NVA1020	●
10.50	0/-0.027	10.5	87	133	5	P238NVA1050	●
11.00	0/-0.027	11	94	142	5	P238NVA1100	●
11.50	0/-0.027	11.5	94	142	5	P238NVA1150	●
12.00	0/-0.027	12	101	151	5	P238NVA1200	●
12.50	0/-0.027	12.5	101	151	5	P238NVA1250	●
13.00	0/-0.027	13	101	151	5	P238NVA1300	●
13.50	0/-0.027	13.5	108	160	1	P238NVA1350	●

● stock standard ○ non-standard stock ▽ stock exhaustion

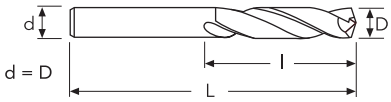
238NVA

NVA type for tough materials, short

DIN 338 | NH | HSS/CO HT | 130° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
14.00	0/-0.027	14	108	160	1	P238NVA1400	●
14.50	0/-0.027	14.5	114	169	1	P238NVA1450	●
15.00	0/-0.027	15	114	169	1	P238NVA1500	●
15.50	0/-0.027	15.5	120	178	1	P238NVA1550	●
16.00	0/-0.027	16	120	178	1	P238NVA1600	●
16.50	0/-0.027	16.5	125	184	1	P238NVA1650	●
17.00	0/-0.027	17	125	184	1	P238NVA1700	●
17.50	0/-0.027	17.5	130	191	1	P238NVA1750	●
18.00	0/-0.027	18	130	191	1	P238NVA1800	●
18.50	0/-0.033	18.5	135	198	1	P238NVA1850	●
19.00	0/-0.033	19	135	198	1	P238NVA1900	●
19.50	0/-0.033	19.5	140	205	1	P238NVA1950	○
20.00	0/-0.033	20	140	205	1	P238NVA2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

238NVAA01A
Set 50pcs.
238NVA DIN338 HSS/Co
Ø1 mm÷Ø5.9 mm x 0.1 mm

238NVAA01B
Set 41pcs.
238NVA DIN338 HSS/Co
Ø6 mm÷Ø10 mm x 0.1 mm

238NVAA05C
Set 25pcs.
238NVA DIN338 HSS/Co
Ø1 mm÷Ø13 mm x 0.5 mm

238NVA

Material Group ISO 513	P1 P2			P3 P4			M1 M2			M3 M4			K1 K2		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			550-850 N/mm²			150-350 HB		
Vc (m/min)	25-35			20-30			12-18			8-12			25-35		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1	9550	0.017	160	7960	0.014	120	4780	0.012	57	3180	0.009	27	9550	0.019	180
1.5	6370	0.035	220	5310	0.030	160	3180	0.025	80	2120	0.018	37	6370	0.039	250
2	4780	0.050	240	3980	0.043	170	2390	0.035	80	1590	0.025	40	4780	0.055	260
2.5	3820	0.060	230	3180	0.051	160	1910	0.042	80	1270	0.030	38	3820	0.066	250
3	3180	0.070	220	2650	0.060	160	1590	0.049	80	1060	0.035	37	3180	0.077	240
3.5	2730	0.080	220	2270	0.068	150	1360	0.056	80	910	0.040	36	2730	0.088	240
4	2390	0.090	220	1990	0.077	150	1190	0.063	70	800	0.045	36	2390	0.099	240
5	1910	0.100	190	1590	0.085	140	960	0.070	70	640	0.050	32	1910	0.110	210
6	1590	0.110	170	1330	0.094	120	800	0.077	60	530	0.055	29	1590	0.121	190
7	1360	0.120	160	1140	0.102	120	680	0.084	60	450	0.060	27	1360	0.132	180
8	1190	0.130	150	1000	0.111	110	600	0.091	55	400	0.065	26	1190	0.143	170
9	1060	0.140	150	880	0.119	100	530	0.098	52	350	0.070	25	1060	0.154	160
10	960	0.160	150	800	0.136	110	480	0.112	54	320	0.080	26	960	0.176	170
11	870	0.170	150	720	0.145	100	430	0.119	51	290	0.085	25	870	0.187	160
12	800	0.180	140	660	0.153	100	400	0.126	50	270	0.090	24	800	0.198	160
13	730	0.190	140	610	0.162	100	370	0.133	49	240	0.095	23	730	0.209	150
14	680	0.200	140	570	0.170	100	340	0.140	48	230	0.100	23	680	0.220	150
15	640	0.210	130	530	0.179	90	320	0.147	47	210	0.105	22	640	0.231	150
16	600	0.220	130	500	0.187	90	300	0.154	46	200	0.110	22	600	0.242	150
17	560	0.230	130	470	0.196	90	280	0.161	45	190	0.115	22	560	0.253	140
18	530	0.240	130	440	0.204	90	270	0.168	45	180	0.120	22	530	0.264	140
19	500	0.250	130	420	0.213	90	250	0.175	44	170	0.125	21	500	0.275	140
20	480	0.260	120	400	0.221	90	240	0.182	44	160	0.130	21	480	0.286	140

Material Group ISO 513	K3 K4			N1 N5			N2 N3 N4			S1 S2 S4		
Hardness/Rm	< 350 HB									< 35 HRC		
Vc (m/min)	20-30			50-70			40-60			8-12		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
1	7960	0.013	100	19110	0.024	450	15920	0.017	270	3180	0.007	22
1.5	5310	0.026	140	12740	0.049	620	10620	0.035	370	2120	0.014	30
2	3980	0.038	150	9550	0.070	670	7960	0.050	400	1590	0.020	32
2.5	3180	0.045	140	7640	0.084	640	6370	0.060	380	1270	0.024	30
3	2650	0.053	140	6370	0.098	620	5310	0.070	370	1060	0.028	30
3.5	2270	0.060	140	5460	0.112	610	4550	0.080	360	910	0.032	29
4	1990	0.068	130	4780	0.126	600	3980	0.090	360	800	0.036	29
5	1590	0.075	120	3820	0.140	530	3180	0.100	320	640	0.040	26
6	1330	0.083	110	3180	0.154	490	2650	0.110	290	530	0.044	23
7	1140	0.090	100	2730	0.168	460	2270	0.120	270	450	0.048	22
8	1000	0.098	100	2390	0.182	430	1990	0.130	260	400	0.052	21
9	880	0.105	90	2120	0.196	420	1770	0.140	250	350	0.056	20
10	800	0.120	100	1910	0.224	430	1590	0.160	250	320	0.064	20
11	720	0.128	90	1740	0.238	410	1450	0.170	250	290	0.068	20
12	660	0.135	90	1590	0.252	400	1330	0.180	240	270	0.072	19
13	610	0.143	90	1470	0.266	390	1220	0.190	230	240	0.076	18
14	570	0.150	90	1360	0.280	380	1140	0.200	230	230	0.080	18
15	530	0.158	80	1270	0.294	370	1060	0.210	220	210	0.084	18
16	500	0.165	80	1190	0.308	370	1000	0.220	220	200	0.088	18
17	470	0.173	80	1120	0.322	360	940	0.230	220	190	0.092	17
18	440	0.180	80	1060	0.336	360	880	0.240	210	180	0.096	17
19	420	0.188	80	1010	0.350	350	840	0.250	210	170	0.100	17
20	400	0.195	80	960	0.364	350	800	0.260	210	160	0.104	17

234NVA

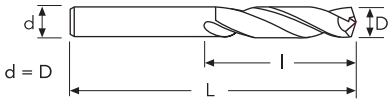
NVA type for tough materials, long

DIN 340 | NH | HSS/CO* HT | 130° | 30°

* < Ø2 mm = HSS BR

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
0.50	0/-0.014	0.5	12	32	10	P134NB0050	●
0.60	0/-0.014	0.6	15	35	10	P134NB0060	●
0.70	0/-0.014	0.7	21	42	10	P134NB0070	●
0.80	0/-0.014	0.8	25	46	10	P134NB0080	●
0.90	0/-0.014	0.9	29	51	10	P134NB0090	●
1.00	0/-0.014	1	33	56	10	P134NB0100	●
1.10	0/-0.014	1.1	37	60	10	P134NB0110	●
1.20	0/-0.014	1.2	41	65	10	P134NB0120	●
1.30	0/-0.014	1.3	41	65	10	P134NB0130	●
1.40	0/-0.014	1.4	45	70	10	P134NB0140	●
1.50	0/-0.014	1.5	45	70	10	P134NB0150	●
1.60	0/-0.014	1.6	50	76	10	P134NB0160	●
1.70	0/-0.014	1.7	50	76	10	P134NB0170	●
1.80	0/-0.014	1.8	53	80	10	P134NB0180	●
1.90	0/-0.014	1.9	53	80	10	P134NB0190	●
2.00	0/-0.014	2	56	85	10	P234NVA0200	●
2.10	0/-0.014	2.1	56	85	10	P234NVA0210	●
2.20	0/-0.014	2.2	59	90	10	P234NVA0220	●
2.30	0/-0.014	2.3	59	90	10	P234NVA0230	●
2.40	0/-0.014	2.4	62	95	10	P234NVA0240	●
2.50	0/-0.014	2.5	62	95	10	P234NVA0250	●
2.60	0/-0.014	2.6	62	95	10	P234NVA0260	●
2.70	0/-0.014	2.7	66	100	10	P234NVA0270	●
2.80	0/-0.014	2.8	66	100	10	P234NVA0280	●
2.90	0/-0.014	2.9	66	100	10	P234NVA0290	●
3.00	0/-0.014	3	66	100	10	P234NVA0300	●
3.10	0/-0.018	3.1	69	106	10	P234NVA0310	●
3.20	0/-0.018	3.2	69	106	10	P234NVA0320	●
3.30	0/-0.018	3.3	69	106	10	P234NVA0330	●
3.40	0/-0.018	3.4	73	112	10	P234NVA0340	●
3.50	0/-0.018	3.5	73	112	10	P234NVA0350	●
3.60	0/-0.018	3.6	73	112	10	P234NVA0360	●
3.70	0/-0.018	3.7	73	112	10	P234NVA0370	●
3.80	0/-0.018	3.8	78	119	10	P234NVA0380	●
3.90	0/-0.018	3.9	78	119	10	P234NVA0390	●
4.00	0/-0.018	4	78	119	10	P234NVA0400	●
4.10	0/-0.018	4.1	78	119	10	P234NVA0410	●
4.20	0/-0.018	4.2	78	119	10	P234NVA0420	●
4.30	0/-0.018	4.3	82	126	10	P234NVA0430	●

● stock standard ○ non-standard stock ▽ stock exhaustion

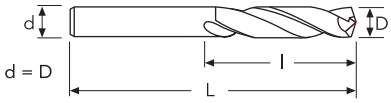
234NVA

NVA type for tough materials, long

DIN 340 | NH | HSS/CO HT | 130° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
4.40	0/-0.018	4.4	82	126	10	P234NVA0440	●
4.50	0/-0.018	4.5	82	126	10	P234NVA0450	●
4.60	0/-0.018	4.6	82	126	10	P234NVA0460	●
4.70	0/-0.018	4.7	82	126	10	P234NVA0470	●
4.80	0/-0.018	4.8	87	132	10	P234NVA0480	●
4.90	0/-0.018	4.9	87	132	10	P234NVA0490	●
5.00	0/-0.018	5	87	132	10	P234NVA0500	●
5.10	0/-0.018	5.1	87	132	10	P234NVA0510	●
5.20	0/-0.018	5.2	87	132	10	P234NVA0520	●
5.30	0/-0.018	5.3	87	132	10	P234NVA0530	●
5.40	0/-0.018	5.4	91	139	10	P234NVA0540	●
5.50	0/-0.018	5.5	91	139	10	P234NVA0550	●
5.60	0/-0.018	5.6	91	139	10	P234NVA0560	●
5.70	0/-0.018	5.7	91	139	10	P234NVA0570	●
5.80	0/-0.018	5.8	91	139	10	P234NVA0580	●
5.90	0/-0.018	5.9	91	139	10	P234NVA0590	●
6.00	0/-0.018	6	91	139	10	P234NVA0600	●
6.10	0/-0.022	6.1	97	148	5	P234NVA0610	●
6.20	0/-0.022	6.2	97	148	5	P234NVA0620	●
6.30	0/-0.022	6.3	97	148	5	P234NVA0630	●
6.40	0/-0.022	6.4	97	148	5	P234NVA0640	○
6.50	0/-0.022	6.5	97	148	5	P234NVA0650	●
6.60	0/-0.022	6.6	97	148	5	P234NVA0660	●
6.70	0/-0.022	6.7	97	148	5	P234NVA0670	●
6.80	0/-0.022	6.8	102	156	5	P234NVA0680	●
6.90	0/-0.022	6.9	102	156	5	P234NVA0690	●
7.00	0/-0.022	7	102	156	5	P234NVA0700	●
7.10	0/-0.022	7.1	102	156	5	P234NVA0710	●
7.20	0/-0.022	7.2	102	156	5	P234NVA0720	●
7.30	0/-0.022	7.3	102	156	5	P234NVA0730	○
7.40	0/-0.022	7.4	102	156	5	P234NVA0740	●
7.50	0/-0.022	7.5	102	156	5	P234NVA0750	●
7.60	0/-0.022	7.6	109	165	5	P234NVA0760	●
7.70	0/-0.022	7.7	109	165	5	P234NVA0770	●
7.80	0/-0.022	7.8	109	165	5	P234NVA0780	●
7.90	0/-0.022	7.9	109	165	5	P234NVA0790	●
8.00	0/-0.022	8	109	165	5	P234NVA0800	●
8.10	0/-0.022	8.1	109	165	5	P234NVA0810	●
8.20	0/-0.022	8.2	109	165	5	P234NVA0820	●

● stock standard ○ non-standard stock ▽ stock exhaustion

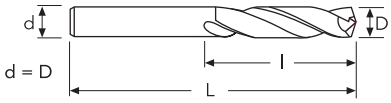
234NVA

NVA type for tough materials, long

DIN 340 | NH | HSS/CO HT | 130° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
8.30	0/-0.022	8.3	109	165	5	P234NVA0830	●
8.40	0/-0.022	8.4	109	165	5	P234NVA0840	●
8.50	0/-0.022	8.5	109	165	5	P234NVA0850	●
8.60	0/-0.022	8.6	115	175	5	P234NVA0860	●
8.70	0/-0.022	8.7	115	175	5	P234NVA0870	●
8.80	0/-0.022	8.8	115	175	5	P234NVA0880	●
8.90	0/-0.022	8.9	115	175	5	P234NVA0890	●
9.00	0/-0.022	9	115	175	5	P234NVA0900	●
9.10	0/-0.022	9.1	115	175	5	P234NVA0910	●
9.20	0/-0.022	9.2	115	175	5	P234NVA0920	●
9.30	0/-0.022	9.3	115	175	5	P234NVA0930	●
9.40	0/-0.022	9.4	115	175	5	P234NVA0940	●
9.50	0/-0.022	9.5	115	175	5	P234NVA0950	●
9.60	0/-0.022	9.6	121	184	5	P234NVA0960	●
9.70	0/-0.022	9.7	121	184	5	P234NVA0970	●
9.80	0/-0.022	9.8	121	184	5	P234NVA0980	●
9.90	0/-0.022	9.9	121	184	5	P234NVA0990	●
10.00	0/-0.022	10	121	184	5	P234NVA1000	●
10.20	0/-0.027	10.2	121	184	5	P234NVA1020	●
10.50	0/-0.027	10.5	121	184	5	P234NVA1050	●
10.80	0/-0.027	10.8	128	195	5	P234NVA1080	●
11.00	0/-0.027	11	128	195	5	P234NVA1100	●
11.20	0/-0.027	11.20	128	195	5	P234NVA1120	●
11.50	0/-0.027	11.5	128	195	5	P234NVA1150	●
11.80	0/-0.027	11.80	128	195	5	P234NVA1180	●
12.00	0/-0.027	12	134	205	5	P234NVA1200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

234NVA

Material Group ISO 513	P1 P2			P3 P4			M1 M2			M3 M4			K1 K2		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			550-850 N/mm²			150-350 HB		
Vc (m/min)	20-30			15-25			12-16			8-12			20-30		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
0.5	15920	0.008	130	12740	0.007	90	8920	0.006	50	6370	0.004	25	15920	0.009	140
0.8	9950	0.015	150	7960	0.013	100	5570	0.011	58	3980	0.008	30	9950	0.017	160
1	7960	0.020	160	6370	0.017	110	4460	0.014	62	3180	0.010	32	7960	0.022	180
1.5	5310	0.030	160	4250	0.026	110	2970	0.021	62	2120	0.015	32	5310	0.033	180
2	3980	0.040	160	3180	0.034	110	2230	0.028	62	1590	0.020	32	3980	0.044	180
2.5	3180	0.050	160	2550	0.043	110	1780	0.035	62	1270	0.025	32	3180	0.055	170
3	2650	0.060	160	2120	0.051	110	1490	0.042	63	1060	0.030	32	2650	0.066	170
3.5	2270	0.070	160	1820	0.060	110	1270	0.049	62	910	0.035	32	2270	0.077	170
4	1990	0.080	160	1590	0.068	110	1110	0.056	62	800	0.040	32	1990	0.088	180
5	1590	0.090	140	1270	0.077	100	890	0.063	56	640	0.045	29	1590	0.099	160
6	1330	0.100	130	1060	0.085	90	740	0.070	52	530	0.050	27	1330	0.110	150
7	1140	0.110	130	910	0.094	90	640	0.077	49	450	0.055	25	1140	0.121	140
8	1000	0.120	120	800	0.102	80	560	0.084	47	400	0.060	24	1000	0.132	130
9	880	0.130	110	710	0.111	80	500	0.091	46	350	0.065	23	880	0.143	130
10	800	0.140	110	640	0.119	80	450	0.098	44	320	0.070	22	800	0.154	120
11	720	0.150	110	580	0.128	70	410	0.105	43	290	0.075	22	720	0.165	120
12	660	0.160	110	530	0.136	70	370	0.112	41	270	0.080	22	660	0.176	120

Material Group ISO 513	K3 K4			N1 N5			N2 N3 N4			S1 S2 S4		
Hardness/Rm	< 350 HB									< 35 HRC		
Vc (m/min)	20-30			40-60			30-50			8-12		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
0.5	15920	0.006	100	31850	0.011	360	25480	0.008	200	6370	0.003	20
0.8	9950	0.011	110	19900	0.021	420	15920	0.015	240	3980	0.006	24
1	7960	0.015	120	15920	0.028	450	12740	0.020	250	3180	0.008	25
1.5	5310	0.023	120	10620	0.042	450	8490	0.030	250	2120	0.012	25
2	3980	0.030	120	7960	0.056	450	6370	0.040	250	1590	0.016	25
2.5	3180	0.038	120	6370	0.070	450	5100	0.050	260	1270	0.020	25
3	2650	0.045	120	5310	0.084	450	4250	0.060	260	1060	0.024	25
3.5	2270	0.053	120	4550	0.098	450	3640	0.070	250	910	0.028	25
4	1990	0.060	120	3980	0.112	450	3180	0.080	250	800	0.032	26
5	1590	0.068	110	3180	0.126	400	2550	0.090	230	640	0.036	23
6	1330	0.075	100	2650	0.140	370	2120	0.100	210	530	0.040	21
7	1140	0.083	90	2270	0.154	350	1820	0.110	200	450	0.044	20
8	1000	0.090	90	1990	0.168	330	1590	0.120	190	400	0.048	19
9	880	0.098	90	1770	0.182	320	1420	0.130	180	350	0.052	18
10	800	0.105	80	1590	0.196	310	1270	0.140	180	320	0.056	18
11	720	0.113	80	1450	0.210	300	1160	0.150	170	290	0.060	17
12	660	0.120	80	1330	0.224	300	1060	0.160	170	270	0.064	17

234LS-234LSTH

LS type for deep holes, long (234LS),
LS type for deep holes, PV15 coated, long (234LSTH)

DIN 340 | LS | HSS/CO OX | HSS/CO PV15 | 130° | 35-40°

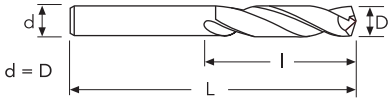
234LS 234LSTH

234LS

234LSTH

P	M	K	N	S	H
★	☆	★			

★ 1st choice ☆ suitable



						234LS		234LSTH	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
2.00	0/-0.014	2	56	85	10	P234LS0200	●	P234LSTH0200	●
2.10	0/-0.014	2.1	56	85	10	P234LS0210	●	P234LSTH0210	●
2.20	0/-0.014	2.2	59	90	10	P234LS0220	●	P234LSTH0220	●
2.30	0/-0.014	2.3	59	90	10	P234LS0230	●	P234LSTH0230	●
2.40	0/-0.014	2.4	62	95	10	P234LS0240	●	P234LSTH0240	●
2.50	0/-0.014	2.5	62	95	10	P234LS0250	●	P234LSTH0250	●
2.60	0/-0.014	2.6	62	95	10	P234LS0260	●	P234LSTH0260	●
2.70	0/-0.014	2.7	66	100	10	P234LS0270	●	P234LSTH0270	●
2.80	0/-0.014	2.8	66	100	10	P234LS0280	●	P234LSTH0280	●
2.90	0/-0.014	2.9	66	100	10	P234LS0290	●	P234LSTH0290	●
3.00	0/-0.014	3	66	100	10	P234LS0300	●	P234LSTH0300	●
3.10	0/-0.018	3.1	69	106	10	P234LS0310	●	P234LSTH0310	●
3.20	0/-0.018	3.2	69	106	10	P234LS0320	●	P234LSTH0320	●
3.30	0/-0.018	3.3	69	106	10	P234LS0330	●	P234LSTH0330	●
3.40	0/-0.018	3.4	73	112	10	P234LS0340	●	P234LSTH0340	●
3.50	0/-0.018	3.5	73	112	10	P234LS0350	●	P234LSTH0350	●
3.60	0/-0.018	3.6	73	112	10	P234LS0360	●	P234LSTH0360	●
3.70	0/-0.018	3.7	73	112	10	P234LS0370	●	P234LSTH0370	●
3.80	0/-0.018	3.8	78	119	10	P234LS0380	●	P234LSTH0380	●
3.90	0/-0.018	3.9	78	119	10	P234LS0390	●	P234LSTH0390	●
4.00	0/-0.018	4	78	119	10	P234LS0400	●	P234LSTH0400	●
4.20	0/-0.018	4.2	78	119	10	P234LS0420	●	P234LSTH0420	●
4.50	0/-0.018	4.5	82	126	10	P234LS0450	●	P234LSTH0450	●
4.80	0/-0.018	4.8	87	132	10	P234LS0480	●	P234LSTH0480	●
5.00	0/-0.018	5	87	132	10	P234LS0500	●	P234LSTH0500	●
5.20	0/-0.018	5.2	87	132	10	P234LS0520	●	P234LSTH0520	●
5.50	0/-0.018	5.5	91	139	10	P234LS0550	●	P234LSTH0550	●
5.80	0/-0.018	5.8	91	139	10	P234LS0580	●	P234LSTH0580	●
6.00	0/-0.018	6	91	139	10	P234LS0600	●	P234LSTH0600	●
6.20	0/-0.022	6.2	97	148	5	P234LS0620	●	P234LSTH0620	●
6.50	0/-0.022	6.5	97	148	5	P234LS0650	●	P234LSTH0650	●
6.80	0/-0.022	6.8	102	156	5	P234LS0680	●	P234LSTH0680	●
7.00	0/-0.022	7	102	156	5	P234LS0700	●	P234LSTH0700	●
7.20	0/-0.022	7.2	102	156	5	P234LS0720	●		
7.50	0/-0.022	7.5	102	156	5	P234LS0750	●	P234LSTH0750	●
7.80	0/-0.022	7.8	109	165	5	P234LS0780	●		
8.00	0/-0.022	8	109	165	5	P234LS0800	●	P234LSTH0800	●
8.20	0/-0.022	8.2	109	165	5	P234LS0820	●		
8.50	0/-0.022	8.5	109	165	5	P234LS0850	●	P234LSTH0850	●

● stock standard ○ non-standard stock ▽ stock exhaustion

234LS-234LSTH

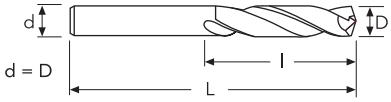
LS type for deep holes, long (234LS),
LS type for deep holes, PV15 coated, long (234LSTH)

234LS

234LSTH

P	M	K	N	S	H
★	☆	★			

★ 1st choice ☆ suitable



						234LS		234LSTH	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
9.00	0/-0.022	9	115	175	5	P234LS0900	●	P234LSTH0900	●
9.50	0/-0.022	9.5	115	175	5	P234LS0950	●	P234LSTH0950	●
9.80	0/-0.022	9.8	121	184	5	P234LS0980	●		
10.00	0/-0.022	10	121	184	5	P234LS1000	●	P234LSTH1000	●
10.50	0/-0.027	10.5	121	184	5	P234LS1050	●	P234LSTH1050	●
11.00	0/-0.027	11	128	195	5	P234LS1100	●	P234LSTH1100	●
11.50	0/-0.027	11.5	128	195	5	P234LS1150	●	P234LSTH1150	●
12.00	0/-0.027	12	134	205	5	P234LS1200	●	P234LSTH1200	●
12.50	0/-0.027	12.5	134	205	5	P234LS1250	●	P234LSTH1250	●
13.00	0/-0.027	13	134	205	5	P234LS1300	●	P234LSTH1300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

234LS

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			150-350 HB		
	Vc (m/min)	20-30			15-25			10-14			20-30		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	2	3980	0.040	160	3180	0.034	110	1910	0.028	53	3980	0.044	180
	2.5	3180	0.050	160	2550	0.043	110	1530	0.035	54	3180	0.055	170
	3	2650	0.060	160	2120	0.051	110	1270	0.042	53	2650	0.066	170
	3.5	2270	0.070	160	1820	0.060	110	1090	0.049	53	2270	0.077	170
	4	1990	0.080	160	1590	0.068	110	960	0.056	54	1990	0.088	180
	5	1590	0.090	140	1270	0.077	100	760	0.063	48	1590	0.099	160
	6	1330	0.100	130	1060	0.085	90	640	0.070	45	1330	0.110	150
	7	1140	0.110	130	910	0.094	90	550	0.077	42	1140	0.121	140
	8	1000	0.120	120	800	0.102	80	480	0.084	40	1000	0.132	130
	9	880	0.130	110	710	0.111	80	420	0.091	38	880	0.143	130
	10	800	0.140	110	640	0.119	80	380	0.098	37	800	0.154	120
	11	720	0.150	110	580	0.128	70	350	0.105	37	720	0.165	120
	12	660	0.160	110	530	0.136	70	320	0.112	36	660	0.176	120
	13	610	0.170	100	490	0.145	70	290	0.119	35	610	0.187	110

234LSTH

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			150-350 HB		
	Vc (m/min)	25-35			20-30			16-20			25-35		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	2	4780	0.040	190	3980	0.034	140	2870	0.028	80	4780	0.044	210
	2.5	3820	0.050	190	3180	0.043	140	2290	0.035	80	3820	0.055	210
	3	3180	0.060	190	2650	0.051	140	1910	0.042	80	3180	0.066	210
	3.5	2730	0.070	190	2270	0.060	140	1640	0.049	80	2730	0.077	210
	4	2390	0.080	190	1990	0.068	140	1430	0.056	80	2390	0.088	210
	5	1910	0.090	170	1590	0.077	120	1150	0.063	72	1910	0.099	190
	6	1590	0.100	160	1330	0.085	110	960	0.070	67	1590	0.110	170
	7	1360	0.110	150	1140	0.094	110	820	0.077	63	1360	0.121	160
	8	1190	0.120	140	1000	0.102	100	720	0.084	60	1190	0.132	160
	9	1060	0.130	140	880	0.111	100	640	0.091	58	1060	0.143	150
	10	960	0.140	130	800	0.119	100	570	0.098	56	960	0.154	150
	11	870	0.150	130	720	0.128	90	520	0.105	55	870	0.165	140
	12	800	0.160	130	660	0.136	90	480	0.112	54	800	0.176	140
	13	730	0.170	120	610	0.145	90	440	0.119	52	730	0.187	140

2691LS-2691LSTH

LS type for deep holes, extra-long/1 (2691LS);
LS type for deep holes, PV15 coated, extra-long/1 (2691LSTH)

DIN 1869/1 | LS | HSS/Co BR | HSS/CO PV15 | 130° | 35-40°

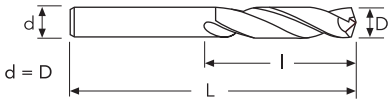
2691LS 2691LSTH

2691LS

2691LSTH

P	M	K	N	S	H
★	☆	★			

★ 1st choice ☆ suitable



						2691LS		2691LSTH	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
2.00	0/-0.014	2	85	125	10	P2691LS0200	●	P2691LSTH0200	●
2.50	0/-0.014	2.5	95	140	10	P2691LS0250	●	P2691LSTH0250	●
3.00	0/-0.014	3	100	150	10	P2691LS0300	●	P2691LSTH0300	●
3.50	0/-0.018	3.5	115	165	10	P2691LS0350	●	P2691LSTH0350	●
4.00	0/-0.018	4	120	175	10	P2691LS0400	●	P2691LSTH0400	●
4.50	0/-0.018	4.5	125	185	10	P2691LS0450	●	P2691LSTH0450	●
5.00	0/-0.018	5	135	195	10	P2691LS0500	●	P2691LSTH0500	●
5.50	0/-0.018	5.5	140	205	10	P2691LS0550	●	P2691LSTH0550	●
6.00	0/-0.018	6	140	205	10	P2691LS0600	●	P2691LSTH0600	●
6.50	0/-0.022	6.5	150	215	5	P2691LS0650	●	P2691LSTH0650	●
6.75	0/-0.022	6.75	155	225	5	P2691LS0675	●		
7.00	0/-0.022	7	155	225	5	P2691LS0700	●	P2691LSTH0700	●
7.50	0/-0.022	7.5	155	225	5	P2691LS0750	●	P2691LSTH0750	●
8.00	0/-0.022	8	165	240	5	P2691LS0800	●	P2691LSTH0800	●
8.50	0/-0.022	8.5	165	240	5	P2691LS0850	●	P2691LSTH0850	●
9.00	0/-0.022	9	175	250	5	P2691LS0900	●	P2691LSTH0900	●
9.50	0/-0.022	9.5	175	250	5	P2691LS0950	●	P2691LSTH0950	●
10.00	0/-0.022	10	185	265	5	P2691LS1000	●	P2691LSTH1000	●
10.50	0/-0.027	10.5	185	265	5	P2691LS1050	●	P2691LSTH1050	●
11.00	0/-0.027	11	195	280	5	P2691LS1100	●	P2691LSTH1100	●
11.50	0/-0.027	11.5	195	280	5	P2691LS1150	●	P2691LSTH1150	●
12.00	0/-0.027	12	205	295	5	P2691LS1200	●	P2691LSTH1200	●
12.50	0/-0.027	12.5	205	295	5	P2691LS1250	●	P2691LSTH1250	●
13.00	0/-0.027	13	205	295	5	P2691LS1300	●	P2691LSTH1300	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

2691LS

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			150-350 HB		
	Vc (m/min)	**20-24**			**16-20**			**8-12**			**20-24**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	2	3500	0.032	110	2870	0.027	80	1590	0.022	36	3500	0.035	125
	2.5	2800	0.040	110	2290	0.034	80	1270	0.028	36	2800	0.044	125
	3	2340	0.048	110	1910	0.041	80	1060	0.034	36	2340	0.053	125
	3.5	2000	0.056	110	1640	0.048	80	910	0.039	36	2000	0.062	125
	4	1750	0.064	110	1430	0.054	80	800	0.045	36	1750	0.070	125
	5	1400	0.072	100	1150	0.061	70	640	0.050	32	1400	0.079	110
	6	1170	0.080	95	960	0.068	65	530	0.056	30	1170	0.088	105
	7	1000	0.088	90	820	0.075	60	450	0.062	28	1000	0.097	95
	8	880	0.096	85	720	0.082	60	400	0.067	27	880	0.106	95
	9	780	0.104	80	640	0.088	55	350	0.073	25	780	0.114	90
	10	700	0.112	80	570	0.095	55	320	0.078	25	700	0.123	85
	11	640	0.120	75	520	0.102	55	290	0.084	24	640	0.132	85
	12	580	0.128	75	480	0.109	50	270	0.090	24	580	0.141	80
	13	540	0.136	75	440	0.116	50	240	0.095	23	540	0.150	80

2691LSTH

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			150-350 HB		
	Vc (m/min)	**24-28**			**20-24**			**10-14**			**24-28**		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	2	4140	0.032	132	3503	0.027	95	1911	0.022	43	4140	0.035	146
	2.5	3312	0.040	132	2803	0.034	95	1529	0.028	43	3312	0.044	146
	3	2760	0.048	132	2335	0.041	95	1274	0.034	43	2760	0.053	146
	3.5	2366	0.056	132	2002	0.048	95	1092	0.039	43	2366	0.062	146
	4	2070	0.064	132	1752	0.054	95	955	0.045	43	2070	0.070	146
	5	1656	0.072	119	1401	0.061	86	764	0.050	39	1656	0.079	131
	6	1380	0.080	110	1168	0.068	79	637	0.056	36	1380	0.088	121
	7	1183	0.088	104	1001	0.075	75	546	0.062	34	1183	0.097	115
	8	1035	0.096	99	876	0.082	71	478	0.067	32	1035	0.106	109
	9	920	0.104	96	778	0.088	69	425	0.073	31	920	0.114	105
	10	828	0.112	93	701	0.095	67	382	0.078	30	828	0.123	102
	11	753	0.120	90	637	0.102	65	347	0.084	29	753	0.132	99
	12	690	0.128	88	584	0.109	64	318	0.090	29	690	0.141	97
	13	637	0.136	87	539	0.116	62	294	0.095	28	637	0.150	95

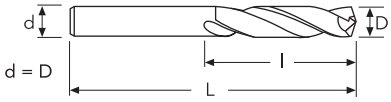
1692LS

LS type for deep holes, extra-long/2

DIN 1869/2 | LS | HSS BR | 130° | 35-40°

P	M	K	N	S	H
★		★			

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
3.00	0/-0.014	3	130	190	1	P1692LS0300	●
3.50	0/-0.018	3.5	145	210	1	P1692LS0350	●
4.00	0/-0.018	4	150	220	1	P1692LS0400	●
4.50	0/-0.018	4.5	160	235	1	P1692LS0450	●
5.00	0/-0.018	5	170	245	1	P1692LS0500	●
5.50	0/-0.018	5.5	180	260	1	P1692LS0550	●
6.00	0/-0.018	6	180	260	1	P1692LS0600	●
6.50	0/-0.022	6.5	190	275	1	P1692LS0650	●
7.00	0/-0.022	7	200	290	1	P1692LS0700	●
7.50	0/-0.022	7.5	200	290	1	P1692LS0750	●
8.00	0/-0.022	8	210	305	1	P1692LS0800	●
8.50	0/-0.022	8.5	210	305	1	P1692LS0850	●
9.00	0/-0.022	9	220	320	1	P1692LS0900	●
9.50	0/-0.022	9.5	220	320	1	P1692LS0950	●
10.00	0/-0.022	10	235	340	1	P1692LS1000	●
10.50	0/-0.027	10.5	235	340	1	P1692LS1050	●
11.00	0/-0.027	11	250	365	1	P1692LS1100	●
12.00	0/-0.027	12	260	375	1	P1692LS1200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

1692LS

	Material Group ISO 513	P1 P2			P3 P4			K1 K2								
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			150-350 HB								
	Vc (m/min)	20-24			16-20			20-24								
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)						
	3	2340	0.040	95	1910	0.034	65	2340	0.044	105						
	3.5	2000	0.048	95	1640	0.041	65	2000	0.053	105						
	4	1750	0.056	100	1430	0.048	70	1750	0.062	110						
	5	1400	0.064	90	1150	0.054	65	1400	0.070	100						
	6	1170	0.072	85	960	0.061	60	1170	0.079	95						
	7	1000	0.080	80	820	0.068	55	1000	0.088	90						
	8	880	0.088	75	720	0.075	55	880	0.097	85						
	9	780	0.096	75	640	0.082	50	780	0.106	80						
	10	700	0.104	75	570	0.088	50	700	0.114	80						
	11	640	0.112	70	520	0.095	50	640	0.123	80						
	12	580	0.120	70	480	0.102	50	580	0.132	75						
	13	540	0.128	70	440	0.109	50	540	0.141	75						

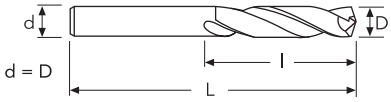
1693LS

LS type for deep holes, extra-long/3

DIN 1869/3 | LS | HSS / BR | 130° | 35-40°

P	M	K	N	S	H
★		★			

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
3.50	0/-0.018	3.5	180	265	1	P1693LS0350	●
4.00	0/-0.018	4	190	280	1	P1693LS0400	●
4.50	0/-0.018	4.5	200	295	1	P1693LS0450	●
5.00	0/-0.018	5	210	315	1	P1693LS0500	●
5.50	0/-0.018	5.5	225	330	1	P1693LS0550	●
6.00	0/-0.018	6	225	330	1	P1693LS0600	●
6.50	0/-0.022	6.5	235	350	1	P1693LS0650	●
7.00	0/-0.022	7	250	370	1	P1693LS0700	●
7.50	0/-0.022	7.5	250	370	1	P1693LS0750	●
8.00	0/-0.022	8	265	390	1	P1693LS0800	●
8.50	0/-0.022	8.5	265	390	1	P1693LS0850	●
9.00	0/-0.022	9	280	410	1	P1693LS0900	●
9.50	0/-0.022	9.5	280	410	1	P1693LS0950	●
10.00	0/-0.022	10	295	430	1	P1693LS1000	●
10.50	0/-0.027	10.5	295	430	1	P1693LS1050	●
11.00	0/-0.027	11	310	455	1	P1693LS1100	●
12.00	0/-0.027	12	330	480	1	P1693LS1200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

1693LS

	Material Group ISO 513	P1 P2			P3 P4			K1 K2					
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			150-350 HB					
	Vc (m/min)	**15-25**			**10-20**			**15-25**					
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)			
	3.5	1820	0.045	80	1360	0.038	50	1820	0.050	90			
	4	1590	0.053	85	1190	0.045	55	1590	0.058	90			
	5	1270	0.060	75	960	0.051	50	1270	0.066	85			
	6	1060	0.068	70	800	0.057	45	1060	0.074	80			
	7	910	0.075	70	680	0.064	45	910	0.083	75			
	8	800	0.083	65	600	0.070	40	800	0.091	75			
	9	710	0.090	65	530	0.077	40	710	0.099	70			
	10	640	0.098	60	480	0.083	40	640	0.107	70			
	11	580	0.105	60	430	0.089	40	580	0.116	65			
	12	530	0.113	60	400	0.096	40	530	0.124	65			
	13	490	0.120	60	370	0.102	40	490	0.132	65			

145N-145NTI

N type for general purpose, MT shank, short (145N),
N type for general purpose, MT shank, TiN coated, short (145NTI)

DIN 345 | N | HSS OX | HSS TiN | 118° | 25-30°

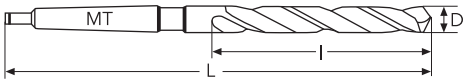
145N 145NTI

145N

145NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



						145N		145NTI	
D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
5.00	0/-0.018	1	52	133	1	P145N0500	●		
5.25	0/-0.018	1	52	133	1	P145N0525	○		
5.50	0/-0.018	1	57	138	1	P145N0550	●		
5.75	0/-0.018	1	57	138	1	P145N0575	○		
6.00	0/-0.018	1	57	138	1	P145N0600	●		
6.25	0/-0.022	1	63	144	1	P145N0625	○		
6.50	0/-0.022	1	63	144	1	P145N0650	●		
6.75	0/-0.022	1	69	150	1	P145N0675	●		
7.00	0/-0.022	1	69	150	1	P145N0700	●		
7.25	0/-0.022	1	69	150	1	P145N0725	○		
7.50	0/-0.022	1	69	150	1	P145N0750	●		
7.75	0/-0.022	1	75	156	1	P145N0775	○		
8.00	0/-0.022	1	75	156	1	P145N0800	●		
8.25	0/-0.022	1	75	156	1	P145N0825	○		
8.50	0/-0.022	1	75	156	1	P145N0850	●		
8.75	0/-0.022	1	81	162	1	P145N0875	○		
9.00	0/-0.022	1	81	162	1	P145N0900	●		
9.25	0/-0.022	1	81	162	1	P145N0925	○		
9.50	0/-0.022	1	81	162	1	P145N0950	●		
9.75	0/-0.022	1	87	168	1	P145N0975	○		
10.00	0/-0.022	1	87	168	1	P145N1000	●		
10.25	0/-0.027	1	87	168	1	P145N1025	●		
10.50	0/-0.027	1	87	168	1	P145N1050	●		
10.75	0/-0.027	1	94	175	1	P145N1075	○		
11.00	0/-0.027	1	94	175	1	P145N1100	●		
11.25	0/-0.027	1	94	175	1	P145N1125	○		
11.50	0/-0.027	1	94	175	1	P145N1150	●		
11.75	0/-0.027	1	94	175	1	P145N1175	○		
12.00	0/-0.027	1	101	182	1	P145N1200	●		
12.25	0/-0.027	1	101	182	1	P145N1225	○		
12.50	0/-0.027	1	101	182	1	P145N1250	●		
12.75	0/-0.027	1	101	182	1	P145N1275	○		
13.00	0/-0.027	1	101	182	1	P145N1300	●	P145NTI1300	●
13.25	0/-0.027	1	108	189	1	P145N1325	●		
13.50	0/-0.027	1	108	189	1	P145N1350	●	P145NTI1350	●
13.75	0/-0.027	1	108	189	1	P145N1375	●		
14.00	0/-0.027	1	108	189	1	P145N1400	●	P145NTI1400	●
14.25	0/-0.027	2	114	212	1	P145N1425	●		
14.50	0/-0.027	2	114	212	1	P145N1450	●	P145NTI1450	●

● stock standard ○ non-standard stock ▽ stock exhaustion

145N-145NTI

N type for general purpose, MT shank, short (145N),
N type for general purpose, MT shank, TiN coated, short (145NTI)

DIN 345 | N | HSS OX | HSS TiN | 118° | 25-30°

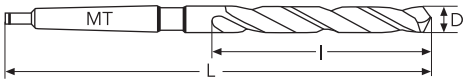
145N 145NTI

145N

145NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



						145N		145NTI	
D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
14.75	0/-0.027	2	114	212	1	P145N1475	●		
15.00	0/-0.027	2	114	212	1	P145N1500	●	P145NTI1500	●
15.25	0/-0.027	2	120	218	1	P145N1525	●		
15.50	0/-0.027	2	120	218	1	P145N1550	●	P145NTI1550	●
15.75	0/-0.027	2	120	218	1	P145N1575	●		
16.00	0/-0.027	2	120	218	1	P145N1600	●	P145NTI1600	●
16.25	0/-0.027	2	125	223	1	P145N1625	●		
16.50	0/-0.027	2	125	223	1	P145N1650	●	P145NTI1650	●
16.75	0/-0.027	2	125	223	1	P145N1675	●		
17.00	0/-0.027	2	125	223	1	P145N1700	●	P145NTI1700	●
17.25	0/-0.027	2	130	228	1	P145N1725	●		
17.50	0/-0.027	2	130	228	1	P145N1750	●	P145NTI1750	●
17.75	0/-0.027	2	130	228	1	P145N1775	●		
18.00	0/-0.027	2	130	228	1	P145N1800	●	P145NTI1800	●
18.25	0/-0.033	2	135	233	1	P145N1825	●		
18.50	0/-0.033	2	135	233	1	P145N1850	●	P145NTI1850	●
18.75	0/-0.033	2	135	233	1	P145N1875	●		
19.00	0/-0.033	2	135	233	1	P145N1900	●	P145NTI1900	●
19.25	0/-0.033	2	140	238	1	P145N1925	●		
19.50	0/-0.033	2	140	238	1	P145N1950	●	P145NTI1950	●
19.75	0/-0.033	2	140	238	1	P145N1975	●		
20.00	0/-0.033	2	140	238	1	P145N2000	●	P145NTI2000	●
20.25	0/-0.033	2	145	243	1	P145N2025	●		
20.50	0/-0.033	2	145	243	1	P145N2050	●	P145NTI2050	●
20.75	0/-0.033	2	145	243	1	P145N2075	●		
21.00	0/-0.033	2	145	243	1	P145N2100	●	P145NTI2100	●
21.25	0/-0.033	2	150	248	1	P145N2125	●		
21.50	0/-0.033	2	150	248	1	P145N2150	●	P145NTI2150	●
21.75	0/-0.033	2	150	248	1	P145N2175	●		
22.00	0/-0.033	2	150	248	1	P145N2200	●	P145NTI2200	●
22.25	0/-0.033	2	150	248	1	P145N2225	●		
22.50	0/-0.033	2	155	253	1	P145N2250	●	P145NTI2250	●
22.75	0/-0.033	2	155	253	1	P145N2275	●		
23.00	0/-0.033	2	155	253	1	P145N2300	●	P145NTI2300	●
23.25	0/-0.033	3	155	276	1	P145N2325	●		
23.50	0/-0.033	3	155	276	1	P145N2350	●	P145NTI2350	●
23.75	0/-0.033	3	160	281	1	P145N2375	●		
24.00	0/-0.033	3	160	281	1	P145N2400	●	P145NTI2400	●
24.25	0/-0.033	3	160	281	1	P145N2425	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

145N-145NTI

N type for general purpose, MT shank, short (145N),
N type for general purpose, MT shank, TiN coated, short (145NTI)

DIN 345 | N | HSS OX | HSS TiN | 118° | 25-30°

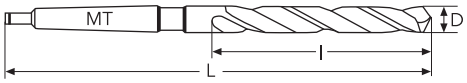
145N 145NTI

145N

145NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



						145N		145NTI	
D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
24.50	0/-0.033	3	160	281	1	P145N2450	●	P145NTI2450	●
24.75	0/-0.033	3	160	281	1	P145N2475	●		
25.00	0/-0.033	3	160	281	1	P145N2500	●	P145NTI2500	●
25.25	0/-0.033	3	165	286	1	P145N2525	○		
25.50	0/-0.033	3	165	286	1	P145N2550	●		
25.75	0/-0.033	3	165	286	1	P145N2575	○		
26.00	0/-0.033	3	165	286	1	P145N2600	●	P145NTI2600	●
26.25	0/-0.033	3	165	286	1	P145N2625	○		
26.50	0/-0.033	3	165	286	1	P145N2650	●		
26.75	0/-0.033	3	170	291	1	P145N2675	○		
27.00	0/-0.033	3	170	291	1	P145N2700	●	P145NTI2700	●
27.25	0/-0.033	3	170	291	1	P145N2725	○		
27.50	0/-0.033	3	170	291	1	P145N2750	●		
27.75	0/-0.033	3	170	291	1	P145N2775	○		
28.00	0/-0.033	3	170	291	1	P145N2800	●	P145NTI2800	●
28.25	0/-0.033	3	175	296	1	P145N2825	○		
28.50	0/-0.033	3	175	296	1	P145N2850	●		
28.75	0/-0.033	3	175	296	1	P145N2875	○		
29.00	0/-0.033	3	175	296	1	P145N2900	●	P145NTI2900	●
29.25	0/-0.033	3	175	296	1	P145N2925	○		
29.50	0/-0.033	3	175	296	1	P145N2950	●		
29.75	0/-0.033	3	175	296	1	P145N2975	○		
30.00	0/-0.033	3	175	296	1	P145N3000	●	P145NTI3000	●
30.25	0/-0.039	3	180	301	1	P145N3025	○		
30.50	0/-0.039	3	180	301	1	P145N3050	●		
30.75	0/-0.039	3	180	301	1	P145N3075	○		
31.00	0/-0.039	3	180	301	1	P145N3100	●		
31.25	0/-0.039	3	180	301	1	P145N3125	○		
31.50	0/-0.039	3	180	301	1	P145N3150	●		
31.75	0/-0.039	3	185	306	1	P145N3175	○		
32.00	0/-0.039	4	185	334	1	P145N3200	●		
32.50	0/-0.039	4	185	334	1	P145N3250	●		
33.00	0/-0.039	4	185	334	1	P145N3300	●		
33.50	0/-0.039	4	185	334	1	P145N3350	●		
34.00	0/-0.039	4	190	339	1	P145N3400	●		
34.50	0/-0.039	4	190	339	1	P145N3450	●		
35.00	0/-0.039	4	190	339	1	P145N3500	●		
35.50	0/-0.039	4	190	339	1	P145N3550	●		
36.00	0/-0.039	4	195	344	1	P145N3600	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

145N-145NTI

N type for general purpose, MT shank, short (145N),
N type for general purpose, MT shank, TiN coated, short (145NTI)

DIN 345 | N | HSS OX | HSS TiN | 118° | 25-30°

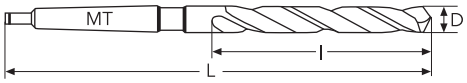
145N 145NTI

145N

145NTI

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



						145N		145NTI	
D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
36.50	0/-0.039	4	195	344	1	P145N3650	●		
37.00	0/-0.039	4	195	344	1	P145N3700	●		
37.50	0/-0.039	4	195	344	1	P145N3750	●		
38.00	0/-0.039	4	200	349	1	P145N3800	●		
38.50	0/-0.039	4	200	349	1	P145N3850	●		
39.00	0/-0.039	4	200	349	1	P145N3900	●		
39.50	0/-0.039	4	200	349	1	P145N3950	●		
40.00	0/-0.039	4	200	349	1	P145N4000	●		
40.50	0/-0.039	4	205	354	1	P145N4050	●		
41.00	0/-0.039	4	205	354	1	P145N4100	●		
42.00	0/-0.039	4	205	354	1	P145N4200	●		
43.00	0/-0.039	4	210	359	1	P145N4300	●		
44.00	0/-0.039	4	210	359	1	P145N4400	●		
45.00	0/-0.039	4	210	359	1	P145N4500	●		
46.00	0/-0.039	4	215	364	1	P145N4600	●		
47.00	0/-0.039	4	215	364	1	P145N4700	●		
48.00	0/-0.039	4	220	369	1	P145N4800	●		
49.00	0/-0.039	4	220	369	1	P145N4900	●		
50.00	0/-0.039	4	220	369	1	P145N5000	●		
55.00	0/-0.046	5	230	417	1	P145N5500	●		
60.00	0/-0.046	5	235	422	1	P145N6000	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

145N

	Material Group ISO 513	P1 P2			P3 P4			K1 K2			N1 N5			N2 N3 N4		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			150-350 HB								
	Vc (m/min)	25-35			20-30			25-35			50-70			40-60		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	5	1910	0.100	190	1590	0.085	140	1910	0.110	210	3820	0.140	530	3180	0.100	320
	6	1590	0.120	190	1330	0.102	140	1590	0.132	210	3180	0.168	530	2650	0.120	320
	7	1360	0.140	190	1140	0.119	140	1360	0.154	210	2730	0.196	540	2270	0.140	320
	8	1190	0.160	190	1000	0.136	140	1190	0.176	210	2390	0.224	540	1990	0.160	320
	9	1060	0.180	190	880	0.153	130	1060	0.198	210	2120	0.252	530	1770	0.180	320
	10	960	0.200	190	800	0.170	140	960	0.220	210	1910	0.280	530	1590	0.200	320
	11	870	0.208	180	720	0.177	130	870	0.229	200	1740	0.291	510	1450	0.208	300
	12	800	0.216	170	660	0.184	120	800	0.238	190	1590	0.302	480	1330	0.216	290
	13	730	0.224	160	610	0.190	120	730	0.246	180	1470	0.314	460	1220	0.224	270
	14	680	0.232	160	570	0.197	110	680	0.255	170	1360	0.325	440	1140	0.232	260
	15	640	0.240	150	530	0.204	110	640	0.264	170	1270	0.336	430	1060	0.240	250
	16	600	0.250	150	500	0.213	110	600	0.275	170	1190	0.350	420	1000	0.250	250
	17	560	0.265	150	470	0.225	110	560	0.292	160	1120	0.371	420	940	0.265	250
	18	530	0.280	150	440	0.238	100	530	0.308	160	1060	0.392	420	880	0.280	250
	19	500	0.295	150	420	0.251	110	500	0.325	160	1010	0.413	420	840	0.295	250
	20	480	0.315	150	400	0.268	110	480	0.347	170	960	0.441	420	800	0.315	250
	22	430	0.330	140	360	0.281	100	430	0.363	160	870	0.462	400	720	0.330	240
	25	380	0.350	130	320	0.298	100	380	0.385	150	760	0.490	370	640	0.350	220
	27	350	0.370	130	290	0.315	90	350	0.407	140	710	0.518	370	590	0.370	220
	30	320	0.400	130	270	0.340	90	320	0.440	140	640	0.560	360	530	0.400	210
	35	270	0.450	120	230	0.383	90	270	0.495	130	550	0.630	350	450	0.450	200
	40	240	0.500	120	200	0.425	90	240	0.550	130	480	0.700	340	400	0.500	200
	45	210	0.560	120	180	0.476	90	210	0.616	130	420	0.784	330	350	0.560	200
	50	190	0.630	120	160	0.536	90	190	0.693	130	380	0.882	340	320	0.630	200
	55	170	0.700	120	140	0.595	80	170	0.770	130	350	0.980	340	290	0.700	200
	60	160	0.800	130	130	0.680	90	160	0.880	140	320	1.120	360	270	0.800	220

145NTI

	Material Group ISO 513	P1 P2			P3 P4			K1 K2			N1 N5			N2 N3 N4		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			150-350 HB								
	Vc (m/min)	30-40			25-35			30-40			60-80			50-70		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	13	860	0.224	190	730	0.190	139	860	0.246	210	1710	0.314	540	1470	0.224	330
	14	800	0.232	190	680	0.197	134	800	0.255	200	1590	0.325	520	1360	0.232	320
	15	740	0.240	180	640	0.204	131	740	0.264	200	1490	0.336	500	1270	0.240	300
	16	700	0.250	180	600	0.213	128	700	0.275	190	1390	0.350	490	1190	0.250	300
	17	660	0.265	170	560	0.225	126	660	0.292	190	1310	0.371	490	1120	0.265	300
	18	620	0.280	170	530	0.238	126	620	0.308	190	1240	0.392	490	1060	0.280	300
	19	590	0.295	170	500	0.251	125	590	0.325	190	1170	0.413	480	1010	0.295	300
	20	560	0.315	180	480	0.268	129	560	0.347	190	1110	0.441	490	960	0.315	300
	22	510	0.330	170	430	0.281	121	510	0.363	190	1010	0.462	470	870	0.330	290
	25	450	0.350	160	380	0.298	113	450	0.385	170	890	0.490	440	760	0.350	270
	27	410	0.370	150	350	0.315	110	410	0.407	170	830	0.518	430	710	0.370	260
	30	370	0.400	150	320	0.340	109	370	0.440	160	740	0.560	410	640	0.400	260

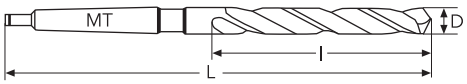
245N

N type for tough materials, MT shank, short

DIN 345 | NH | HSS/CO OX | 118° | 30°

P	M	K	N	S	H
★	★	☆	☆	☆	

★ 1st choice ☆ suitable



D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock
13.00	0/-0.027	1	101	182	1	P245N1300	●
13.50	0/-0.027	1	108	189	1	P245N1350	●
14.00	0/-0.027	1	108	189	1	P245N1400	●
14.50	0/-0.027	2	114	212	1	P245N1450	●
15.00	0/-0.027	2	114	212	1	P245N1500	●
15.50	0/-0.027	2	120	218	1	P245N1550	●
16.00	0/-0.027	2	120	218	1	P245N1600	●
16.50	0/-0.027	2	125	223	1	P245N1650	●
17.00	0/-0.027	2	125	223	1	P245N1700	●
17.50	0/-0.027	2	130	228	1	P245N1750	●
18.00	0/-0.027	2	130	228	1	P245N1800	●
18.50	0/-0.033	2	135	233	1	P245N1850	●
19.00	0/-0.033	2	135	233	1	P245N1900	●
19.50	0/-0.033	2	140	238	1	P245N1950	●
20.00	0/-0.033	2	140	238	1	P245N2000	●
20.50	0/-0.033	2	145	243	1	P245N2050	●
21.00	0/-0.033	2	145	243	1	P245N2100	●
21.50	0/-0.033	2	150	248	1	P245N2150	●
22.00	0/-0.033	2	150	248	1	P245N2200	●
22.50	0/-0.033	2	155	253	1	P245N2250	●
23.00	0/-0.033	2	155	253	1	P245N2300	●
23.50	0/-0.033	3	155	276	1	P245N2350	●
24.00	0/-0.033	3	160	281	1	P245N2400	●
24.50	0/-0.033	3	160	281	1	P245N2450	●
25.00	0/-0.033	3	160	281	1	P245N2500	●
26.00	0/-0.033	3	165	286	1	P245N2600	●
27.00	0/-0.033	3	170	291	1	P245N2700	●
28.00	0/-0.033	3	170	291	1	P245N2800	●
29.00	0/-0.033	3	175	296	1	P245N2900	●
30.00	0/-0.033	3	175	296	1	P245N3000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

245N

Material Group ISO 513	P1 P2			P3 P4			M1 M2			M3 M4			K1 K2		
Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			550-850 N/mm²			150-350 HB		
Vc (m/min)	25-35			20-30			12-18			8-12			25-35		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
13	730	0.224	160	610	0.190	120	370	0.157	60	240	0.112	27	730	0.246	180
14	680	0.232	160	570	0.197	110	340	0.162	55	230	0.116	27	680	0.255	170
15	640	0.240	150	530	0.204	110	320	0.168	55	210	0.120	25	640	0.264	170
16	600	0.250	150	500	0.213	110	300	0.175	55	200	0.125	25	600	0.275	170
17	560	0.265	150	470	0.225	110	280	0.186	50	190	0.133	25	560	0.292	160
18	530	0.280	150	440	0.238	100	270	0.196	55	180	0.140	25	530	0.308	160
19	500	0.295	150	420	0.251	110	250	0.207	50	170	0.148	25	500	0.325	160
20	480	0.315	150	400	0.268	110	240	0.221	55	160	0.158	25	480	0.347	170
22	430	0.330	140	360	0.281	100	220	0.231	50	140	0.165	23	430	0.363	160
25	380	0.350	130	320	0.298	100	190	0.245	47	130	0.175	23	380	0.385	150
27	350	0.370	130	290	0.315	90	180	0.259	47	120	0.185	22	350	0.407	140
30	320	0.400	130	270	0.340	90	160	0.280	45	110	0.200	22	320	0.440	140

Material Group ISO 513	K3 K4			N1 N5			N2 N3 N4			S1 S2 S4		
Hardness/Rm	< 350 HB									< 35 HRC		
Vc (m/min)	20-30			50-70			40-60			8-12		
D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
13	610	0.168	100	1470	0.314	460	1220	0.224	270	240	0.090	22
14	570	0.174	100	1360	0.325	440	1140	0.232	260	230	0.093	21
15	530	0.180	100	1270	0.336	430	1060	0.240	250	210	0.096	20
16	500	0.188	90	1190	0.350	420	1000	0.250	250	200	0.100	20
17	470	0.199	90	1120	0.371	420	940	0.265	250	190	0.106	20
18	440	0.210	90	1060	0.392	420	880	0.280	250	180	0.112	20
19	420	0.221	90	1010	0.413	420	840	0.295	250	170	0.118	20
20	400	0.236	90	960	0.441	420	800	0.315	250	160	0.126	20
22	360	0.248	90	870	0.462	400	720	0.330	240	140	0.132	18
25	320	0.263	80	760	0.490	370	640	0.350	220	130	0.140	18
27	290	0.278	80	710	0.518	370	590	0.370	220	120	0.148	18
30	270	0.300	80	640	0.560	360	530	0.400	210	110	0.160	18

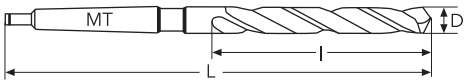
241LS

LS type for deep holes, MT shank, long

DIN 341 | LS | HSS/CO OX | 130° | 35-40°

P	M	K	N	S	H
★	☆	★			

★ 1st choice ☆ suitable



D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock
13.00	0/-0.027	1	134	215	1	P241LS1300	●
14.00	0/-0.027	1	142	223	1	P241LS1400	●
14.50	0/-0.027	2	147	245	1	P241LS1450	●
15.00	0/-0.027	2	147	245	1	P241LS1500	●
15.50	0/-0.027	2	153	251	1	P241LS1550	●
16.00	0/-0.027	2	153	251	1	P241LS1600	●
16.50	0/-0.027	2	159	257	1	P241LS1650	●
17.00	0/-0.027	2	159	257	1	P241LS1700	●
17.50	0/-0.027	2	165	263	1	P241LS1750	●
18.00	0/-0.027	2	165	263	1	P241LS1800	●
18.50	0/-0.033	2	171	269	1	P241LS1850	●
19.00	0/-0.033	2	171	269	1	P241LS1900	●
19.50	0/-0.033	2	177	275	1	P241LS1950	●
20.00	0/-0.033	2	177	275	1	P241LS2000	●
21.00	0/-0.033	2	184	282	1	P241LS2100	●
22.00	0/-0.033	2	191	289	1	P241LS2200	●
23.00	0/-0.033	2	198	296	1	P241LS2300	●
24.00	0/-0.033	3	206	327	1	P241LS2400	●
25.00	0/-0.033	3	206	327	1	P241LS2500	●
26.00	0/-0.033	3	214	335	1	P241LS2600	●
27.00	0/-0.033	3	222	343	1	P241LS2700	●
28.00	0/-0.033	3	222	343	1	P241LS2800	●
29.00	0/-0.033	3	230	351	1	P241LS2900	●
30.00	0/-0.033	3	230	351	1	P241LS3000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

241LS

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			150-350 HB		
	Vc (m/min)	15-25			10-20			10-14			20-30		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	13	490	0.160	80	370	0.136	50	290	0.112	32	610	0.176	110
	14	450	0.170	75	340	0.145	49	270	0.119	32	570	0.187	110
	15	420	0.180	75	320	0.153	49	250	0.126	32	530	0.198	100
	16	400	0.200	80	300	0.170	51	240	0.140	34	500	0.220	110
	17	370	0.190	70	280	0.162	45	220	0.133	29	470	0.209	100
	18	350	0.205	70	270	0.174	47	210	0.144	30	440	0.226	100
	19	340	0.220	75	250	0.187	47	200	0.154	31	420	0.242	100
	20	320	0.235	75	240	0.200	48	190	0.165	31	400	0.259	100
	21	300	0.250	75	230	0.213	49	180	0.175	32	380	0.275	100
	22	290	0.265	75	220	0.225	50	170	0.186	32	360	0.292	100
	23	280	0.280	80	210	0.238	50	170	0.196	33	350	0.308	110
	24	270	0.295	80	200	0.251	50	160	0.207	33	330	0.325	110
	25	250	0.310	80	190	0.264	50	150	0.217	33	320	0.341	110
	26	240	0.325	80	180	0.276	50	150	0.228	34	310	0.358	110
	27	240	0.340	80	180	0.289	52	140	0.238	33	290	0.374	110
	28	230	0.355	80	170	0.302	51	140	0.249	35	280	0.391	110
	29	220	0.370	80	160	0.315	50	130	0.259	34	270	0.407	110
	30	210	0.385	80	160	0.327	52	130	0.270	35	270	0.424	110

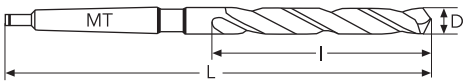
2701LS

LS type for deep holes, MT shank, extra-long/1

DIN 1870/1 | LS | HSS/CO OX | 130° | 35-40°

P	M	K	N	S	H
★	☆	★			

★ 1st choice ☆ suitable



D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock
13.00	0/-0.027	1	205	310	1	P2701LS1300	●
13.50	0/-0.027	1	220	325	1	P2701LS1350	●
14.00	0/-0.027	1	220	325	1	P2701LS1400	●
14.50	0/-0.027	2	220	340	1	P2701LS1450	●
15.00	0/-0.027	2	220	340	1	P2701LS1500	●
15.50	0/-0.027	2	230	355	1	P2701LS1550	●
16.00	0/-0.027	2	230	355	1	P2701LS1600	●
16.50	0/-0.027	2	230	355	1	P2701LS1650	●
17.00	0/-0.027	2	230	355	1	P2701LS1700	●
17.50	0/-0.027	2	245	370	1	P2701LS1750	●
18.00	0/-0.027	2	245	370	1	P2701LS1800	●
18.50	0/-0.033	2	245	370	1	P2701LS1850	●
19.00	0/-0.033	2	245	370	1	P2701LS1900	●
19.50	0/-0.033	2	260	385	1	P2701LS1950	●
20.00	0/-0.033	2	260	385	1	P2701LS2000	●
21.00	0/-0.033	2	260	385	1	P2701LS2100	●
22.00	0/-0.033	2	270	405	1	P2701LS2200	●
23.00	0/-0.033	2	270	405	1	P2701LS2300	●
24.00	0/-0.033	3	290	440	1	P2701LS2400	●
25.00	0/-0.033	3	290	440	1	P2701LS2500	●
26.00	0/-0.033	3	290	440	1	P2701LS2600	●
27.00	0/-0.033	3	305	460	1	P2701LS2700	●
28.00	0/-0.033	3	305	460	1	P2701LS2800	●
29.00	0/-0.033	3	305	460	1	P2701LS2900	●
30.00	0/-0.033	3	305	460	1	P2701LS3000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

2701LS

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			150-350 HB		
	Vc (m/min)	20-24			16-20			8-12			20-24		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	13	540	0.140	75	440	0.119	50	240	0.098	24	540	0.154	83
	14	500	0.150	75	410	0.128	50	230	0.105	24	500	0.165	83
	15	470	0.160	75	380	0.136	50	210	0.112	24	470	0.176	83
	16	440	0.180	80	360	0.153	55	200	0.126	25	440	0.198	87
	17	410	0.190	80	340	0.162	55	190	0.133	25	410	0.209	86
	18	390	0.200	80	320	0.170	55	180	0.140	25	390	0.220	86
	19	370	0.210	80	300	0.179	55	170	0.147	25	370	0.231	85
	20	350	0.220	75	290	0.187	55	160	0.154	25	350	0.242	85
	21	330	0.220	75	270	0.187	50	150	0.154	23	330	0.242	80
	22	320	0.230	75	260	0.196	50	140	0.161	23	320	0.253	81
	23	300	0.250	75	250	0.213	55	140	0.175	25	300	0.275	83
	24	290	0.260	75	240	0.221	55	130	0.182	24	290	0.286	83
	25	280	0.280	80	230	0.238	55	130	0.196	25	280	0.308	86
	26	270	0.290	80	220	0.247	55	120	0.203	24	270	0.319	86
	27	260	0.300	80	210	0.255	55	120	0.210	25	260	0.330	86
	28	250	0.310	80	200	0.264	55	110	0.217	24	250	0.341	85
	29	240	0.325	80	200	0.276	55	110	0.228	25	240	0.358	86
	30	230	0.340	80	190	0.289	55	110	0.238	26	230	0.374	86

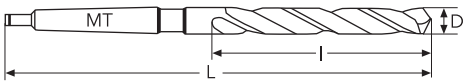
2702LS

LS type for deep holes, MT shank, extra-long/2

DIN 1870/2 | LS | HSS/CO OX | 130° | 35-40°

P	M	K	N	S	H
★	☆	★			

★ 1st choice ☆ suitable



D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock
13.00	0/-0.027	1	260	395	1	P2702LS1300	●
14.00	0/-0.027	1	275	410	1	P2702LS1400	●
14.50	0/-0.027	2	275	425	1	P2702LS1450	●
15.00	0/-0.027	2	275	425	1	P2702LS1500	●
15.50	0/-0.027	2	295	445	1	P2702LS1550	●
16.00	0/-0.027	2	295	445	1	P2702LS1600	●
16.50	0/-0.027	2	295	445	1	P2702LS1650	●
17.00	0/-0.027	2	295	445	1	P2702LS1700	●
17.50	0/-0.027	2	310	465	1	P2702LS1750	●
18.00	0/-0.027	2	310	465	1	P2702LS1800	●
18.50	0/-0.033	2	310	465	1	P2702LS1850	●
19.00	0/-0.033	2	310	465	1	P2702LS1900	●
19.50	0/-0.033	2	325	490	1	P2702LS1950	●
20.00	0/-0.033	2	325	490	1	P2702LS2000	●
21.00	0/-0.033	2	325	490	1	P2702LS2100	●
22.00	0/-0.033	2	345	515	1	P2702LS2200	●
23.00	0/-0.033	2	345	515	1	P2702LS2300	●
24.00	0/-0.033	3	365	555	1	P2702LS2400	●
25.00	0/-0.033	3	365	555	1	P2702LS2500	●
26.00	0/-0.033	3	365	555	1	P2702LS2600	●
27.00	0/-0.033	3	385	580	1	P2702LS2700	●
28.00	0/-0.033	3	385	580	1	P2702LS2800	●
29.00	0/-0.033	3	385	580	1	P2702LS2900	●
30.00	0/-0.033	3	385	580	1	P2702LS3000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

2702LS

	Material Group ISO 513	P1 P2			P3 P4			M1 M2			K1 K2		
	Hardness/Rm	500-700 N/mm²			600-1000 N/mm²			< 750 N/mm²			150-350 HB		
	Vc (m/min)	15-25			10-20			10-14			20-30		
	D (mm)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)	n (rpm)	fn (mm/rev)	Vf (mm/min)
	13	490	0.130	65	370	0.111	40	290	0.091	26	610	0.143	85
	14	450	0.140	65	340	0.119	40	270	0.098	26	570	0.154	90
	15	420	0.150	65	320	0.128	40	250	0.105	26	530	0.165	85
	16	400	0.160	65	300	0.136	40	240	0.112	27	500	0.176	90
	17	370	0.170	65	280	0.145	40	220	0.119	26	470	0.187	90
	18	350	0.180	65	270	0.153	40	210	0.126	26	440	0.198	85
	19	340	0.190	65	250	0.162	40	200	0.133	27	420	0.209	90
	20	320	0.200	65	240	0.170	40	190	0.140	27	400	0.220	90
	21	300	0.210	65	230	0.179	40	180	0.147	26	380	0.231	90
	22	290	0.220	65	220	0.187	40	170	0.154	26	360	0.242	85
	23	280	0.230	65	210	0.196	40	170	0.161	27	350	0.253	90
	24	270	0.240	65	200	0.204	40	160	0.168	27	330	0.264	85
	25	250	0.250	65	190	0.213	40	150	0.175	26	320	0.275	90
	26	240	0.270	65	180	0.230	40	150	0.189	28	310	0.297	90
	27	240	0.280	65	180	0.238	45	140	0.196	27	290	0.308	90
	28	230	0.290	65	170	0.247	40	140	0.203	28	280	0.319	90
	29	220	0.300	65	160	0.255	40	130	0.210	27	270	0.330	90
	30	210	0.310	65	160	0.264	40	130	0.217	28	270	0.341	90

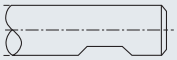
CARBIDE END MILLS

CAPTION . 300
SELECTION GUIDE . 304
SYSTEM CHARTS . 314
G2 . 317
MDTA . 363
HF VH/UP . 387
MEF . 483
ALU . 497
MEX . 523
UH . 583

Legenda Verzeichnis Légende Leyenda Условные обозначения

STOCK		
●	stock standard stock standard Standard Lager	stock standard stock estándar складская позиция
○	non-standard stock stock non standard nicht Standard Lager	stock non standard stock no estándar не складская позиция
▽	stock exhaustion esaurimento stock Vorraterschöpfung	épuisement du stock agotamiento de stock складские остатки

APPLICATION GUIDELINES INDICAZIONI PER L'APPLICAZIONE LEITFADEN ZUR ANWENDUNG INDICATIONS POUR L'APPLICATION INDICACIONES PARA SU APLICACIÓN УКАЗАНИЯ ПО ПРИМЕНЕНИЮ		
★	1st choice 1a scelta 1. Wahl	1er choix 1ª elección 1-й выбор
☆	suitable adatto geeignet	adapté adecuado пригоден

SHANK ATTACCO SCHAFT QUEUE MANGO ХВОСТОВИК		
	cylindrical shank attacco cilindrico zylindrischer Schaft	queue cylindrique mango cilíndrico цилиндрическое крепление
	Weldon	

MILLING STRATEGY STRATEGIA DI FRESATURA FRÄSSTRATEGIE STRATÉGIES DE FRAISAGE ESTRATEGIA DE FRESADO СТРАТЕГИЯ ФРЕЗЕРОВАНИЯ		
	slotting fresatura di cave Nutfräsen	rainurage ranurado фрезерование канавок
	side milling contornatura Konturfräsen	contournage perfiladura фрезерование по контуру
	square rib nervatura piana Flachrippen	rainurage nervio plano прямоугольное оребрение
	copying copiatura Kopieren	copiage copia копирование
	round rib nervatura raggiata Rundrippen	rainurage rayonné nervio radiado радиальное оребрение

Legenda Verzeichnis Légende Leyenda Условные обозначения

MILLING STRATEGY STRATEGIA DI FRESATURA FRÄSSTRATEGIE STRATÉGIES DE FRAISAGE ESTRATEGIA DE FRESADO СТРАТЕГИЯ ФРЕЗЕРОВАНИЯ		
HELICAL	helical interpolazione elicoidale Helixinterpolation	interpolation hélicoïdale interpolación helicoidal винтовая интерполяция
RAMPING	ramping entrata in rampa Rampen	entrée en ramping entrada en rampa фрезерование под углом
VERTICAL	vertical fresatura assiale Vertikalfräsen	fraisage axial fresado axial осевое фрезерование
DRILLING	drilling foratura Bohren	perçage taladro сверление
TROCHOIDAL	trochoidal fresatura trocoidale trochoidales Fräsen	fraisage trochoïdal fresado trocoidal трохоидальное фрезерование

APPLICATION RANGE GAMMA DI APPLICAZIONE ANWENDUNGSBEREICH GAMME D'APPLICATION RANGO DE APLICACIÓN ОБЛАСТЬ ПРИМЕНЕНИЯ		
N	general purpose uso generico allgemeine Anwendung	applications génériques uso genérico общего назначения
HF UNI	< 40 HRC variable helix and unequal pitch < 40 HRC elica variabile e passo differenziato < 40 HRC ungleicher Teilung und Winkel	< 40 HRC hélice et pas différencié < 40 HRC hélice variable y paso diferenciado < 40 HRC переменный завиток и дифференциальная кромка
HF HARD	30÷55 HRC unequal pitch 30÷55 HRC passo differenziato 30÷55 HRC ungleicher Teilung	30÷55 HRC pas différencié 30÷55 HRC paso diferenciado 30÷55 HRC неодинаковый шаг режущих кромок
MEF	for stainless steel per acciaio inossidabile für rostfreien Stahl	pour acier inoxydable para acero inoxidable для нержавеющих сталей
ALU	for aluminium per alluminio für Aluminium	pour aluminium para aluminio для алюминия
HF ALU	unequal pitch (UP) for Aluminium passo differenziato (UP) per alluminio ungleiche Teilung (UP) für Aluminium	pas différencié (UP) pour aluminium paso diferenciado (UP) para aluminio неравномерный шаг (UP) для алюминия
MEX	30÷55 HRC general purpose and hardened steel 30÷55 HRC uso generico e acciaio temprato 30÷55 HRC allgemeine Anwendung und gehärtete Stähle	30÷55 HRC utilisation générale et aciers trempés 30÷55 HRC mecanizado genérico y acero templado 30÷55 HRC общее назначение и для закалённых сталей
UH	< 70 HRC for hardened steel < 70 HRC per acciai temprati < 70 HRC für Hartstahl	< 70 HRC pour acier trempé < 70 HRC para aceros templados < 70 HRC для закалённых сталей

Legenda Verzeichnis Légende Leyenda Условные обозначения

TYPE TIPO TYP TYPE TIPO ТИП		
	sharp corner spigolo vivo scharfe Kante	arête vive borde puntiagudo острая кромка
	45° chamfer smusso a 45° 45° abgeschrägt	biseau à 45° chaflán a 45° фаска 45°
	45° chamfer + radius smusso a 45° + raggio 45° abgeschrägt + Radius	biseau à 45° + rayon chaflán a 45° + radio фаска 45° + радиус
	corner radius torica Eckradius	torique tórica с радиусом при вершине
	ball nose raggiata runder Stirn	bout hémisphérique fresa de bola сферическая
	high feed alto avanzamento hoher Vorschub	haute vitesse alto avance высокая подача

NR. OF FLUTES N. DI TAGLIENTI ANZAHL DER SCHNEIDEN NOMBRE DE DENTS N. DE LABIOS КОЛИЧЕСТВО РЕЖУЩИХ КРОМОК		
	single flute monotagliente Einzelschneide	monocoupe monofilo 1 зуб
	2 flutes 2 taglienti 2 Schneiden	2 arêtes de coupe 2 filos 2 зуба
	3 flutes 3 taglienti 3 Schneiden	3 arêtes de coupe 3 filos 3 зуба
	3 flutes unequal pitch 3 taglienti passo differenziato 3 Schneiden ungleiche Teilung	3 arêtes de coupe pas différencié 3 filos paso diferenciado 3 зуба с неравномерным шагом
	4 flutes 4 taglienti 4 Schneiden	4 arêtes de coupe 4 filos 4 зуба
	4 flutes unequal pitch 4 taglienti passo differenziato 4 Schneiden ungleiche Teilung	4 arêtes de coupe pas différencié 4 filos paso diferenciado 4 зуба с неравномерным шагом
	5 flutes 5 taglienti 5 Schneiden	5 arêtes de coupe 5 filos 5 зуба
	6 flutes 6 taglienti 6 Schneiden	6 arêtes de coupe 6 filos 6 зуба

Legenda Verzeichnis Légende Leyenda Условные обозначения

CHIPBREAKER STYLE TIPO DI ROMPITRUCIOLO SPÄNEBRECHER TYP TYPE DE BRISE-COPEAUX TIPO DE ROMPEVIRUTAS ТИП СТРУЖКОЛОМА

NR COARSE	roughing coarse pitch sgrossare passo grosso Schruppfräser Regelgewinde	ébauche pas gros desbaste paso grueso черновая с крупным шагом
HR FINE	roughing fine pitch sgrossare passo fine Schruppfräser Feingewinde	ébauche pas fin desbaste paso fino черновая с мелким шагом

MATERIAL MATERIALE WERKSTOFF MATIÈRE MATERIAL МАТЕРИАЛ

NMG ---	nano micrograin nano micrograna nano Mikrokörnung	nano micrograin nano micrograno нано микрозернистый твёрдый сплав
UMG ---	ultra fine micrograin micrograna ultra fine ultrafeine Mikrokörnung	micrograin ultra-fin micrograno ultra fino ультра микрозернистый твёрдый сплав
MG ---	micrograin micrograna Mikrokörnung	micrograin micrograno микрозернистый твёрдый сплав

SURFACE TREATMENT TRATTAMENTO SUPERFICIALE OBERFLÄCHENBEHANDLUNG TRAITMENT DE SURFACE TRATAMIENTO SUPERFICIAL ОБРАБОТКА ПОВЕРХНОСТИ

--- BR	uncoated non rivestito unbeschichtet	non revêtu no revestido без покрытия
--- POLISHED	polished lappato geläppt	poli pulido полированный

COATINGS RIVESTIMENTI BESCHICHTUNGEN REVÊTEMENTS RECUBRIMIENTOS ПОКРЫТИЕ

		--- PV200	--- PV300	--- ENDLESS	--- ENDLESS ORANGE	--- UH RED
hardness (HV) durezza (HV) Härte (HV)	dureté (HV) dureza (HV) твёрдость (HV)	3300	3300	3300	3300	3600
friction coefficient coefficiente d'attrito Reibungskoeffizient	coefficent de frottement coeficiente de rozamiento коэффициент трения	0.3	0.3	0.3	0.35	0.35
thickness (µ) spessore (µ) dicke (µ)	epaisseur (µ) espesor (µ) толщина (мкм)	3	2.5÷3.5	2.5÷3.5	2.5÷3.5	2.5÷3.5
max working temperature (°C) temperatura max (°C) hochste Temperatur (°C)	température maximale (°C) temperatura máx (°C) макс. температура (°C)	950°	1100°	900°	1000°	1200°

	ITEM No.	PAGE	
G2 general purpose, square	**GB205**	318	
	G2CS2	320	
	G2WS2	322	
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	G2211	324	
	G2212	324	
	GB305	327	
	G2CSH3	329	
	G2WSH3	331	
	G2310	333	
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	G2312	333	
	GB405	335	
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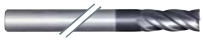
	G2410	341	
	G2411	341	
	G2412	341	
	G2413	341	
	G2CSHM	343	
G2 general purpose, roughing	**G2CSFR**	345	
	G2WSFR	347	
G2 general purpose, corner radius	**G2CS2R**	349	
	G2CS4R	351	
	G2CL4R	353	
G2 general purpose, ball nose	**GB255**	355	
	G2CSB2	357	

RANGE	NORM	TYPE	MATERIAL / COATING	HRC	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
1-12	OSAWA	N	MG BR	<45	30°	SQUARE	2	★	☆	★	☆		
1-20	OSAWA	N	MG PV200	<45	30°	SQUARE	2	★	☆	★	☆		
3-20	OSAWA	N	MG PV200	<45	30°	SQUARE	2	★	☆	★	☆		
2-6	OSAWA	N	MG PV200	<45	30°	SQUARE	2	★	☆	★	☆		
5-12	OSAWA	N	MG PV200	<45	30°	SQUARE	2	★	☆	★	☆		
8-16	OSAWA	N	MG PV200	<45	30°	SQUARE	2	★	☆	★	☆		
1-12	OSAWA	N	MG BR	<45	45°	SQUARE	3	★	☆	★	☆		
1-20	OSAWA	N	MG PV200	<45	45°	SQUARE	3	★	☆	★	☆		
3-20	OSAWA	N	MG PV200	<45	45°	SQUARE	3	★	☆	★	☆		
2-6	OSAWA	N	MG PV200	<45	45°	SQUARE	3	★	☆	★	☆		
4-12	OSAWA	N	MG PV200	<45	45°	SQUARE	3	★	☆	★	☆		
8-20	OSAWA	N	MG PV200	<45	45°	SQUARE	3	★	☆	★	☆		
1-12	OSAWA	N	MG BR	<45	30°	SQUARE	4	★	☆	★	☆		
1-25	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
3-20	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
2-6	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
3-12	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
8-20	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
16-20	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
6-20	OSAWA	N	MG PV200	<45	45°	SQUARE	6	★	☆	★	☆		
4-20	OSAWA	N - HR	MG PV200	<45	30°	SQUARE	3-4	★	☆	★	☆		
6-20	OSAWA	N - HR	MG PV200	<45	30°	SQUARE	3-4	★	☆	★	☆		
1-12	OSAWA	N	MG PV200	<45	30°	CORNER RADIUS	2	★	☆	★	☆		
1-12	OSAWA	N	MG PV200	<45	30°	CORNER RADIUS	4	★	☆	★	☆		
2-12	OSAWA	N	MG PV200	<45	30°	CORNER RADIUS	4	★	☆	★	☆		
1-12	OSAWA	N	MG BR	<45	30°	BALL NOSE	2	★	☆	★	☆		
1-20	OSAWA	N	MG PV200	<45	30°	BALL NOSE	2	★	☆	★	☆		

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
G2 general purpose, ball nose	**G2250**	359	
	G2251	359	
	G2CSB4	361	
MDTA general purpose, square	**MDTACS2**	364	
	MDTA210	366	
	MDCL2	368	
	MDTACS3	370	
	MDTAWSH3	372	
	MDTACS4	374	
	MDTA410	376	
	MDCL4	378	
MDTA general purpose, roughing	**MDTAUPR**	380	
MDTA general purpose, ball nose	**MDTACSB2**	382	
	MDTA250	384	
HF UNI < 40 HRC, 45° chamfer	**HF840**	390	
	HF440	394	
	HF441	399	
HF UNI < 40 HRC, roughing	**HF844**	405	
	HF444	409	
	HF445	413	
HF UNI < 40 HRC, corner radius	**HF342**	418	
	HF842	421	
	HF442	425	
	HF443	430	
	HF542	435	
	HF942	438	
	HF943	442	

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RANGE	NORM	TYPE	MATERIAL / COATING	HRC	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
1-12	OSAWA	N	MG PV200	<45	30°	BALL NOSE	2	★	☆	★	☆		
6-20	OSAWA	N	MG PV200	<45	30°	BALL NOSE	2	★	☆	★	☆		
1-20	OSAWA	N	MG PV200	<45	30°	BALL NOSE	4	★	☆	★	☆		
1-20	OSAWA	N	MG PV200	<45	30°	SQUARE	2	★	☆	★	☆		
3-12	OSAWA	N	MG PV200	<45	30°	SQUARE	2	★	☆	★	☆		
3-12	OSAWA	N	MG BR	<45	30°	SQUARE	2	★	☆	★	☆		
1-20	OSAWA	N	MG PV200	<45	30°	SQUARE	3	★	☆	★	☆		
3-20	OSAWA	N	MG PV200	<45	45°	SQUARE	3	★	☆	★	☆		
1-20	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
3-16	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
3-20	OSAWA	N	MG BR	<45	30°	SQUARE	4	★	☆	★	☆		
6-20	OSAWA	N - UP - NR	MG PV200	<45	40°	C45°	3-4	★	☆	★			
1-12	OSAWA	N	MG PV200	<45	30°	BALL NOSE	2	★	☆	★	☆		
3-12	OSAWA	N	MG PV200	<45	30°	BALL NOSE	2	★	☆	★	☆		
3-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CHAMFER 45°	4	★	★	★		★	
3-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CHAMFER 45°	4	★	★	★		★	
3-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CHAMFER 45°	4	★	★	★		★	
6-20	OSAWA	VH/UP - HR	MG PV300	<40	36°/39°	CHAMFER 45°	4	★	★	★		★	
6-20	OSAWA	VH/UP - HR	MG PV300	<40	36°/39°	CHAMFER 45°	4	★	★	★		★	
6-20	OSAWA	VH/UP - HR	MG PV300	<40	36°/39°	CHAMFER 45°	4	★	★	★		★	
3-12	OSAWA	VH/UP	MG PV300	<40	36°/39°	CORNER RADIUS	4	★	★	★		★	
4-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CORNER RADIUS	4	★	★	★		★	
3-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CORNER RADIUS	4	★	★	★		★	
3-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CORNER RADIUS	4	★	★	★		★	
6-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CORNER RADIUS	4	★	★	★		★	
4-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CORNER RADIUS	4	★	★	★		★	
4-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CORNER RADIUS	4	★	★	★		★	

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
HF UNI < 40 HRC, corner radius	**HF642**	446	
	HF643	449	
	HF742	452	
	HF743	455	
HF UNI SC < 40 HRC, 45° chamfer + corner radius	**HF861**	458	
HF HARD 30÷55 HRC, 45° chamfer	**HF850**	463	
	HF450	467	
	HF451	471	
HF HARD 30÷55 HRC, corner radius	**HF852**	475	
	HF452	479	
MEF stainless steel and super alloys, square	**MEFCS2**	484	
	MEFCSH3	486	
	MEFCS4	488	
	MEF600	490	
MEF stainless steel and super alloys, roughing	**MEF901**	492	
	MEF902	494	
ALU unequal pitch, square	**HFAL4**	498	
ALU unequal pitch, corner radius	**HFAL3**	501	
	HFA53	504	
ALU square	**MDCSA1**	507	
	MDCSA2	509	
	MDCSA3	512	
	MDA310	514	
	MDA311	514	
	MDA312	514	
	MDCSAM	517	
ALU corner radius	**MCA212R**	519	

RANGE	NORM	TYPE	MATERIAL / COATING	HRC	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
4-20	OSAWA	VH	MG PV300	<40	36°/37°/38°	CORNER RADIUS	5	★	★	★		★	
4-20	OSAWA	VH	MG PV300	<40	36°/37°/38°	CORNER RADIUS	5	★	★	★		★	
6-20	OSAWA	VH	MG PV300	<40	36°/37°/38°	CORNER RADIUS	5	★	★	★		★	
6-20	OSAWA	VH	MG PV300	<40	36°/37°/38°	CORNER RADIUS	5	★	★	★		★	
1-20	OSAWA	VH/UP	MG PV300	<40	36°/39°	CR+C45°	4	★	★	★		★	
3-20	OSAWA	UP	MG PV300	35÷55	40°	CHAMFER 45°	4	★	★	★		★	★
3-20	OSAWA	UP	MG PV300	35÷55	40°	CHAMFER 45°	4	★	★	★		★	★
3-20	OSAWA	UP	MG PV300	35÷55	40°	CHAMFER 45°	4	★	★	★		★	★
4-20	OSAWA	UP	MG PV300	35÷55	40°	CORNER RADIUS	4	★	★	★		★	★
3-20	OSAWA	UP	MG PV300	35÷55	40°	CORNER RADIUS	4	★	★	★		★	★
1-16	OSAWA	VA	UMG ENDLESS	<45	35°	SQUARE	2	★	★			★	
6-20	OSAWA	VA	UMG ENDLESS	<45	50°	SQUARE	3	★	★			★	
2-20	OSAWA	VA	UMG ENDLESS	<45	35°	SQUARE	4	★	★			★	
6-20	OSAWA	VA	UMG ENDLESS	<45	50°	SQUARE	6-8	★	★			★	
4-20	OSAWA	VA - HR	UMG ENDLESS	<45	45°	SQUARE	3-6	★	★			★	
6-20	OSAWA	VA - HR	UMG ENDLESS	<45	45°	SQUARE	4-6	★	★			★	
3-20	OSAWA	UP ALU	MG BR		40°	SQUARE	4				★		
2-20	OSAWA	UP ALU	MG POLISHED		30°	CORNER RADIUS	3				★		
3-20	OSAWA	UP ALU	MG BR		30°	CORNER RADIUS	3				★		
2-12	OSAWA	ALU	MG POLISHED		25°	SQUARE	1				★		
1-20	OSAWA	ALU	MG POLISHED		45°	SQUARE	2				★		
1-20	OSAWA	ALU	MG POLISHED		55°	SQUARE	3				★		
3-6	OSAWA	ALU	MG POLISHED		55°	SQUARE	3				★		
3-12	OSAWA	ALU	MG POLISHED		55°	SQUARE	3				★		
8-20	OSAWA	ALU	MG POLISHED		55°	SQUARE	3				★		
6-12	OSAWA	ALU	MG POLISHED		50°	SQUARE	6				★		
2-12	OSAWA	ALU	MG PV200		25°	CORNER RADIUS	2				★		

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
ALU ball nose	**MDCAB2**	521	
MEX 30÷55 HRC, square	**MEXM2**	524	
	MEXM2SC	526	
	MEXLN2	528	
	MEXCS2	533	
	MEXCL2	535	
MEX 30÷55 HRC, square	**MEXCS4**	537	
	MEXCL4	539	
	MEXCSHM	541	
	MEXCLHM	543	
MEX 30÷55 HRC, roughing	**MEXCSFR**	545	
MEX 30÷55 HRC, corner radius	**MEXLN2R**	547	
	MEXLS2R	553	
	MEXCS4R	555	
	MEX410R	558	
	MEXLS4R	560	
	MEX610R	562	
	MEX611R	564	
MEX 30÷55 HRC, ball nose	**MEXMB2**	566	
	MEXMB2SC	568	
	MEXLNB2	570	
	MEXLNB206	575	
	MEXCSB2	577	
	MEXCLSB2	579	
	MEX253	581	
UH < 70 HRC, square	**UHM204**	584	
	UHLN2	586	

RANGE	NORM	TYPE	MATERIAL / COATING	HRC	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
1-12	OSAWA	ALU	MG POLISHED		40°	BALL NOSE	2				★		
0.3-2	OSAWA	MEX	UMG ENDLESS ORANGE	<55	40°	SQUARE	2	★		★			★
0.2-0.9	OSAWA	MEX	UMG ENDLESS ORANGE	<55	40°	SQUARE	2	★		★			★
0.2-4	OSAWA	MEX	UMG ENDLESS ORANGE	<55	40°	SQUARE	2	★		★			★
1-20	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	SQUARE	2	★		★			★
1-12	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	SQUARE	2	★		★			★
1-25	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	SQUARE	4	★		★			★
2-25	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°-40°	SQUARE	4	★		★			★
3-20	OSAWA	MEX	UMG ENDLESS ORANGE	<55	50°	SQUARE	6-8	★		★			★
3-20	OSAWA	MEX	UMG ENDLESS ORANGE	<55	45°	SQUARE	6-8	★		★			★
6-20	OSAWA	MEX - HR	UMG ENDLESS ORANGE	<55	20°	SQUARE	3-4	★		★			★
0.3-4	OSAWA	MEX	UMG ENDLESS ORANGE	<55	40°	CORNER RADIUS	2	★		★			★
2-16	OSAWA	MEX	UMG ENDLESS ORANGE	<55	40°	CORNER RADIUS	2	★		★			★
1-20	OSAWA	MEX	UMG ENDLESS ORANGE	<55	40°	CORNER RADIUS	4	★		★			★
2-12	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	CORNER RADIUS	4	★		★			★
2-16	OSAWA	MEX	UMG ENDLESS ORANGE	<55	40°	CORNER RADIUS	4	★		★			★
6-12	OSAWA	MEX	UMG ENDLESS ORANGE	<55	45°	CORNER RADIUS	6	★		★			★
6-12	OSAWA	MEX	UMG ENDLESS ORANGE	<55	45°	CORNER RADIUS	6	★		★			★
0.2-2	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	BALL NOSE	2	★		★			★
0.2-0.8	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	BALL NOSE	2	★		★			★
0.2-4	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	BALL NOSE	2	★		★			★
0.5-2	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	BALL NOSE	2	★		★			★
1-20	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	BALL NOSE	2	★		★			★
1-20	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	BALL NOSE	2	★		★			★
1-20	OSAWA	MEX	UMG ENDLESS ORANGE	<55	30°	BALL NOSE	2	★		★			★
0.1-0.9	OSAWA	UH	NMG UH RED	<70	40°	SQUARE	2	☆		☆			★
0.2-4	OSAWA	UH	NMG UH RED	<70	40°	SQUARE	2	☆		☆			★

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
UH < 70 HRC, square	**UH600**	591	
	UH612	593	
UH < 70 HRC, corner radius	**UHM206**	595	
	UH211	597	
	UH212	599	
	UHCS2	604	
	UHF4LN	606	
	UHF4	610	
	UHCS4	612	
	UH410	614	
	UH411	617	
	UH412	619	
	UH413	621	
	UH610R	623	
	UH611R	625	
UH < 70 HRC, ball nose	**UHMB204**	627	
	UHMB206	629	
	UHLNB2	631	
	UHCRB2	636	
	UHCSB2	638	
	UH250	640	
	UH253	642	

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RANGE	NORM	TYPE	MATERIAL / COATING	HRC	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
3-20	OSAWA	UH	NMG UH RED	<70	50°	SQUARE	6-8	☆		☆			★
3-20	OSAWA	UH	NMG UH RED	<70	50°	SQUARE	6-8	☆		☆			★
0.3-2	OSAWA	UH	NMG UH RED	<70	40°	CORNER RADIUS	2	☆		☆			★
1-6	OSAWA	UH	NMG UH RED	<70	30°	CORNER RADIUS	2	☆		☆			★
0.2-4	OSAWA	UH	NMG UH RED	<70	40°	CORNER RADIUS	2	☆		☆			★
1-12	OSAWA	UH	NMG UH RED	<70	30°	CORNER RADIUS	2	☆		☆			★
1-4	OSAWA	UP – UH	NMG UH RED	<70	25°	CORNER RADIUS	4	☆		☆			★
2-12	OSAWA	UH	NMG UH RED	<70	25°	CORNER RADIUS	4	☆		☆			★
1-12	OSAWA	UH	NMG UH RED	<70	30°	CORNER RADIUS	4	☆		☆			★
1-20	OSAWA	UH	NMG UH RED	<70	40°	CORNER RADIUS	4	☆		☆			★
3-12	OSAWA	UH	NMG UH RED	<70	30°	CORNER RADIUS	4	☆		☆			★
2-12	OSAWA	UH	NMG UH RED	<70	40°	CORNER RADIUS	4	☆		☆			★
6-16	OSAWA	UH	NMG UH RED	<70	40°	CORNER RADIUS	4	☆		☆			★
6-12	OSAWA	UH	NMG UH RED	<70	45°	CORNER RADIUS	6	☆		☆			★
6-20	OSAWA	UH	NMG UH RED	<70	45°	CORNER RADIUS	6	☆		☆			★
0.2-0.8	OSAWA	UH	NMG UH RED	<70	30°	BALL NOSE	2	☆		☆			★
0.4-0.8	OSAWA	UH	NMG UH RED	<70	30°	BALL NOSE	2	☆		☆			★
0.2-4	OSAWA	UH	NMG UH RED	<70	30°	BALL NOSE	2	☆		☆			★
0.5-2	OSAWA	UH	NMG UH RED	<70	30°	BALL NOSE	2	☆		☆			★
1-20	OSAWA	UH	NMG UH RED	<70	30°	BALL NOSE	2	☆		☆			★
1-20	OSAWA	UH	NMG UH RED	<70	30°	BALL NOSE	2	☆		☆			★
1-20	OSAWA	UH	NMG UH RED	<70	30°	BALL NOSE	2	☆		☆			★

★ 1st choice ☆ suitable

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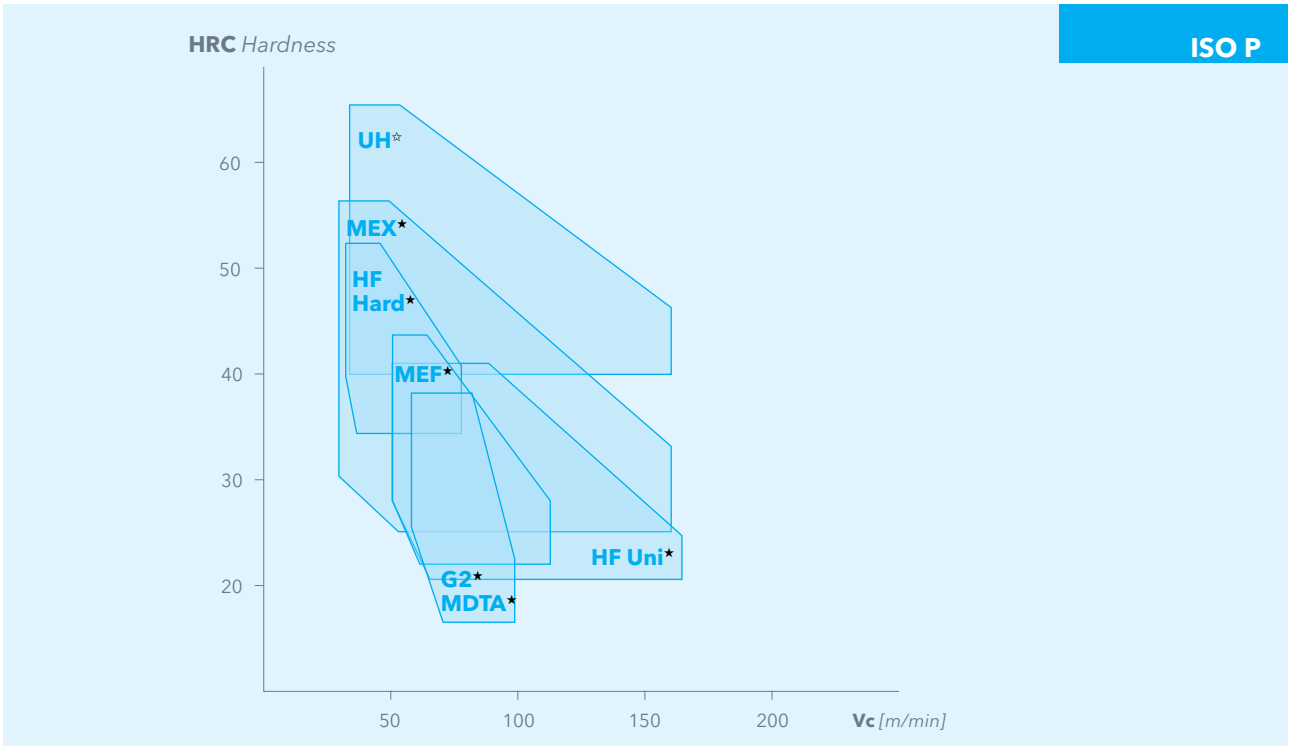
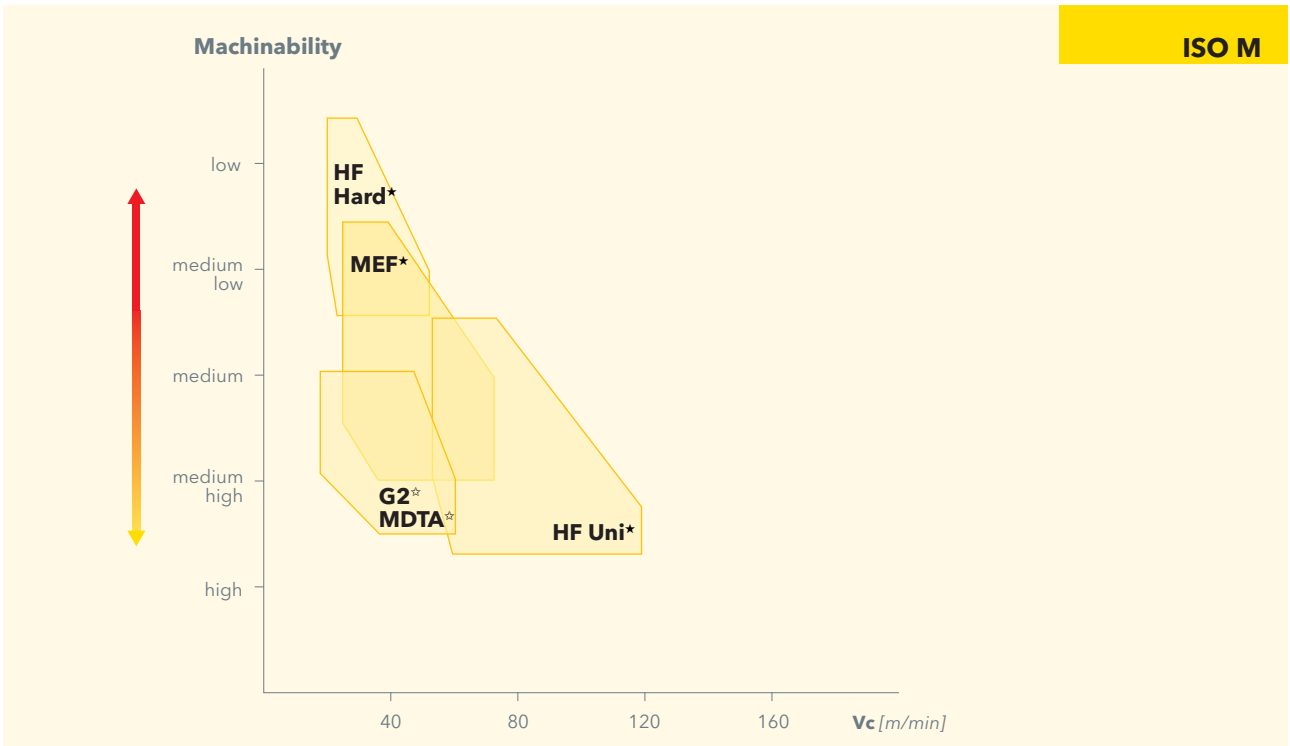
STEEL APPLICATION



★ 1st choice ☆ suitable

STAINLESS STEEL APPLICATION



★ 1st choice ☆ suitable

G2 : general purpose (page 317)
MDTA : general purpose (page 363)
HF UNI : universal purpose (page 387)
HF HARD : special purpose (page 463)
MEF : special purpose (page 483)
MEX : special purpose (page 523)
UH :special purpose (page 583)

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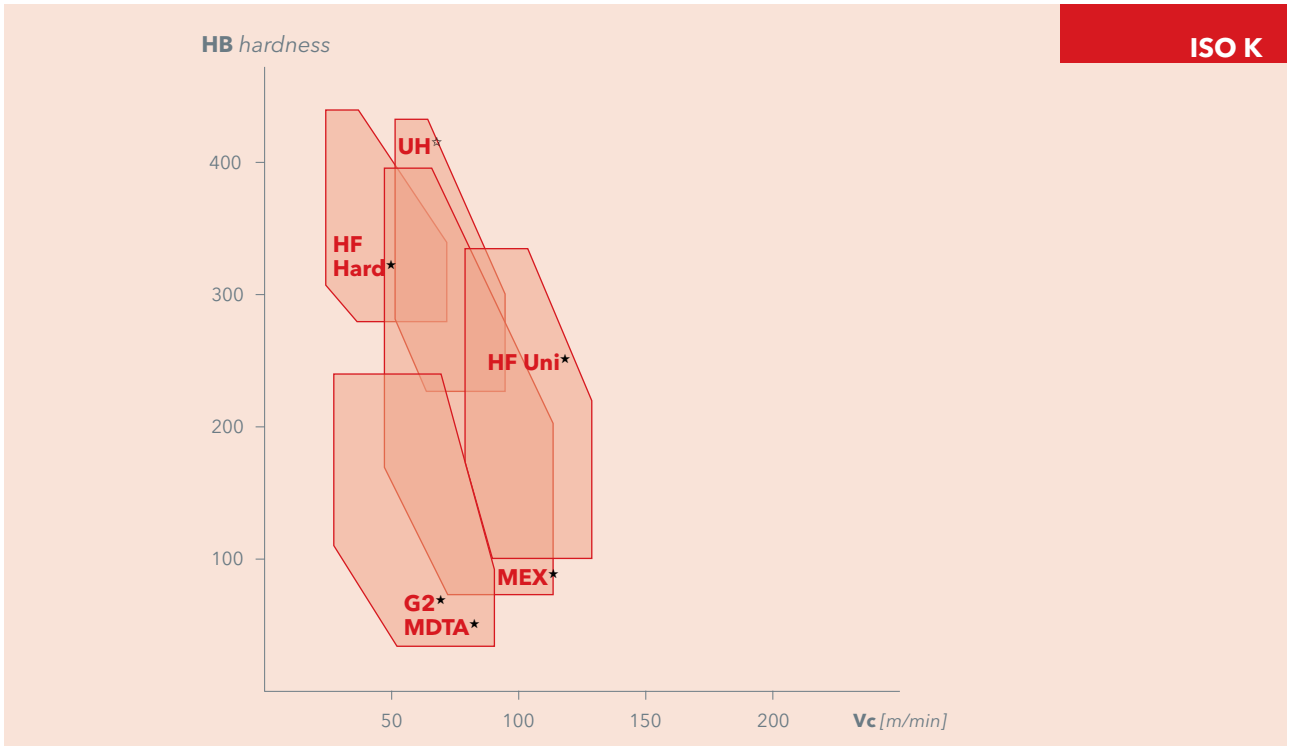
CAST IRON APPLICATION



★ 1st choice ☆ suitable

NON-FERROUS MATERIALS APPLICATION

★ 1st choice ☆ suitable

G2 : general purpose (page 317)
MDTA : general purpose (page 363)
HF UNI : universal purpose (page 387)
HF HARD : special purpose (page 463)
ALU : special purpose (page 497)
MEX : special purpose (page 523)
UH :special purpose (page 583)

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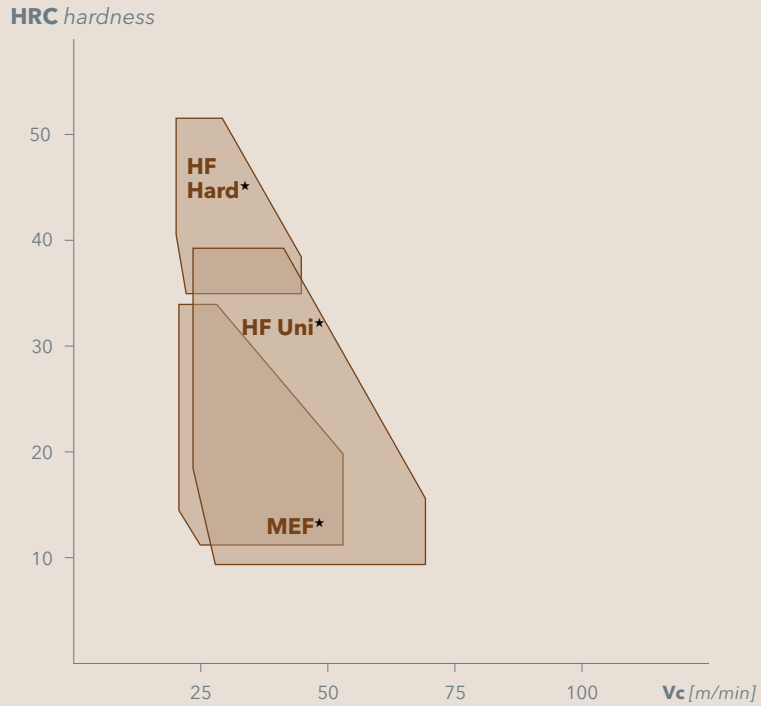
SUPER ALLOYS APPLICATION

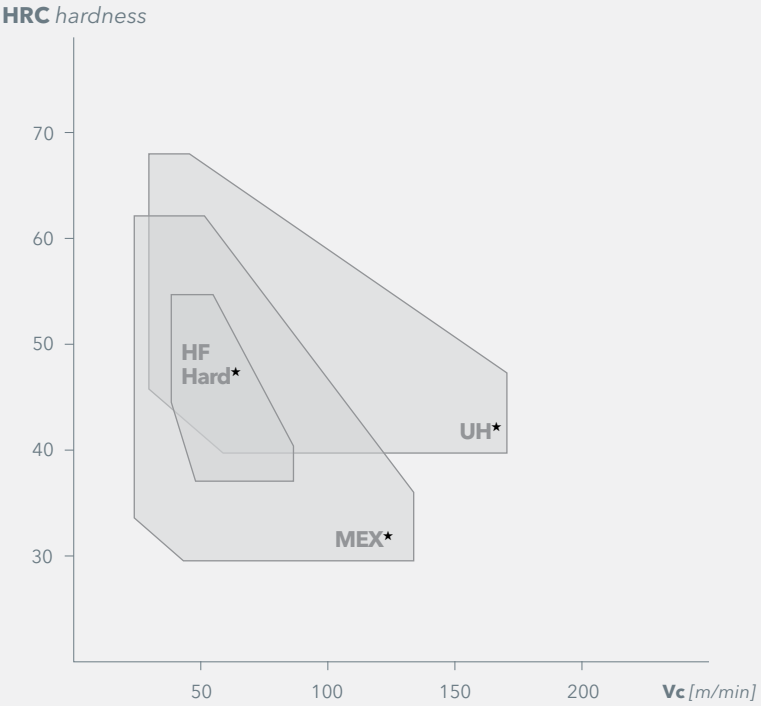
ISO S



★ 1st choice ☆ suitable

HARDENED STEEL APPLICATION

ISO H



★ 1st choice ☆ suitable

HF UNI : universal purpose (page 387)
HF HARD : special purpose (page 463)
MEF : special purpose (page 483)
MEX : special purpose (page 523)
UH :special purpose (page 583)

G2
GENERAL PURPOSE

Range of general-purpose endmills, featuring new cutting geometries and innovative coatings for enhanced performance. The answer given by Osawa to the market demand for higher performance tools. Thanks to a fully optimized manufacturing process and to large production batches the G2 range excels in the cost-performance ratio.

Gamma di frese per uso generico, dotate di geometria di taglio e rivestimenti innovativi per garantire prestazioni ancora più elevate. La risposta di Osawa ad un mercato che chiede utensili sempre più performanti e competitivi. L'innovazione nei processi produttivi consente alla gamma G2 di eccellere nel rapporto qualità-prezzo.

Produktpalette von Fräser für allgemeine Anwendungen, ausgestattet mit einer Schnittgeometrie und innovativen Beschichtungen zur Gewährleistung noch höherer Leistungen. Die Antwort von Osawa auf einen Markt, der immer leistungsstärkere und wettbewerbsfähigere Werkzeuge fordert. Dank der Innovation der Produktionsprozesse zeichnet sich die Produktreihe G2 durch ein außergewöhnliches Preis-Leistungsverhältnis aus.

Gamme de fraises pour un usage général, dotées de géométrie de coupe et de revêtements innovants pour garantir des prestations encore plus élevées. C'est la réponse d'Osawa à un marché qui nécessite d'outils de plus en plus performants et compétitifs. L'innovation des processus de production permet à la gamme G2 d'avoir un rapport qualité-prix excellent.

Gama de fresas para uso genérico, provistas de geometría de corte y revestimientos innovadores para garantizar prestaciones aún más elevadas. La respuesta de Osawa a un mercado que pide herramientas cada vez con mayor rendimiento y más competitivas. La innovación en los procesos de producción permite a la gama G2 sobresalir en la relación calidad-precio.

Ассортимент фрез общего назначения, с новой геометрией и покрытиями, гарантирующими высокоэффективную работу. Это ответ компании Osawa на запросы рынка, который требует всё более конкурентоспособные инструменты с высокими эксплуатационными характеристиками. Инновации в производственных процессах и большие изготавливаемые партии позволяют серии G2 иметь превосходное соотношение цена-качество.

GB205

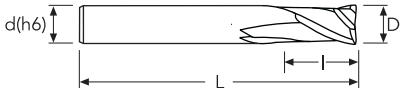
cylindrical shank, 2 flutes

OSAWA NORM | N | MG / BR | <45 HRC | 30° | SQUARE | Z2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			4	3		50	2	GB205010	●
1.5	0/-0.020			4	4.5		50	2	GB205015	●
2	0/-0.020			4	6		50	2	GB205020	●
3	0/-0.020			4	8		50	2	GB205030	●
4	0/-0.020			4	11		50	2	GB205040	●
5	0/-0.020			6	13		50	2	GB205050	●
6	0/-0.020			6	15		50	2	GB205060	●
8	0/-0.025			8	20		60	2	GB205080	●
10	0/-0.025			10	30		75	2	GB205100	●
12	0/-0.025			12	30		75	2	GB205120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

GB205

SLOTTING	Material Group ISO 513	P1 K1			P2 M1 K2			P3 M2			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.5D x D**		
	Vc (m/min)	**50-60**			**30-50**			**20-40**			**70-90**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	17520	0.004	120	12740	0.003	80	9550	0.003	50	25480	0.005	230
	2	8760	0.007	120	6370	0.006	80	4780	0.005	50	12740	0.009	230
	3	5840	0.010	120	4250	0.009	70	3180	0.008	50	8490	0.013	220
	4	4380	0.014	120	3180	0.012	80	2390	0.011	50	6370	0.018	230
	5	3500	0.018	130	2550	0.015	80	1910	0.014	50	5100	0.023	240
	6	2920	0.023	130	2120	0.020	80	1590	0.017	50	4250	0.030	250
	8	2190	0.030	130	1590	0.026	80	1190	0.023	50	3180	0.039	250
	10	1750	0.038	130	1270	0.032	80	960	0.029	50	2550	0.049	250
	12	1460	0.045	130	1060	0.038	80	800	0.034	50	2120	0.059	250

< D3 mm: ap = 0.2D

SIDE MILLING	Material Group ISO 513	P1 K1			P2 M1 K2			P3 M2			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.2D**			**1.5D x 0.3D**		
	Vc (m/min)	**50-60**			**30-50**			**20-40**			**70-90**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	17520	0.004	150	12740	0.004	90	9550	0.003	60	25480	0.006	290
	2	8760	0.009	150	6370	0.007	90	4780	0.007	60	12740	0.011	290
	3	5840	0.013	150	4250	0.011	90	3180	0.009	60	8490	0.016	280
	4	4380	0.018	150	3180	0.015	90	2390	0.013	60	6370	0.023	290
	5	3500	0.023	160	2550	0.019	100	1910	0.017	60	5100	0.029	300
	6	2920	0.029	170	2120	0.024	100	1590	0.022	70	4250	0.037	320
	8	2190	0.038	160	1590	0.032	100	1190	0.028	70	3180	0.049	310
	10	1750	0.048	170	1270	0.040	100	960	0.036	70	2550	0.062	310
	12	1460	0.056	160	1060	0.048	100	800	0.042	70	2120	0.073	310

< D3 mm: ae = 0.2D

DRILLING	Material Group ISO 513	P1 K1			P2 M1 K2			P3 M2			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**D X D**			**D X D**			**0.5D X D**			**D X D**		
	Vc (m/min)	**40-50**			**30-40**			**20-30**			**60-80**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	14330	0.002	60	11150	0.002	40	7960	0.002	30	22290	0.003	130
	2	7170	0.004	60	5570	0.004	40	3980	0.003	30	11150	0.006	130
	3	4780	0.006	60	3720	0.005	40	2650	0.005	20	7430	0.008	120
	4	3580	0.009	60	2790	0.007	40	1990	0.007	30	5570	0.011	130
	5	2870	0.011	60	2230	0.010	40	1590	0.008	30	4460	0.015	130
	6	2390	0.014	70	1860	0.012	50	1330	0.011	30	3720	0.019	140
	8	1790	0.019	70	1390	0.016	40	1000	0.014	30	2790	0.024	140
	10	1430	0.024	70	1110	0.020	40	800	0.018	30	2230	0.031	140
	12	1190	0.028	70	930	0.024	40	660	0.021	30	1860	0.037	140

< D3 mm: ap = 0.5D

G2CS2

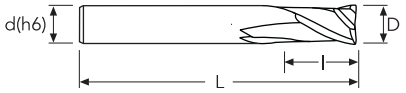
cylindrical shank, 2 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			4	3		50	2	G2CS2010	●
1.5	0/-0.020			4	4.5		50	2	G2CS2015	●
2	0/-0.020			4	6		50	2	G2CS2020	●
2.5	0/-0.020			4	7		50	2	G2CS2025	●
3	0/-0.020			4	8		50	2	G2CS2030	●
3.5	0/-0.020			4	10		50	2	G2CS2035	●
4	0/-0.020			4	11		50	2	G2CS2040	●
4.5	0/-0.020			6	13		50	2	G2CS2045	●
5	0/-0.020			6	13		50	2	G2CS2050	●
5.5	0/-0.020			6	13		50	2	G2CS2055	●
6	0/-0.020			6	15		50	2	G2CS2060	●
6.5	0/-0.025			8	17		60	2	G2CS2065	●
7	0/-0.025			8	17		60	2	G2CS2070	●
7.5	0/-0.025			8	17		60	2	G2CS2075	●
8	0/-0.025			8	20		60	2	G2CS2080	●
8.5	0/-0.025			10	23		75	2	G2CS2085	●
9	0/-0.025			10	23		75	2	G2CS2090	●
10	0/-0.025			10	30		75	2	G2CS2100	●
10.5	0/-0.025			12	25		75	2	G2CS2105	●
11	0/-0.025			12	28		75	2	G2CS2110	●
12	0/-0.025			12	30		75	2	G2CS2120	●
13	0/-0.030			16	33		100	2	G2CS2130	●
14	0/-0.030			14	26		83	2	G2CS2140	●
15	0/-0.030			16	40		100	2	G2CS2150	●
16	0/-0.030			16	32		92	2	G2CS2160	●
17	0/-0.030			20	40		100	2	G2CS2170	●
18	0/-0.030			20	40		100	2	G2CS2180	●
20	0/-0.030			20	40		100	2	G2CS2200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

G2CS2

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**100-120**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.004	230	19110	0.003	130	12740	0.003	80	35030	0.005	360
	2	14330	0.008	230	9550	0.007	130	6370	0.006	80	17520	0.010	360
	3	9550	0.012	230	6370	0.010	130	4250	0.009	80	11680	0.016	360
	4	7170	0.016	230	4780	0.014	130	3180	0.012	80	8760	0.021	360
	5	5730	0.020	230	3820	0.017	130	2550	0.015	80	7010	0.026	360
	6	4780	0.025	240	3180	0.021	140	2120	0.019	80	5840	0.033	380
	8	3580	0.032	230	2390	0.027	130	1590	0.024	80	4380	0.042	360
	10	2870	0.038	220	1910	0.032	120	1270	0.029	70	3500	0.049	350
	12	2390	0.045	220	1590	0.038	120	1060	0.034	70	2920	0.059	340
	14	2050	0.052	210	1360	0.044	120	910	0.039	70	2500	0.068	340
	16	1790	0.060	210	1190	0.051	120	800	0.045	70	2190	0.078	340
	18	1590	0.070	220	1060	0.060	130	710	0.053	70	1950	0.091	350
	20	1430	0.080	230	960	0.068	130	640	0.060	80	1750	0.104	360

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.5D x 0.5D**			**1.5D x 0.5D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**100-120**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.005	280	19110	0.004	160	12740	0.004	90	35030	0.006	440
	2	14330	0.010	280	9550	0.008	160	6370	0.007	90	17520	0.012	440
	3	9550	0.014	280	6370	0.012	160	4250	0.011	90	11680	0.019	440
	4	7170	0.019	280	4780	0.016	160	3180	0.014	90	8760	0.025	440
	5	5730	0.024	280	3820	0.020	160	2550	0.018	90	7010	0.031	440
	6	4780	0.030	290	3180	0.026	160	2120	0.023	100	5840	0.039	460
	8	3580	0.038	270	2390	0.033	160	1590	0.029	90	4380	0.050	440
	10	2870	0.046	260	1910	0.039	150	1270	0.034	90	3500	0.059	410
	12	2390	0.054	260	1590	0.046	150	1060	0.041	90	2920	0.070	410
	14	2050	0.062	260	1360	0.053	140	910	0.047	90	2500	0.081	410
	16	1790	0.072	260	1190	0.061	150	800	0.054	90	2190	0.094	410
	18	1590	0.084	270	1060	0.071	150	710	0.063	90	1950	0.109	430
	20	1430	0.096	270	960	0.082	160	640	0.072	90	1750	0.125	440

< D3 mm: ae = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**70-90**			**40-60**			**25-35**			**80-100**		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	25480	0.002	120	15920	0.002	60	9550	0.002	30	28660	0.003	180
	2	12740	0.005	120	7960	0.004	60	4780	0.004	30	14330	0.006	180
	3	8490	0.007	120	5310	0.006	60	3180	0.005	30	9550	0.009	180
	4	6370	0.010	120	3980	0.008	60	2390	0.007	30	7170	0.012	180
	5	5100	0.012	120	3180	0.010	60	1910	0.009	30	5730	0.016	180
	6	4250	0.015	130	2650	0.013	70	1590	0.011	40	4780	0.020	190
	8	3180	0.019	120	1990	0.016	60	1190	0.014	30	3580	0.025	180
	10	2550	0.023	120	1590	0.019	60	960	0.017	30	2870	0.030	170
	12	2120	0.027	110	1330	0.023	60	800	0.020	30	2390	0.035	170
	14	1820	0.031	110	1140	0.027	60	680	0.023	30	2050	0.041	170
	16	1590	0.036	110	1000	0.031	60	600	0.027	30	1790	0.047	170
	18	1420	0.042	120	880	0.036	60	530	0.032	30	1590	0.055	170
	20	1270	0.048	120	800	0.041	70	480	0.036	30	1430	0.062	180

< D3 mm: ap = 0.5D

G2WS2

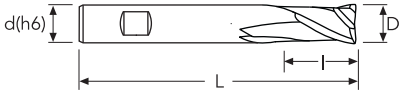
weldon shank, 2 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.020			6	8		57	2	G2WS2030	●
4	0/-0.020			6	11		57	2	G2WS2040	●
5	0/-0.020			6	13		57	2	G2WS2050	●
6	0/-0.020			6	13		57	2	G2WS2060	●
8	0/-0.025			8	19		63	2	G2WS2080	●
10	0/-0.025			10	22		72	2	G2WS2100	●
12	0/-0.025			12	26		83	2	G2WS2120	●
14	0/-0.030			14	26		83	2	G2WS2140	●
16	0/-0.030			16	32		92	2	G2WS2160	●
20	0/-0.030			20	38		104	2	G2WS2200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

G2WS2

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	80-100			50-70			30-50			100-120		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	9550	0.012	230	6370	0.010	130	4250	0.009	80	11680	0.016	360
	4	7170	0.016	230	4780	0.014	130	3180	0.012	80	8760	0.021	360
	5	5730	0.020	230	3820	0.017	130	2550	0.015	80	7010	0.026	360
	6	4780	0.025	240	3180	0.021	140	2120	0.019	80	5840	0.033	380
	8	3580	0.032	230	2390	0.027	130	1590	0.024	80	4380	0.042	360
	10	2870	0.038	220	1910	0.032	120	1270	0.029	70	3500	0.049	350
	12	2390	0.045	220	1590	0.038	120	1060	0.034	70	2920	0.059	340
	14	2050	0.052	210	1360	0.044	120	910	0.039	70	2500	0.068	340
	16	1790	0.060	210	1190	0.051	120	800	0.045	70	2190	0.078	340
	18	1590	0.070	220	1060	0.060	130	710	0.053	70	1950	0.091	350
	20	1430	0.080	230	960	0.068	130	640	0.060	80	1750	0.104	360

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	1.5D x 0.3D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
	Vc (m/min)	80-100			50-70			30-50			100-120		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	9550	0.014	280	6370	0.012	160	4250	0.011	90	11680	0.019	440
	4	7170	0.019	280	4780	0.016	160	3180	0.014	90	8760	0.025	440
	5	5730	0.024	280	3820	0.020	160	2550	0.018	90	7010	0.031	440
	6	4780	0.030	290	3180	0.026	160	2120	0.023	100	5840	0.039	460
	8	3580	0.038	270	2390	0.033	160	1590	0.029	90	4380	0.050	440
	10	2870	0.046	260	1910	0.039	150	1270	0.034	90	3500	0.059	410
	12	2390	0.054	260	1590	0.046	150	1060	0.041	90	2920	0.070	410
	14	2050	0.062	260	1360	0.053	140	910	0.047	90	2500	0.081	410
	16	1790	0.072	260	1190	0.061	150	800	0.054	90	2190	0.094	410
	18	1590	0.084	270	1060	0.071	150	710	0.063	90	1950	0.109	430
	20	1430	0.096	270	960	0.082	160	640	0.072	90	1750	0.125	440

< D3 mm: ae = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	D x D			D x D			0.5D x D			D x D		
	Vc (m/min)	70-90			40-60			25-35			80-100		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	8490	0.007	120	5310	0.006	60	3180	0.005	30	9550	0.009	180
	4	6370	0.010	120	3980	0.008	60	2390	0.007	30	7170	0.012	180
	5	5100	0.012	120	3180	0.010	60	1910	0.009	30	5730	0.016	180
	6	4250	0.015	130	2650	0.013	70	1590	0.011	40	4780	0.020	190
	8	3180	0.019	120	1990	0.016	60	1190	0.014	30	3580	0.025	180
	10	2550	0.023	120	1590	0.019	60	960	0.017	30	2870	0.030	170
	12	2120	0.027	110	1330	0.023	60	800	0.020	30	2390	0.035	170
	14	1820	0.031	110	1140	0.027	60	680	0.023	30	2050	0.041	170
	16	1590	0.036	110	1000	0.031	60	600	0.027	30	1790	0.047	170
	18	1420	0.042	120	880	0.036	60	530	0.032	30	1590	0.055	170
	20	1270	0.048	120	800	0.041	70	480	0.036	30	1430	0.062	180

< D3 mm: ap = 0.5D

G2210-11-12

cylindrical shank, 2 flutes, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z2

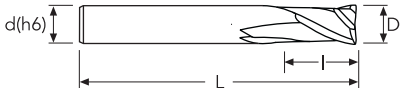
G2210

G2211-G2212

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.030			4	9		75	2	G2210020	●
3	0/-0.030			4	15		75	2	G2210030	●
4	0/-0.030			4	20		75	2	G2210040	●
5	0/-0.030			6	25		75	2	G2210050	●
6	0/-0.030			6	25		75	2	G2210060	●
5	0/-0.030			6	30		100	2	G2211050	●
6	0/-0.030			6	30		100	2	G2211060	●
8	0/-0.035			8	35		100	2	G2211080	●
10	0/-0.035			10	40		100	2	G2211100	●
12	0/-0.035			12	45		100	2	G2211120	●
8	0/-0.035			8	40		150	2	G2212080	●
10	0/-0.035			10	50		150	2	G2212100	●
12	0/-0.035			12	50		150	2	G2212120	●
16	0/-0.040			16	70		150	2	G2212160	●

● stock standard ○ non-standard stock ▽ stock exhaustion

G2210-G2211

SLOTTING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	70-90			45-65			30-50			80-120		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	12740	0.007	180	8760	0.006	100	6370	0.005	70	15920	0.009	290
	3	8490	0.010	170	5840	0.009	100	4250	0.008	60	10620	0.013	280
	4	6370	0.014	180	4380	0.012	100	3180	0.011	70	7960	0.018	290
	5	5100	0.018	180	3500	0.015	110	2550	0.014	70	6370	0.023	300
	6	4250	0.023	190	2920	0.019	110	2120	0.017	70	5310	0.029	310
	8	3180	0.030	190	2190	0.026	110	1590	0.023	70	3980	0.039	310
	10	2550	0.035	180	1750	0.030	100	1270	0.026	70	3180	0.046	290
	12	2120	0.041	170	1460	0.035	100	1060	0.031	70	2650	0.053	280

< D3 mm: ap = 0.2D

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
	Vc (m/min)	70-90			45-65			30-50			80-120		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	12740	0.008	210	8760	0.007	130	6370	0.006	80	15920	0.011	350
	3	8490	0.012	200	5840	0.010	120	4250	0.009	80	10620	0.016	330
	4	6370	0.017	210	4380	0.014	130	3180	0.013	80	7960	0.022	350
	5	5100	0.022	220	3500	0.018	130	2550	0.016	80	6370	0.028	360
	6	4250	0.027	230	2920	0.023	130	2120	0.020	90	5310	0.035	370
	8	3180	0.036	230	2190	0.031	130	1590	0.027	90	3980	0.047	370
	10	2550	0.042	210	1750	0.036	120	1270	0.032	80	3180	0.055	350
	12	2120	0.049	210	1460	0.042	120	1060	0.037	80	2650	0.064	340

< D3 mm: ae = 0.2D

DRILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	D X D			D X D			0.5D X D			D X D		
	Vc (m/min)	60-80			40-60			25-45			70-110		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	11150	0.004	90	7960	0.004	60	5570	0.003	40	14330	0.005	160
	3	7430	0.006	90	5310	0.005	50	3720	0.005	30	9550	0.008	150
	4	5570	0.008	90	3980	0.007	60	2790	0.006	40	7170	0.011	160
	5	4460	0.011	100	3180	0.009	60	2230	0.008	40	5730	0.014	160
	6	3720	0.014	100	2650	0.011	60	1860	0.010	40	4780	0.018	170
	8	2790	0.018	100	1990	0.015	60	1390	0.014	40	3580	0.023	170
	10	2230	0.021	90	1590	0.018	60	1110	0.016	30	2870	0.027	160
	12	1860	0.025	90	1330	0.021	60	930	0.018	30	2390	0.032	150

< D3 mm: ap = 0.5D

CUTTING PARAMETERS

G2212

SLOTTING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.3D x D**			**0.3D x D**			**0.3D x D**			**0.3D x D**		
	Vc (m/min)	**55-75**			**40-60**			**20-40**			**70-90**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	8	2590	0.026	130	1990	0.022	90	1190	0.020	50	3180	0.034	210
	10	2070	0.032	130	1590	0.027	90	960	0.024	50	2550	0.042	210
	12	1730	0.036	120	1330	0.031	80	800	0.027	40	2120	0.047	200
	14	1480	0.042	120	1140	0.036	80	680	0.032	40	1820	0.055	200
	16	1290	0.048	120	1000	0.041	80	600	0.036	40	1590	0.062	200

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
	Vc (m/min)	**55-75**			**40-60**			**20-40**			**70-90**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	8	2590	0.031	160	1990	0.027	110	1190	0.023	60	3180	0.041	260
	10	2070	0.038	160	1590	0.033	100	960	0.029	60	2550	0.050	250
	12	1730	0.043	150	1330	0.037	100	800	0.032	50	2120	0.056	240
	14	1480	0.050	150	1140	0.043	100	680	0.038	50	1820	0.066	240
	16	1290	0.058	150	1000	0.049	100	600	0.043	50	1590	0.075	240

DRILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**D X D**			**D X D**			**0.5D X D**			**D X D**		
	Vc (m/min)	**50-70**			**35-55**			**20-30**			**60-80**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	8	2390	0.016	70	1790	0.013	50	1000	0.012	20	2790	0.020	110
	10	1910	0.019	70	1430	0.016	50	800	0.014	20	2230	0.025	110
	12	1590	0.022	70	1190	0.018	40	660	0.016	20	1860	0.028	100
	14	1360	0.025	70	1020	0.021	40	570	0.019	20	1590	0.033	100
	16	1190	0.029	70	900	0.024	40	500	0.022	20	1390	0.037	100

GB305

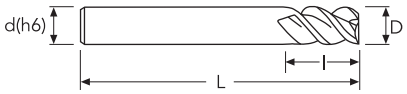
cylindrical shank, 3 flutes

OSAWA NORM | N | MG / BR | <45 HRC | 45° | SQUARE | Z3

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			4	3		50	3	GB305010	●
1.5	0/-0.020			4	4.5		50	3	GB305015	●
2	0/-0.020			4	6		50	3	GB305020	●
3	0/-0.020			4	8		50	3	GB305030	●
4	0/-0.020			4	11		50	3	GB305040	●
5	0/-0.020			6	13		50	3	GB305050	●
6	0/-0.020			6	15		50	3	GB305060	●
8	0/-0.025			8	20		60	3	GB305080	●
10	0/-0.025			10	30		75	3	GB305100	●
12	0/-0.025			12	30		75	3	GB305120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

GB305

SLOTTING	Material Group ISO 513	P1 K1			P2 M1 K2			P3 M2			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.5D x D**		
	Vc (m/min)	**50-60**			**30-50**			**20-40**			**70-90**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	17520	0.003	160	12740	0.003	100	9550	0.002	60	25480	0.004	300
	2	8760	0.006	160	6370	0.005	100	4780	0.004	60	12740	0.008	300
	3	5840	0.009	150	4250	0.007	90	3180	0.006	60	8490	0.011	280
	4	4380	0.012	160	3180	0.010	100	2390	0.009	60	6370	0.016	300
	5	3500	0.015	160	2550	0.013	100	1910	0.012	70	5100	0.020	310
	6	2920	0.020	170	2120	0.017	110	1590	0.015	70	4250	0.026	330
	8	2190	0.026	170	1590	0.022	100	1190	0.019	70	3180	0.033	320
	10	1750	0.032	170	1270	0.028	110	960	0.024	70	2550	0.042	320
	12	1460	0.038	170	1060	0.033	100	800	0.029	70	2120	0.050	320

< D3 mm: ap = 0.2D

SIDE MILLING	Material Group ISO 513	P1 K1			P2 M1 K2			P3 M2			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.2D**			**1.5D x 0.3D**		
	Vc (m/min)	**50-70**			**40-50**			**20-40**			**80-100**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	19110	0.004	210	14330	0.003	130	9550	0.003	80	28660	0.005	400
	2	9550	0.007	210	7170	0.006	130	4780	0.005	80	14330	0.009	400
	3	6370	0.010	200	4780	0.009	130	3180	0.008	70	9550	0.013	380
	4	4780	0.014	210	3580	0.012	130	2390	0.011	80	7170	0.019	400
	5	3820	0.018	210	2870	0.016	140	1910	0.014	80	5730	0.024	410
	6	3180	0.024	230	2390	0.020	140	1590	0.018	80	4780	0.031	440
	8	2390	0.031	220	1790	0.026	140	1190	0.023	80	3580	0.040	430
	10	1910	0.039	220	1430	0.033	140	960	0.029	80	2870	0.051	440
	12	1590	0.046	220	1190	0.039	140	800	0.035	80	2390	0.060	430

< D3 mm: ae = 0.1D

OSAWA

G2CSH3

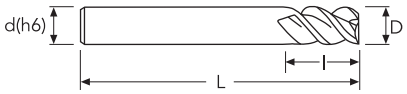
cylindrical shank, 3 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z3

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			4	3		50	3	G2CSH3010	●
1.5	0/-0.020			4	4.5		50	3	G2CSH3015	●
2	0/-0.020			4	6		50	3	G2CSH3020	●
2.5	0/-0.020			4	7		50	3	G2CSH3025	●
3	0/-0.020			4	8		50	3	G2CSH3030	●
3.5	0/-0.020			4	10		50	3	G2CSH3035	●
4	0/-0.020			4	11		50	3	G2CSH3040	●
4.5	0/-0.020			6	13		50	3	G2CSH3045	●
5	0/-0.020			6	13		50	3	G2CSH3050	●
5.5	0/-0.020			6	13		50	3	G2CSH3055	●
6	0/-0.020			6	15		50	3	G2CSH3060	●
6.5	0/-0.025			8	17		60	3	G2CSH3065	●
7	0/-0.025			8	17		60	3	G2CSH3070	●
7.5	0/-0.025			8	17		60	3	G2CSH3075	●
8	0/-0.025			8	20		60	3	G2CSH3080	●
8.5	0/-0.025			10	23		75	3	G2CSH3085	●
9	0/-0.025			10	23		75	3	G2CSH3090	●
10	0/-0.025			10	30		75	3	G2CSH3100	●
11	0/-0.025			12	28		75	3	G2CSH3110	●
12	0/-0.025			12	30		75	3	G2CSH3120	●
14	0/-0.030			14	26		83	3	G2CSH3140	●
16	0/-0.030			16	32		92	3	G2CSH3160	●
18	0/-0.030			20	40		100	3	G2CSH3180	●
20	0/-0.030			20	40		100	3	G2CSH3200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CSH3

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**80-120**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.003	260	19110	0.003	150	12740	0.002	90	31850	0.004	370
	2	14330	0.006	270	9550	0.005	150	6370	0.005	90	15920	0.008	390
	3	9550	0.009	270	6370	0.008	150	4250	0.007	90	10620	0.012	390
	4	7170	0.013	270	4780	0.011	150	3180	0.009	90	7960	0.016	390
	5	5730	0.016	270	3820	0.013	150	2550	0.012	90	6370	0.020	390
	6	4780	0.019	270	3180	0.016	150	2120	0.014	90	5310	0.024	390
	8	3580	0.025	270	2390	0.021	150	1590	0.019	90	3980	0.033	390
	10	2870	0.031	270	1910	0.027	150	1270	0.023	90	3180	0.041	390
	12	2390	0.040	290	1590	0.034	160	1060	0.030	100	2650	0.052	410
	14	2050	0.046	280	1360	0.039	160	910	0.035	90	2270	0.060	410
	16	1790	0.056	300	1190	0.048	170	800	0.042	100	1990	0.073	440
	18	1590	0.065	310	1060	0.055	180	710	0.049	100	1770	0.085	450
	20	1430	0.075	320	960	0.064	180	640	0.056	110	1590	0.098	470

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
	Vc (m/min)	**90-110**			**60-80**			**40-60**			**110-120**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	31850	0.004	340	22290	0.003	200	15920	0.003	130	38220	0.005	540
	2	15920	0.008	360	11150	0.006	210	7960	0.006	130	19110	0.010	560
	3	10620	0.011	360	7430	0.010	210	5310	0.008	130	12740	0.015	560
	4	7960	0.015	360	5570	0.013	210	3980	0.011	130	9550	0.020	560
	5	6370	0.019	360	4460	0.016	210	3180	0.014	130	7640	0.024	560
	6	5310	0.023	360	3720	0.019	210	2650	0.017	130	6370	0.029	560
	8	3980	0.030	360	2790	0.026	210	1990	0.023	130	4780	0.039	560
	10	3180	0.038	360	2230	0.032	210	1590	0.028	130	3820	0.049	560
	12	2650	0.048	380	1860	0.041	230	1330	0.036	140	3180	0.062	600
	14	2270	0.056	380	1590	0.047	230	1140	0.042	140	2730	0.072	590
	16	1990	0.068	400	1390	0.057	240	1000	0.051	150	2390	0.088	630
	18	1770	0.078	410	1240	0.066	250	880	0.059	150	2120	0.101	640
	20	1590	0.090	430	1110	0.077	250	800	0.068	160	1910	0.117	670

< D3 mm: ae = 0.1D

G2WSH3

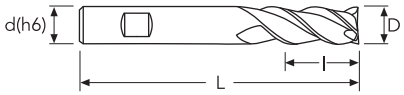
weldon shank, 3 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z3

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.020			6	8		57	3	G2WSH3030	●
4	0/-0.020			6	11		57	3	G2WSH3040	●
5	0/-0.020			6	13		57	3	G2WSH3050	●
6	0/-0.020			6	13		57	3	G2WSH3060	●
8	0/-0.025			8	19		63	3	G2WSH3080	●
10	0/-0.025			10	22		72	3	G2WSH3100	●
12	0/-0.025			12	26		83	3	G2WSH3120	●
14	0/-0.030			14	26		83	3	G2WSH3140	●
16	0/-0.030			16	32		92	3	G2WSH3160	●
20	0/-0.030			20	38		104	3	G2WSH3200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2WSH3

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**80-120**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	9550	0.009	270	6370	0.008	150	4250	0.007	90	10620	0.012	390
	4	7170	0.013	270	4780	0.011	150	3180	0.009	90	7960	0.016	390
	5	5730	0.016	270	3820	0.013	150	2550	0.012	90	6370	0.020	390
	6	4780	0.019	270	3180	0.016	150	2120	0.014	90	5310	0.024	390
	8	3580	0.025	270	2390	0.021	150	1590	0.019	90	3980	0.033	390
	10	2870	0.031	270	1910	0.027	150	1270	0.023	90	3180	0.041	390
	12	2390	0.040	290	1590	0.034	160	1060	0.030	100	2650	0.052	410
	14	2050	0.046	280	1360	0.039	160	910	0.035	90	2270	0.060	410
	16	1790	0.056	300	1190	0.048	170	800	0.042	100	1990	0.073	440
	18	1590	0.065	310	1060	0.055	180	710	0.049	100	1770	0.085	450
	20	1430	0.075	320	960	0.064	180	640	0.056	110	1590	0.098	470

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
	Vc (m/min)	**90-110**			**60-80**			**40-60**			**110-120**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10620	0.011	360	7430	0.010	210	5310	0.008	130	12740	0.015	560
	4	7960	0.015	360	5570	0.013	210	3980	0.011	130	9550	0.020	560
	5	6370	0.019	360	4460	0.016	210	3180	0.014	130	7640	0.024	560
	6	5310	0.023	360	3720	0.019	210	2650	0.017	130	6370	0.029	560
	8	3980	0.030	360	2790	0.026	210	1990	0.023	130	4780	0.039	560
	10	3180	0.038	360	2230	0.032	210	1590	0.028	130	3820	0.049	560
	12	2650	0.048	380	1860	0.041	230	1330	0.036	140	3180	0.062	600
	14	2270	0.056	380	1590	0.047	230	1140	0.042	140	2730	0.072	590
	16	1990	0.068	400	1390	0.057	240	1000	0.051	150	2390	0.088	630
	18	1770	0.078	410	1240	0.066	250	880	0.059	150	2120	0.101	640
	20	1590	0.090	430	1110	0.077	250	800	0.068	160	1910	0.117	670

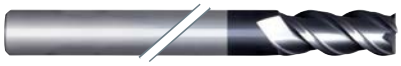
< D3 mm: ae = 0.1D

G2310-11-12

cylindrical shank, 3 flutes, long

OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z3

G2310

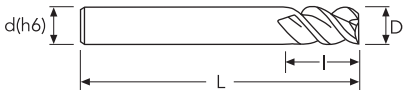


G2311-G2312

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.030			4	9		75	3	G2310020	●
3	0/-0.030			4	15		75	3	G2310030	●
4	0/-0.030			4	20		75	3	G2310040	●
5	0/-0.030			6	25		75	3	G2310050	●
6	0/-0.030			6	25		75	3	G2310060	●
4	0/-0.030			6	25		100	3	G2311040	●
5	0/-0.030			6	30		100	3	G2311050	●
6	0/-0.030			6	30		100	3	G2311060	●
7	0/-0.030			8	35		100	3	G2311070	●
8	0/-0.035			8	35		100	3	G2311080	●
9	0/-0.035			10	40		100	3	G2311090	●
10	0/-0.035			10	40		100	3	G2311100	●
11	0/-0.035			12	45		100	3	G2311110	●
12	0/-0.035			12	45		100	3	G2311120	●
8	0/-0.035			8	40		150	3	G2312080	●
10	0/-0.035			10	50		150	3	G2312100	●
12	0/-0.035			12	50		150	3	G2312120	●
16	0/-0.040			16	70		150	3	G2312160	●
20	0/-0.040			20	80		150	3	G2312200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2310-G2311

SLOTTING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**60-80**			**35-55**			**25-35**			**80-100**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	11150	0.006	190	7170	0.005	100	4780	0.004	60	14330	0.007	310
	3	7430	0.008	190	4780	0.007	100	3180	0.006	60	9550	0.011	310
	4	5570	0.011	190	3580	0.010	100	2390	0.008	60	7170	0.015	310
	5	4460	0.014	190	2870	0.012	100	1910	0.011	60	5730	0.018	310
	6	3720	0.017	190	2390	0.014	100	1590	0.013	60	4780	0.022	310
	8	2790	0.023	190	1790	0.019	100	1190	0.017	60	3580	0.029	310
	10	2230	0.028	190	1430	0.024	100	960	0.021	60	2870	0.037	310
	12	1860	0.036	200	1190	0.031	110	800	0.027	60	2390	0.047	340

< D3 mm: ap = 0.2D

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
	Vc (m/min)	**70-90**			**45-65**			**30-50**			**80-120**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	12740	0.007	270	8760	0.006	160	6370	0.005	100	15920	0.009	440
	3	8490	0.011	270	5840	0.009	160	4250	0.008	100	10620	0.014	440
	4	6370	0.014	270	4380	0.012	160	3180	0.011	100	7960	0.018	440
	5	5100	0.018	270	3500	0.015	160	2550	0.013	100	6370	0.023	440
	6	4250	0.021	270	2920	0.018	160	2120	0.016	100	5310	0.027	440
	8	3180	0.028	270	2190	0.024	160	1590	0.021	100	3980	0.037	440
	10	2550	0.035	270	1750	0.030	160	1270	0.026	100	3180	0.046	440
	12	2120	0.045	290	1460	0.038	170	1060	0.034	110	2650	0.059	470

< D3 mm: ae = 0.1D

G2312

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**		
	Vc (m/min)	**55-75**			**40-60**			**20-40**			**70-90**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	8	2590	0.020	160	1990	0.017	100	1190	0.015	50	3180	0.026	250
	10	2070	0.025	160	1590	0.021	100	960	0.019	50	2550	0.033	250
	12	1730	0.032	170	1330	0.027	110	800	0.024	60	2120	0.042	260
	14	1480	0.037	160	1140	0.031	110	680	0.028	60	1820	0.048	260
	16	1290	0.045	170	1000	0.038	110	600	0.034	60	1590	0.059	280

GB405

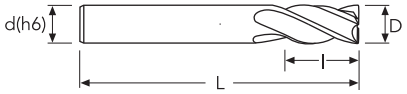
cylindrical shank, 4 flutes

OSAWA NORM | N | MG / BR | <45 HRC | 30° | SQUARE | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			4	3		50	4	GB405010	●
1.5	0/-0.020			4	4.5		50	4	GB405015	●
2	0/-0.020			4	6		50	4	GB405020	●
3	0/-0.020			4	8		50	4	GB405030	●
4	0/-0.020			4	11		50	4	GB405040	●
5	0/-0.020			6	13		50	4	GB405050	●
6	0/-0.020			6	15		50	4	GB405060	●
8	0/-0.025			8	20		60	4	GB405080	●
10	0/-0.025			10	30		75	4	GB405100	●
12	0/-0.025			12	30		75	4	GB405120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

GB405

	Material Group ISO 513	P1 K1			P2 M1 K2			P3 M2			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**		
	Vc (m/min)	**50-70**			**40-50**			**20-40**			**80-100**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	19110	0.003	250	14330	0.003	160	9550	0.002	90	28660	0.004	480
	2	9550	0.006	250	7170	0.006	160	4780	0.005	90	14330	0.008	480
	3	6370	0.010	250	4780	0.008	160	3180	0.007	90	9550	0.013	480
	4	4780	0.013	250	3580	0.011	160	2390	0.010	90	7170	0.017	480
	5	3820	0.016	250	2870	0.014	160	1910	0.012	90	5730	0.021	480
	6	3180	0.020	260	2390	0.017	160	1590	0.015	100	4780	0.026	500
	8	2390	0.026	250	1790	0.022	160	1190	0.019	90	3580	0.034	480
	10	1910	0.031	240	1430	0.026	150	960	0.023	90	2870	0.040	460
	12	1590	0.036	230	1190	0.031	150	800	0.027	90	2390	0.047	450

< D3 mm: ae = 0.1D

OSAWA

G2CS4

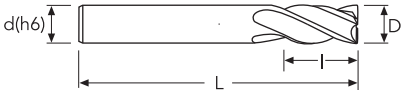
cylindrical shank, 4 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			4	3		50	4	G2CS4010	●
1.5	0/-0.020			4	4.5		50	4	G2CS4015	●
2	0/-0.020			4	6		50	4	G2CS4020	●
2.5	0/-0.020			4	7		50	4	G2CS4025	●
3	0/-0.020			4	8		50	4	G2CS4030	●
3.5	0/-0.020			4	10		50	4	G2CS4035	●
4	0/-0.020			4	11		50	4	G2CS4040	●
4.5	0/-0.020			6	13		50	4	G2CS4045	●
5	0/-0.020			6	13		50	4	G2CS4050	●
5.5	0/-0.020			6	13		50	4	G2CS4055	●
6	0/-0.020			6	15		50	4	G2CS4060	●
6.5	0/-0.025			8	17		60	4	G2CS4065	●
7	0/-0.025			8	17		60	4	G2CS4070	●
7.5	0/-0.025			8	17		60	4	G2CS4075	●
8	0/-0.025			8	20		60	4	G2CS4080	●
8.5	0/-0.025			10	23		75	4	G2CS4085	●
9	0/-0.025			10	23		75	4	G2CS4090	●
9.5	0/-0.025			10	25		75	4	G2CS4095	●
10	0/-0.025			10	30		75	4	G2CS4100	●
10.5	0/-0.025			12	25		75	4	G2CS4105	●
11	0/-0.025			12	30		75	4	G2CS4110	●
11.5	0/-0.025			12	28		75	4	G2CS4115	●
12	0/-0.025			12	30		75	4	G2CS4120	●
12.5	0/-0.030			14	26		83	4	G2CS4125	●
13	0/-0.030			14	26		83	4	G2CS4130	●
13.5	0/-0.030			14	26		83	4	G2CS4135	●
14	0/-0.030			14	26		83	4	G2CS4140	●
14.5	0/-0.030			16	32		92	4	G2CS4145	●
15	0/-0.030			16	32		92	4	G2CS4150	●
15.5	0/-0.030			16	32		92	4	G2CS4155	●
16	0/-0.030			16	32		92	4	G2CS4160	●
17	0/-0.030			20	40		100	4	G2CS4170	●
18	0/-0.030			20	40		100	4	G2CS4180	●
19	0/-0.030			20	40		100	4	G2CS4190	●
20	0/-0.030			20	40		100	4	G2CS4200	●
22	0/-0.030			25	40		100	4	G2CS4220	●
25	0/-0.030			25	40		100	4	G2CS4250	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CS4

SIDE MILLING

Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae	**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**		
Vc (m/min)	**80-100**			**50-70**			**30-50**			**100-120**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	28660	0.004	400	19110	0.003	230	12740	0.003	130	35030	0.005	640
2	14330	0.007	400	9550	0.006	230	6370	0.005	130	17520	0.009	640
3	9550	0.010	380	6370	0.009	220	4250	0.008	130	11680	0.013	610
4	7170	0.013	370	4780	0.011	210	3180	0.010	120	8760	0.017	590
5	5730	0.016	370	3820	0.014	210	2550	0.012	120	7010	0.021	580
6	4780	0.019	360	3180	0.016	210	2120	0.014	120	5840	0.025	580
8	3580	0.025	360	2390	0.021	200	1590	0.019	120	4380	0.033	570
10	2870	0.032	370	1910	0.027	210	1270	0.024	120	3500	0.042	580
12	2390	0.040	380	1590	0.034	220	1060	0.030	130	2920	0.052	610
14	2050	0.047	390	1360	0.040	220	910	0.035	130	2500	0.061	610
16	1790	0.054	390	1190	0.046	220	800	0.041	130	2190	0.070	610
18	1590	0.060	380	1060	0.051	220	710	0.045	130	1950	0.078	610
20	1430	0.065	370	960	0.055	210	640	0.049	120	1750	0.085	590
22	1300	0.073	380	870	0.062	220	580	0.055	130	1590	0.095	600
25	1150	0.083	380	760	0.071	210	510	0.062	130	1400	0.108	600

< D3 mm: ae = 0.1D

G2WS4

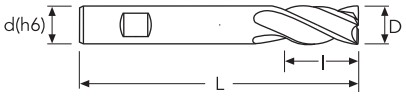
weldon shank, 4 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.020			6	8		57	4	G2WS4030	●
4	0/-0.020			6	11		57	4	G2WS4040	●
5	0/-0.020			6	13		57	4	G2WS4050	●
6	0/-0.020			6	13		57	4	G2WS4060	●
8	0/-0.025			8	19		63	4	G2WS4080	●
10	0/-0.025			10	22		72	4	G2WS4100	●
12	0/-0.025			12	26		83	4	G2WS4120	●
14	0/-0.030			14	26		83	4	G2WS4140	●
16	0/-0.030			16	32		92	4	G2WS4160	●
20	0/-0.030			20	38		104	4	G2WS4200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2WS4

SIDE MILLING

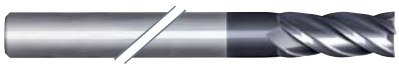
Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae	**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**		
Vc (m/min)	**80-100**			**50-70**			**30-50**			**100-120**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	9550	0.01	380	6370	0.0085	220	4250	0.0075	130	11680	0.013	610
4	7170	0.013	370	4780	0.011	210	3180	0.010	120	8760	0.017	590
5	5730	0.016	370	3820	0.014	210	2550	0.012	120	7010	0.021	580
6	4780	0.019	360	3180	0.016	210	2120	0.014	120	5840	0.025	580
8	3580	0.025	360	2390	0.021	200	1590	0.019	120	4380	0.033	570
10	2870	0.032	370	1910	0.027	210	1270	0.024	120	3500	0.042	580
12	2390	0.040	380	1590	0.034	220	1060	0.030	130	2920	0.052	610
14	2050	0.047	390	1360	0.040	220	910	0.035	130	2500	0.061	610
16	1790	0.054	390	1190	0.046	220	800	0.041	130	2190	0.070	610
18	1590	0.060	380	1060	0.051	220	710	0.045	130	1950	0.078	610
20	1430	0.065	370	960	0.055	210	640	0.049	120	1750	0.085	590

G2410-11-12-13

cylindrical shank, 4 flutes, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z4

G2410

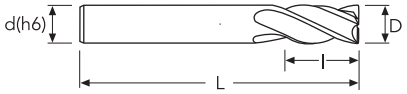


G2411-G2412-G2413

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.030			4	9		75	4	G2410020	●
2.5	0/-0.030			4	10		75	4	G2410025	●
3	0/-0.030			4	15		75	4	G2410030	●
3.5	0/-0.030			4	15		75	4	G2410035	●
4	0/-0.030			4	20		75	4	G2410040	●
4.5	0/-0.030			6	20		75	4	G2410045	●
5	0/-0.030			6	25		75	4	G2410050	●
6	0/-0.030			6	25		75	4	G2410060	●
3	0/-0.030			6	15		100	4	G2411030	●
4	0/-0.030			6	25		100	4	G2411040	●
5	0/-0.030			6	30		100	4	G2411050	●
6	0/-0.030			6	30		100	4	G2411060	●
7	0/-0.030			8	35		100	4	G2411070	●
8	0/-0.035			8	35		100	4	G2411080	●
9	0/-0.035			10	40		100	4	G2411090	●
10	0/-0.035			10	40		100	4	G2411100	●
11	0/-0.035			12	45		100	4	G2411110	●
12	0/-0.035			12	45		100	4	G2411120	●
8	0/-0.035			8	40		150	4	G2412080	●
10	0/-0.035			10	50		150	4	G2412100	●
12	0/-0.035			12	50		150	4	G2412120	●
16	0/-0.040			16	70		150	4	G2412160	●
18	0/-0.040			20	80		150	4	G2412180	●
20	0/-0.040			20	80		150	4	G2412200	●
16	0/-0.040			16	40		200	4	G2413160	●
20	0/-0.040			20	40		200	4	G2413200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2410-G2411

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**70-90**			**45-65**			**30-50**			**80-120**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	mm	*rpm*	*mm/rev*	*mm/min*	*rpm*	*mm/rev*	*mm/min*	*rpm*	*mm/rev*	*mm/min*	*rpm*	*mm/rev*	*mm/min*
	2	12740	0.006	320	8760	0.005	190	6370	0.005	120	15920	0.008	520
	3	8490	0.009	310	5840	0.008	180	4250	0.007	110	10620	0.012	500
	4	6370	0.012	300	4380	0.010	170	3180	0.009	110	7960	0.015	480
	5	5100	0.014	290	3500	0.012	170	2550	0.011	110	6370	0.019	480
	6	4250	0.017	290	2920	0.015	170	2120	0.013	110	5310	0.022	470
	8	3180	0.023	290	2190	0.019	170	1590	0.017	110	3980	0.029	470
	10	2550	0.029	290	1750	0.024	170	1270	0.022	110	3180	0.037	480
	12	2120	0.036	310	1460	0.031	180	1060	0.027	110	2650	0.047	500

G2412-G2413

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**55-75**			**40-60**			**20-40**			**70-90**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	8	2590	0.020	210	1990	0.017	140	1190	0.015	70	3180	0.026	330
	10	2070	0.026	210	1590	0.022	140	960	0.019	70	2550	0.033	340
	12	1730	0.032	220	1330	0.027	140	800	0.024	80	2120	0.042	350
	14	1480	0.038	220	1140	0.032	150	680	0.028	80	1820	0.049	360
	16	1290	0.043	220	1000	0.037	150	600	0.032	80	1590	0.056	360
	20	1040	0.065	270	800	0.055	180	480	0.049	90	1270	0.085	430

G2CSHM

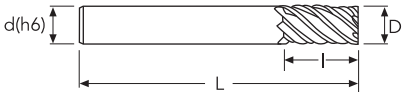
cylindrical shank, multi flute

OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z6

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.020			6	15		50	6	G2CSHM060	●
8	0/-0.025			8	20		60	6	G2CSHM080	●
10	0/-0.025			10	30		75	6	G2CSHM100	●
12	0/-0.025			12	30		75	6	G2CSHM120	●
14	0/-0.030			14	30		83	6	G2CSHM140	●
16	0/-0.030			16	35		92	6	G2CSHM160	●
20	0/-0.030			20	40		100	6	G2CSHM200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CSHM

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3					
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**					
	Vc (m/min)	**100-120**			**70-90**			**50-70**					
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)			
	6	5840	0.016	560	4250	0.014	350	3180	0.012	230			
	8	4380	0.020	530	3180	0.017	320	2390	0.015	220			
	10	3500	0.025	530	2550	0.021	330	1910	0.019	210			
	12	2920	0.030	530	2120	0.026	320	1590	0.023	210			
	14	2500	0.035	530	1820	0.030	320	1360	0.026	210			
	16	2190	0.040	530	1590	0.034	320	1190	0.030	210			
	20	1750	0.050	530	1270	0.043	320	960	0.038	220			

G2CSFR

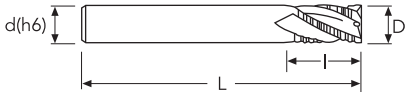
cylindrical shank, roughing HR

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | HR FINE | Z3~Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
4	0/-0.070			6	11		50	3	G2CSFR040	●
5	0/-0.070			6	13		50	3	G2CSFR050	●
6	0/-0.070			6	15		50	3	G2CSFR060	●
7	0/-0.070			8	20		60	3	G2CSFR070	●
8	0/-0.070			8	20		60	3	G2CSFR080	●
9	0/-0.070			10	25		75	3	G2CSFR090	●
10	0/-0.070			10	30		75	4	G2CSFR100	●
11	0/-0.070			12	30		75	4	G2CSFR110	●
12	0/-0.070			12	30		75	4	G2CSFR120	●
13	0/-0.070			14	30		83	4	G2CSFR130	●
14	0/-0.070			14	30		83	4	G2CSFR140	●
15	0/-0.070			16	30		92	4	G2CSFR150	●
16	0/-0.070			16	35		92	4	G2CSFR160	●
20	0/-0.070			20	40		100	4	G2CSFR200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CSFR

SIDE MILLING

Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3					
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**					
Vc (m/min)	**70-90**			**50-70**			**30-50**					
D (mm)	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**			
6	4250	0.030	380	3180	0.026	320	2120	0.023	190			
8	3180	0.045	430	2390	0.038	370	1590	0.034	210			
10	2550	0.060	610	1910	0.051	390	1270	0.045	230			
12	2120	0.072	610	1590	0.061	390	1060	0.054	230			
14	1820	0.085	620	1360	0.072	390	910	0.064	230			
16	1590	0.096	610	1190	0.082	390	800	0.072	230			
20	1270	0.120	610	960	0.102	390	640	0.090	230			

D6-9: Z3
D10-20: Z4

G2WSFR

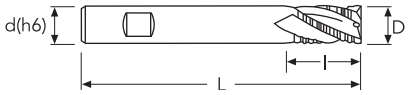
weldon shank, roughing HR

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | HR FINE | Z3~Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.070			6	13		57	3	G2WSFR060	●
8	0/-0.070			8	19		63	3	G2WSFR080	●
10	0/-0.070			10	22		72	4	G2WSFR100	●
12	0/-0.070			12	26		83	4	G2WSFR120	●
14	0/-0.070			14	26		83	4	G2WSFR140	●
16	0/-0.070			16	32		92	4	G2WSFR160	●
20	0/-0.070			20	38		104	4	G2WSFR200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2WSFR

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3					
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**					
	Vc (m/min)	**70-90**			**50-70**			**30-50**					
	D (mm)	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**			
	6	4250	0.030	380	3180	0.026	320	2120	0.023	190			
	8	3180	0.045	430	2390	0.038	370	1590	0.034	210			
	10	2550	0.060	610	1910	0.051	390	1270	0.045	230			
	12	2120	0.072	610	1590	0.061	390	1060	0.054	230			
	14	1820	0.085	620	1360	0.072	390	910	0.064	230			
	16	1590	0.096	610	1190	0.082	390	800	0.072	230			
	20	1270	0.120	610	960	0.102	390	640	0.090	230			

D6-8: Z3
D10-20: Z4

G2CS2R

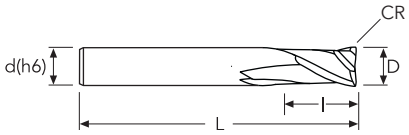
cylindrical shank, 2 flutes, corner radius

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | RADIUS | Z2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.20	+/-0.010	4	2		50	2	G2CS2R02010	●
1.5	0/-0.020	0.20	+/-0.010	4	3		50	2	G2CS2R02015	●
1.5	0/-0.020	0.50	+/-0.010	4	3		50	2	G2CS2R05015	●
2	0/-0.020	0.20	+/-0.010	4	4		50	2	G2CS2R02020	●
2	0/-0.020	0.50	+/-0.010	4	4		50	2	G2CS2R05020	●
2.5	0/-0.020	0.20	+/-0.010	4	5		50	2	G2CS2R02025	●
2.5	0/-0.020	0.50	+/-0.010	4	5		50	2	G2CS2R05025	●
3	0/-0.020	0.20	+/-0.010	4	6		50	2	G2CS2R02030	●
3	0/-0.020	0.50	+/-0.010	4	6		50	2	G2CS2R05030	●
3	0/-0.020	1.00	+/-0.010	4	6		50	2	G2CS2R10030	●
4	0/-0.020	0.20	+/-0.010	4	8		50	2	G2CS2R02040	●
4	0/-0.020	0.50	+/-0.010	4	8		50	2	G2CS2R05040	●
4	0/-0.020	1.00	+/-0.010	4	8		50	2	G2CS2R10040	●
5	0/-0.020	0.50	+/-0.010	6	10		50	2	G2CS2R05050	●
5	0/-0.020	1.00	+/-0.010	6	10		50	2	G2CS2R10050	●
6	0/-0.020	0.20	+/-0.010	6	12		50	2	G2CS2R02060	●
6	0/-0.020	0.50	+/-0.010	6	12		50	2	G2CS2R05060	●
6	0/-0.020	1.00	+/-0.010	6	12		50	2	G2CS2R10060	●
6	0/-0.020	1.50	+/-0.010	6	12		50	2	G2CS2R15060	●
6	0/-0.020	2.00	+/-0.010	6	12		50	2	G2CS2R20060	●
8	0/-0.025	0.50	+/-0.010	8	16		60	2	G2CS2R05080	●
8	0/-0.025	1.00	+/-0.010	8	16		60	2	G2CS2R10080	●
8	0/-0.025	1.50	+/-0.010	8	16		60	2	G2CS2R15080	●
8	0/-0.025	2.00	+/-0.010	8	16		60	2	G2CS2R20080	●
10	0/-0.025	0.50	+/-0.010	10	20		75	2	G2CS2R05100	●
10	0/-0.025	1.00	+/-0.010	10	20		75	2	G2CS2R10100	●
10	0/-0.025	1.50	+/-0.010	10	20		75	2	G2CS2R15100	●
10	0/-0.025	2.00	+/-0.010	10	20		75	2	G2CS2R20100	●
12	0/-0.025	0.50	+/-0.010	12	24		75	2	G2CS2R05120	●
12	0/-0.025	1.00	+/-0.010	12	24		75	2	G2CS2R10120	●
12	0/-0.025	1.50	+/-0.010	12	24		75	2	G2CS2R15120	●
12	0/-0.025	2.00	+/-0.010	12	24		75	2	G2CS2R20120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CS2R

SLOTTING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	80-100			50-70			30-50			100-120		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.004	230	19110	0.003	130	12740	0.003	80	35030	0.005	360
	2	14330	0.008	230	9550	0.007	130	6370	0.006	80	17520	0.010	360
	3	9550	0.012	230	6370	0.010	130	4250	0.009	80	11680	0.016	360
	4	7170	0.016	230	4780	0.014	130	3180	0.012	80	8760	0.021	360
	5	5730	0.020	230	3820	0.017	130	2550	0.015	80	7010	0.026	360
	6	4780	0.025	240	3180	0.021	140	2120	0.019	80	5840	0.033	380
	8	3580	0.032	230	2390	0.027	130	1590	0.024	80	4380	0.042	360
	10	2870	0.038	220	1910	0.032	120	1270	0.029	70	3500	0.049	350
	12	2390	0.045	220	1590	0.038	120	1060	0.034	70	2920	0.059	340

< D3 mm: ap = 0.2D

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
	Vc (m/min)	80-100			50-70			30-50			100-120		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.005	280	19110	0.004	160	12740	0.004	90	35030	0.006	440
	2	14330	0.010	280	9550	0.008	160	6370	0.007	90	17520	0.012	440
	3	9550	0.014	280	6370	0.012	160	4250	0.011	90	11680	0.019	440
	4	7170	0.019	280	4780	0.016	160	3180	0.014	90	8760	0.025	440
	5	5730	0.024	280	3820	0.020	160	2550	0.018	90	7010	0.031	440
	6	4780	0.030	290	3180	0.026	160	2120	0.023	100	5840	0.039	460
	8	3580	0.038	270	2390	0.033	160	1590	0.029	90	4380	0.050	440
	10	2870	0.046	260	1910	0.039	150	1270	0.034	90	3500	0.059	410
	12	2390	0.054	260	1590	0.046	150	1060	0.041	90	2920	0.070	410

< D3 mm: ae = 0.2D

DRILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	D x D			D x D			0.5D x D			D x D		
	Vc (m/min)	70-90			40-60			25-35			80-100		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	25480	0.002	120	15920	0.002	60	9550	0.002	30	28660	0.003	180
	2	12740	0.005	120	7960	0.004	60	4780	0.004	30	14330	0.006	180
	3	8490	0.007	120	5310	0.006	60	3180	0.005	30	9550	0.009	180
	4	6370	0.010	120	3980	0.008	60	2390	0.007	30	7170	0.012	180
	5	5100	0.012	120	3180	0.010	60	1910	0.009	30	5730	0.016	180
	6	4250	0.015	130	2650	0.013	70	1590	0.011	40	4780	0.020	190
	8	3180	0.019	120	1990	0.016	60	1190	0.014	30	3580	0.025	180
	10	2550	0.023	120	1590	0.019	60	960	0.017	30	2870	0.030	170
	12	2120	0.027	110	1330	0.023	60	800	0.020	30	2390	0.035	170

< D3 mm: ap = 0.5D

G2CS4R

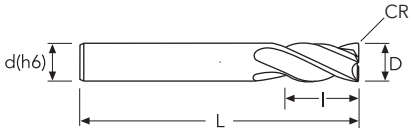
cylindrical shank, 4 flutes, corner radius

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | RADIUS | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.20	+/-0.010	4	2		50	4	G2CS4R02010	●
1.5	0/-0.020	0.20	+/-0.010	4	3		50	4	G2CS4R02015	●
1.5	0/-0.020	0.50	+/-0.010	4	3		50	4	G2CS4R05015	●
2	0/-0.020	0.20	+/-0.010	4	4		50	4	G2CS4R02020	●
2	0/-0.020	0.50	+/-0.010	4	4		50	4	G2CS4R05020	●
2.5	0/-0.020	0.20	+/-0.010	4	5		50	4	G2CS4R02025	●
2.5	0/-0.020	0.50	+/-0.010	4	5		50	4	G2CS4R05025	●
3	0/-0.020	0.20	+/-0.010	4	6		50	4	G2CS4R02030	●
3	0/-0.020	0.50	+/-0.010	4	6		50	4	G2CS4R05030	●
3	0/-0.020	1.00	+/-0.010	4	6		50	4	G2CS4R10030	●
4	0/-0.020	0.20	+/-0.010	4	8		50	4	G2CS4R02040	●
4	0/-0.020	0.50	+/-0.010	4	8		50	4	G2CS4R05040	●
4	0/-0.020	1.00	+/-0.010	4	8		50	4	G2CS4R10040	●
5	0/-0.020	0.50	+/-0.010	6	10		50	4	G2CS4R05050	●
5	0/-0.020	1.00	+/-0.010	6	10		50	4	G2CS4R10050	●
6	0/-0.020	0.20	+/-0.010	6	12		50	4	G2CS4R02060	●
6	0/-0.020	0.50	+/-0.010	6	12		50	4	G2CS4R05060	●
6	0/-0.020	1.00	+/-0.010	6	12		50	4	G2CS4R10060	●
6	0/-0.020	1.50	+/-0.010	6	12		50	4	G2CS4R15060	●
6	0/-0.020	2.00	+/-0.010	6	12		50	4	G2CS4R20060	●
8	0/-0.025	0.50	+/-0.010	8	16		60	4	G2CS4R05080	●
8	0/-0.025	1.00	+/-0.010	8	16		60	4	G2CS4R10080	●
8	0/-0.025	1.50	+/-0.010	8	16		60	4	G2CS4R15080	●
8	0/-0.025	2.00	+/-0.010	8	16		60	4	G2CS4R20080	●
10	0/-0.025	0.50	+/-0.010	10	20		75	4	G2CS4R05100	●
10	0/-0.025	1.00	+/-0.010	10	20		75	4	G2CS4R10100	●
10	0/-0.025	1.50	+/-0.010	10	20		75	4	G2CS4R15100	●
10	0/-0.025	2.00	+/-0.010	10	20		75	4	G2CS4R20100	●
10	0/-0.025	2.50	+/-0.010	10	20		75	4	G2CS4R25100	●
10	0/-0.025	3.00	+/-0.010	10	20		75	4	G2CS4R30100	●
12	0/-0.025	0.50	+/-0.010	12	24		75	4	G2CS4R05120	●
12	0/-0.025	1.00	+/-0.010	12	24		75	4	G2CS4R10120	●
12	0/-0.025	1.50	+/-0.010	12	24		75	4	G2CS4R15120	●
12	0/-0.025	2.00	+/-0.010	12	24		75	4	G2CS4R20120	●
12	0/-0.025	2.50	+/-0.010	12	24		75	4	G2CS4R25120	●
12	0/-0.025	3.00	+/-0.010	12	24		75	4	G2CS4R30120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CS4R

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**100-120**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.004	400	19110	0.003	230	12740	0.003	130	35030	0.005	640
	2	14330	0.007	400	9550	0.006	230	6370	0.005	130	17520	0.009	640
	3	9550	0.010	380	6370	0.009	220	4250	0.008	130	11680	0.013	610
	4	7170	0.013	370	4780	0.011	210	3180	0.010	120	8760	0.017	590
	5	5730	0.016	370	3820	0.014	210	2550	0.012	120	7010	0.021	580
	6	4780	0.019	360	3180	0.016	210	2120	0.014	120	5840	0.025	580
	8	3580	0.025	360	2390	0.021	200	1590	0.019	120	4380	0.033	570
	10	2870	0.032	370	1910	0.027	210	1270	0.024	120	3500	0.042	580
	12	2390	0.040	380	1590	0.034	220	1060	0.030	130	2920	0.052	610

< D3 mm: ae = 0.1D

G2CL4R

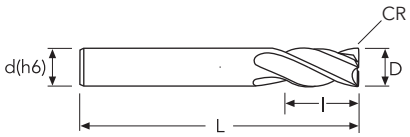
cylindrical shank, 4 flutes, long, corner radius

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | RADIUS | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.030	0.20	+/-0.010	4	4		75	4	G2CL4R02020	●
2	0/-0.030	0.50	+/-0.010	4	4		75	4	G2CL4R05020	●
3	0/-0.030	0.20	+/-0.010	4	6		75	4	G2CL4R02030	●
3	0/-0.030	0.50	+/-0.010	4	6		75	4	G2CL4R05030	●
3	0/-0.030	1.00	+/-0.010	4	6		75	4	G2CL4R10030	●
4	0/-0.030	0.20	+/-0.010	4	8		75	4	G2CL4R02040	●
4	0/-0.030	0.50	+/-0.010	4	8		75	4	G2CL4R05040	●
4	0/-0.030	1.00	+/-0.010	4	8		75	4	G2CL4R10040	●
5	0/-0.030	0.50	+/-0.010	6	10		75	4	G2CL4R05050	●
5	0/-0.030	1.00	+/-0.010	6	10		75	4	G2CL4R10050	●
6	0/-0.030	0.50	+/-0.010	6	12		75	4	G2CL4R05060	●
6	0/-0.030	1.00	+/-0.010	6	12		75	4	G2CL4R10060	●
8	0/-0.035	0.50	+/-0.010	8	16		100	4	G2CL4R05080	●
8	0/-0.035	1.00	+/-0.010	8	16		100	4	G2CL4R10080	●
8	0/-0.035	2.00	+/-0.010	8	16		100	4	G2CL4R20080	●
10	0/-0.035	0.50	+/-0.010	10	20		100	4	G2CL4R05100	●
10	0/-0.035	1.00	+/-0.010	10	20		100	4	G2CL4R10100	●
10	0/-0.035	2.00	+/-0.010	10	20		100	4	G2CL4R20100	●
12	0/-0.035	0.50	+/-0.010	12	24		100	4	G2CL4R05120	●
12	0/-0.035	1.00	+/-0.010	12	24		100	4	G2CL4R10120	●
12	0/-0.035	2.00	+/-0.010	12	24		100	4	G2CL4R20120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CL4R

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**		
	Vc (m/min)	**55-75**			**40-60**			**20-40**			**70-90**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	10350	0.006	250	7960	0.005	160	4780	0.005	90	12740	0.007	340
	3	6900	0.009	250	5310	0.008	160	3180	0.007	90	8490	0.010	340
	4	5180	0.012	250	3980	0.010	160	2390	0.009	90	6370	0.013	340
	5	4140	0.015	250	3180	0.013	160	1910	0.011	90	5100	0.017	340
	6	3450	0.017	230	2650	0.014	150	1590	0.013	80	4250	0.019	320
	8	2590	0.023	240	1990	0.020	160	1190	0.017	80	3180	0.030	380
	10	2070	0.029	240	1590	0.025	160	960	0.022	80	2550	0.038	380
	12	1730	0.036	250	1330	0.031	160	800	0.027	90	2120	0.047	400

< D3 mm: ae = 0.1D

GB255

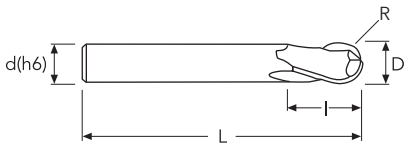
cylindrical shank, 2 flutes ball nose

OSAWA NORM | N | MG / BR | <45 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.50	+/-0.015	4	2		50	2	GB255010	●
1.5	0/-0.020	0.75	+/-0.015	4	3		50	2	GB255015	●
2	0/-0.020	1.00	+/-0.015	4	4		50	2	GB255020	●
3	0/-0.020	1.50	+/-0.015	4	6		50	2	GB255030	●
4	0/-0.020	2.00	+/-0.015	4	8		50	2	GB255040	●
5	0/-0.020	2.50	+/-0.015	6	10		50	2	GB255050	●
6	0/-0.020	3.00	+/-0.015	6	12		50	2	GB255060	●
8	0/-0.025	4.00	+/-0.015	8	16		60	2	GB255080	●
10	0/-0.025	5.00	+/-0.015	10	20		75	2	GB255100	●
12	0/-0.025	6.00	+/-0.015	12	24		75	2	GB255120	●

● stock standard ○ non-standard stock ∇ stock exhaustion

CUTTING PARAMETERS

GB255

COPYING

Material Group ISO 513		P1 K1			P2 M1 K2			P3 M2			N1 N2 N3 N4		
Hardness/Rm		< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae		**0.1D x 0.1D**			**0.1D x 0.1D**			**0.1D x 0.1D**			**0.1D x 0.1D**		
Vc (m/min)		**50-70**			**35-55**			**20-40**			**80-120**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	**0.60**	19110	0.030	1150	14330	0.023	640	9550	0.021	400	31850	0.036	2290
2	**1.20**	9550	0.040	760	7170	0.030	430	4780	0.028	270	15920	0.048	1530
3	**1.80**	6370	0.050	640	4780	0.038	360	3180	0.035	220	10620	0.060	1270
4	**2.40**	4780	0.060	570	3580	0.045	320	2390	0.042	200	7960	0.072	1150
5	**3.00**	3820	0.070	530	2870	0.053	300	1910	0.049	190	6370	0.084	1070
6	**3.60**	3180	0.080	510	2390	0.060	290	1590	0.056	180	5310	0.096	1020
8	**4.80**	2390	0.090	430	1790	0.068	240	1190	0.063	150	3980	0.108	860
10	**6.00**	1910	0.105	400	1430	0.079	230	960	0.074	140	3180	0.126	800
12	**7.20**	1590	0.120	380	1190	0.090	210	800	0.084	130	2650	0.144	760

G2CSB2

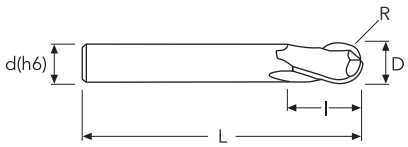
cylindrical shank, 2 flutes ball nose

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.50	+/-0.015	4	2		50	2	G2CSB2010	●
1.5	0/-0.020	0.75	+/-0.015	4	3		50	2	G2CSB2015	●
2	0/-0.020	1.00	+/-0.015	4	4		50	2	G2CSB2020	●
2.5	0/-0.020	1.25	+/-0.015	4	5		50	2	G2CSB2025	●
3	0/-0.020	1.50	+/-0.015	4	6		50	2	G2CSB2030	●
3.5	0/-0.020	1.75	+/-0.015	4	7		50	2	G2CSB2035	●
4	0/-0.020	2.00	+/-0.015	4	8		50	2	G2CSB2040	●
4.5	0/-0.020	2.25	+/-0.015	6	9		50	2	G2CSB2045	●
5	0/-0.020	2.50	+/-0.015	6	10		50	2	G2CSB2050	●
5.5	0/-0.020	2.75	+/-0.015	6	11		50	2	G2CSB2055	●
6	0/-0.020	3.00	+/-0.015	6	12		50	2	G2CSB2060	●
6.5	0/-0.025	3.25	+/-0.015	8	13		60	2	G2CSB2065	●
7	0/-0.025	3.50	+/-0.015	8	14		60	2	G2CSB2070	●
8	0/-0.025	4.00	+/-0.015	8	16		60	2	G2CSB2080	●
9	0/-0.025	4.50	+/-0.015	10	18		75	2	G2CSB2090	●
10	0/-0.025	5.00	+/-0.015	10	20		75	2	G2CSB2100	●
12	0/-0.025	6.00	+/-0.015	12	24		75	2	G2CSB2120	●
16	0/-0.030	8.00	+/-0.015	16	30		92	2	G2CSB2160	●
20	0/-0.030	10.00	+/-0.015	20	30		100	2	G2CSB2200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CSB2

COPYING

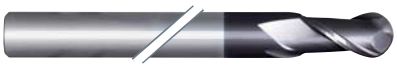
Material Group ISO 513		P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
Hardness/Rm		< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae		**0.1D x 0.1D**			**0.1D x 0.1D**			**0.1D x 0.1D**			**0.1D x 0.1D**		
Vc (m/min)		**80-100**			**60-80**			**40-60**			**110-130**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	**0.60**	28660	0.030	1720	22290	0.023	1000	15920	0.021	670	38220	0.036	2750
2	**1.20**	14330	0.040	1150	11150	0.030	670	7960	0.028	450	19110	0.048	1830
3	**1.80**	9550	0.050	960	7430	0.038	560	5310	0.035	370	12740	0.060	1530
4	**2.40**	7170	0.060	860	5570	0.045	500	3980	0.042	330	9550	0.072	1380
5	**3.00**	5730	0.070	800	4460	0.053	470	3180	0.049	310	7640	0.084	1280
6	**3.60**	4780	0.080	760	3720	0.060	450	2650	0.056	300	6370	0.096	1220
8	**4.80**	3580	0.090	640	2790	0.068	380	1990	0.063	250	4780	0.108	1030
10	**6.00**	2870	0.105	600	2230	0.079	350	1590	0.074	230	3820	0.126	960
12	**7.20**	2390	0.120	570	1860	0.090	330	1330	0.084	220	3180	0.144	920
16	**9.60**	1790	0.150	540	1390	0.113	310	1000	0.105	210	2390	0.180	860
20	**12.00**	1430	0.180	510	1110	0.135	300	800	0.126	200	1910	0.216	830

G2250-51

cylindrical shank, 2 flutes ball nose, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | BALL NOSE | Z2 BALL

G2250

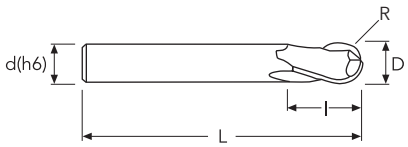


G2251

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.025	0.50	+/-0.015	4	2		75	2	G2250010	●
1.5	0/-0.025	0.75	+/-0.015	4	3		75	2	G2250015	●
2	0/-0.025	1.00	+/-0.015	4	4		75	2	G2250020	●
3	0/-0.025	1.50	+/-0.015	4	6		75	2	G2250030	●
4	0/-0.025	2.00	+/-0.015	4	8		75	2	G2250040	●
5	0/-0.025	2.50	+/-0.015	6	10		75	2	G2250050	●
6	0/-0.025	3.00	+/-0.015	6	12		100	2	G2250060	●
8	0/-0.030	4.00	+/-0.015	8	16		100	2	G2250080	●
10	0/-0.030	5.00	+/-0.015	10	20		100	2	G2250100	●
12	0/-0.030	6.00	+/-0.015	12	24		100	2	G2250120	●
6	0/-0.025	3.00	+/-0.015	6	12		150	2	G2251060	●
8	0/-0.030	4.00	+/-0.015	8	16		150	2	G2251080	●
10	0/-0.030	5.00	+/-0.015	10	20		150	2	G2251100	●
12	0/-0.030	6.00	+/-0.015	12	24		150	2	G2251120	●
16	0/-0.035	8.00	+/-0.015	16	30		150	2	G2251160	●
20	0/-0.035	10.00	+/-0.015	20	30		150	2	G2251200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2250

	Material Group ISO 513		P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm		< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae		0.1D x 0.1D			0.1D x 0.1D			0.1D x 0.1D			0.1D x 0.1D		
	Vc (m/min)		70-90			50-70			40-50			100-120		
COPYING	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	0.60	25480	0.027	1380	19110	0.020	770	14330	0.019	540	35030	0.032	2270
	2	1.20	12740	0.036	920	9550	0.027	520	7170	0.025	360	17520	0.043	1510
	3	1.80	8490	0.045	760	6370	0.034	430	4780	0.032	300	11680	0.054	1260
	4	2.40	6370	0.054	690	4780	0.041	390	3580	0.038	270	8760	0.065	1140
	5	3.00	5100	0.063	640	3820	0.047	360	2870	0.044	250	7010	0.076	1060
	6	3.60	4250	0.072	610	3180	0.054	340	2390	0.050	240	5840	0.086	1010
	8	4.80	3180	0.081	520	2390	0.061	290	1790	0.057	200	4380	0.097	850
	10	6.00	2550	0.095	480	1910	0.071	270	1430	0.066	190	3500	0.113	790
	12	7.20	2120	0.108	460	1590	0.081	260	1190	0.076	180	2920	0.130	760

G2251

	Material Group ISO 513		P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm		< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae		0.1D x 0.1D			0.1D x 0.1D			0.1D x 0.1D			0.1D x 0.1D		
	Vc (m/min)		60-80			40-60			35-45			90-110		
COPYING	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	3.60	3720	0.058	430	2650	0.044	230	2120	0.041	170	5310	0.070	740
	8	4.80	2790	0.066	370	1990	0.049	200	1590	0.046	150	3980	0.079	630
	10	6.00	2230	0.077	340	1590	0.057	180	1270	0.054	140	3180	0.092	580
	12	7.20	1860	0.087	330	1330	0.066	170	1060	0.061	130	2650	0.105	560
	16	9.60	1390	0.122	340	1000	0.092	180	800	0.085	140	1990	0.146	580
	20	12.00	1110	0.146	320	800	0.110	180	640	0.102	130	1590	0.175	560

G2CSB4

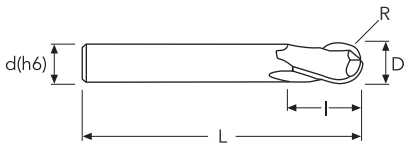
cylindrical shank, 4 flutes ball nose

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | BALL NOSE | Z4 BALL

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.50	+/-0.015	4	2		50	2	G2CSB4010	●
1.5	0/-0.020	0.75	+/-0.015	4	3		50	2	G2CSB4015	●
2	0/-0.020	1.00	+/-0.015	4	4		50	2	G2CSB4020	●
3	0/-0.020	1.50	+/-0.015	4	6		50	2	G2CSB4030	●
4	0/-0.020	2.00	+/-0.015	4	8		50	2	G2CSB4040	●
5	0/-0.020	2.50	+/-0.015	6	10		50	2	G2CSB4050	●
6	0/-0.020	3.00	+/-0.015	6	12		50	2	G2CSB4060	●
8	0/-0.025	4.00	+/-0.015	8	16		60	2	G2CSB4080	●
10	0/-0.025	5.00	+/-0.015	10	20		75	2	G2CSB4100	●
12	0/-0.025	6.00	+/-0.015	12	24		75	2	G2CSB4120	●
16	0/-0.030	8.00	+/-0.015	16	30		92	2	G2CSB4160	●
20	0/-0.030	10.00	+/-0.015	20	30		100	2	G2CSB4200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CSB4

COPYING

Material Group ISO 513		P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
Hardness/Rm		< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae		**0.1D x 0.3D**			**0.1D x 0.3D**			**0.1D x 0.3D**			**0.1D x 0.3D**		
Vc (m/min)		**80-100**			**60-80**			**40-60**			**110-130**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	**0.60**	28660	0.030	3440	22290	0.023	2010	15920	0.021	1340	38220	0.036	5500
2	**1.20**	14330	0.040	2290	11150	0.030	1340	7960	0.028	890	19110	0.048	3670
3	**1.80**	9550	0.050	1910	7430	0.038	1110	5310	0.035	740	12740	0.060	3060
4	**2.40**	7170	0.060	1720	5570	0.045	1000	3980	0.042	670	9550	0.072	2750
5	**3.00**	5730	0.070	1600	4460	0.053	940	3180	0.049	620	7640	0.084	2570
6	**3.60**	4780	0.080	1530	3720	0.060	890	2650	0.056	590	6370	0.096	2450
8	**4.80**	3580	0.090	1290	2790	0.068	750	1990	0.063	500	4780	0.108	2060
10	**6.00**	2870	0.105	1210	2230	0.079	700	1590	0.074	470	3820	0.126	1930
12	**7.20**	2390	0.120	1150	1860	0.090	670	1330	0.084	450	3180	0.144	1830
16	**9.60**	1790	0.150	1070	1390	0.113	630	1000	0.105	420	2390	0.180	1720
20	**12.00**	1430	0.180	1030	1110	0.135	600	800	0.126	400	1910	0.216	1650

MDTA
GENERAL PURPOSE

MDTA is the Osawa range of micrograin carbide end mills with PV200 coating. MDTA endmills have been developed for general purpose milling up to 45 HRC. The exclusive and innovative PV200 coating (3500HV) ensures the best performance, even in applications with air blow or MQL (Minimum Quantity Lubrication).

MDTA sono le frese Osawa in metallo duro micrograna con rivestimento PV200 sviluppate per la fresatura di materiali generici sino a 45 HRC. L'esclusivo e innovativo rivestimento PV200 (3500HV) garantisce performance elevate anche in lavorazioni con impiego di refrigerazione con getto d'aria o MQL (Minimum Quantity Lubrication).

MDTA sind Fräser von Osawa aus Mikrokörnungs-Hartmetall mit Beschichtung PV200, die für das Fräsen von allgemeinen Materialien bis zu 45 HRC entwickelt wurden. Die exklusive und innovative Beschichtung PV200 (3500HV) gewährleistet auch bei Bearbeitungen mit Kühlung durch Luftstrahl oder MQL (Minimum Quantity Lubrication) hohe Leistungen.

MDTA sont les fraises Osawa en carbure micrograin avec revêtement PV200 développées pour le fraisage de matériaux génériques jusqu'à 45 HRC. Le revêtement PV200 (3500HV) exclusif et innovant garantit des performances élevées même pour les usinages employant un système de lubrification avec jet d'air ou MQL (Minimum Quantity Lubrication).

MDTA son las fresas Osawa de metal duro micrograno con revestimiento PV200 desarrolladas para el fresado de materiales genéricos hasta 45 HRC. Su exclusivo e innovador revestimiento PV200 (3500HV) garantiza rendimientos elevados incluso en elaboraciones con el uso de refrigeración con chorro de aire o MQL (Minimum Quantity Lubrication).

MDTA - это фрезы фирмы Osawa из твёрдого сплава с мелкозернистой структурой и покрытием PV200, предназначенные для стандартной обработки материалов с твёрдостью до 45 HRC. Эксклюзивное и инновационное покрытие PV200 (3500HV) гарантирует высокую производительность, даже, при обработке с обдувом воздухом или с масляным туманом.

MDTACS2

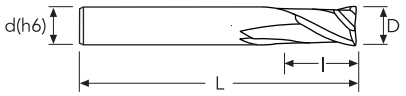
cylindrical shank, 2 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			3	3		40	2	MDTACS2010403	●
1	0/-0.020			4	3		40	2	MDTACS2010404	●
1.5	0/-0.020			3	4.5		40	2	MDTACS2015403	●
1.5	0/-0.020			4	4.5		40	2	MDTACS2015404	●
2	0/-0.030			2	8		32	2	MDTACS2020	●
2	0/-0.020			3	6.5		40	2	MDTACS2020403	●
2	0/-0.020			4	6.5		40	2	MDTACS2020404	●
2.5	0/-0.020			3	6.5		40	2	MDTACS2025403	●
2.5	0/-0.020			4	6.5		40	2	MDTACS2025404	●
3	0/-0.025			3	9		40	2	MDTACS2030403	●
4	0/-0.025			4	12		50	2	MDTACS2040504	●
5	0/-0.025			6	15		50	2	MDTACS2050506	●
6	0/-0.025			6	16		50	2	MDTACS2060	●
8	0/-0.030			8	20		64	2	MDTACS208064	●
10	0/-0.030			10	22		70	2	MDTACS2100	●
12	0/-0.030			12	25		75	2	MDTACS212075	●
14	0/-0.030			14	25		75	2	MDTACS2140	●
16	0/-0.030			16	32		90	2	MDTACS216090	●
20	0/-0.030			20	38		100	2	MDTACS220038	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MDTACS2

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	80-100			50-70			30-50			100-120		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.004	230	19110	0.003	130	12740	0.003	80	35030	0.005	360
	2	14330	0.008	230	9550	0.007	130	6370	0.006	80	17520	0.010	360
	3	9550	0.012	230	6370	0.010	130	4250	0.009	80	11680	0.016	360
	4	7170	0.016	230	4780	0.014	130	3180	0.012	80	8760	0.021	360
	5	5730	0.020	230	3820	0.017	130	2550	0.015	80	7010	0.026	360
	6	4780	0.025	240	3180	0.021	140	2120	0.019	80	5840	0.033	380
	8	3580	0.032	230	2390	0.027	130	1590	0.024	80	4380	0.042	360
	10	2870	0.038	220	1910	0.032	120	1270	0.029	70	3500	0.049	350
	12	2390	0.045	220	1590	0.038	120	1060	0.034	70	2920	0.059	340
	14	2050	0.052	210	1360	0.044	120	910	0.039	70	2500	0.068	340
	16	1790	0.060	210	1190	0.051	120	800	0.045	70	2190	0.078	340
	18	1590	0.070	220	1060	0.060	130	710	0.053	70	1950	0.091	350
	20	1430	0.080	230	960	0.068	130	640	0.060	80	1750	0.104	360

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
	Vc (m/min)	80-100			50-70			30-50			100-120		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.005	280	19110	0.004	160	12740	0.004	90	35030	0.006	440
	2	14330	0.010	280	9550	0.008	160	6370	0.007	90	17520	0.012	440
	3	9550	0.014	280	6370	0.012	160	4250	0.011	90	11680	0.019	440
	4	7170	0.019	280	4780	0.016	160	3180	0.014	90	8760	0.025	440
	5	5730	0.024	280	3820	0.020	160	2550	0.018	90	7010	0.031	440
	6	4780	0.030	290	3180	0.026	160	2120	0.023	100	5840	0.039	460
	8	3580	0.038	270	2390	0.033	160	1590	0.029	90	4380	0.050	440
	10	2870	0.046	260	1910	0.039	150	1270	0.034	90	3500	0.059	410
	12	2390	0.054	260	1590	0.046	150	1060	0.041	90	2920	0.070	410
	14	2050	0.062	260	1360	0.053	140	910	0.047	90	2500	0.081	410
	16	1790	0.072	260	1190	0.061	150	800	0.054	90	2190	0.094	410
	18	1590	0.084	270	1060	0.071	150	710	0.063	90	1950	0.109	430
	20	1430	0.096	270	960	0.082	160	640	0.072	90	1750	0.125	440

< D3 mm: ae = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	D x D			D x D			0.5D x D			D x D		
	Vc (m/min)	70-90			40-60			25-35			80-100		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	25480	0.002	120	15920	0.002	60	9550	0.002	30	28660	0.003	180
	2	12740	0.005	120	7960	0.004	60	4780	0.004	30	14330	0.006	180
	3	8490	0.007	120	5310	0.006	60	3180	0.005	30	9550	0.009	180
	4	6370	0.010	120	3980	0.008	60	2390	0.007	30	7170	0.012	180
	5	5100	0.012	120	3180	0.010	60	1910	0.009	30	5730	0.016	180
	6	4250	0.015	130	2650	0.013	70	1590	0.011	40	4780	0.020	190
	8	3180	0.019	120	1990	0.016	60	1190	0.014	30	3580	0.025	180
	10	2550	0.023	120	1590	0.019	60	960	0.017	30	2870	0.030	170
	12	2120	0.027	110	1330	0.023	60	800	0.020	30	2390	0.035	170
	14	1820	0.031	110	1140	0.027	60	680	0.023	30	2050	0.041	170
	16	1590	0.036	110	1000	0.031	60	600	0.027	30	1790	0.047	170
	18	1420	0.042	120	880	0.036	60	530	0.032	30	1590	0.055	170
	20	1270	0.048	120	800	0.041	70	480	0.036	30	1430	0.062	180

< D3 mm: ap = 0.5D

MDTA210

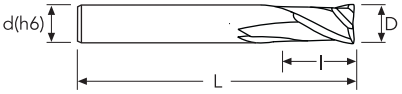
cylindrical shank, 2 flutes, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.030			3	20		60	2	MDTA210030	●
4	0/-0.030			4	20		60	2	MDTA210040	●
5	0/-0.030			5	25		75	2	MDTA210050	●
6	0/-0.030			6	30		75	2	MDTA210060	●
8	0/-0.030			8	30		75	2	MDTA210080	●
10	0/-0.030			10	40		100	2	MDTA210100	●
12	0/-0.030			12	45		100	2	MDTA210120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MDTA210

Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
Vc (m/min)	60-80			40-60			30-40			70-80		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	7430	0.011	160	5310	0.009	100	3720	0.008	60	8490	0.014	240
4	5570	0.014	160	3980	0.012	100	2790	0.011	60	6370	0.019	240
5	4460	0.018	160	3180	0.015	100	2230	0.014	60	5100	0.023	240
6	3720	0.023	170	2650	0.019	100	1860	0.017	60	4250	0.029	250
8	2790	0.029	160	1990	0.024	100	1390	0.022	60	3180	0.037	240
10	2230	0.034	150	1590	0.029	90	1110	0.026	60	2550	0.044	230
12	1860	0.041	150	1330	0.034	90	930	0.030	60	2120	0.053	220

Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae	1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
Vc (m/min)	60-80			40-60			30-40			70-80		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	7430	0.014	200	5310	0.011	120	3720	0.010	80	8490	0.018	300
4	5570	0.018	200	3980	0.015	120	2790	0.014	80	6370	0.023	300
5	4460	0.023	200	3180	0.019	120	2230	0.017	80	5100	0.029	300
6	3720	0.028	210	2650	0.024	130	1860	0.021	80	4250	0.037	310
8	2790	0.036	200	1990	0.031	120	1390	0.027	80	3180	0.047	300
10	2230	0.043	190	1590	0.036	120	1110	0.032	70	2550	0.056	280
12	1860	0.051	190	1330	0.043	110	930	0.038	70	2120	0.066	280

Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae	D x D			D x D			0.5D x D			D x D		
Vc (m/min)	50-70			35-45			25-35			60-80		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	6370	0.007	90	4250	0.006	50	3180	0.005	30	7430	0.009	130
4	4780	0.009	90	3180	0.008	50	2390	0.007	30	5570	0.012	130
5	3820	0.011	90	2550	0.010	50	1910	0.008	30	4460	0.015	130
6	3180	0.014	90	2120	0.012	50	1590	0.011	30	3720	0.018	140
8	2390	0.018	90	1590	0.015	50	1190	0.014	30	2790	0.023	130
10	1910	0.021	80	1270	0.018	50	960	0.016	30	2230	0.028	120
12	1590	0.025	80	1060	0.022	50	800	0.019	30	1860	0.033	120

MDCL2

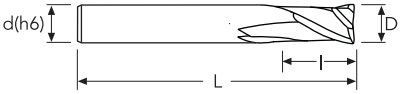
cylindrical shank, 2 flutes, long

OSAWA NORM | N | MG / BR | <45 HRC | 30° | SQUARE | Z2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.040			3	30		75	2	MDCL2030	●
4	0/-0.048			4	30		75	2	MDCL2040	●
5	0/-0.048			5	40		100	2	MDCL2050	●
6	0/-0.048			6	50		150	2	MDCL2060	●
8	0/-0.058			8	50		150	2	MDCL2080	●
10	0/-0.058			10	60		150	2	MDCL2100	●
12	0/-0.070			12	75		150	2	MDCL2120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDCL2

SLOTTING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	0.3D x D			0.3D x D			0.3D x D			0.3D x D		
	Vc (m/min)	40-50			25-35			20-30			60-80		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	4780	0.010	90	3180	0.008	50	2650	0.007	40	7430	0.011	160
	4	3580	0.013	90	2390	0.011	50	1990	0.010	40	5570	0.014	160
	5	2870	0.016	90	1910	0.014	50	1590	0.012	40	4460	0.018	160
	6	2390	0.020	100	1590	0.017	50	1330	0.015	40	3720	0.022	160
	8	1790	0.026	90	1190	0.022	50	1000	0.019	40	2790	0.033	190
	10	1430	0.030	90	960	0.026	50	800	0.023	40	2230	0.040	180
	12	1190	0.036	90	800	0.031	50	660	0.027	40	1860	0.047	170

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	1.5D x 0.3D			1.5D x 0.3D			1.5D x 0.3D			1.5D x 0.3D		
	Vc (m/min)	45-55			30-40			25-35			70-90		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	5310	0.012	120	3720	0.010	70	3180	0.009	50	8490	0.013	220
	4	3980	0.015	120	2790	0.013	70	2390	0.012	60	6370	0.017	220
	5	3180	0.019	120	2230	0.016	70	1910	0.014	60	5100	0.021	220
	6	2650	0.024	130	1860	0.020	80	1590	0.018	60	4250	0.027	230
	8	1990	0.031	120	1390	0.026	70	1190	0.023	50	3180	0.040	250
	10	1590	0.036	120	1110	0.031	70	960	0.027	50	2550	0.047	240
	12	1330	0.043	110	930	0.037	70	800	0.032	50	2120	0.056	240

MDTACS3

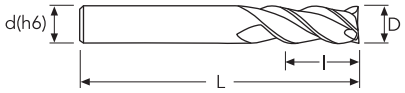
cylindrical shank, 3 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z3

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			3	3		40	3	MDTACS3010403	●
1	0/-0.020			4	3		40	3	MDTACS3010404	●
1.5	0/-0.020			3	4.5		40	3	MDTACS3015403	●
1.5	0/-0.020			4	4.5		40	3	MDTACS3015404	●
2	0/-0.020			3	6.5		40	3	MDTACS3020403	●
2	0/-0.020			4	6.5		40	3	MDTACS3020404	●
2.5	0/-0.020			3	6.5		40	3	MDTACS3025403	●
2.5	0/-0.020			4	6.5		40	3	MDTACS3025404	●
3	0/-0.025			3	9		40	3	MDTACS3030403	●
4	0/-0.025			4	12		50	3	MDTACS3040504	●
5	0/-0.025			6	15		50	3	MDTACS3050506	●
6	0/-0.025			6	16		50	3	MDTACS3060	●
8	0/-0.030			8	20		64	3	MDTACS308064	●
10	0/-0.030			10	22		70	3	MDTACS3100	●
12	0/-0.030			12	25		75	3	MDTACS312075	●
14	0/-0.030			14	25		75	3	MDTACS3140	●
16	0/-0.030			16	32		90	3	MDTACS316090	●
20	0/-0.030			20	38		100	3	MDTACS320038	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MDTACS3

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**100-120**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.004	330	19110	0.003	190	12740	0.003	110	35030	0.005	530
	2	14330	0.008	330	9550	0.007	190	6370	0.006	110	17520	0.010	530
	3	9550	0.011	320	6370	0.009	180	4250	0.008	110	11680	0.014	500
	4	7170	0.014	310	4780	0.012	170	3180	0.011	100	8760	0.019	490
	5	5730	0.018	300	3820	0.015	170	2550	0.013	100	7010	0.023	480
	6	4780	0.021	300	3180	0.018	170	2120	0.016	100	5840	0.027	480
	8	3580	0.028	300	2390	0.023	170	1590	0.021	100	4380	0.036	470
	10	2870	0.035	300	1910	0.030	170	1270	0.026	100	3500	0.046	480
	12	2390	0.044	320	1590	0.037	180	1060	0.033	100	2920	0.057	500
	14	2050	0.052	320	1360	0.044	180	910	0.039	110	2500	0.067	500
	16	1790	0.059	320	1190	0.050	180	800	0.045	110	2190	0.077	510
	18	1590	0.066	310	1060	0.056	180	710	0.050	110	1950	0.086	500
	20	1430	0.072	310	960	0.061	180	640	0.054	100	1750	0.093	490

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**100-120**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	28660	0.005	400	19110	0.004	230	12740	0.003	130	35030	0.006	630
	2	14330	0.009	400	9550	0.008	230	6370	0.007	130	17520	0.012	630
	3	9550	0.013	380	6370	0.011	210	4250	0.010	130	11680	0.017	600
	4	7170	0.017	370	4780	0.015	210	3180	0.013	120	8760	0.022	590
	5	5730	0.021	360	3820	0.018	210	2550	0.016	120	7010	0.027	580
	6	4780	0.025	360	3180	0.021	200	2120	0.019	120	5840	0.033	570
	8	3580	0.033	350	2390	0.028	200	1590	0.025	120	4380	0.043	560
	10	2870	0.042	360	1910	0.036	210	1270	0.032	120	3500	0.055	580
	12	2390	0.053	380	1590	0.045	210	1060	0.040	130	2920	0.069	600
	14	2050	0.062	380	1360	0.053	220	910	0.047	130	2500	0.081	600
	16	1790	0.071	380	1190	0.061	220	800	0.053	130	2190	0.093	610
	18	1590	0.079	380	1060	0.067	210	710	0.059	130	1950	0.103	600
	20	1430	0.086	370	960	0.073	210	640	0.064	120	1750	0.112	590

< D3 mm: ae = 0.1D

MDTAWSH3

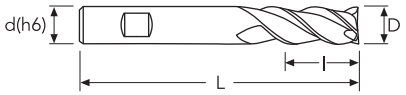
weldon shank, 3 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z3

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.030			6	7		57	3	MDTAWSH3030	●
4	0/-0.030			6	8		57	3	MDTAWSH3040	●
5	0/-0.030			6	10		57	3	MDTAWSH3050	●
6	0/-0.030			6	10		57	3	MDTAWSH3060	●
8	0/-0.030			8	16		63	3	MDTAWSH3080	●
10	0/-0.030			10	19		72	3	MDTAWSH3100	●
12	0/-0.030			12	22		83	3	MDTAWSH3120	●
14	0/-0.030			14	22		83	3	MDTAWSH3140	●
16	0/-0.030			16	26		92	3	MDTAWSH3160	●
20	0/-0.030			20	32		104	3	MDTAWSH3200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDTAWSH3

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**80-120**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	9550	0.011	320	6370	0.009	180	4250	0.008	110	10620	0.014	460
	4	7170	0.014	310	4780	0.012	170	3180	0.011	100	7960	0.019	440
	5	5730	0.018	300	3820	0.015	170	2550	0.013	100	6370	0.023	440
	6	4780	0.021	300	3180	0.018	170	2120	0.016	100	5310	0.027	430
	8	3580	0.028	300	2390	0.023	170	1590	0.021	100	3980	0.036	430
	10	2870	0.035	300	1910	0.030	170	1270	0.026	100	3180	0.046	440
	12	2390	0.044	320	1590	0.037	180	1060	0.033	100	2650	0.057	450
	14	2050	0.052	320	1360	0.044	180	910	0.039	110	2270	0.067	460
	16	1790	0.059	320	1190	0.050	180	800	0.045	110	1990	0.077	460
	18	1590	0.066	310	1060	0.056	180	710	0.050	110	1770	0.086	460
	20	1430	0.072	310	960	0.061	180	640	0.054	100	1590	0.093	440

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
	Vc (m/min)	**90-110**			**60-80**			**40-60**			**110-120**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10620	0.013	420	7430	0.011	250	5310	0.010	160	12740	0.017	660
	4	7960	0.017	410	5570	0.015	240	3980	0.013	150	9550	0.022	640
	5	6370	0.021	400	4460	0.018	240	3180	0.016	150	7640	0.027	630
	6	5310	0.025	400	3720	0.021	240	2650	0.019	150	6370	0.033	620
	8	3980	0.033	390	2790	0.028	230	1990	0.025	150	4780	0.043	620
	10	3180	0.042	400	2230	0.036	240	1590	0.032	150	3820	0.055	630
	12	2650	0.053	420	1860	0.045	250	1330	0.040	160	3180	0.069	650
	14	2270	0.062	420	1590	0.053	250	1140	0.047	160	2730	0.081	660
	16	1990	0.071	430	1390	0.061	250	1000	0.053	160	2390	0.093	660
	18	1770	0.079	420	1240	0.067	250	880	0.059	160	2120	0.103	650
	20	1590	0.086	410	1110	0.073	240	800	0.064	150	1910	0.112	640

MDTACS4

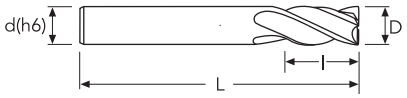
cylindrical shank, 4 flutes

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			3	3		40	4	MDTACS4010403	●
1	0/-0.020			4	3		40	4	MDTACS4010404	●
1.5	0/-0.020			3	4.5		40	4	MDTACS4015403	●
1.5	0/-0.020			4	4.5		40	4	MDTACS4015404	●
2	0/-0.030			2	8		32	4	MDTACS4020	●
2	0/-0.020			3	6.5		40	4	MDTACS4020403	●
2	0/-0.020			4	6.5		40	4	MDTACS4020404	●
2.5	0/-0.020			3	6.5		40	4	MDTACS4025403	●
2.5	0/-0.020			4	6.5		40	4	MDTACS4025404	●
3	0/-0.025			3	9		40	4	MDTACS4030403	●
4	0/-0.025			4	12		50	4	MDTACS4040504	●
5	0/-0.025			6	15		50	4	MDTACS4050506	●
6	0/-0.030			6	16		50	4	MDTACS4060	●
8	0/-0.030			8	20		64	4	MDTACS408064	●
10	0/-0.030			10	22		70	4	MDTACS4100	●
12	0/-0.030			12	25		75	4	MDTACS412075	●
14	0/-0.030			14	25		75	4	MDTACS4140	●
16	0/-0.030			16	32		90	4	MDTACS416090	●
20	0/-0.030			20	38		100	4	MDTACS420038	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDTACS4

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**			**1.5D x 0.2D**		
	Vc (m/min)	**80-100**			**50-70**			**30-50**			**100-120**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
SIDE MILLING	**1**	28660	0.004	400	19110	0.003	230	12740	0.003	130	35030	0.005	640
	2	14330	0.007	400	9550	0.006	230	6370	0.005	130	17520	0.009	640
	3	9550	0.010	380	6370	0.009	220	4250	0.008	130	11680	0.013	610
	4	7170	0.013	370	4780	0.011	210	3180	0.010	120	8760	0.017	590
	5	5730	0.016	370	3820	0.014	210	2550	0.012	120	7010	0.021	580
	6	4780	0.019	360	3180	0.016	210	2120	0.014	120	5840	0.025	580
	8	3580	0.025	360	2390	0.021	200	1590	0.019	120	4380	0.033	570
	10	2870	0.032	370	1910	0.027	210	1270	0.024	120	3500	0.042	580
	12	2390	0.040	380	1590	0.034	220	1060	0.030	130	2920	0.052	610
	14	2050	0.047	390	1360	0.040	220	910	0.035	130	2500	0.061	610
	16	1790	0.054	390	1190	0.046	220	800	0.041	130	2190	0.070	610
	18	1590	0.060	380	1060	0.051	220	710	0.045	130	1950	0.078	610
	20	1430	0.065	370	960	0.055	210	640	0.049	120	1750	0.085	590

< D3 mm: ae = 0.1D

MDTA410

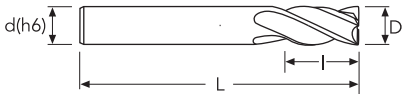
cylindrical shank, 4 flutes, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.030			3	20		60	4	MDTA410030	●
4	0/-0.030			4	20		60	4	MDTA410040	●
5	0/-0.030			5	25		75	4	MDTA410050	●
6	0/-0.030			6	30		75	4	MDTA410060	●
8	0/-0.030			8	30		75	4	MDTA410080	●
10	0/-0.030			10	40		100	4	MDTA410100	●
12	0/-0.030			12	45		100	4	MDTA410120	●
14	0/-0.030			14	45		100	4	MDTA410140	●
16	0/-0.030			16	45		100	4	MDTA410160	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDTA410

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**70-90**			**45-65**			**30-50**			**80-120**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	8490	0.009	310	5840	0.008	180	4250	0.007	110	10620	0.012	500
	4	6370	0.012	300	4380	0.010	170	3180	0.009	110	7960	0.015	480
	5	5100	0.014	290	3500	0.012	170	2550	0.011	110	6370	0.019	480
	6	4250	0.017	290	2920	0.015	170	2120	0.013	110	5310	0.022	470
	8	3180	0.023	290	2190	0.019	170	1590	0.017	110	3980	0.029	470
	10	2550	0.029	290	1750	0.024	170	1270	0.022	110	3180	0.037	480
	12	2120	0.036	310	1460	0.031	180	1060	0.027	110	2650	0.047	500
	14	1820	0.042	310	1250	0.036	180	910	0.032	110	2270	0.055	500
	16	1590	0.048	310	1090	0.041	180	800	0.036	120	1990	0.062	500

MDCL4

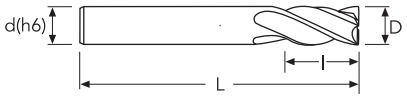
cylindrical shank, 4 flutes, long

OSAWA NORM | N | MG / BR | <45 HRC | 30° | SQUARE | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.040			3	30		75	4	MDCL4030	●
4	0/-0.048			4	30		75	4	MDCL4040	●
5	0/-0.048			5	40		100	4	MDCL4050	●
6	0/-0.048			6	50		150	4	MDCL4060	●
8	0/-0.058			8	50		150	4	MDCL4080	●
10	0/-0.058			10	60		150	4	MDCL4100	●
12	0/-0.030			12	75		150	4	MDCL4120	●
14	0/-0.030			14	75		150	4	MDCL4140	●
16	0/-0.030			16	75		150	4	MDCL4160	●
20	0/-0.030			20	75		150	4	MDCL4200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDCL4

	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**40-50**			**25-35**			**20-30**			**60-80**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	4780	0.008	150	3180	0.007	90	2650	0.006	60	7430	0.009	260
	4	3580	0.010	150	2390	0.009	80	1990	0.008	60	5570	0.011	260
	5	2870	0.013	150	1910	0.011	80	1590	0.010	60	4460	0.014	250
	6	2390	0.015	150	1590	0.013	80	1330	0.011	60	3720	0.017	250
	8	1790	0.020	140	1190	0.017	80	1000	0.015	60	2790	0.026	290
	10	1430	0.026	150	960	0.022	80	800	0.019	60	2230	0.033	300
	12	1190	0.032	150	800	0.027	90	660	0.024	60	1860	0.042	310
	14	1020	0.038	150	680	0.032	90	570	0.028	60	1590	0.049	310
	16	900	0.043	160	600	0.037	90	500	0.032	60	1390	0.056	310
	20	720	0.052	150	480	0.044	80	400	0.039	60	1110	0.068	300

MDTAUPR

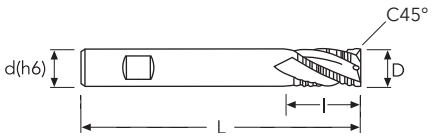
weldon shank, roughing HR, unequal pitch

OSAWA NORM | N | MG PV200 | <45 HRC | 40° | C45° | Z3 UP ≤ Ø8 | Z4 UP > Ø8

P	M	K	N	S	H
★	☆	★			

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.030	0.10	+/-0.020	6	16		57	3	MDTAUPR060	●
8	0/-0.030	0.20	+/-0.020	8	16		63	3	MDTAUPR080	●
10	0/-0.030	0.20	+/-0.020	10	22		72	4	MDTAUPR100	●
12	0/-0.030	0.20	+/-0.020	12	26		83	4	MDTAUPR120	●
14	0/-0.030	0.30	+/-0.020	14	26		83	4	MDTAUPR140	●
16	0/-0.030	0.30	+/-0.020	16	32		92	4	MDTAUPR160	●
20	0/-0.030	0.40	+/-0.020	20	38		104	4	MDTAUPR200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MDTAUPR

SLOTTING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3					
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**					
	Vc (m/min)	**80-100**			**50-70**			**30-50**					
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)			
	6	4780	0.030	430	3180	0.026	240	2120	0.023	140			
	8	3580	0.045	480	2390	0.038	270	1590	0.034	160			
	10	2870	0.055	630	1910	0.047	360	1270	0.041	210			
	12	2390	0.065	620	1590	0.055	350	1060	0.049	210			
	14	2050	0.075	620	1360	0.064	350	910	0.056	200			
	16	1790	0.085	610	1190	0.072	340	800	0.064	200			
	20	1430	0.100	570	960	0.085	330	640	0.075	190			

D6-8: Z3
D10-20: Z4

SIDE MILLING	Material Group ISO 513	P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3					
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.3D**					
	Vc (m/min)	**80-100**			**50-70**			**30-50**					
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)			
	6	4780	0.040	570	3180	0.034	320	2120	0.030	190			
	8	3580	0.055	590	2390	0.047	340	1590	0.041	200			
	10	2870	0.065	750	1910	0.055	420	1270	0.049	250			
	12	2390	0.080	760	1590	0.068	430	1060	0.060	250			
	14	2050	0.090	740	1360	0.077	420	910	0.068	250			
	16	1790	0.100	720	1190	0.085	400	800	0.075	240			
	20	1430	0.120	690	960	0.102	390	640	0.090	230			

D6-8: Z3
D10-20: Z4

MDTACSB2

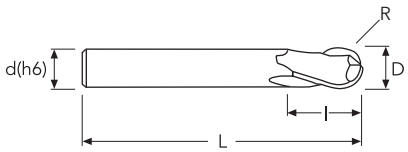
cylindrical shank, 2 flutes ball nose

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.030	0.50	0/-0.020	3	3		40	2	MDTACSB2010	●
1.5	0/-0.030	0.75	0/-0.020	3	5		40	2	MDTACSB2015	●
2	0/-0.030	1.00	0/-0.020	3	7		40	2	MDTACSB2020	●
2.5	0/-0.030	1.25	0/-0.020	3	8		40	2	MDTACSB2025	●
3	0/-0.030	1.50	0/-0.020	3	10		40	2	MDTACSB2030	●
4	0/-0.030	2.00	0/-0.020	4	12		40	2	MDTACSB2040	●
5	0/-0.030	2.50	0/-0.020	5	14		50	2	MDTACSB2050	●
6	0/-0.030	3.00	0/-0.020	6	7		50	2	MDTACSB2060	●
8	0/-0.030	4.00	0/-0.020	8	9		60	2	MDTACSB2080	●
10	0/-0.030	5.00	0/-0.020	10	10		60	2	MDTACSB2100	●
12	0/-0.030	6.00	0/-0.020	12	14		70	2	MDTACSB2120	●

● stock standard ○ non-standard stock ∇ stock exhaustion

CUTTING PARAMETERS

MDTACSB2

	Material Group ISO 513		P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
	Hardness/Rm		< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
	ap x ae		0.1D x 0.1D			0.1D x 0.1D			0.1D x 0.1D			0.1D x 0.1D		
	Vc (m/min)		80-100			60-80			40-60			110-130		
COPYING	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	**0.60**	28660	0.030	1720	22290	0.023	1000	15920	0.021	670	38220	0.036	2750
	2	**1.20**	14330	0.040	1150	11150	0.030	670	7960	0.028	450	19110	0.048	1830
	3	**1.80**	9550	0.050	960	7430	0.038	560	5310	0.035	370	12740	0.060	1530
	4	**2.40**	7170	0.060	860	5570	0.045	500	3980	0.042	330	9550	0.072	1380
	5	**3.00**	5730	0.070	800	4460	0.053	470	3180	0.049	310	7640	0.084	1280
	6	**3.60**	4780	0.080	760	3720	0.060	450	2650	0.056	300	6370	0.096	1220
	8	**4.80**	3580	0.090	640	2790	0.068	380	1990	0.063	250	4780	0.108	1030
	10	**6.00**	2870	0.105	600	2230	0.079	350	1590	0.074	230	3820	0.126	960
	12	**7.20**	2390	0.120	570	1860	0.090	330	1330	0.084	220	3180	0.144	920

MDTA250

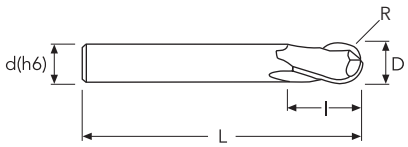
cylindrical shank, 2 flutes ball nose, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.030	1.50	0/-0.020	3	5		75	2	MDTA250030	●
4	0/-0.030	2.00	0/-0.020	4	8		75	2	MDTA250040	●
5	0/-0.030	2.50	0/-0.020	5	9		75	2	MDTA250050	●
6	0/-0.030	3.00	0/-0.020	6	10		100	2	MDTA250060	●
8	0/-0.030	4.00	0/-0.020	8	12		100	2	MDTA250080	●
10	0/-0.030	5.00	0/-0.020	10	14		100	2	MDTA250100	●
12	0/-0.030	6.00	0/-0.020	12	16		100	2	MDTA250120	●

● stock standard ○ non-standard stock ∇ stock exhaustion

CUTTING PARAMETERS

MDTA250

COPYING

Material Group ISO 513		P1 P2 K1			P3 P4 M1 M2 K2			P5 M3 K3			N1 N2 N3 N4		
Hardness/Rm		< 700 N/mm²			700-1000 N/mm²			< 40 HRC					
ap x ae		**0.1D x 0.1D**			**0.1D x 0.1D**			**0.1D x 0.1D**			**0.1D x 0.1D**		
Vc (m/min)		**70-90**			**50-70**			**40-50**			**100-120**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	**1.80**	8490	0.045	760	6370	0.034	430	4780	0.032	300	11680	0.054	1260
4	**2.40**	6370	0.054	690	4780	0.041	390	3580	0.038	270	8760	0.065	1140
5	**3.00**	5100	0.063	640	3820	0.047	360	2870	0.044	250	7010	0.076	1060
6	**3.60**	4250	0.072	610	3180	0.054	340	2390	0.050	240	5840	0.086	1010
8	**4.80**	3180	0.081	520	2390	0.061	290	1790	0.057	200	4380	0.097	850
10	**6.00**	2550	0.095	480	1910	0.071	270	1430	0.066	190	3500	0.113	790
12	**7.20**	2120	0.108	460	1590	0.081	260	1190	0.076	180	2920	0.130	760

HF VH/UP

UNIVERSAL PURPOSE

HF EVOlution is the Osawa family of micrograin carbide endmills for universal application with coatings and cutting edges specifically designed for high performance machining of all ISO materials. The HF EVOlution endmills are available in a broad range of types, lengths and radii. They are the ideal tools for both mass production and small batch manufacturing, thanks to the outstanding performance delivered and the universal applicability.

HF EVOlution è la linea Osawa di frese universali in metallo duro micrograna con spoglie e rivestimenti specifici per la lavorazione ad alto rendimento di tutti i materiali della scala ISO. Le frese HF EVOlution sono disponibili in un'ampia gamma di tipologie, lunghezze e raggi torici. Sono gli utensili ideali sia per le superproduzioni di serie che per la produzione di piccoli lotti, grazie all'eccellenza del rendimento e all'universalità d'impiego.

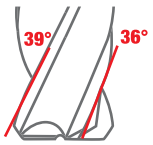
HF EVOlution heißt die Linie der Universalfräser aus mikrokörnigem Hartmetall von Osawa, mit Schneidekanten und spezifischen Beschichtungen zur Hochleistungsbearbeitung von allen Materialien der ISO-Skala. Die Fräser HF EVOlution sind in einer reichen Auswahl an Typologien, Längen und Torusradien erhältlich. Mit ihren ausgezeichneten Leistungen und dem universellen Einsatz sind sie die idealen Werkzeuge, sowohl für die Serienproduktion großer Mengen als auch für die Herstellung kleiner Lose.

HF EVOlution est la ligne Osawa de fraises universelles en carbure micrograin avec dépouilles et revêtements spécifiques pour l'usinage de haute performance de tous les matériaux de l'échelle ISO. Les fraises HF EVOlution sont disponibles dans une large gamme, longueurs et rayons. Ce sont des outils aussi bien pour les grandes séries que pour la production de prototypes, grâce à leur excellence de rendement et leur polyvalence.

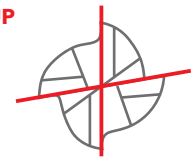
HF EVOlution es la línea de fresas universales de metal duro microgranulado con inclinación y revestimientos específicos para el mecanizado de alto rendimiento de todos los materiales de la escala ISO. Las fresas HF EVOlution están disponibles en una amplia gama de tipologías, longitudes y radios tóricos. Son las herramientas ideales tanto para las superproducciones en serie como para la producción de pequeños lotes, gracias a la excelencia del rendimiento y la universalidad de empleo.

HF EVOlution - это линейка универсальных фрез Osawa из мелкозернистого твердого сплава со специальным покрытием для высокопроизводительной обработки всех материалов по ISO. Доступна широкая гамма фрез этой серии, имеющих различную длину и радиусы на уголках. Благодаря высокой эффективности и универсальности, это идеальные инструменты как для массового, так и для мелкосерийного производства.

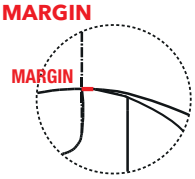
(1) VH



(2) UP



(3) MARGIN



HIGH PERFORMANCE

Thanks to the variable helix geometry VH (1) with unequal pitch UP (2) and to the highly sophisticated cutting edge preparation (3), the HF EVOlution endmills enable the highest level of performances in terms of tool life, volume of chip removed, productivity and surface finishing.

Grâce à la géométrie à hélice variable VH (1) à pas décalé UP (2) et à la préparation technique de la partie coupante (3), les fraises HF EVOlution garantissent des performances de haut niveau en termes de durée, volume de débit copeau, productivité et finition superficielle.

Grazie alla geometria ad elica variabile VH (1) con passo differenziato UP (2) e alla sofisticata preparazione del tagliente (3), le frese HF EVOlution garantiscono performance di alto livello in termini di durata, volume truciolo asportato, produttività e finitura superficiale.

Gracias a la geometría de hélice variable VH (1) con paso diferenciado UP (2) y a la sofisticada preparación del filo (3), las fresas HF EVOlution garantizan rendimientos de alto nivel en términos de duración, volumen de la viruta extraída, productividad y acabado de la superficie.

Dank der Geometrie mit variabler Helix VH (1) mit ungleicher Teilung UP (2) und der sorgfältigen Herstellung der Schneide (3) gewährleisten die Fräser HF EVOlution Höchstleistungen, was die Dauer, das Volumen des abgetragenen Spans, die Produktivität und das Oberflächenfinish betrifft.

Благодаря геометрии с переменным углом наклона спирали VH (1) с неравномерным шагом UP (2) и сложной формой зубьев (3), фрезы HF EVOlution гарантируют высокую производительность, стойкость, объем удаляемого материала и низкую шероховатость обработанной поверхности.

ISO P
ISO M
ISO K
ISO S
ISO H

UNIVERSAL

The HF EVOlution endmills are universal tools, both for the broad range of materials machineable, the type of applications and for the milling strategies applicable: slotting, side milling, helical interpolation, ramping, vertical milling, drilling and trochoidal milling. Just one single HF tool enables roughing, semi-finishing and finishing applications.

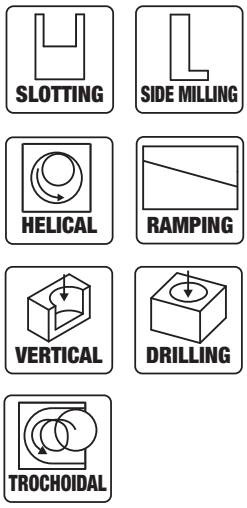
Les fraises HF EVOlution sont des outils universels aussi bien pour tous types de matériaux que pour tous types d'usinages et de stratégies de fraisages applicables : fraisage de pièces taillées dans la masse, contournage, interpolation hélicoïdale, entrée sur rampe, fraisage axial, perçage et fraisage trochoïdal. Un seul outil HF permet de réaliser des usinages d'ébauche, semi finition et finition.

Le frese HF EVOlution sono utensili universali sia per la gamma dei materiali lavorabili che per il tipo di lavorazione e strategia di fresatura applicabile: fresatura dal pieno, contornatura, interpolazione elicoidale, entrata in rampa, fresatura assiale, foratura e fresatura trocoidale. Un unico utensile HF permette lavorazioni di sgrossatura, semi-sgrossatura e finitura.

Las fresas HF EVOlution son herramientas universales tanto por su gama de materiales trabajables como por el tipo de elaboración y estrategia de fresado aplicable: fresado de una sola pieza, contorneado, interpolación helicoidal, entrada en rampa, fresado axial, perforación y fresado trocoidal. Un sola herramienta HF permite elaboraciones de desbastado, semidesbastado y acabado.

Die Fräser HF EVOlution sind universelle Werkzeuge, sowohl aufgrund der breiten Palette bearbeitbarer Materialien als auch dank der anwendbaren Bearbeitungsarten und Frässtrategien: Nutfräsen, Konturfräsen, Helixinterpolation, Rampenfräsen, Vertikalfräsen, Bohren und trochoidales Fräsen. Ein einziges HF Werkzeug kann zum Schruppen, Vorschlichten und Schlichten eingesetzt werden.

Фрезы HF EVOlution являются универсальными инструментами как для широкой гаммы обрабатываемых материалов, так и для многих стратегий фрезерования: фрезерование пазов, уступов, по спирали, под углом, вдоль оси, сверление и трохоидальное фрезерование. С помощью одной фрезы серии HF можно выполнять черновую, получистовую и чистовую обработку.



COMPLETE RANGE

2 families of tools with application-specific geometries.
- HF UNI (VH+UP), designed for milling of materials with hardness up to 40 HRC: steel (ISO P), stainless steel (ISO M), cast iron (ISO K) and super alloys (ISO S), such as Inconel or Titanium. The HF UNI range is now extended with the new HF UNI SC "smooth cut" which reduces significantly the cutting forces thanks to the cutting edge geometry, becoming particularly suitable in case of machining with less powerful machines.
- HF HARD (UP) for steel (ISO P), stainless steel (ISO M), cast iron (ISO K), super alloys (ISO S), hardened steel (ISO H) milling, with hardness up to 55 HRC.

2 famiglie di utensili con geometrie specifiche.
- HF UNI (VH+UP), per fresatura di materiali con durezza sino a 40 HRC: acciaio (ISO P), acciaio inossidabile (ISO M), ghisa (ISO K) e super leghe (ISO S), quali Inconel o titanio. La gamma HF UNI si arricchisce della nuova HF UNI SC "smooth cut" che, grazie alla geometria del tagliente, riduce notevolmente gli sforzi di taglio, risultando particolarmente adatta all'utilizzo su macchine poco potenti.
- HF HARD (UP) per fresatura di acciaio (ISO P), acciaio inossidabile (ISO M), ghisa (ISO K), super leghe (ISO S), acciaio temprato (ISO H), con durezza sino a 55 HRC.

2 Werkzeugfamilien mit spezifischen Geometrien.
- HF UNI (VH+UP), zum Fräsen von Materialien mit einer Härte bis zu 40HRC: Stahl (ISO P), korrosionsbeständiger Stahl (ISO M), Gusseisen (ISO K) und Superlegierungen (ISO S) wie Inconel oder Titan. Die Serie HF UNI wird durch den neuen Fräser HF UNI SC „Smooth Cut" erweitert, bei dem dank der Geometrie der Schneide die aufzubringende Schnittkraft wesentlich verringert werden konnte, so dass dieser Fräser besonders für den Einsatz auf weniger leistungsfähigen Maschinen geeignet ist.
- HF HARD (UP) für das Fräsen von Stahl (ISO P), korrosionsbeständigem Stahl (ISO M), Gusseisen (ISO K), Superlegierungen (ISO S), gehärtetem Stahl (ISO H) mit einer Härten bis zu 55HRC.

2 familles d'outils avec des géométries spécifiques.
- HF UNI (VH+UP), pour fraisage de matériaux dont la dureté peut atteindre 40HRC : acier (ISO P), acier inoxydable (ISO M), fonte (ISO K) et super alliages (ISO S), tels que l' inconel ou titane. La gamme HF UNI s'enrichit de la nouvelle HF UNI SC « smooth cut » qui, grâce à la géométrie de coupe, réduit considérablement les efforts de coupe, ce qui la rend particulièrement adaptée à l'utilisation sur des machines peu puissantes.
- HF HARD (UP), pour fraisage d'acier (ISO P), acier inoxydable (ISO M), fonte (ISO K) et super alliages (ISO S), acier trempé (ISO H), dont la dureté peut atteindre 55HRC.

2 familias de herramientas con geometrías específicas.
- HF UNI (VH+UP), para fresado de materiales con dureza hasta 40HRC: acero (ISO P), acero inoxidable (ISO M), fundición (ISO K) y súper aleaciones (ISO S), como Inconel o titanio. La gama HF UNI se enriquece con la nueva HF UNI SC «smooth cut», que, gracias a la geometría del filo cortante, reduce de forma importante los esfuerzos de corte, resultando especialmente adecuada para su uso en máquinas poco potentes.
- HF HARD (UP), para fresado de acero (ISO P), acero inoxidable (ISO M), fundición (ISO K) y súper aleaciones (ISO S), acero templado (ISO H), con duración de hasta 55 HRC.

2 семейства инструментов со специальной геометрией.
- HF UNI (VH+UP), для фрезерования материалов твердостью до 40HRC: сталь (ISO P), нержавеющая сталь (ISO M), чугун (ISO K) и жаропрочные сплавы (ISO S), такие как инконель и титан. К этому семейству добавлена новая фреза HF UNI SC «smooth cut» (плавное резание), которая, благодаря форме зубьев, значительно сокращает усилия резания, что делает ее пригодной для использования на маломощных станках.
- HF HARD (UP) для фрезерования стали (ISO P), нержавеющей стали (ISO M), чугуна (ISO K), жаропрочных сплавов (ISO S), закаленной стали (ISO H) твердостью до 55 HRC.

HF840

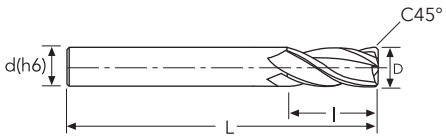
cylindrical shank, 45° chamfer

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.030	0.10	+/-0.020	6	9		57	4	HF840030	●
4	0/-0.025	0.10	+/-0.020	6	11		57	4	HF840040	●
5	0/-0.025	0.10	+/-0.020	6	13		57	4	HF840050	●
6	0/-0.025	0.10	+/-0.020	6	13		57	4	HF840060	●
8	0/-0.030	0.20	+/-0.020	8	20		64	4	HF840080	●
10	0/-0.030	0.20	+/-0.020	10	22		72	4	HF840100	●
12	0/-0.030	0.20	+/-0.020	12	26		83	4	HF840120	●
14	0/-0.030	0.30	+/-0.020	14	32		90	4	HF840140	●
16	0/-0.030	0.30	+/-0.020	16	32		92	4	HF840160	●
18	0/-0.030	0.30	+/-0.020	18	32		92	4	HF840180	●
20	0/-0.030	0.40	+/-0.020	20	38		104	4	HF840200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF840

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	14860	0.014	830	9550	0.013	480	7430	0.011	310	4250	0.010	170
	4	11150	0.019	830	7170	0.017	480	5570	0.014	310	3180	0.013	160
	5	8920	0.023	820	5730	0.021	470	4460	0.017	310	2550	0.016	160
	6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
	8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
	10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
	12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
	14	3180	0.054	690	2050	0.049	400	1590	0.041	260	910	0.038	140
	16	2790	0.060	670	1790	0.054	390	1390	0.045	250	800	0.042	130
	18	2480	0.066	650	1590	0.059	380	1240	0.050	250	710	0.046	130
	20	2230	0.073	650	1430	0.066	380	1110	0.055	240	640	0.051	130
ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**160-180**			**100-120**			**70-90**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	18050	0.017	1210	11680	0.015	710	8490	0.013	460	5310	0.018	390
	4	13540	0.022	1200	8760	0.020	700	6370	0.018	450	3980	0.024	390
	5	10830	0.028	1200	7010	0.025	700	5100	0.022	450	3180	0.030	390
	6	9020	0.032	1170	5840	0.029	680	4250	0.026	440	2650	0.036	380
	8	6770	0.042	1140	4380	0.038	660	3180	0.034	430	1990	0.046	370
	10	5410	0.050	1090	3500	0.045	640	2550	0.040	410	1590	0.055	350
	12	4510	0.058	1040	2920	0.052	610	2120	0.046	390	1330	0.063	340
	14	3870	0.065	1000	2500	0.058	580	1820	0.052	380	1140	0.071	330
	16	3380	0.072	970	2190	0.065	570	1590	0.058	370	1000	0.079	320
	18	3010	0.079	950	1950	0.071	560	1420	0.063	360	880	0.087	310
	20	2710	0.088	950	1750	0.079	550	1270	0.070	360	800	0.096	310
ap x ae	**≤ D5**	1.5D x 0.25D			1.5D x 0.25D			1.2D x 0.1D			1.2D x 0.1D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	14860	0.010	605	9550	0.010	365	7430	0.008	250	4250	0.008	133
	4	11150	0.013	600	7170	0.013	360	5570	0.011	247	3180	0.010	132
	5	8920	0.017	600	5730	0.016	360	4460	0.014	246	2550	0.013	131
	6	7430	0.020	585	4780	0.018	350	3720	0.016	241	2120	0.015	128
	8	5570	0.025	570	3580	0.024	340	2790	0.021	235	1590	0.020	125
	10	4460	0.031	545	2870	0.029	325	2230	0.025	225	1270	0.024	120
	12	3720	0.035	520	2390	0.033	310	1860	0.029	214	1060	0.027	114
	14	3180	0.039	500	2050	0.037	300	1590	0.032	206	910	0.030	110
	16	2790	0.044	490	1790	0.041	290	1390	0.036	200	800	0.034	108
	18	2480	0.048	475	1590	0.045	285	1240	0.040	197	710	0.037	105
	20	2230	0.053	475	1430	0.050	285	1110	0.044	195	640	0.041	105
α° max	**≤ D5**	2°			2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF840

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	7430	0.022	640	4780	0.020	380	3720	0.019	281	2120	0.026	220
8	5570	0.028	620	3580	0.026	370	2790	0.024	273	1590	0.034	214
10	4460	0.034	600	2870	0.031	355	2230	0.029	262	1270	0.040	205
12	3720	0.038	570	2390	0.035	335	1860	0.034	250	1060	0.046	196
14	3180	0.043	550	2050	0.040	325	1590	0.038	240	910	0.052	189
16	2790	0.048	535	1790	0.044	315	1390	0.042	233	800	0.058	185
18	2480	0.053	520	1590	0.048	310	1240	0.046	229	710	0.063	180
20	2230	0.058	520	1430	0.054	305	1110	0.051	227	640	0.070	180

VERTICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
14	3180	0.054	690	2050	0.049	400	1590	0.041	260	910	0.038	140
16	2790	0.060	670	1790	0.054	390	1390	0.045	250	800	0.042	130
18	2480	0.066	650	1590	0.059	380	1240	0.050	250	710	0.046	130
20	2230	0.073	650	1430	0.066	380	1110	0.055	240	640	0.051	130

DRILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
Vc (m/min)	**100-120**			**60-80**			**45-65**			**590-690**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	11680	0.007	330	7430	0.006	190	5840	0.006	130	3180	0.008	100
4	8760	0.009	320	5570	0.008	190	4380	0.007	130	2390	0.010	100
5	7010	0.012	320	4460	0.010	180	3500	0.009	130	1910	0.013	100
6	5840	0.014	320	3720	0.012	180	2920	0.011	130	1590	0.015	90
8	4380	0.018	310	2790	0.016	180	2190	0.014	120	1190	0.019	90
10	3500	0.021	290	2230	0.019	170	1750	0.017	120	960	0.023	90
12	2920	0.024	280	1860	0.022	160	1460	0.019	110	800	0.026	80
14	2500	0.027	270	1590	0.024	150	1250	0.022	110	680	0.030	80
16	2190	0.030	260	1390	0.027	150	1090	0.024	100	600	0.033	80
18	1950	0.033	260	1240	0.030	150	970	0.026	100	530	0.036	80
20	1750	0.037	260	1110	0.033	150	880	0.029	100	480	0.040	80

ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

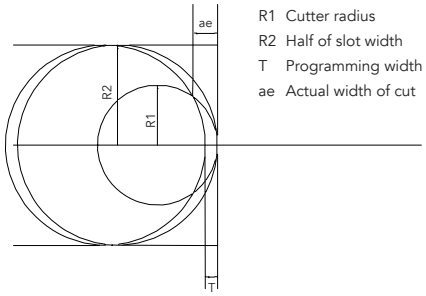
CUTTING PARAMETERS

HF840

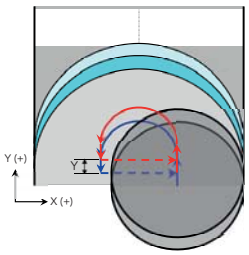
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.2D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**190-230**			**130-150**			**100-120**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	11680	0.035	1640	7430	0.032	940	5840	0.028	650	3180	0.039	490
	4	8760	0.046	1620	5570	0.042	930	4380	0.037	650	2390	0.051	490
	5	7010	0.058	1610	4460	0.052	920	3500	0.046	640	1910	0.063	480
	6	5840	0.068	1580	3720	0.061	900	2920	0.054	630	1590	0.074	470
	8	4380	0.088	1530	2790	0.079	880	2190	0.070	610	1190	0.096	460
	10	3500	0.105	1470	2230	0.095	840	1750	0.084	590	960	0.116	440
	12	2920	0.120	1400	1860	0.108	800	1460	0.096	560	800	0.132	420
	14	2500	0.135	1350	1590	0.122	770	1250	0.108	540	680	0.149	400
	16	2190	0.150	1310	1390	0.135	750	1090	0.120	520	600	0.165	400
	18	1950	0.165	1290	1240	0.149	740	970	0.132	510	530	0.182	380
	20	1750	0.183	1280	1110	0.164	730	880	0.146	510	480	0.201	390

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF440

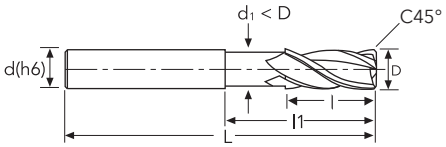
cylindrical shank and reduced neck, 45° chamfer

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING (1.5D) | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.10	+/-0.020	6	9	15	2.80	57	4	HF440030	●
4	0/-0.030	0.10	+/-0.020	6	11	18	3.80	57	4	HF440040	●
5	0/-0.030	0.10	+/-0.020	6	13	19	4.80	57	4	HF440050	●
6	0/-0.030	0.10	+/-0.020	6	13	20	5.80	57	4	HF440060	●
8	0/-0.030	0.20	+/-0.020	8	20	26	7.80	64	4	HF440080	●
10	0/-0.030	0.20	+/-0.020	10	22	30	9.80	72	4	HF440100	●
12	0/-0.030	0.20	+/-0.020	12	26	36	11.80	83	4	HF440120	●
14	0/-0.030	0.20	+/-0.020	14	26	36	13.70	83	4	HF440140	●
16	0/-0.030	0.30	+/-0.020	16	32	42	15.70	92	4	HF440160	●
20	0/-0.030	0.40	+/-0.020	20	38	50	19.70	104	4	HF440200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF440

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	12740	0.013	640	8490	0.011	390	6370	0.009	240	4250	0.009	150
	4	9550	0.017	640	6370	0.015	380	4780	0.012	240	3180	0.012	150
	5	7640	0.021	630	5100	0.019	380	3820	0.016	240	2550	0.014	150
	6	6370	0.024	620	4250	0.022	370	3180	0.018	230	2120	0.017	140
	8	4780	0.032	600	3180	0.028	360	2390	0.024	230	1590	0.022	140
	10	3820	0.038	580	2550	0.034	350	1910	0.028	220	1270	0.026	130
	12	3180	0.043	550	2120	0.039	330	1590	0.032	210	1060	0.030	130
	14	2730	0.049	530	1820	0.044	320	1360	0.036	200	910	0.034	120
	16	2390	0.054	520	1590	0.049	310	1190	0.041	190	800	0.038	120
	20	1910	0.066	500	1270	0.059	300	960	0.049	190	640	0.046	120
ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**85-105**			**55-75**								
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	8	3780	0.025	380	2590	0.023	230						
	10	3030	0.030	370	2070	0.027	230						
	12	2520	0.035	350	1730	0.031	220						
	14	2160	0.039	340	1480	0.035	210						
	16	1890	0.043	330	1290	0.039	200						
	20	1510	0.053	320	1040	0.047	200						

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**130-150**			**90-110**			**60-80**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	14860	0.015	900	10620	0.014	580	7430	0.012	360	5310	0.017	350
	4	11150	0.020	890	7960	0.018	570	5570	0.016	360	3980	0.022	350
	5	8920	0.025	890	6370	0.022	570	4460	0.020	350	3180	0.027	350
	6	7430	0.029	870	5310	0.026	560	3720	0.023	350	2650	0.032	340
	8	5570	0.038	840	3980	0.034	540	2790	0.030	340	1990	0.042	330
	10	4460	0.045	810	3180	0.041	520	2230	0.036	320	1590	0.050	320
	12	3720	0.052	770	2650	0.047	490	1860	0.041	310	1330	0.057	300
	14	3180	0.058	740	2270	0.052	480	1590	0.047	300	1140	0.064	290
	16	2790	0.065	720	1990	0.058	460	1390	0.052	290	1000	0.071	290
	20	2230	0.079	700	1590	0.071	450	1110	0.063	280	800	0.087	280
ap x ae	**≤ D5**	1.5D x 0.25D			1.5D x 0.25D			1.2D x 0.1D			1.2D x 0.1D		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF440

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	12740	0.009	470	8490	0.009	290	6370	0.008	193	4250	0.007	120
	4	9550	0.012	465	6370	0.011	290	4780	0.010	191	3180	0.009	119
	5	7640	0.015	460	5100	0.014	285	3820	0.012	190	2550	0.012	118
	6	6370	0.018	450	4250	0.016	280	3180	0.015	186	2120	0.014	115
	8	4780	0.023	440	3180	0.021	270	2390	0.019	181	1590	0.018	112
	10	3820	0.028	420	2550	0.026	260	1910	0.023	173	1270	0.021	108
	12	3180	0.031	400	2120	0.029	250	1590	0.026	165	1060	0.024	103
	14	2730	0.035	385	1820	0.033	240	1360	0.029	159	910	0.027	99
	16	2390	0.039	375	1590	0.037	235	1190	0.032	154	800	0.030	97
	20	1910	0.048	365	1270	0.045	225	960	0.039	151	640	0.037	94
	α° max	**≤ D5**	2°		2°			1°			1°		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
RAMPING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.019	455	3720	0.018	265	2920	0.017	198	1860	0.023	174
	8	4380	0.025	440	2790	0.023	260	2190	0.022	193	1390	0.030	168
	10	3500	0.030	420	2230	0.028	250	1750	0.026	185	1110	0.036	161
	12	2920	0.034	405	1860	0.032	235	1460	0.030	176	930	0.042	154
	14	2500	0.039	390	1590	0.036	225	1250	0.034	170	800	0.047	149
	16	2190	0.043	375	1390	0.040	220	1090	0.038	165	700	0.052	145
	20	1750	0.052	365	1110	0.048	215	880	0.046	162	560	0.063	141

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	α° x ae	**30° x D**			**15° x D**								
	Vc (m/min)	**80-100**			**45-65**								
RAMPING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	10	2870	0.025	280	1750	0.023	160						
	12	2390	0.028	270	1460	0.026	150						
	14	2050	0.032	260	1250	0.029	145						
	16	1790	0.035	250	1090	0.032	140						
	20	1430	0.043	245	880	0.039	140						

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF440

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
VERTICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.024	570	3720	0.022	330	2920	0.018	210	1860	0.017	130
	8	4380	0.032	550	2790	0.028	320	2190	0.024	210	1390	0.022	120
	10	3500	0.038	530	2230	0.034	300	1750	0.028	200	1110	0.026	120
	12	2920	0.043	500	1860	0.039	290	1460	0.032	190	930	0.030	110
	14	2500	0.049	490	1590	0.044	280	1250	0.036	180	800	0.034	110
	16	2190	0.054	470	1390	0.049	270	1090	0.041	180	700	0.038	110
	20	1750	0.066	460	1110	0.059	260	880	0.049	170	560	0.046	100

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**85-105**			**55-75**			**40-60**			**20-40**		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10080	0.006	250	6900	0.006	160	5310	0.005	110	3180	0.007	90
	4	7560	0.008	250	5180	0.007	160	3980	0.007	110	2390	0.009	90
	5	6050	0.010	250	4140	0.009	150	3180	0.008	110	1910	0.011	90
	6	5040	0.012	240	3450	0.011	150	2650	0.010	100	1590	0.013	90
	8	3780	0.016	240	2590	0.014	150	1990	0.013	100	1190	0.017	80
	10	3030	0.019	230	2070	0.017	140	1590	0.015	100	960	0.021	80
	12	2520	0.022	220	1730	0.019	130	1330	0.017	90	800	0.024	80
	14	2160	0.024	210	1480	0.022	130	1140	0.019	90	680	0.027	70
	16	1890	0.027	200	1290	0.024	130	1000	0.022	90	600	0.030	70
	20	1510	0.033	200	1040	0.030	120	800	0.026	80	480	0.036	70

ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

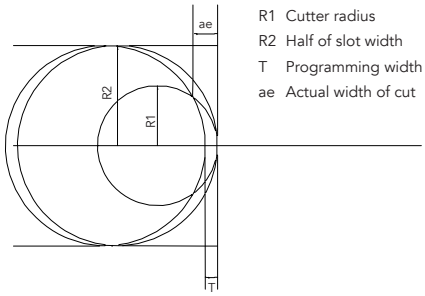
CUTTING PARAMETERS

HF440

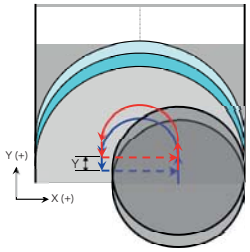
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**160-200**			**110-130**			**80-100**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10080	0.032	1270	6900	0.028	780	5310	0.025	540	3180	0.035	440
	4	7560	0.042	1260	5180	0.037	780	3980	0.033	530	2390	0.046	440
	5	6050	0.052	1250	4140	0.047	770	3180	0.041	530	1910	0.057	430
	6	5040	0.061	1220	3450	0.055	750	2650	0.049	520	1590	0.067	430
	8	3780	0.079	1190	2590	0.071	730	1990	0.063	500	1190	0.087	410
	10	3030	0.095	1150	2070	0.085	700	1590	0.076	480	960	0.104	400
	12	2520	0.108	1090	1730	0.097	670	1330	0.086	460	800	0.119	380
	14	2160	0.122	1050	1480	0.109	650	1140	0.097	440	680	0.134	360
	16	1890	0.135	1020	1290	0.122	630	1000	0.108	430	600	0.149	360
	20	1510	0.164	990	1040	0.148	610	800	0.131	420	480	0.181	350

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF441

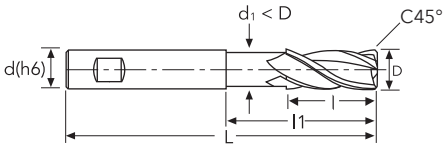
weldon shank and reduced neck, 45° chamfer

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.10	+/-0.020	6	9	15	2.80	57	4	HF441030	●
4	0/-0.030	0.10	+/-0.020	6	11	18	3.80	57	4	HF441040	●
5	0/-0.030	0.10	+/-0.020	6	13	19	4.80	57	4	HF441050	●
6	0/-0.030	0.10	+/-0.020	6	13	20	5.80	57	4	HF441060	●
8	0/-0.030	0.20	+/-0.020	8	20	26	7.80	64	4	HF441080	●
10	0/-0.030	0.20	+/-0.020	10	22	30	9.80	72	4	HF441100	●
12	0/-0.030	0.20	+/-0.020	12	26	36	11.80	83	4	HF441120	●
14	0/-0.030	0.20	+/-0.020	14	26	36	13.70	83	4	HF441140	●
16	0/-0.030	0.30	+/-0.020	16	32	42	15.70	92	4	HF441160	●
18	0/-0.030	0.30	+/-0.020	18	32	42	17.70	92	4	HF441180	●
20	0/-0.030	0.40	+/-0.020	20	38	50	19.70	104	4	HF441200	●

● stock standard ○ non-standard stock ∇ stock exhaustion

CUTTING PARAMETERS

HF441

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	12740	0.013	640	8490	0.011	390	6370	0.009	240	4250	0.009	150
	4	9550	0.017	640	6370	0.015	380	4780	0.012	240	3180	0.012	150
	5	7640	0.021	630	5100	0.019	380	3820	0.016	240	2550	0.014	150
	6	6370	0.024	620	4250	0.022	370	3180	0.018	230	2120	0.017	140
	8	4780	0.032	600	3180	0.028	360	2390	0.024	230	1590	0.022	140
	10	3820	0.038	580	2550	0.034	350	1910	0.028	220	1270	0.026	130
	12	3180	0.043	550	2120	0.039	330	1590	0.032	210	1060	0.030	130
	14	2730	0.049	530	1820	0.044	320	1360	0.036	200	910	0.034	120
	16	2390	0.054	520	1590	0.049	310	1190	0.041	190	800	0.038	120
	18	2120	0.059	500	1420	0.053	300	1060	0.045	190	710	0.042	120
	20	1910	0.066	500	1270	0.059	300	960	0.049	190	640	0.046	120

ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**85-105**			**55-75**								
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	8	3780	0.025	380	2590	0.023	230						
	10	3030	0.030	370	2070	0.027	230						
	12	2520	0.035	350	1730	0.031	220						
	14	2160	0.039	340	1480	0.035	210						
	16	1890	0.043	330	1290	0.039	200						
	18	1680	0.048	320	1150	0.043	200						
	20	1510	0.053	320	1040	0.047	200						

	Material Group ISO 513	P1 P2 M1 K1											
	Hardness/Rm	≤ 700 N/mm²											
	ap x ae	**2D x D**											
	Vc (m/min)	**60-80**											
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)									
	10	2230	0.023	200									
	12	1860	0.026	190									
	14	1590	0.029	190									
	16	1390	0.032	180									
	18	1240	0.036	180									
	20	1110	0.039	180									

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF440 PARAMETERS.

HF441

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**130-150**			**90-110**			**60-80**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	14860	0.015	900	10620	0.014	580	7430	0.012	360	5310	0.017	350
	4	11150	0.020	890	7960	0.018	570	5570	0.016	360	3980	0.022	350
	5	8920	0.025	890	6370	0.022	570	4460	0.020	350	3180	0.027	350
	6	7430	0.029	870	5310	0.026	560	3720	0.023	350	2650	0.032	340
	8	5570	0.038	840	3980	0.034	540	2790	0.030	340	1990	0.042	330
	10	4460	0.045	810	3180	0.041	520	2230	0.036	320	1590	0.050	320
	12	3720	0.052	770	2650	0.047	490	1860	0.041	310	1330	0.057	300
	14	3180	0.058	740	2270	0.052	480	1590	0.047	300	1140	0.064	290
	16	2790	0.065	720	1990	0.058	460	1390	0.052	290	1000	0.071	290
	18	2480	0.071	710	1770	0.064	450	1240	0.057	280	880	0.078	280
	20	2230	0.079	700	1590	0.071	450	1110	0.063	280	800	0.087	280
ap x ae	**≤ D5**	1.5D x 0.25D			1.5D x 0.25D			1.2D x 0.1D			1.2D x 0.1D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	12740	0.009	470	8490	0.009	290	6370	0.008	193	4250	0.007	120
	4	9550	0.012	465	6370	0.011	290	4780	0.010	191	3180	0.009	119
	5	7640	0.015	460	5100	0.014	285	3820	0.012	190	2550	0.012	118
	6	6370	0.018	450	4250	0.016	280	3180	0.015	186	2120	0.014	115
	8	4780	0.023	440	3180	0.021	270	2390	0.019	181	1590	0.018	112
	10	3820	0.028	420	2550	0.026	260	1910	0.023	173	1270	0.021	108
	12	3180	0.031	400	2120	0.029	250	1590	0.026	165	1060	0.024	103
	14	2730	0.035	385	1820	0.033	240	1360	0.029	159	910	0.027	99
	16	2390	0.039	375	1590	0.037	235	1190	0.032	154	800	0.030	97
	18	2120	0.043	365	1420	0.040	230	1060	0.036	151	710	0.033	95
	20	1910	0.048	365	1270	0.045	225	960	0.039	151	640	0.037	94
α° max	**≤ D5**	2°			2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF440 PARAMETERS.

CUTTING PARAMETERS

HF441

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.019	455	3720	0.018	265	2920	0.017	198	1860	0.023	174
	8	4380	0.025	440	2790	0.023	260	2190	0.022	193	1390	0.030	168
	10	3500	0.030	420	2230	0.028	250	1750	0.026	185	1110	0.036	161
	12	2920	0.034	405	1860	0.032	235	1460	0.030	176	930	0.042	154
	14	2500	0.039	390	1590	0.036	225	1250	0.034	170	800	0.047	149
	16	2190	0.043	375	1390	0.040	220	1090	0.038	165	700	0.052	145
	18	1950	0.047	370	1240	0.044	215	970	0.042	161	620	0.057	142
	20	1750	0.052	365	1110	0.048	215	880	0.046	162	560	0.063	141

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	α° x ae	**30° x D**			**15° x D**								
	Vc (m/min)	**85-105**			**55-75**								
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	10	2870	0.025	280	1750	0.023	160						
	12	2390	0.028	270	1460	0.026	150						
	14	2050	0.032	260	1250	0.029	145						
	16	1790	0.035	250	1090	0.032	140						
	18	1590	0.039	245	970	0.036	140						
	20	1430	0.043	245	880	0.039	140						

RAMPING	Material Group ISO 513	P1 P2 M1 K1											
	Hardness/Rm	≤ 700 N/mm²											
	α° x ae	**45° x D**											
	Vc (m/min)	**60-80**											
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)									
	10	2070	0.024	200									
	12	1730	0.028	195									
	14	1480	0.031	185									
	16	1290	0.035	180									
	18	1150	0.038	175									
	20	1040	0.042	175									

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF440 PARAMETERS.

CUTTING PARAMETERS

HF441

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
VERTICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.024	570	3720	0.022	330	2920	0.018	210	1860	0.017	130
	8	4380	0.032	550	2790	0.028	320	2190	0.024	210	1390	0.022	120
	10	3500	0.038	530	2230	0.034	300	1750	0.028	200	1110	0.026	120
	12	2920	0.043	500	1860	0.039	290	1460	0.032	190	930	0.030	110
	14	2500	0.049	490	1590	0.044	280	1250	0.036	180	800	0.034	110
	16	2190	0.054	470	1390	0.049	270	1090	0.041	180	700	0.038	110
	18	1950	0.059	460	1240	0.053	270	970	0.045	170	620	0.042	100
	20	1750	0.066	460	1110	0.059	260	880	0.049	170	560	0.046	100

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**85-105**			**55-75**			**40-60**			**20-40**		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10080	0.006	250	6900	0.006	160	5310	0.005	110	3180	0.007	90
	4	7560	0.008	250	5180	0.007	160	3980	0.007	110	2390	0.009	90
	5	6050	0.010	250	4140	0.009	150	3180	0.008	110	1910	0.011	90
	6	5040	0.012	240	3450	0.011	150	2650	0.010	100	1590	0.013	90
	8	3780	0.016	240	2590	0.014	150	1990	0.013	100	1190	0.017	80
	10	3030	0.019	230	2070	0.017	140	1590	0.015	100	960	0.021	80
	12	2520	0.022	220	1730	0.019	130	1330	0.017	90	800	0.024	80
	14	2160	0.024	210	1480	0.022	130	1140	0.019	90	680	0.027	70
	16	1890	0.027	200	1290	0.024	130	1000	0.022	90	600	0.030	70
	18	1680	0.030	200	1150	0.027	120	880	0.024	80	530	0.033	70
	20	1510	0.033	200	1040	0.030	120	800	0.026	80	480	0.036	70

ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF440 PARAMETERS.

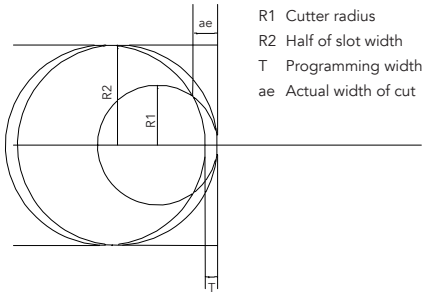
CUTTING PARAMETERS

HF441

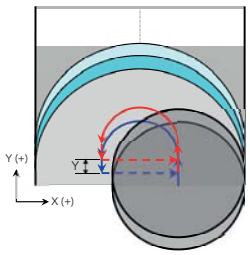
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**160-200**			**110-130**			**80-100**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10080	0.032	1270	6900	0.028	780	5310	0.025	540	3180	0.035	440
	4	7560	0.042	1260	5180	0.037	780	3980	0.033	530	2390	0.046	440
	5	6050	0.052	1250	4140	0.047	770	3180	0.041	530	1910	0.057	430
	6	5040	0.061	1220	3450	0.055	750	2650	0.049	520	1590	0.067	430
	8	3780	0.079	1190	2590	0.071	730	1990	0.063	500	1190	0.087	410
	10	3030	0.095	1150	2070	0.085	700	1590	0.076	480	960	0.104	400
	12	2520	0.108	1090	1730	0.097	670	1330	0.086	460	800	0.119	380
	14	2160	0.122	1050	1480	0.109	650	1140	0.097	440	680	0.134	360
	16	1890	0.135	1020	1290	0.122	630	1000	0.108	430	600	0.149	360
	18	1680	0.149	1000	1150	0.134	610	880	0.119	420	530	0.163	350
	20	1510	0.164	990	1040	0.148	610	800	0.131	420	480	0.181	350

ap x ae	**≤ D5**	1.5D x 0.1D	1.5D x 0.1D

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF440 PARAMETERS.

HF844

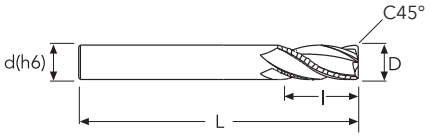
cylindrical shank, 45° chamfer, roughing HR

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | HR FINE | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING (1.5D) | SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.030	0.10	+/-0.020	6	16		57	4	HF844060	●
8	0/-0.030	0.20	+/-0.020	8	20		64	4	HF844080	●
10	0/-0.030	0.20	+/-0.020	10	22		72	4	HF844100	●
12	0/-0.030	0.20	+/-0.020	12	26		83	4	HF844120	●
14	0/-0.030	0.20	+/-0.020	14	26		83	4	HF844140	●
16	0/-0.030	0.30	+/-0.020	16	32		92	4	HF844160	●
18	0/-0.030	0.30	+/-0.020	18	32		92	4	HF844180	●
20	0/-0.030	0.40	+/-0.020	20	38		104	4	HF844200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF844

SLOTTING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	6370	0.029	740	4250	0.026	450	3180	0.022	280	2120	0.020	170
	8	4780	0.038	720	3180	0.034	430	2390	0.028	270	1590	0.026	170
	10	3820	0.045	690	2550	0.041	420	1910	0.034	260	1270	0.032	160
	12	3180	0.052	660	2120	0.047	400	1590	0.039	250	1060	0.036	150
	14	2730	0.058	640	1820	0.052	380	1360	0.044	240	910	0.041	150
	16	2390	0.065	620	1590	0.058	370	1190	0.049	230	800	0.045	150
	18	2120	0.071	600	1420	0.064	360	1060	0.053	230	710	0.050	140
	20	1910	0.079	600	1270	0.071	360	960	0.059	230	640	0.055	140

SLOTTING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**85-105**			**55-75**								
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	6	5040	0.023	470	3450	0.021	290						
	8	3780	0.030	460	2590	0.027	280						
	10	3030	0.036	440	2070	0.033	270						
	12	2520	0.041	420	1730	0.037	260						
	14	2160	0.047	400	1480	0.042	250						
	16	1890	0.052	390	1290	0.047	240						
	18	1680	0.057	380	1150	0.051	240						
	20	1510	0.063	380	1040	0.057	240						

SIDE MILLING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**130-150**			**90-110**			**60-80**			**40-60**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.035	1040	5310	0.031	670	3720	0.028	420	2650	0.038	410
	8	5570	0.045	1010	3980	0.041	650	2790	0.036	400	1990	0.050	400
	10	4460	0.054	970	3180	0.049	620	2230	0.044	390	1590	0.060	380
	12	3720	0.062	930	2650	0.056	590	1860	0.050	370	1330	0.068	360
	14	3180	0.070	890	2270	0.063	570	1590	0.056	360	1140	0.077	350
	16	2790	0.078	870	1990	0.070	560	1390	0.062	350	1000	0.086	340
	18	2480	0.086	850	1770	0.077	550	1240	0.068	340	880	0.094	330
	20	2230	0.095	840	1590	0.085	540	1110	0.076	340	800	0.104	330

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF844

HELICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**8° x 0.4D**			**6° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**		
Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	6370	0.020	515	4250	0.019	315	3180	0.016	210	2120	0.016	139
8	4780	0.026	500	3180	0.024	310	2390	0.021	204	1590	0.021	135
10	3820	0.031	480	2550	0.029	295	1910	0.026	196	1270	0.025	129
12	3180	0.036	455	2120	0.033	280	1590	0.029	187	1060	0.029	123
14	2730	0.040	440	1820	0.037	270	1360	0.033	179	910	0.033	119
16	2390	0.045	430	1590	0.041	265	1190	0.037	174	800	0.036	116
18	2120	0.049	420	1420	0.046	260	1060	0.040	171	710	0.040	113
20	1910	0.055	415	1270	0.050	255	960	0.045	171	640	0.044	113

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	5840	0.023	545	3720	0.021	320	2920	0.020	238	1860	0.028	209
8	4380	0.030	530	2790	0.028	310	2190	0.026	231	1390	0.036	202
10	3500	0.036	505	2230	0.033	295	1750	0.032	222	1110	0.044	194
12	2920	0.041	485	1860	0.038	285	1460	0.036	212	930	0.050	185
14	2500	0.047	465	1590	0.043	270	1250	0.041	204	800	0.056	179
16	2190	0.052	455	1390	0.048	265	1090	0.045	197	700	0.062	174
18	1950	0.057	445	1240	0.052	260	970	0.050	193	620	0.069	170
20	1750	0.063	440	1110	0.058	255	880	0.055	194	560	0.076	170

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
α° x ae	**30° x D**			**15° x D**								
Vc (m/min)	**85-105**			**45-65**								
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
10	2870	0.030	340	1750	0.027	190						
12	2390	0.034	320	1460	0.031	180						
14	2050	0.038	310	1250	0.035	175						
16	1790	0.042	300	1090	0.039	170						
18	1590	0.046	295	970	0.043	165						
20	1430	0.051	295	880	0.047	165						

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

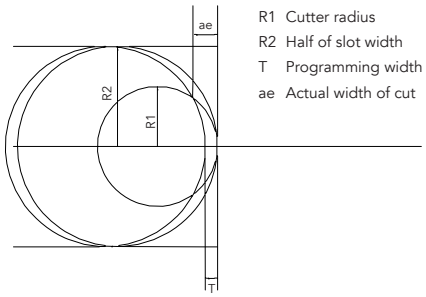
CUTTING PARAMETERS

HF844

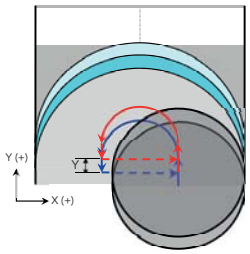
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
VERTICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.029	680	3720	0.026	390	2920	0.022	260	1860	0.020	150
	8	4380	0.038	660	2790	0.034	380	2190	0.028	250	1390	0.026	150
	10	3500	0.045	640	2230	0.041	360	1750	0.034	240	1110	0.032	140
	12	2920	0.052	610	1860	0.047	350	1460	0.039	230	930	0.036	130
	14	2500	0.058	580	1590	0.052	330	1250	0.044	220	800	0.041	130
	16	2190	0.065	570	1390	0.058	320	1090	0.049	210	700	0.045	130
	18	1950	0.071	560	1240	0.064	320	970	0.053	210	620	0.050	120
	20	1750	0.079	550	1110	0.071	320	880	0.059	210	560	0.055	120

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**160-200**			**110-130**			**80-100**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5040	0.073	1470	3450	0.066	910	2650	0.058	620	1590	0.080	510
	8	3780	0.095	1430	2590	0.085	880	1990	0.076	600	1190	0.104	490
	10	3030	0.113	1370	2070	0.102	850	1590	0.091	580	960	0.125	480
	12	2520	0.130	1310	1730	0.117	810	1330	0.104	550	800	0.143	460
	14	2160	0.146	1260	1480	0.131	780	1140	0.117	530	680	0.160	440
	16	1890	0.162	1220	1290	0.146	750	1000	0.130	520	600	0.178	430
	18	1680	0.178	1200	1150	0.160	740	880	0.143	500	530	0.196	420
	20	1510	0.197	1190	1040	0.177	740	800	0.158	500	480	0.217	420

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF444

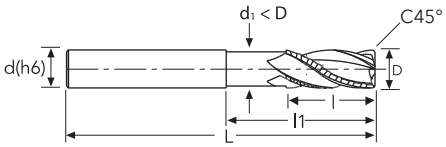
cylindrical shank and reduced neck, 45° chamfer, roughing HR

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | HR FINE | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING (1.5D) | SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
6	0/-0.030	0.10	+/-0.020	6	13	20	5.80	57	4	HF444060	●
8	0/-0.030	0.20	+/-0.020	8	20	26	7.80	64	4	HF444080	●
10	0/-0.030	0.20	+/-0.020	10	22	30	9.80	72	4	HF444100	●
12	0/-0.030	0.20	+/-0.020	12	26	36	11.80	83	4	HF444120	●
14	0/-0.030	0.20	+/-0.020	14	26	36	13.70	83	4	HF444140	●
16	0/-0.030	0.30	+/-0.020	16	32	42	15.70	92	4	HF444160	●
20	0/-0.030	0.40	+/-0.020	20	38	50	19.70	104	4	HF444200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF444

SLOTTING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	6370	0.026	670	4250	0.024	400	3180	0.020	250	2120	0.018	160
	8	4780	0.034	650	3180	0.031	390	2390	0.026	240	1590	0.024	150
	10	3820	0.041	620	2550	0.037	370	1910	0.031	230	1270	0.029	150
	12	3180	0.047	590	2120	0.042	360	1590	0.035	220	1060	0.033	140
	14	2730	0.052	570	1820	0.047	340	1360	0.039	210	910	0.037	130
	16	2390	0.058	560	1590	0.052	330	1190	0.044	210	800	0.041	130
	20	1910	0.071	540	1270	0.064	320	960	0.053	200	640	0.050	130

SLOTTING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**85-105**			**55-75**								
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	6	5040	0.021	420	3450	0.019	260						
	8	3780	0.027	410	2590	0.024	250						
	10	3030	0.033	400	2070	0.029	240						
	12	2520	0.037	380	1730	0.034	230						
	14	2160	0.042	360	1480	0.038	220						
	16	1890	0.047	350	1290	0.042	220						
	20	1510	0.057	340	1040	0.051	210						

SIDE MILLING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**130-150**			**90-110**			**60-80**			**40-60**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.031	940	5310	0.028	600	3720	0.025	370	2650	0.035	370
	8	5570	0.041	910	3980	0.037	580	2790	0.033	360	1990	0.045	360
	10	4460	0.049	870	3180	0.044	560	2230	0.039	350	1590	0.054	340
	12	3720	0.056	830	2650	0.050	530	1860	0.045	330	1330	0.062	330
	14	3180	0.063	800	2270	0.057	510	1590	0.050	320	1140	0.069	320
	16	2790	0.070	780	1990	0.063	500	1390	0.056	310	1000	0.077	310
	20	2230	0.085	760	1590	0.077	490	1110	0.068	300	800	0.094	300

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF444

HELICAL	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	7° x 0.4D			5° x 0.4D			3° x 0.4D			3° x 0.4D		
	Vc (m/min)	110-130			70-90			50-70			30-50		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	6370	0.018	470	4250	0.017	290	3180	0.016	200	2120	0.015	125
	8	4780	0.024	455	3180	0.022	285	2390	0.020	195	1590	0.019	121
	10	3820	0.029	435	2550	0.027	275	1910	0.025	187	1270	0.023	116
	12	3180	0.033	415	2120	0.031	260	1590	0.028	178	1060	0.026	111
	14	2730	0.037	400	1820	0.034	250	1360	0.032	171	910	0.029	107
	16	2390	0.041	390	1590	0.038	245	1190	0.035	167	800	0.033	105
	20	1910	0.050	380	1270	0.046	235	960	0.043	164	640	0.040	102

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	15° x D			10° x D			5° x D			5° x D		
	Vc (m/min)	100-120			60-80			45-65			30-40		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.021	490	3720	0.019	285	2920	0.018	214	1860	0.025	188
	8	4380	0.027	475	2790	0.025	280	2190	0.024	208	1390	0.033	182
	10	3500	0.033	455	2230	0.030	265	1750	0.029	200	1110	0.039	174
	12	2920	0.037	435	1860	0.034	255	1460	0.033	190	930	0.045	167
	14	2500	0.042	420	1590	0.039	245	1250	0.037	183	800	0.050	161
	16	2190	0.047	410	1390	0.043	240	1090	0.041	178	700	0.056	157
	20	1750	0.057	395	1110	0.052	230	880	0.050	175	560	0.068	153

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	α° x ae	30° x D			15° x D								
	Vc (m/min)	85-105			45-65								
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	10	2870	0.027	305	1750	0.024	170						
	12	2390	0.030	290	1460	0.028	165						
	14	2050	0.034	280	1250	0.031	155						
	16	1790	0.038	270	1090	0.035	150						
	20	1430	0.046	265	880	0.042	150						

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF444

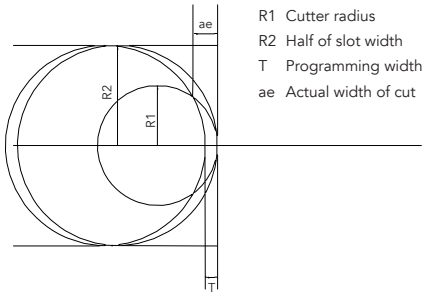
VERTICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	D x 0.4D			D x 0.4D			D x 0.25D			D x 0.25D		
Vc (m/min)	100-120			60-80			45-65			30-40		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	5840	0.026	610	3720	0.024	350	2920	0.020	230	1860	0.018	140
8	4380	0.034	600	2790	0.031	340	2190	0.026	220	1390	0.024	130
10	3500	0.041	570	2230	0.037	330	1750	0.031	210	1110	0.029	130
12	2920	0.047	540	1860	0.042	310	1460	0.035	200	930	0.033	120
14	2500	0.052	520	1590	0.047	300	1250	0.039	200	800	0.037	120
16	2190	0.058	510	1390	0.052	290	1090	0.044	190	700	0.041	110
20	1750	0.071	500	1110	0.064	280	880	0.053	190	560	0.050	110

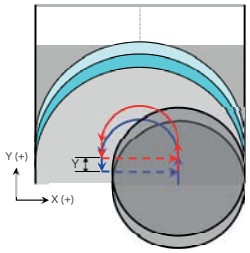
TROCHOIDAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	2D x 0.2D			2D x 0.1D			1.5D x 0.1D			1.5D x 0.1D		
Vc (m/min)	160-200			110-130			80-100			50-70		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	5040	0.066	1320	3450	0.059	810	2650	0.052	560	1590	0.072	460
8	3780	0.085	1290	2590	0.077	790	1990	0.068	540	1190	0.094	450
10	3030	0.102	1240	2070	0.092	760	1590	0.082	520	960	0.112	430
12	2520	0.117	1180	1730	0.105	730	1330	0.093	500	800	0.128	410
14	2160	0.131	1130	1480	0.118	700	1140	0.105	480	680	0.144	390
16	1890	0.146	1100	1290	0.131	680	1000	0.117	470	600	0.160	380
20	1510	0.177	1070	1040	0.160	660	800	0.142	450	480	0.195	370

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF445

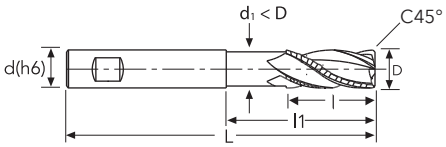
weldon shank and reduced neck, 45° chamfer, roughing HR

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | HR FINE | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING (1.5D) | SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
6	0/-0.030	0.10	+/-0.020	6	13	20	5.80	57	4	HF445060	●
8	0/-0.030	0.20	+/-0.020	8	20	26	7.80	64	4	HF445080	●
10	0/-0.030	0.20	+/-0.020	10	22	30	9.80	72	4	HF445100	●
12	0/-0.030	0.20	+/-0.020	12	26	36	11.80	83	4	HF445120	●
14	0/-0.030	0.20	+/-0.020	14	26	36	13.70	83	4	HF445140	●
16	0/-0.030	0.30	+/-0.020	16	32	42	15.70	92	4	HF445160	●
20	0/-0.030	0.40	+/-0.020	20	38	50	19.70	104	4	HF445200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF445

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	6370	0.026	670	4250	0.024	400	3180	0.020	250	2120	0.018	160
	8	4780	0.034	650	3180	0.031	390	2390	0.026	240	1590	0.024	150
	10	3820	0.041	620	2550	0.037	370	1910	0.031	230	1270	0.029	150
	12	3180	0.047	590	2120	0.042	360	1590	0.035	220	1060	0.033	140
	14	2730	0.052	570	1820	0.047	340	1360	0.039	210	910	0.037	130
	16	2390	0.058	560	1590	0.052	330	1190	0.044	210	800	0.041	130
	20	1910	0.071	540	1270	0.064	320	960	0.053	200	640	0.050	130

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**85-105**			**55-75**								
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	8	3780	0.027	410	2590	0.024	250						
	10	3030	0.033	400	2070	0.029	240						
	12	2520	0.037	380	1730	0.034	230						
	14	2160	0.042	360	1480	0.038	220						
	16	1890	0.047	350	1290	0.042	220						
	20	1510	0.057	340	1040	0.051	210						

	Material Group ISO 513	P1 P2 M1 K1											
	Hardness/Rm	≤ 700 N/mm²											
	ap x ae	**2D x D**											
	Vc (m/min)	**60-80**											
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)									
	6	3720	0.016	230									
	8	2790	0.020	230									
	10	2230	0.024	220									
	12	1860	0.028	210									
	14	1590	0.031	200									
	16	1390	0.035	190									
	20	1110	0.043	190									

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF444 PARAMETERS.

HF445

SIDE MILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
Vc (m/min)	**130-150**			**90-110**			**60-80**			**40-60**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	7430	0.031	940	5310	0.028	600	3720	0.025	370	2650	0.035	370
8	5570	0.041	910	3980	0.037	580	2790	0.033	360	1990	0.045	360
10	4460	0.049	870	3180	0.044	560	2230	0.039	350	1590	0.054	340
12	3720	0.056	830	2650	0.050	530	1860	0.045	330	1330	0.062	330
14	3180	0.063	800	2270	0.057	510	1590	0.050	320	1140	0.069	320
16	2790	0.070	780	1990	0.063	500	1390	0.056	310	1000	0.077	310
20	2230	0.085	760	1590	0.077	490	1110	0.068	300	800	0.094	300

HELICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**7° x 0.4D**			**5° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	6370	0.018	470	4250	0.017	290	3180	0.016	200	2120	0.015	125
8	4780	0.024	455	3180	0.022	285	2390	0.020	195	1590	0.019	121
10	3820	0.029	435	2550	0.027	275	1910	0.025	187	1270	0.023	116
12	3180	0.033	415	2120	0.031	260	1590	0.028	178	1060	0.026	111
14	2730	0.037	400	1820	0.034	250	1360	0.032	171	910	0.029	107
16	2390	0.041	390	1590	0.038	245	1190	0.035	167	800	0.033	105
20	1910	0.050	380	1270	0.046	235	960	0.043	164	640	0.040	102

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
8	4380	0.027	475	2790	0.025	280	2190	0.024	208	1390	0.033	182
10	3500	0.033	455	2230	0.030	265	1750	0.029	200	1110	0.039	174
12	2920	0.037	435	1860	0.034	255	1460	0.033	190	930	0.045	167
14	2500	0.042	420	1590	0.039	245	1250	0.037	183	800	0.050	161
16	2190	0.047	410	1390	0.043	240	1090	0.041	178	700	0.056	157
20	1750	0.057	395	1110	0.052	230	880	0.050	175	560	0.068	153

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF444 PARAMETERS.

CUTTING PARAMETERS

HF445

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**30° x D**			**15° x D**								
	Vc (m/min)	**85-105**			**45-65**								
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	10	2870	0.027	305	1750	0.024	170						
	12	2390	0.030	290	1460	0.028	165						
	14	2050	0.034	280	1250	0.031	155						
	16	1790	0.038	270	1090	0.035	150						
	20	1430	0.046	265	880	0.042	150						

RAMPING	Material Group ISO 513	P1 P2 M1 K1											
	Hardness/Rm	≤ 700 N/mm²											
	α° x ae	**45° x D**											
	Vc (m/min)	**55-75**											
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)									
	10	2070	0.026	220									
	12	1730	0.030	210									
	14	1480	0.034	200									
	16	1290	0.038	195									
	20	1040	0.046	190									

VERTICAL	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.026	610	3720	0.024	350	2920	0.020	230	1860	0.018	140
	8	4380	0.034	600	2790	0.031	340	2190	0.026	220	1390	0.024	130
	10	3500	0.041	570	2230	0.037	330	1750	0.031	210	1110	0.029	130
	12	2920	0.047	540	1860	0.042	310	1460	0.035	200	930	0.033	120
	14	2500	0.052	520	1590	0.047	300	1250	0.039	200	800	0.037	120
	16	2190	0.058	510	1390	0.052	290	1090	0.044	190	700	0.041	110
	20	1750	0.071	500	1110	0.064	280	880	0.053	190	560	0.050	110

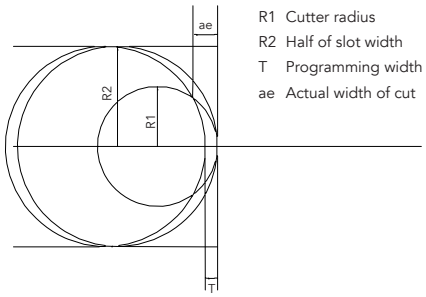
PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF444 PARAMETERS.

CUTTING PARAMETERS

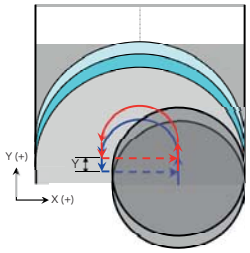
HF445

TROCHOIDAL	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**160-200**			**110-130**			**80-100**			**50-70**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5040	0.066	1320	3450	0.059	810	2650	0.052	560	1590	0.072	460
	8	3780	0.085	1290	2590	0.077	790	1990	0.068	540	1190	0.094	450
	10	3030	0.102	1240	2070	0.092	760	1590	0.082	520	960	0.112	430
	12	2520	0.117	1180	1730	0.105	730	1330	0.093	500	800	0.128	410
	14	2160	0.131	1130	1480	0.118	700	1140	0.105	480	680	0.144	390
	16	1890	0.146	1100	1290	0.131	680	1000	0.117	470	600	0.160	380
	20	1510	0.177	1070	1040	0.160	660	800	0.142	450	480	0.195	370

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF444 PARAMETERS.

HF342

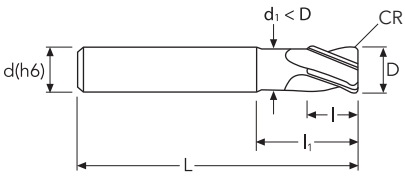
cylindrical shank and reduced neck, extra short, corner radius

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.20	+/-0.010	6	5	9	2.80	50	4	HF34202030	●
4	0/-0.030	0.20	+/-0.010	6	6	12	3.80	50	4	HF34202040	●
5	0/-0.030	0.20	+/-0.010	6	8	14	4.80	50	4	HF34202050	●
6	0/-0.030	0.30	+/-0.010	6	9	18	5.80	55	4	HF34203060	●
8	0/-0.030	0.50	+/-0.010	8	12	24	7.80	60	4	HF34205080	●
10	0/-0.030	1.00	+/-0.010	10	15	30	9.80	70	4	HF34210100	●
12	0/-0.030	1.00	+/-0.010	12	18	35	11.80	80	4	HF34210120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF342

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	14860	0.014	830	9550	0.013	480	7430	0.011	310	4250	0.010	170
	4	11150	0.019	830	7170	0.017	480	5570	0.014	310	3180	0.013	160
	5	8920	0.023	820	5730	0.021	470	4460	0.017	310	2550	0.016	160
	6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
	8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
	10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
	12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.2D x 0.5D**			**1.2D x 0.5D**			**D x 0.3D**			**D x 0.3D**		
	Vc (m/min)	**160-180**			**100-120**			**70-90**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	18050	0.017	1210	11680	0.015	710	8490	0.013	460	5310	0.018	390
	4	13540	0.022	1200	8760	0.020	700	6370	0.018	450	3980	0.024	390
	5	10830	0.028	1200	7010	0.025	700	5100	0.022	450	3180	0.030	390
	6	9020	0.032	1170	5840	0.029	680	4250	0.026	440	2650	0.036	380
	8	6770	0.042	1140	4380	0.038	660	3180	0.034	430	1990	0.046	370
	10	5410	0.050	1090	3500	0.045	640	2550	0.040	410	1590	0.055	350
	12	4510	0.058	1040	2920	0.052	610	2120	0.046	390	1330	0.063	340
ap x ae	**≤ D5**	1.2D x 0.3D			1.2D x 0.3D			D x 0.2D			D x 0.2D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	14860	0.010	605	9550	0.010	365	7430	0.008	250	4250	0.008	133
	4	11150	0.013	600	7170	0.013	360	5570	0.011	247	3180	0.010	132
	5	8920	0.017	600	5730	0.016	360	4460	0.014	246	2550	0.013	131
	6	7430	0.020	585	4780	0.018	350	3720	0.016	241	2120	0.015	128
	8	5570	0.025	570	3580	0.024	340	2790	0.021	235	1590	0.020	125
	10	4460	0.031	545	2870	0.029	325	2230	0.025	225	1270	0.024	120
	12	3720	0.035	520	2390	0.033	310	1860	0.029	214	1060	0.027	114
α°	**≤ D5**	2°			2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF342

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**15° x 0.4D**			**10° x 0.4D**			**5° x 0.4D**			**5° x 0.4D**		
Vc (m/min)	**120-140**			**70-90**			**55-75**			**25-45**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	6900	0.022	595	4250	0.020	335	3450	0.019	260	1860	0.026	193
8	5180	0.028	580	3180	0.026	325	2590	0.024	253	1390	0.034	187
10	4140	0.034	555	2550	0.031	315	2070	0.029	243	1110	0.040	179
12	3450	0.038	530	2120	0.035	300	1730	0.034	232	930	0.046	172

VERTICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**120-140**			**70-90**			**55-75**			**25-45**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	6900	0.027	750	4250	0.024	410	3450	0.020	280	1860	0.019	140
8	5180	0.035	730	3180	0.032	400	2590	0.026	270	1390	0.025	140
10	4140	0.042	700	2550	0.038	390	2070	0.032	260	1110	0.029	130
12	3450	0.048	660	2120	0.043	370	1730	0.036	250	930	0.034	120

DRILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
Vc (m/min)	**100-120**			**60-80**			**45-65**			**590-690**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	11680	0.007	330	7430	0.006	190	5840	0.006	130	3180	0.008	100
4	8760	0.009	320	5570	0.008	190	4380	0.007	130	2390	0.010	100
5	7010	0.012	320	4460	0.010	180	3500	0.009	130	1910	0.013	100
6	5840	0.014	320	3720	0.012	180	2920	0.011	130	1590	0.015	90
8	4380	0.018	310	2790	0.016	180	2190	0.014	120	1190	0.019	90
10	3500	0.021	290	2230	0.019	170	1750	0.017	120	960	0.023	90
12	2920	0.024	280	1860	0.022	160	1460	0.019	110	800	0.026	80

ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF842

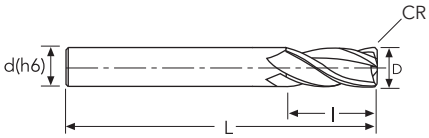
cylindrical shank, corner radius

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
4	0/-0.025	0.30	+/-0.010	6	11		57	4	HF84203040	●
4	0/-0.025	0.50	+/-0.010	6	11		57	4	HF84205040	●
5	0/-0.025	0.30	+/-0.010	6	13		57	4	HF84203050	●
5	0/-0.025	0.50	+/-0.010	6	13		57	4	HF84205050	●
6	0/-0.025	0.30	+/-0.010	6	13		57	4	HF84203060	●
6	0/-0.025	0.50	+/-0.010	6	13		57	4	HF84205060	●
6	0/-0.025	1.00	+/-0.010	6	13		57	4	HF84210060	●
8	0/-0.030	0.50	+/-0.010	8	20		64	4	HF84205080	●
8	0/-0.030	1.00	+/-0.010	8	20		64	4	HF84210080	●
10	0/-0.030	0.50	+/-0.010	10	22		72	4	HF84205100	●
10	0/-0.030	1.00	+/-0.010	10	22		72	4	HF84210100	●
12	0/-0.030	0.50	+/-0.010	12	26		83	4	HF84205120	●
12	0/-0.030	1.00	+/-0.010	12	26		83	4	HF84210120	●
12	0/-0.030	2.00	+/-0.010	12	26		83	4	HF84220120	●
12	0/-0.030	3.00	+/-0.010	12	26		83	4	HF84230120	●
14	0/-0.030	1.00	+/-0.010	14	26		83	4	HF84210140	●
16	0/-0.030	1.00	+/-0.010	16	32		92	4	HF84210160	●
16	0/-0.030	2.00	+/-0.010	16	32		92	4	HF84220160	●
16	0/-0.030	3.00	+/-0.010	16	32		92	4	HF84230160	●
18	0/-0.030	1.00	+/-0.010	18	32		92	4	HF84210180	●
20	0/-0.030	1.00	+/-0.010	20	38		104	4	HF84210200	●
20	0/-0.030	2.00	+/-0.010	20	38		104	4	HF84220200	●
20	0/-0.030	3.00	+/-0.010	20	38		104	4	HF84230200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF842

SLOTTING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	11150	0.019	830	7170	0.017	480	5570	0.014	310	3180	0.013	160
5	8920	0.023	820	5730	0.021	470	4460	0.017	310	2550	0.016	160
6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
14	3180	0.054	690	2050	0.049	400	1590	0.041	260	910	0.038	140
16	2790	0.060	670	1790	0.054	390	1390	0.045	250	800	0.042	130
18	2480	0.066	650	1590	0.059	380	1240	0.050	250	710	0.046	130
20	2230	0.073	650	1430	0.066	380	1110	0.055	240	640	0.051	130
ap x ae	**≤ D5**	0.5D x D		0.5D x D			0.25D x D			0.25D x D		

SIDE MILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
Vc (m/min)	**160-180**			**100-120**			**70-90**			**40-60**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	13540	0.022	1200	8760	0.020	700	6370	0.018	450	3980	0.024	390
5	10830	0.028	1200	7010	0.025	700	5100	0.022	450	3180	0.030	390
6	9020	0.032	1170	5840	0.029	680	4250	0.026	440	2650	0.036	380
8	6770	0.042	1140	4380	0.038	660	3180	0.034	430	1990	0.046	370
10	5410	0.050	1090	3500	0.045	640	2550	0.040	410	1590	0.055	350
12	4510	0.058	1040	2920	0.052	610	2120	0.046	390	1330	0.063	340
14	3870	0.065	1000	2500	0.058	580	1820	0.052	380	1140	0.071	330
16	3380	0.072	970	2190	0.065	570	1590	0.058	370	1000	0.079	320
18	3010	0.079	950	1950	0.071	560	1420	0.063	360	880	0.087	310
20	2710	0.088	950	1750	0.079	550	1270	0.070	360	800	0.096	310
ap x ae	**≤ D5**	1.5D x 0.25D		1.5D x 0.25D			1.2D x 0.1D			1.2D x 0.1D		

HELICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	11150	0.013	600	7170	0.013	360	5570	0.011	247	3180	0.010	132
5	8920	0.017	600	5730	0.016	360	4460	0.014	246	2550	0.013	131
6	7430	0.020	585	4780	0.018	350	3720	0.016	241	2120	0.015	128
8	5570	0.025	570	3580	0.024	340	2790	0.021	235	1590	0.020	125
10	4460	0.031	545	2870	0.029	325	2230	0.025	225	1270	0.024	120
12	3720	0.035	520	2390	0.033	310	1860	0.029	214	1060	0.027	114
14	3180	0.039	500	2050	0.037	300	1590	0.032	206	910	0.030	110
16	2790	0.044	490	1790	0.041	290	1390	0.036	200	800	0.034	108
18	2480	0.048	475	1590	0.045	285	1240	0.040	197	710	0.037	105
20	2230	0.053	475	1430	0.050	285	1110	0.044	195	640	0.041	105
α° max	**≤ D5**	2°		2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF842

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**15° x 0.4D**			**10° x 0.4D**			**5° x 0.4D**			**5° x 0.4D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.022	640	4780	0.020	380	3720	0.019	281	2120	0.026	220
	8	5570	0.028	620	3580	0.026	370	2790	0.024	273	1590	0.034	214
	10	4460	0.034	600	2870	0.031	355	2230	0.029	262	1270	0.040	205
	12	3720	0.038	570	2390	0.035	335	1860	0.034	250	1060	0.046	196
	14	3180	0.043	550	2050	0.040	325	1590	0.038	240	910	0.052	189
	16	2790	0.048	535	1790	0.044	315	1390	0.042	233	800	0.058	185
	18	2480	0.053	520	1590	0.048	310	1240	0.046	229	710	0.063	180
	20	2230	0.058	520	1430	0.054	305	1110	0.051	227	640	0.070	180

VERTICAL	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
	8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
	10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
	12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
	14	3180	0.054	690	2050	0.049	400	1590	0.041	260	910	0.038	140
	16	2790	0.060	670	1790	0.054	390	1390	0.045	250	800	0.042	130
	18	2480	0.066	650	1590	0.059	380	1240	0.050	250	710	0.046	130
	20	2230	0.073	650	1430	0.066	380	1110	0.055	240	640	0.051	130

DRILLING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**590-690**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	8760	0.009	320	5570	0.008	190	4380	0.007	130	2390	0.010	100
	5	7010	0.012	320	4460	0.010	180	3500	0.009	130	1910	0.013	100
	6	5840	0.014	320	3720	0.012	180	2920	0.011	130	1590	0.015	90
	8	4380	0.018	310	2790	0.016	180	2190	0.014	120	1190	0.019	90
	10	3500	0.021	290	2230	0.019	170	1750	0.017	120	960	0.023	90
	12	2920	0.024	280	1860	0.022	160	1460	0.019	110	800	0.026	80
	14	2500	0.027	270	1590	0.024	150	1250	0.022	110	680	0.030	80
	16	2190	0.030	260	1390	0.027	150	1090	0.024	100	600	0.033	80
	18	1950	0.033	260	1240	0.030	150	970	0.026	100	530	0.036	80
	20	1750	0.037	260	1110	0.033	150	880	0.029	100	480	0.040	80

ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

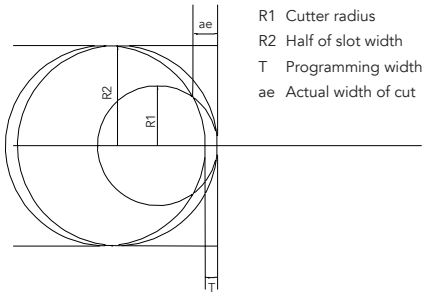
CUTTING PARAMETERS

HF842

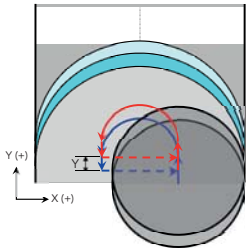
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**190-230**			**130-150**			**100-120**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	8760	0.046	1620	5570	0.042	930	4380	0.037	650	2390	0.051	490
	5	7010	0.058	1610	4460	0.052	920	3500	0.046	640	1910	0.063	480
	6	5840	0.068	1580	3720	0.061	900	2920	0.054	630	1590	0.074	470
	8	4380	0.088	1530	2790	0.079	880	2190	0.070	610	1190	0.096	460
	10	3500	0.105	1470	2230	0.095	840	1750	0.084	590	960	0.116	440
	12	2920	0.120	1400	1860	0.108	800	1460	0.096	560	800	0.132	420
	14	2500	0.135	1350	1590	0.122	770	1250	0.108	540	680	0.149	400
	16	2190	0.150	1310	1390	0.135	750	1090	0.120	520	600	0.165	400
	18	1950	0.165	1290	1240	0.149	740	970	0.132	510	530	0.182	380
	20	1750	0.183	1280	1110	0.164	730	880	0.146	510	480	0.201	390

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF442

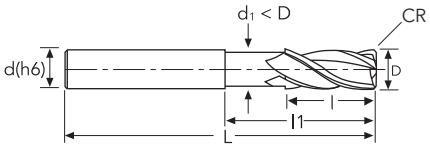
cylindrical shank and reduced neck, corner radius

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.30	+/-0.020	6	9	15	2.80	57	4	HF44203030	●
3	0/-0.030	0.50	+/-0.020	6	9	15	2.80	57	4	HF44205030	●
4	0/-0.030	0.30	+/-0.020	6	11	18	3.80	57	4	HF44203040	●
4	0/-0.030	0.50	+/-0.020	6	11	18	3.80	57	4	HF44205040	●
5	0/-0.030	0.30	+/-0.020	6	13	19	4.80	57	4	HF44203050	●
5	0/-0.030	0.50	+/-0.020	6	13	19	4.80	57	4	HF44205050	●
6	0/-0.030	0.30	+/-0.020	6	13	20	5.80	57	4	HF44203060	●
6	0/-0.030	0.50	+/-0.020	6	13	20	5.80	57	4	HF44205060	●
6	0/-0.030	1.00	+/-0.020	6	13	20	5.80	57	4	HF44210060	●
8	0/-0.030	0.50	+/-0.020	8	20	26	7.80	64	4	HF44205080	●
8	0/-0.030	1.00	+/-0.020	8	20	26	7.80	64	4	HF44210080	●
10	0/-0.030	0.50	+/-0.020	10	22	30	9.80	72	4	HF44205100	●
10	0/-0.030	1.00	+/-0.020	10	22	30	9.80	72	4	HF44210100	●
12	0/-0.030	0.50	+/-0.020	12	26	36	11.80	83	4	HF44205120	●
12	0/-0.030	1.00	+/-0.020	12	26	36	11.80	83	4	HF44210120	●
14	0/-0.030	1.00	+/-0.020	14	26	36	13.70	83	4	HF44210140	●
16	0/-0.030	1.00	+/-0.020	16	32	42	15.70	92	4	HF44210160	●
16	0/-0.030	2.00	+/-0.020	16	32	42	15.70	92	4	HF44220160	●
20	0/-0.030	1.00	+/-0.020	20	38	50	19.70	104	4	HF44210200	●
20	0/-0.030	2.00	+/-0.020	20	38	50	19.70	104	4	HF44220200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF442

SLOTTING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	12740	0.013	640	8490	0.011	390	6370	0.009	240	4250	0.009	150
	4	9550	0.017	640	6370	0.015	380	4780	0.012	240	3180	0.012	150
	5	7640	0.021	630	5100	0.019	380	3820	0.016	240	2550	0.014	150
	6	6370	0.024	620	4250	0.022	370	3180	0.018	230	2120	0.017	140
	8	4780	0.032	600	3180	0.028	360	2390	0.024	230	1590	0.022	140
	10	3820	0.038	580	2550	0.034	350	1910	0.028	220	1270	0.026	130
	12	3180	0.043	550	2120	0.039	330	1590	0.032	210	1060	0.030	130
	14	2730	0.049	530	1820	0.044	320	1360	0.036	200	910	0.034	120
	16	2390	0.054	520	1590	0.049	310	1190	0.041	190	800	0.038	120
	20	1910	0.066	500	1270	0.059	300	960	0.049	190	640	0.046	120
ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

SLOTTING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**85-105**			**55-75**								
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	8	3780	0.025	380	2590	0.023	230						
	10	3030	0.030	370	2070	0.027	230						
	12	2520	0.035	350	1730	0.031	220						
	14	2160	0.039	340	1480	0.035	210						
	16	1890	0.043	330	1290	0.039	200						
	20	1510	0.053	320	1040	0.047	200						

SIDE MILLING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**130-150**			**90-110**			**60-80**			**40-60**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	14860	0.015	900	10620	0.014	580	7430	0.012	360	5310	0.017	350
	4	11150	0.020	890	7960	0.018	570	5570	0.016	360	3980	0.022	350
	5	8920	0.025	890	6370	0.022	570	4460	0.020	350	3180	0.027	350
	6	7430	0.029	870	5310	0.026	560	3720	0.023	350	2650	0.032	340
	8	5570	0.038	840	3980	0.034	540	2790	0.030	340	1990	0.042	330
	10	4460	0.045	810	3180	0.041	520	2230	0.036	320	1590	0.050	320
	12	3720	0.052	770	2650	0.047	490	1860	0.041	310	1330	0.057	300
	14	3180	0.058	740	2270	0.052	480	1590	0.047	300	1140	0.064	290
	16	2790	0.065	720	1990	0.058	460	1390	0.052	290	1000	0.071	290
	20	2230	0.079	700	1590	0.071	450	1110	0.063	280	800	0.087	280
ap x ae	**≤ D5**	1.5D x 0.25D			1.5D x 0.25D			1.2D x 0.1D			1.2D x 0.1D		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF442

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	5° x 0.4D			4° x 0.4D			3° x 0.4D			3° x 0.4D		
	Vc (m/min)	110-130			70-90			50-70			30-50		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	12740	0.009	470	8490	0.009	290	6370	0.008	193	4250	0.007	120
	4	9550	0.012	465	6370	0.011	290	4780	0.010	191	3180	0.009	119
	5	7640	0.015	460	5100	0.014	285	3820	0.012	190	2550	0.012	118
	6	6370	0.018	450	4250	0.016	280	3180	0.015	186	2120	0.014	115
	8	4780	0.023	440	3180	0.021	270	2390	0.019	181	1590	0.018	112
	10	3820	0.028	420	2550	0.026	260	1910	0.023	173	1270	0.021	108
	12	3180	0.031	400	2120	0.029	250	1590	0.026	165	1060	0.024	103
	14	2730	0.035	385	1820	0.033	240	1360	0.029	159	910	0.027	99
	16	2390	0.039	375	1590	0.037	235	1190	0.032	154	800	0.030	97
	20	1910	0.048	365	1270	0.045	225	960	0.039	151	640	0.037	94
	α° max	≤ D5	2°		2°			1°			1°		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	15° x D			10° x D			5° x D			5° x D		
	Vc (m/min)	100-120			60-80			45-65			30-40		
RAMPING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.019	455	3720	0.018	265	2920	0.017	198	1860	0.023	174
	8	4380	0.025	440	2790	0.023	260	2190	0.022	193	1390	0.030	168
	10	3500	0.030	420	2230	0.028	250	1750	0.026	185	1110	0.036	161
	12	2920	0.034	405	1860	0.032	235	1460	0.030	176	930	0.042	154
	14	2500	0.039	390	1590	0.036	225	1250	0.034	170	800	0.047	149
	16	2190	0.043	375	1390	0.040	220	1090	0.038	165	700	0.052	145
	20	1750	0.052	365	1110	0.048	215	880	0.046	162	560	0.063	141

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	α° x ae	30° x D			15° x D								
	Vc (m/min)	80-100			45-65								
RAMPING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	10	2870	0.025	280	1750	0.023	160						
	12	2390	0.028	270	1460	0.026	150						
	14	2050	0.032	260	1250	0.029	145						
	16	1790	0.035	250	1090	0.032	140						
	20	1430	0.043	245	880	0.039	140						

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF442

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
VERTICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.024	570	3720	0.022	330	2920	0.018	210	1860	0.017	130
	8	4380	0.032	550	2790	0.028	320	2190	0.024	210	1390	0.022	120
	10	3500	0.038	530	2230	0.034	300	1750	0.028	200	1110	0.026	120
	12	2920	0.043	500	1860	0.039	290	1460	0.032	190	930	0.030	110
	14	2500	0.049	490	1590	0.044	280	1250	0.036	180	800	0.034	110
	16	2190	0.054	470	1390	0.049	270	1090	0.041	180	700	0.038	110
	20	1750	0.066	460	1110	0.059	260	880	0.049	170	560	0.046	100

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**85-105**			**55-75**			**40-60**			**20-40**		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10080	0.006	250	6900	0.006	160	5310	0.005	110	3180	0.007	90
	4	7560	0.008	250	5180	0.007	160	3980	0.007	110	2390	0.009	90
	5	6050	0.010	250	4140	0.009	150	3180	0.008	110	1910	0.011	90
	6	5040	0.012	240	3450	0.011	150	2650	0.010	100	1590	0.013	90
	8	3780	0.016	240	2590	0.014	150	1990	0.013	100	1190	0.017	80
	10	3030	0.019	230	2070	0.017	140	1590	0.015	100	960	0.021	80
	12	2520	0.022	220	1730	0.019	130	1330	0.017	90	800	0.024	80
	14	2160	0.024	210	1480	0.022	130	1140	0.019	90	680	0.027	70
	16	1890	0.027	200	1290	0.024	130	1000	0.022	90	600	0.030	70
	20	1510	0.033	200	1040	0.030	120	800	0.026	80	480	0.036	70

ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

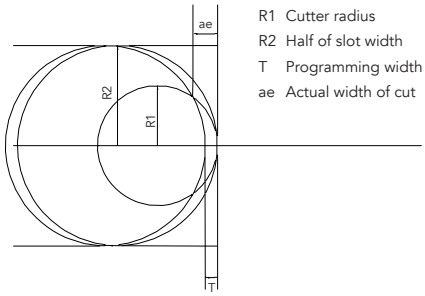
CUTTING PARAMETERS

HF442

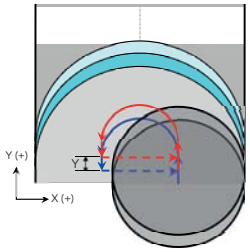
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**160-200**			**110-130**			**80-100**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10080	0.032	1270	6900	0.028	780	5310	0.025	540	3180	0.035	440
	4	7560	0.042	1260	5180	0.037	780	3980	0.033	530	2390	0.046	440
	5	6050	0.052	1250	4140	0.047	770	3180	0.041	530	1910	0.057	430
	6	5040	0.061	1220	3450	0.055	750	2650	0.049	520	1590	0.067	430
	8	3780	0.079	1190	2590	0.071	730	1990	0.063	500	1190	0.087	410
	10	3030	0.095	1150	2070	0.085	700	1590	0.076	480	960	0.104	400
	12	2520	0.108	1090	1730	0.097	670	1330	0.086	460	800	0.119	380
	14	2160	0.122	1050	1480	0.109	650	1140	0.097	440	680	0.134	360
	16	1890	0.135	1020	1290	0.122	630	1000	0.108	430	600	0.149	360
	20	1510	0.164	990	1040	0.148	610	800	0.131	420	480	0.181	350

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D								

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF443

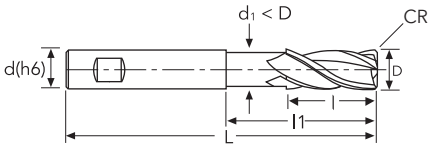
weldon shank and reduced neck, corner radius

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.30	+/-0.020	6	9	15	2.80	57	4	HF44303030	●
3	0/-0.030	0.50	+/-0.020	6	9	15	2.80	57	4	HF44305030	●
4	0/-0.030	0.30	+/-0.020	6	11	18	3.80	57	4	HF44303040	●
4	0/-0.030	0.50	+/-0.020	6	11	18	3.80	57	4	HF44305040	●
5	0/-0.030	0.50	+/-0.020	6	13	19	4.80	57	4	HF44305050	●
6	0/-0.030	0.50	+/-0.020	6	13	20	5.80	57	4	HF44305060	●
6	0/-0.030	1.00	+/-0.020	6	13	20	5.80	57	4	HF44310060	●
8	0/-0.030	0.50	+/-0.020	8	20	26	7.80	64	4	HF44305080	●
8	0/-0.030	1.00	+/-0.020	8	20	26	7.80	64	4	HF44310080	●
10	0/-0.030	0.50	+/-0.020	10	22	30	9.80	72	4	HF44305100	●
10	0/-0.030	1.00	+/-0.020	10	22	30	9.80	72	4	HF44310100	●
12	0/-0.030	0.50	+/-0.020	12	26	36	11.80	83	4	HF44305120	●
12	0/-0.030	1.00	+/-0.020	12	26	36	11.80	83	4	HF44310120	●
14	0/-0.030	1.00	+/-0.020	14	26	36	13.70	83	4	HF44310140	●
16	0/-0.030	1.00	+/-0.020	16	32	42	15.70	92	4	HF44310160	●
20	0/-0.030	1.00	+/-0.020	20	38	50	19.70	104	4	HF44310200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF443

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	12740	0.013	640	8490	0.011	390	6370	0.009	240	4250	0.009	150
	4	9550	0.017	640	6370	0.015	380	4780	0.012	240	3180	0.012	150
	5	7640	0.021	630	5100	0.019	380	3820	0.016	240	2550	0.014	150
	6	6370	0.024	620	4250	0.022	370	3180	0.018	230	2120	0.017	140
	8	4780	0.032	600	3180	0.028	360	2390	0.024	230	1590	0.022	140
	10	3820	0.038	580	2550	0.034	350	1910	0.028	220	1270	0.026	130
	12	3180	0.043	550	2120	0.039	330	1590	0.032	210	1060	0.030	130
	14	2730	0.049	530	1820	0.044	320	1360	0.036	200	910	0.034	120
	16	2390	0.054	520	1590	0.049	310	1190	0.041	190	800	0.038	120
	20	1910	0.066	500	1270	0.059	300	960	0.049	190	640	0.046	120
ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**85-105**			**55-75**								
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	8	3780	0.025	380	2590	0.023	230						
	10	3030	0.030	370	2070	0.027	230						
	12	2520	0.035	350	1730	0.031	220						
	14	2160	0.039	340	1480	0.035	210						
	16	1890	0.043	330	1290	0.039	200						
	20	1510	0.053	320	1040	0.047	200						

	Material Group ISO 513	P1 P2 M1 K1											
	Hardness/Rm	≤ 700 N/mm²											
	ap x ae	**2D x D**											
	Vc (m/min)	**60-80**											
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)									
	10	2230	0.023	200									
	12	1860	0.026	190									
	14	1590	0.029	190									
	16	1390	0.032	180									
	20	1110	0.039	180									

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF442 PARAMETERS.

CUTTING PARAMETERS

HF443

SIDE MILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
Vc (m/min)	**130-150**			**90-110**			**60-80**			**40-60**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	14860	0.015	900	10620	0.014	580	7430	0.012	360	5310	0.017	350
4	11150	0.020	890	7960	0.018	570	5570	0.016	360	3980	0.022	350
5	8920	0.025	890	6370	0.022	570	4460	0.020	350	3180	0.027	350
6	7430	0.029	870	5310	0.026	560	3720	0.023	350	2650	0.032	340
8	5570	0.038	840	3980	0.034	540	2790	0.030	340	1990	0.042	330
10	4460	0.045	810	3180	0.041	520	2230	0.036	320	1590	0.050	320
12	3720	0.052	770	2650	0.047	490	1860	0.041	310	1330	0.057	300
14	3180	0.058	740	2270	0.052	480	1590	0.047	300	1140	0.064	290
16	2790	0.065	720	1990	0.058	460	1390	0.052	290	1000	0.071	290
20	2230	0.079	700	1590	0.071	450	1110	0.063	280	800	0.087	280

ap x ae	**≤ D5**	1.5D x 0.25D	1.5D x 0.25D	1.2D x 0.1D	1.2D x 0.1D

HELICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	12740	0.009	470	8490	0.009	290	6370	0.008	193	4250	0.007	120
4	9550	0.012	465	6370	0.011	290	4780	0.010	191	3180	0.009	119
5	7640	0.015	460	5100	0.014	285	3820	0.012	190	2550	0.012	118
6	6370	0.018	450	4250	0.016	280	3180	0.015	186	2120	0.014	115
8	4780	0.023	440	3180	0.021	270	2390	0.019	181	1590	0.018	112
10	3820	0.028	420	2550	0.026	260	1910	0.023	173	1270	0.021	108
12	3180	0.031	400	2120	0.029	250	1590	0.026	165	1060	0.024	103
14	2730	0.035	385	1820	0.033	240	1360	0.029	159	910	0.027	99
16	2390	0.039	375	1590	0.037	235	1190	0.032	154	800	0.030	97
20	1910	0.048	365	1270	0.045	225	960	0.039	151	640	0.037	94

α° max	**≤ D5**	2°	2°	1°	1°

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	5840	0.019	455	3720	0.018	265	2920	0.017	198	1860	0.023	174
8	4380	0.025	440	2790	0.023	260	2190	0.022	193	1390	0.030	168
10	3500	0.030	420	2230	0.028	250	1750	0.026	185	1110	0.036	161
12	2920	0.034	405	1860	0.032	235	1460	0.030	176	930	0.042	154
14	2500	0.039	390	1590	0.036	225	1250	0.034	170	800	0.047	149
16	2190	0.043	375	1390	0.040	220	1090	0.038	165	700	0.052	145
20	1750	0.052	365	1110	0.048	215	880	0.046	162	560	0.063	141

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
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CUTTING PARAMETERS

HF443

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**30° x D**			**15° x D**								
	Vc (m/min)	**85-105**			**55-75**								
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	10	2870	0.025	280	1750	0.023	160						
	12	2390	0.028	270	1460	0.026	150						
	14	2050	0.032	260	1250	0.029	145						
	16	1790	0.035	250	1090	0.032	140						
	20	1430	0.043	245	880	0.039	140						

RAMPING	Material Group ISO 513	P1 P2 M1 K1											
	Hardness/Rm	≤ 700 N/mm²											
	α° x ae	**45° x D**											
	Vc (m/min)	**60-80**											
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)									
	10	2070	0.024	200									
	12	1730	0.028	195									
	14	1480	0.031	185									
	16	1290	0.035	180									
	20	1040	0.042	175									

VERTICAL	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**30-40**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.024	570	3720	0.022	330	2920	0.018	210	1860	0.017	130
	8	4380	0.032	550	2790	0.028	320	2190	0.024	210	1390	0.022	120
	10	3500	0.038	530	2230	0.034	300	1750	0.028	200	1110	0.026	120
	12	2920	0.043	500	1860	0.039	290	1460	0.032	190	930	0.030	110
	14	2500	0.049	490	1590	0.044	280	1250	0.036	180	800	0.034	110
	16	2190	0.054	470	1390	0.049	270	1090	0.041	180	700	0.038	110
	20	1750	0.066	460	1110	0.059	260	880	0.049	170	560	0.046	100

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF442 PARAMETERS.

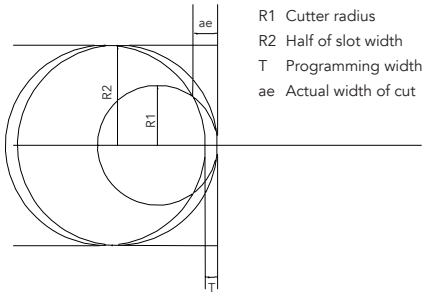
CUTTING PARAMETERS

HF443

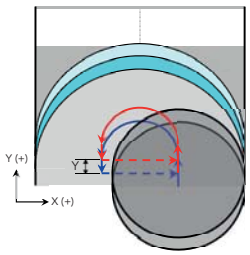
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**85-105**			**55-75**			**40-60**			**20-40**		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10080	0.006	250	6900	0.006	160	5310	0.005	110	3180	0.007	90
	4	7560	0.008	250	5180	0.007	160	3980	0.007	110	2390	0.009	90
	5	6050	0.010	250	4140	0.009	150	3180	0.008	110	1910	0.011	90
	6	5040	0.012	240	3450	0.011	150	2650	0.010	100	1590	0.013	90
	8	3780	0.016	240	2590	0.014	150	1990	0.013	100	1190	0.017	80
	10	3030	0.019	230	2070	0.017	140	1590	0.015	100	960	0.021	80
	12	2520	0.022	220	1730	0.019	130	1330	0.017	90	800	0.024	80
	14	2160	0.024	210	1480	0.022	130	1140	0.019	90	680	0.027	70
	16	1890	0.027	200	1290	0.024	130	1000	0.022	90	600	0.030	70
	20	1510	0.033	200	1040	0.030	120	800	0.026	80	480	0.036	70
ap x ae	**≤ D5**	0.5D x D			0.5D x D			0.25D x D			0.25D x D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**160-200**			**110-130**			**80-100**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10080	0.032	1270	6900	0.028	780	5310	0.025	540	3180	0.035	440
	4	7560	0.042	1260	5180	0.037	780	3980	0.033	530	2390	0.046	440
	5	6050	0.052	1250	4140	0.047	770	3180	0.041	530	1910	0.057	430
	6	5040	0.061	1220	3450	0.055	750	2650	0.049	520	1590	0.067	430
	8	3780	0.079	1190	2590	0.071	730	1990	0.063	500	1190	0.087	410
	10	3030	0.095	1150	2070	0.085	700	1590	0.076	480	960	0.104	400
	12	2520	0.108	1090	1730	0.097	670	1330	0.086	460	800	0.119	380
	14	2160	0.122	1050	1480	0.109	650	1140	0.097	440	680	0.134	360
	16	1890	0.135	1020	1290	0.122	630	1000	0.108	430	600	0.149	360
	20	1510	0.164	990	1040	0.148	610	800	0.131	420	480	0.181	350
ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D								

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF442 PARAMETERS.

HF542

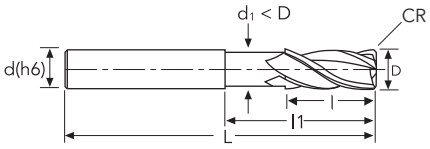
cylindrical shank and reduced neck, long reach, corner radius

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
6	0/-0.030	0.30	+/-0.010	6	12	30	5.80	75	4	HF5420306075	●
6	0/-0.030	0.50	+/-0.010	6	12	30	5.80	75	4	HF5420506075	●
6	0/-0.030	1.00	+/-0.010	6	12	30	5.80	75	4	HF5421006075	●
6	0/-0.030	0.30	+/-0.010	6	12	30	5.80	100	4	HF54203060100	●
6	0/-0.030	0.50	+/-0.010	6	12	30	5.80	100	4	HF54205060100	●
6	0/-0.030	1.00	+/-0.010	6	12	30	5.80	100	4	HF54210060100	●
8	0/-0.030	0.50	+/-0.010	8	16	40	7.80	100	4	HF54205080100	●
8	0/-0.030	1.00	+/-0.010	8	16	40	7.80	100	4	HF54210080100	●
8	0/-0.030	2.00	+/-0.010	8	16	40	7.80	100	4	HF54220080100	●
10	0/-0.030	0.50	+/-0.010	10	20	50	9.80	125	4	HF54205100125	●
10	0/-0.030	1.00	+/-0.010	10	20	50	9.80	125	4	HF54210100125	●
10	0/-0.030	2.00	+/-0.010	10	20	50	9.80	125	4	HF54220100125	●
12	0/-0.030	0.50	+/-0.010	12	24	60	11.80	125	4	HF54205120125	●
12	0/-0.030	1.00	+/-0.010	12	24	60	11.80	125	4	HF54210120125	●
12	0/-0.030	2.00	+/-0.010	12	24	60	11.80	125	4	HF54220120125	●
12	0/-0.030	3.00	+/-0.010	12	24	60	11.80	125	4	HF54230120125	●
12	0/-0.030	0.50	+/-0.010	12	24	60	11.80	150	4	HF54205120150	●
12	0/-0.030	1.00	+/-0.010	12	24	60	11.80	150	4	HF54210120150	●
12	0/-0.030	2.00	+/-0.010	12	24	60	11.80	150	4	HF54220120150	●
12	0/-0.030	3.00	+/-0.010	12	24	60	11.80	150	4	HF54230120150	●
16	0/-0.030	0.50	+/-0.010	16	32	80	15.70	150	4	HF54205160150	●
16	0/-0.030	1.00	+/-0.010	16	32	80	15.70	150	4	HF54210160150	●
16	0/-0.030	2.00	+/-0.010	16	32	80	15.70	150	4	HF54220160150	●
16	0/-0.030	3.00	+/-0.010	16	32	80	15.70	150	4	HF54230160150	●
16	0/-0.030	4.00	+/-0.010	16	32	80	15.70	150	4	HF54240160150	●
20	0/-0.030	0.50	+/-0.010	20	40	100	19.70	150	4	HF54205200150	●
20	0/-0.030	1.00	+/-0.010	20	40	100	19.70	150	4	HF54210200150	●
20	0/-0.030	2.00	+/-0.010	20	40	100	19.70	150	4	HF54220200150	●
20	0/-0.030	3.00	+/-0.010	20	40	100	19.70	150	4	HF54230200150	●
20	0/-0.030	4.00	+/-0.010	20	40	100	19.70	150	4	HF54240200150	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF542

SLOTTING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**0.5D x D**			**0.3D x D**			**0.2D x D**			**0.2D x D**		
Vc (m/min)	**90-110**			**60-80**			**40-60**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	5310	0.019	410	3720	0.017	260	2650	0.015	150	1590	0.014	90
8	3980	0.025	400	2790	0.023	250	1990	0.019	150	1190	0.018	80
10	3180	0.030	380	2230	0.027	240	1590	0.023	140	960	0.021	80
12	2650	0.035	370	1860	0.031	230	1330	0.026	140	800	0.024	80
16	1990	0.043	340	1390	0.039	220	1000	0.032	130	600	0.030	70
20	1590	0.053	330	1110	0.047	210	800	0.039	130	480	0.037	70

SIDE MILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.2D x 0.2D**			**1.2D x 0.2D**		
Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	6370	0.023	590	4250	0.021	360	3180	0.019	240	2120	0.026	220
8	4780	0.030	580	3180	0.027	350	2390	0.024	230	1590	0.033	210
10	3820	0.036	550	2550	0.033	330	1910	0.029	220	1270	0.040	200
12	3180	0.041	530	2120	0.037	320	1590	0.033	210	1060	0.046	190
16	2390	0.052	500	1590	0.047	300	1190	0.041	200	800	0.057	180
20	1910	0.063	480	1270	0.057	290	960	0.050	190	640	0.069	180

HELICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
Vc (m/min)	**90-110**			**60-80**			**40-60**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	5310	0.015	310	3720	0.014	210	2650	0.012	124	1590	0.012	78
8	3980	0.019	305	2790	0.018	205	1990	0.015	120	1190	0.016	76
10	3180	0.023	290	2230	0.022	195	1590	0.018	115	960	0.019	73
12	2650	0.026	275	1860	0.025	185	1330	0.021	110	800	0.022	70
16	1990	0.033	260	1390	0.031	175	1000	0.026	104	600	0.027	66
20	1590	0.040	250	1110	0.038	170	800	0.032	101	480	0.033	64

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**7° x 0.4D**			**5° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
Vc (m/min)	**80-100**			**50-70**			**35-55**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	4780	0.016	310	3180	0.015	195	2390	0.015	143	1330	0.021	109
8	3580	0.021	305	2390	0.020	190	1790	0.019	139	1000	0.027	107
10	2870	0.025	290	1910	0.024	180	1430	0.023	133	800	0.032	102
12	2390	0.029	275	1590	0.027	175	1190	0.027	126	660	0.037	96
16	1790	0.036	260	1190	0.034	160	900	0.033	120	500	0.046	91
20	1430	0.044	250	960	0.041	160	720	0.040	116	400	0.056	89

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

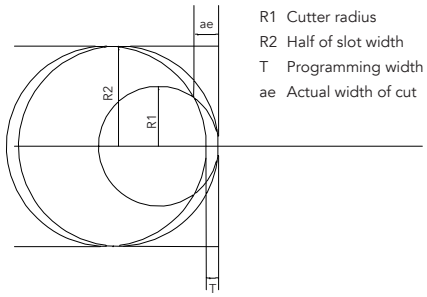
HF542

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	D x 0.4D			D x 0.4D			D x 0.25D			D x 0.25D		
VERTICAL	Vc (m/min)	80-100			50-70			35-55			20-30		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4780	0.019	370	3180	0.017	220	2390	0.015	140	1330	0.014	70
	8	3580	0.025	360	2390	0.023	220	1790	0.019	140	1000	0.018	70
	10	2870	0.030	350	1910	0.027	210	1430	0.023	130	800	0.021	70
	12	2390	0.035	330	1590	0.031	200	1190	0.026	120	660	0.024	60
	16	1790	0.043	310	1190	0.039	190	900	0.032	120	500	0.030	60
	20	1430	0.053	300	960	0.047	180	720	0.039	110	400	0.037	60

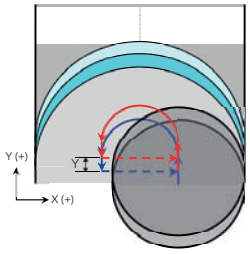
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	D x D			D x D			0.5D x D			0.5D x D		
DRILLING	Vc (m/min)	85-105			55-75			40-60			20-40		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4250	0.010	170	2920	0.009	100	2120	0.008	70	1330	0.011	60
	8	3180	0.013	160	2190	0.011	100	1590	0.010	60	1000	0.014	60
	10	2550	0.015	150	1750	0.014	100	1270	0.012	60	800	0.017	50
	12	2120	0.017	150	1460	0.016	90	1060	0.014	60	660	0.019	50
	16	1590	0.022	140	1090	0.019	80	800	0.017	60	500	0.024	50
	20	1270	0.026	130	880	0.024	80	640	0.021	50	400	0.029	50

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	2D x 0.1D			2D x 0.1D			1.5D x 0.1D			1.5D x 0.1D		
TROCHOIDAL	Vc (m/min)	160-200			110-130			80-100			50-70		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4250	0.049	830	2920	0.044	510	2120	0.039	330	1330	0.053	280
	8	3180	0.063	800	2190	0.057	500	1590	0.050	320	1000	0.069	280
	10	2550	0.076	770	1750	0.068	480	1270	0.060	310	800	0.083	270
	12	2120	0.086	730	1460	0.078	450	1060	0.069	290	660	0.095	250
	16	1590	0.108	690	1090	0.097	420	800	0.086	280	500	0.119	240
	20	1270	0.131	670	880	0.118	420	640	0.105	270	400	0.145	230

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF942

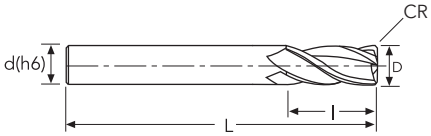
cylindrical shank, long cutting edge ideal for trochoidal milling, corner radius

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
4	0/-0.025	0.10	+/-0.010	6	19		75	4	HF9420104075	●
5	0/-0.025	0.10	+/-0.010	6	19		75	4	HF9420105075	●
6	0/-0.025	0.10	+/-0.010	6	25		75	4	HF9420106075	●
8	0/-0.030	0.20	+/-0.010	8	30		75	4	HF9420208075	●
10	0/-0.030	0.20	+/-0.010	10	40		100	4	HF94202100100	●
12	0/-0.030	0.30	+/-0.010	12	45		100	4	HF94203120100	●
16	0/-0.030	0.30	+/-0.010	16	65		125	4	HF94203160125	●
20	0/-0.030	0.30	+/-0.010	20	65		125	4	HF94203200125	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF942

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.2D x 0.2D**			**1.2D x 0.2D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	9550	0.016	620	6370	0.015	370	4780	0.013	250	3180	0.018	230
	5	7640	0.021	650	5100	0.019	390	3820	0.017	260	2550	0.023	240
	6	6370	0.026	660	4250	0.023	400	3180	0.021	260	2120	0.029	240
	8	4780	0.031	590	3180	0.028	350	2390	0.025	230	1590	0.034	210
	10	3820	0.036	560	2550	0.033	330	1910	0.029	220	1270	0.040	200
	12	3180	0.041	530	2120	0.037	320	1590	0.033	210	1060	0.045	190
	16	2390	0.047	450	1590	0.042	270	1190	0.038	180	800	0.052	170
	20	1910	0.063	480	1270	0.057	290	960	0.051	190	640	0.070	180
ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D			1.2D x 0.1D			1.2D x 0.1D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
	Vc (m/min)	**90-110**			**60-80**			**40-60**			**20-40**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	7960	0.010	325	5570	0.010	220	3980	0.008	130	2390	0.009	82
	5	6370	0.013	340	4460	0.013	225	3180	0.011	134	1910	0.011	85
	6	5310	0.016	345	3720	0.016	230	2650	0.013	137	1590	0.014	87
	8	3980	0.019	305	2790	0.018	205	1990	0.015	122	1190	0.016	77
	10	3180	0.023	290	2230	0.022	195	1590	0.018	116	960	0.019	74
	12	2650	0.026	275	1860	0.025	185	1330	0.021	110	800	0.022	70
	16	1990	0.030	235	1390	0.028	155	1000	0.024	94	600	0.025	59
	20	1590	0.040	255	1110	0.038	170	800	0.032	101	480	0.033	64
α° max	**≤ D5**	2°			2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF942

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**5° x 0.4D**			**5° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
Vc (m/min)	**80-100**			**50-70**			**35-55**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	7170	0.012	340	4780	0.011	205	3580	0.010	150	1990	0.014	114
5	5730	0.015	350	3820	0.014	210	2870	0.014	155	1590	0.019	118
6	4780	0.019	360	3180	0.017	215	2390	0.017	159	1330	0.023	121
8	3580	0.022	320	2390	0.020	190	1790	0.020	141	1000	0.027	108
10	2870	0.027	305	1910	0.024	185	1430	0.023	134	800	0.032	103
12	2390	0.030	285	1590	0.027	170	1190	0.026	126	660	0.036	96
16	1790	0.034	245	1190	0.031	145	900	0.030	108	500	0.041	83
20	1430	0.046	265	960	0.042	160	720	0.041	117	400	0.056	89

VERTICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**80-100**			**50-70**			**35-55**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	7170	0.014	390	4780	0.012	230	3580	0.010	150	1990	0.010	80
5	5730	0.018	400	3820	0.016	240	2870	0.013	150	1590	0.012	80
6	4780	0.022	410	3180	0.019	250	2390	0.016	150	1330	0.015	80
8	3580	0.026	370	2390	0.023	220	1790	0.019	140	1000	0.018	70
10	2870	0.030	350	1910	0.027	210	1430	0.023	130	800	0.021	70
12	2390	0.034	330	1590	0.031	200	1190	0.026	120	660	0.024	60
16	1790	0.039	280	1190	0.035	170	900	0.029	110	500	0.027	50
20	1430	0.053	300	960	0.048	180	720	0.040	110	400	0.037	60

DRILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
Vc (m/min)	**85-105**			**55-75**			**40-60**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	6370	0.007	170	4380	0.006	110	3180	0.005	70	1990	0.007	60
5	5100	0.009	180	3500	0.008	110	2550	0.007	70	1590	0.010	60
6	4250	0.011	180	2920	0.010	110	2120	0.009	70	1330	0.012	60
8	3180	0.013	160	2190	0.012	100	1590	0.010	70	1000	0.014	60
10	2550	0.015	160	1750	0.014	100	1270	0.012	60	800	0.017	50
12	2120	0.017	150	1460	0.015	90	1060	0.014	60	660	0.019	50
16	1590	0.020	120	1090	0.018	80	800	0.016	50	500	0.022	40
20	1270	0.026	130	880	0.024	80	640	0.021	50	400	0.029	50

ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

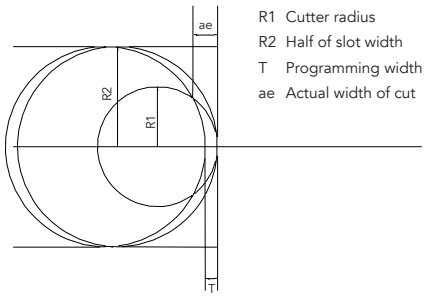
CUTTING PARAMETERS

HF942

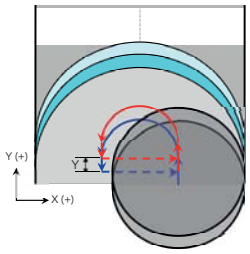
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.1D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**160-200**			**110-130**			**80-100**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	6370	0.034	870	4380	0.031	540	3180	0.027	350	1990	0.037	300
	5	5100	0.044	900	3500	0.040	550	2550	0.035	360	1590	0.048	310
	6	4250	0.054	920	2920	0.049	570	2120	0.043	370	1330	0.059	320
	8	3180	0.064	810	2190	0.058	500	1590	0.051	330	1000	0.070	280
	10	2550	0.076	780	1750	0.068	480	1270	0.061	310	800	0.084	270
	12	2120	0.086	730	1460	0.077	450	1060	0.069	290	660	0.095	250
	16	1590	0.098	620	1090	0.088	380	800	0.078	250	500	0.108	220
	20	1270	0.132	670	880	0.119	420	640	0.106	270	400	0.145	230

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D			1.2D x 0.05D			1.2D x 0.05D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF943

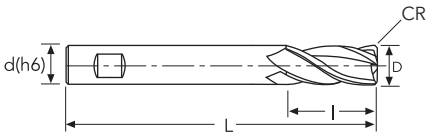
weldon shank, long cutting edge ideal for trochoidal milling, corner radius

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
4	0/-0.025	0.10	+/-0.010	6	19		75	4	HF9430104075	●
5	0/-0.025	0.10	+/-0.010	6	19		75	4	HF9430105075	●
6	0/-0.025	0.10	+/-0.010	6	25		75	4	HF9430106075	●
8	0/-0.030	0.20	+/-0.010	8	30		75	4	HF9430208075	●
10	0/-0.030	0.20	+/-0.010	10	40		100	4	HF94302100100	●
12	0/-0.030	0.30	+/-0.010	12	45		100	4	HF94303120100	●
16	0/-0.030	0.30	+/-0.010	16	65		125	4	HF94303160125	●
20	0/-0.030	0.30	+/-0.010	20	65		125	4	HF94303200125	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF943

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.2D x 0.2D**			**1.2D x 0.2D**		
	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	9550	0.016	620	6370	0.015	370	4780	0.013	250	3180	0.018	230
	5	7640	0.021	650	5100	0.019	390	3820	0.017	260	2550	0.023	240
	6	6370	0.026	660	4250	0.023	400	3180	0.021	260	2120	0.029	240
	8	4780	0.031	590	3180	0.028	350	2390	0.025	230	1590	0.034	210
	10	3820	0.036	560	2550	0.033	330	1910	0.029	220	1270	0.040	200
	12	3180	0.041	530	2120	0.037	320	1590	0.033	210	1060	0.045	190
	16	2390	0.047	450	1590	0.042	270	1190	0.038	180	800	0.052	170
	20	1910	0.063	480	1270	0.057	290	960	0.051	190	640	0.070	180
ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D			1.2D x 0.1D			1.2D x 0.1D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
	Vc (m/min)	**90-110**			**60-80**			**40-60**			**20-40**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	7960	0.010	325	5570	0.010	220	3980	0.008	130	2390	0.009	82
	5	6370	0.013	340	4460	0.013	225	3180	0.011	134	1910	0.011	85
	6	5310	0.016	345	3720	0.016	230	2650	0.013	137	1590	0.014	87
	8	3980	0.019	305	2790	0.018	205	1990	0.015	122	1190	0.016	77
	10	3180	0.023	290	2230	0.022	195	1590	0.018	116	960	0.019	74
	12	2650	0.026	275	1860	0.025	185	1330	0.021	110	800	0.022	70
	16	1990	0.030	235	1390	0.028	155	1000	0.024	94	600	0.025	59
	20	1590	0.040	255	1110	0.038	170	800	0.032	101	480	0.033	64
α° max	**≤ D5**	2°			2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF942 PARAMETERS.

CUTTING PARAMETERS

HF943

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**5° x 0.4D**			**5° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
Vc (m/min)	**80-100**			**50-70**			**35-55**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	7170	0.012	340	4780	0.011	205	3580	0.010	150	1990	0.014	114
5	5730	0.015	350	3820	0.014	210	2870	0.014	155	1590	0.019	118
6	4780	0.019	360	3180	0.017	215	2390	0.017	159	1330	0.023	121
8	3580	0.022	320	2390	0.020	190	1790	0.020	141	1000	0.027	108
10	2870	0.027	305	1910	0.024	185	1430	0.023	134	800	0.032	103
12	2390	0.030	285	1590	0.027	170	1190	0.026	126	660	0.036	96
16	1790	0.034	245	1190	0.031	145	900	0.030	108	500	0.041	83
20	1430	0.046	265	960	0.042	160	720	0.041	117	400	0.056	89

VERTICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**80-100**			**50-70**			**35-55**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	7170	0.014	390	4780	0.012	230	3580	0.010	150	1990	0.010	80
5	5730	0.018	400	3820	0.016	240	2870	0.013	150	1590	0.012	80
6	4780	0.022	410	3180	0.019	250	2390	0.016	150	1330	0.015	80
8	3580	0.026	370	2390	0.023	220	1790	0.019	140	1000	0.018	70
10	2870	0.030	350	1910	0.027	210	1430	0.023	130	800	0.021	70
12	2390	0.034	330	1590	0.031	200	1190	0.026	120	660	0.024	60
16	1790	0.039	280	1190	0.035	170	900	0.029	110	500	0.027	50
20	1430	0.053	300	960	0.048	180	720	0.040	110	400	0.037	60

DRILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
Vc (m/min)	**85-105**			**55-75**			**40-60**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	6370	0.007	170	4380	0.006	110	3180	0.005	70	1990	0.007	60
5	5100	0.009	180	3500	0.008	110	2550	0.007	70	1590	0.010	60
6	4250	0.011	180	2920	0.010	110	2120	0.009	70	1330	0.012	60
8	3180	0.013	160	2190	0.012	100	1590	0.010	70	1000	0.014	60
10	2550	0.015	160	1750	0.014	100	1270	0.012	60	800	0.017	50
12	2120	0.017	150	1460	0.015	90	1060	0.014	60	660	0.019	50
16	1590	0.020	120	1090	0.018	80	800	0.016	50	500	0.022	40
20	1270	0.026	130	880	0.024	80	640	0.021	50	400	0.029	50

ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

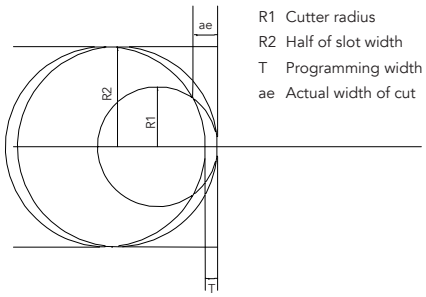
PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF942 PARAMETERS.

HF943

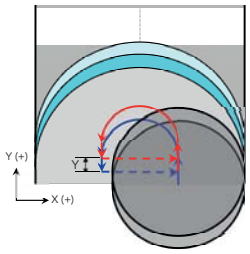
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.1D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**160-200**			**110-130**			**80-100**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	6370	0.034	870	4380	0.031	540	3180	0.027	350	1990	0.037	300
	5	5100	0.044	900	3500	0.040	550	2550	0.035	360	1590	0.048	310
	6	4250	0.054	920	2920	0.049	570	2120	0.043	370	1330	0.059	320
	8	3180	0.064	810	2190	0.058	500	1590	0.051	330	1000	0.070	280
	10	2550	0.076	780	1750	0.068	480	1270	0.061	310	800	0.084	270
	12	2120	0.086	730	1460	0.077	450	1060	0.069	290	660	0.095	250
	16	1590	0.098	620	1090	0.088	380	800	0.078	250	500	0.108	220
	20	1270	0.132	670	880	0.119	420	640	0.106	270	400	0.145	230

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D			1.2D x 0.05D			1.2D x 0.05D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF942 PARAMETERS.

HF642

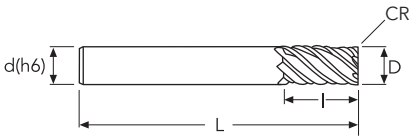
cylindrical shank, 5F ideal for trochoidal milling, corner radius

OSAWA NORM | MG PV300 | <40 HRC | 36°/37°/38° | RADIUS | Z5

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
4	0/-0.025	0.10	+/-0.010	6	12		57	5	HF64201040	●
5	0/-0.025	0.10	+/-0.010	6	13		57	5	HF64201050	●
6	0/-0.025	0.10	+/-0.010	6	13		57	5	HF64201060	●
8	0/-0.030	0.20	+/-0.010	8	20		64	5	HF64202080	●
10	0/-0.030	0.20	+/-0.010	10	22		72	5	HF64202100	●
12	0/-0.030	0.30	+/-0.010	12	26		83	5	HF64203120	●
16	0/-0.030	0.30	+/-0.010	16	32		92	5	HF64203160	●
20	0/-0.030	0.30	+/-0.010	20	38		104	5	HF64203200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF642

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**160-180**			**100-120**			**70-90**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	13540	0.019	1280	8760	0.017	740	6370	0.015	480	3980	0.021	410
	5	10830	0.023	1270	7010	0.021	740	5100	0.019	480	3180	0.026	410
	6	9020	0.028	1240	5840	0.025	720	4250	0.022	470	2650	0.030	400
	8	6770	0.036	1210	4380	0.032	700	3180	0.029	450	1990	0.039	390
	10	5410	0.043	1160	3500	0.039	670	2550	0.034	440	1590	0.047	370
	12	4510	0.049	1100	2920	0.044	640	2120	0.039	420	1330	0.054	360
	16	3380	0.061	1030	2190	0.055	600	1590	0.049	390	1000	0.067	340
	20	2710	0.074	1010	1750	0.067	590	1270	0.060	380	800	0.082	330
ap x ae	**≤ D5**	1.5D x 0.3D			1.5D x 0.3D			1.2D x 0.2D			1.2D x 0.2D		

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	11150	0.011	640	7170	0.011	385	5570	0.009	263	3180	0.009	140
	5	8920	0.014	635	5730	0.013	380	4460	0.012	262	2550	0.011	140
	6	7430	0.017	620	4780	0.016	370	3720	0.014	256	2120	0.013	136
	8	5570	0.022	605	3580	0.020	360	2790	0.018	249	1590	0.017	133
	10	4460	0.026	580	2870	0.024	350	2230	0.021	239	1270	0.020	127
	12	3720	0.030	555	2390	0.028	330	1860	0.024	228	1060	0.023	121
	16	2790	0.037	520	1790	0.035	310	1390	0.031	213	800	0.029	114
	20	2230	0.045	505	1430	0.042	300	1110	0.037	207	640	0.035	111
α° max	**≤ D5**	2°			2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

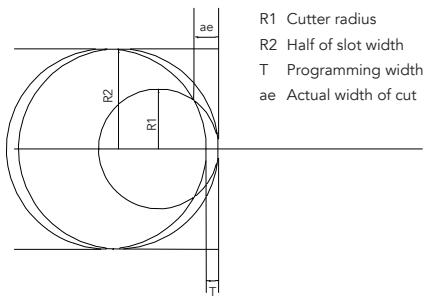
HF642

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.018	680	4780	0.017	405	3720	0.016	298	2120	0.022	234
	8	5570	0.024	660	3580	0.022	390	2790	0.021	290	1590	0.029	227
	10	4460	0.028	635	2870	0.026	375	2230	0.025	278	1270	0.034	218
	12	3720	0.033	605	2390	0.030	360	1860	0.029	265	1060	0.039	208
	16	2790	0.041	570	1790	0.037	335	1390	0.036	248	800	0.049	196
	20	2230	0.050	550	1430	0.046	325	1110	0.043	241	640	0.060	191

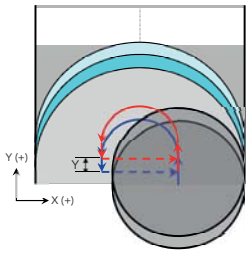
VERTICAL	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.023	850	4780	0.021	490	3720	0.017	320	2120	0.016	170
	8	5570	0.030	830	3580	0.027	480	2790	0.022	310	1590	0.021	170
	10	4460	0.036	800	2870	0.032	460	2230	0.027	300	1270	0.025	160
	12	3720	0.041	760	2390	0.037	440	1860	0.031	280	1060	0.029	150
	16	2790	0.051	710	1790	0.046	410	1390	0.038	270	800	0.036	140
	20	2230	0.062	690	1430	0.056	400	1110	0.047	260	640	0.043	140

TROCHOIDAL	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**190-230**			**130-150**			**100-120**			**50-70**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5840	0.057	1680	3720	0.052	960	2920	0.046	670	1590	0.063	500
	8	4380	0.074	1630	2790	0.067	930	2190	0.060	650	1190	0.082	490
	10	3500	0.089	1560	2230	0.080	900	1750	0.071	620	960	0.098	470
	12	2920	0.102	1490	1860	0.092	850	1460	0.082	600	800	0.112	450
	16	2190	0.128	1400	1390	0.115	800	1090	0.102	560	600	0.140	420
	20	1750	0.155	1360	1110	0.140	770	880	0.124	550	480	0.171	410
ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D			D x 0.1D			D x 0.1D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF643

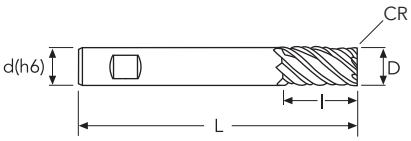
weldon shank, 5 flutes ideal for trochoidal milling, corner radius

OSAWA NORM | MG PV300 | <40 HRC | 36°/37°/38° | RADIUS | Z5

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
4	0/-0.025	0.10	+/-0.010	6	12		57	5	HF64301040	●
5	0/-0.025	0.10	+/-0.010	6	13		57	5	HF64301050	●
6	0/-0.025	0.10	+/-0.010	6	13		57	5	HF64301060	●
8	0/-0.030	0.20	+/-0.010	8	20		64	5	HF64302080	●
10	0/-0.030	0.20	+/-0.010	10	22		72	5	HF64302100	●
12	0/-0.030	0.30	+/-0.010	12	26		83	5	HF64303120	●
16	0/-0.030	0.30	+/-0.010	16	32		92	5	HF64303160	●
20	0/-0.030	0.30	+/-0.010	20	38		104	5	HF64303200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF643

SIDE MILLING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**160-180**			**100-120**			**70-90**			**40-60**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	13540	0.019	1280	8760	0.017	740	6370	0.015	480	3980	0.021	410
	5	10830	0.023	1270	7010	0.021	740	5100	0.019	480	3180	0.026	410
	6	9020	0.028	1240	5840	0.025	720	4250	0.022	470	2650	0.030	400
	8	6770	0.036	1210	4380	0.032	700	3180	0.029	450	1990	0.039	390
	10	5410	0.043	1160	3500	0.039	670	2550	0.034	440	1590	0.047	370
	12	4510	0.049	1100	2920	0.044	640	2120	0.039	420	1330	0.054	360
	16	3380	0.061	1030	2190	0.055	600	1590	0.049	390	1000	0.067	340
	20	2710	0.074	1010	1750	0.067	590	1270	0.060	380	800	0.082	330
ap x ae	**≤ D5**	1.5D x 0.3D			1.5D x 0.3D			1.2D x 0.2D			1.2D x 0.2D		

HELICAL	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	11150	0.011	640	7170	0.011	385	5570	0.009	263	3180	0.009	140
	5	8920	0.014	635	5730	0.013	380	4460	0.012	262	2550	0.011	140
	6	7430	0.017	620	4780	0.016	370	3720	0.014	256	2120	0.013	136
	8	5570	0.022	605	3580	0.020	360	2790	0.018	249	1590	0.017	133
	10	4460	0.026	580	2870	0.024	350	2230	0.021	239	1270	0.020	127
	12	3720	0.030	555	2390	0.028	330	1860	0.024	228	1060	0.023	121
	16	2790	0.037	520	1790	0.035	310	1390	0.031	213	800	0.029	114
	20	2230	0.045	505	1430	0.042	300	1110	0.037	207	640	0.035	111
α° max	**≤ D5**	2°			2°			1°			1°		

RAMPING	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	11150	0.013	700	7170	0.012	415	5570	0.011	306	3180	0.015	240
	5	8920	0.016	695	5730	0.014	410	4460	0.014	305	2550	0.019	240
	6	7430	0.018	680	4780	0.017	405	3720	0.016	298	2120	0.022	234
	8	5570	0.024	660	3580	0.022	390	2790	0.021	290	1590	0.029	227
	10	4460	0.028	635	2870	0.026	375	2230	0.025	278	1270	0.034	218
	12	3720	0.033	605	2390	0.030	360	1860	0.029	265	1060	0.039	208
	16	2790	0.041	570	1790	0.037	335	1390	0.036	248	800	0.049	196
	20	2230	0.050	550	1430	0.046	325	1110	0.043	241	640	0.060	191

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF642 PARAMETERS.

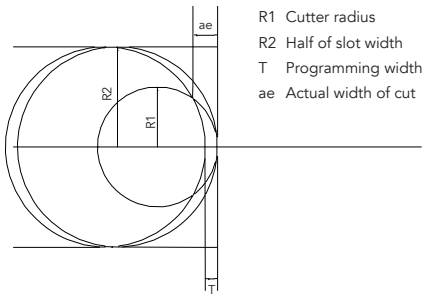
HF643

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
VERTICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	11150	0.016	880	7170	0.014	510	5570	0.012	330	3180	0.011	180
	5	8920	0.020	870	5730	0.018	500	4460	0.015	330	2550	0.014	170
	6	7430	0.023	850	4780	0.021	490	3720	0.017	320	2120	0.016	170
	8	5570	0.030	830	3580	0.027	480	2790	0.022	310	1590	0.021	170
	10	4460	0.036	800	2870	0.032	460	2230	0.027	300	1270	0.025	160
	12	3720	0.041	760	2390	0.037	440	1860	0.031	280	1060	0.029	150
	16	2790	0.051	710	1790	0.046	410	1390	0.038	270	800	0.036	140
	20	2230	0.062	690	1430	0.056	400	1110	0.047	260	640	0.043	140

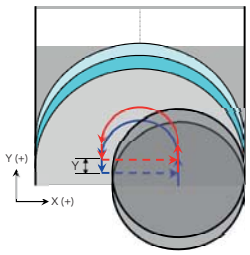
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**190-230**			**130-150**			**100-120**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	8760	0.039	1720	5570	0.035	990	4380	0.031	690	2390	0.043	520
	5	7010	0.049	1710	4460	0.044	980	3500	0.039	680	1910	0.054	510
	6	5840	0.057	1680	3720	0.052	960	2920	0.046	670	1590	0.063	500
	8	4380	0.074	1630	2790	0.067	930	2190	0.060	650	1190	0.082	490
	10	3500	0.089	1560	2230	0.080	900	1750	0.071	620	960	0.098	470
	12	2920	0.102	1490	1860	0.092	850	1460	0.082	600	800	0.112	450
	16	2190	0.128	1400	1390	0.115	800	1090	0.102	560	600	0.140	420
	20	1750	0.155	1360	1110	0.140	770	880	0.124	550	480	0.171	410

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D			D x 0.1D			D x 0.1D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF642 PARAMETERS.

HF742

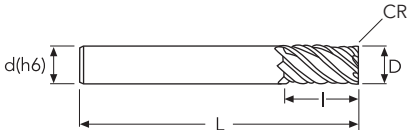
cylindrical shank, long 5 flutes ideal for trochoidal milling, corner radius

OSAWA NORM | MG PV300 | <40 HRC | 36°/37°/38° | RADIUS | Z5

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.025	0.10	+/-0.010	6	25		75	5	HF7420106075	●
8	0/-0.030	0.20	+/-0.010	8	25		75	5	HF7420208075	●
10	0/-0.030	0.20	+/-0.010	10	38		100	5	HF74202100100	●
12	0/-0.030	0.30	+/-0.010	12	45		100	5	HF74203120100	●
16	0/-0.030	0.30	+/-0.010	16	55		125	5	HF74203160125	●
20	0/-0.030	0.30	+/-0.010	20	65		125	5	HF74203200125	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF742

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 03D**			**1.5D x 0.3D**			**1.2D x 0.2D**			**1.2D x 0.2D**		
SIDE MILLING	Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	6370	0.023	740	4250	0.021	450	3180	0.019	300	2120	0.026	270
	8	4780	0.028	660	3180	0.025	400	2390	0.022	260	1590	0.030	240
	10	3820	0.033	630	2550	0.030	380	1910	0.026	250	1270	0.036	230
	12	3180	0.037	590	2120	0.033	350	1590	0.030	240	1060	0.041	220
	16	2390	0.042	510	1590	0.038	300	1190	0.034	200	800	0.047	190
	20	1910	0.057	540	1270	0.051	330	960	0.046	220	640	0.063	200

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
HELICAL	Vc (m/min)	**90-110**			**60-80**			**40-60**			**20-40**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	5310	0.016	435	3720	0.016	290	2650	0.013	172	1590	0.014	109
	8	3980	0.019	385	2790	0.018	255	1990	0.015	153	1190	0.016	96
	10	3180	0.023	365	2230	0.022	245	1590	0.018	145	960	0.019	92
	12	2650	0.026	345	1860	0.025	230	1330	0.021	137	800	0.022	87
	16	1990	0.030	295	1390	0.028	195	1000	0.024	118	600	0.025	74
	20	1590	0.040	315	1110	0.038	210	800	0.032	127	480	0.033	80

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x D**			**4° x D**			**3° x D**			**3° x D**		
RAMPING	Vc (m/min)	**80-100**			**50-70**			**35-55**			**20-30**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4780	0.017	405	3180	0.016	250	2390	0.015	179	1330	0.021	137
	8	3580	0.020	360	2390	0.019	225	1790	0.018	158	1000	0.024	122
	10	2870	0.024	345	1910	0.022	215	1430	0.021	150	800	0.029	116
	12	2390	0.027	325	1590	0.025	200	1190	0.024	142	660	0.033	108
	16	1790	0.031	275	1190	0.029	170	900	0.027	122	500	0.037	93
	20	1430	0.042	295	960	0.039	185	720	0.037	131	400	0.050	100

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

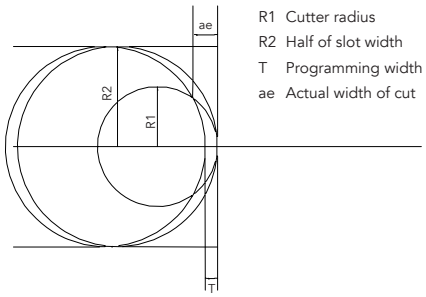
CUTTING PARAMETERS

HF742

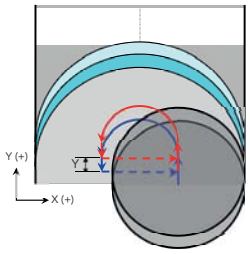
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	D x 0.4D			D x 0.4D			D x 0.25D			D x 0.25D		
	Vc (m/min)	80-100			50-70			35-55			20-30		
VERTICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4780	0.022	520	3180	0.019	310	2390	0.016	190	1330	0.015	100
	8	3580	0.026	460	2390	0.023	280	1790	0.019	170	1000	0.018	90
	10	2870	0.030	440	1910	0.027	260	1430	0.023	160	800	0.021	90
	12	2390	0.034	410	1590	0.031	250	1190	0.026	150	660	0.024	80
	16	1790	0.039	350	1190	0.035	210	900	0.029	130	500	0.027	70
	20	1430	0.053	380	960	0.048	230	720	0.040	140	400	0.037	70

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	3D x 0.1D			3D x 0.1D			2D x 0.1D			2D x 0.1D		
	Vc (m/min)	130-170			100-130			70-90			40-60		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4250	0.054	1150	2920	0.049	710	2120	0.043	460	1330	0.059	400
	8	3180	0.064	1020	2190	0.058	630	1590	0.051	410	1000	0.070	350
	10	2550	0.076	970	1750	0.068	600	1270	0.061	390	800	0.084	330
	12	2120	0.086	910	1460	0.077	570	1060	0.069	360	660	0.095	310
	16	1590	0.098	780	1090	0.088	480	800	0.078	310	500	0.108	270
	20	1270	0.132	840	880	0.119	520	640	0.106	340	400	0.145	290

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF743

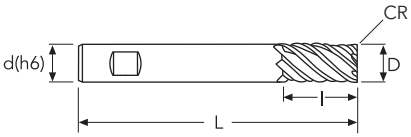
weldon shank, long 5 flutes ideal for trochoidal milling, corner radius

OSAWA NORM | MG PV300 | <40 HRC | 36°/37°/38° | RADIUS | Z5

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable

SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.025	0.10	+/-0.010	6	25		75	5	HF7430106075	●
8	0/-0.030	0.20	+/-0.010	8	25		75	5	HF7430208075	●
10	0/-0.030	0.20	+/-0.010	10	38		100	5	HF74302100100	●
12	0/-0.030	0.30	+/-0.010	12	45		100	5	HF74303120100	●
16	0/-0.030	0.30	+/-0.010	16	55		125	5	HF74303160125	●
20	0/-0.030	0.30	+/-0.010	20	65		125	5	HF74303200125	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF743

SIDE MILLING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
ap x ae	**1.5D x 03D**			**1.5D x 0.3D**			**1.2D x 0.2D**			**1.2D x 0.2D**		
Vc (m/min)	**110-130**			**70-90**			**50-70**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	6370	0.023	740	4250	0.021	450	3180	0.019	300	2120	0.026	270
8	4780	0.028	660	3180	0.025	400	2390	0.022	260	1590	0.030	240
10	3820	0.033	630	2550	0.030	380	1910	0.026	250	1270	0.036	230
12	3180	0.037	590	2120	0.033	350	1590	0.030	240	1060	0.041	220
16	2390	0.042	510	1590	0.038	300	1190	0.034	200	800	0.047	190
20	1910	0.057	540	1270	0.051	330	960	0.046	220	640	0.063	200

HELICAL

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
Vc (m/min)	**90-110**			**60-80**			**40-60**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	5310	0.016	435	3720	0.016	290	2650	0.013	172	1590	0.014	109
8	3980	0.019	385	2790	0.018	255	1990	0.015	153	1190	0.016	96
10	3180	0.023	365	2230	0.022	245	1590	0.018	145	960	0.019	92
12	2650	0.026	345	1860	0.025	230	1330	0.021	137	800	0.022	87
16	1990	0.030	295	1390	0.028	195	1000	0.024	118	600	0.025	74
20	1590	0.040	315	1110	0.038	210	800	0.032	127	480	0.033	80

RAMPING

Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
α° x ae	**5° x D**			**4° x D**			**3° x D**			**3° x D**		
Vc (m/min)	**80-100**			**50-70**			**35-55**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	4780	0.017	405	3180	0.016	250	2390	0.015	179	1330	0.021	137
8	3580	0.020	360	2390	0.019	225	1790	0.018	158	1000	0.024	122
10	2870	0.024	345	1910	0.022	215	1430	0.021	150	800	0.029	116
12	2390	0.027	325	1590	0.025	200	1190	0.024	142	660	0.033	108
16	1790	0.031	275	1190	0.029	170	900	0.027	122	500	0.037	93
20	1430	0.042	295	960	0.039	185	720	0.037	131	400	0.050	100

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF742 PARAMETERS.

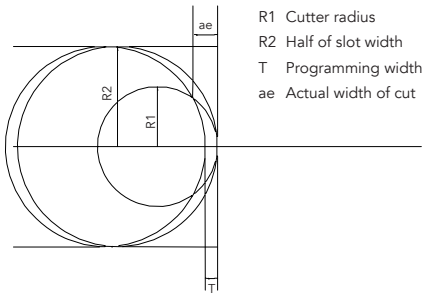
CUTTING PARAMETERS

HF743

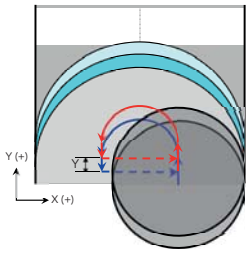
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
VERTICAL	Vc (m/min)	**80-100**			**50-70**			**35-55**			**20-30**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4780	0.022	520	3180	0.019	310	2390	0.016	190	1330	0.015	100
	8	3580	0.026	460	2390	0.023	280	1790	0.019	170	1000	0.018	90
	10	2870	0.030	440	1910	0.027	260	1430	0.023	160	800	0.021	90
	12	2390	0.034	410	1590	0.031	250	1190	0.026	150	660	0.024	80
	16	1790	0.039	350	1190	0.035	210	900	0.029	130	500	0.027	70
	20	1430	0.053	380	960	0.048	230	720	0.040	140	400	0.037	70

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**3D x 0.1D**			**3D x 0.1D**			**2D x 0.1D**			**2D x 0.1D**		
TROCHOIDAL	Vc (m/min)	**130-170**			**100-130**			**70-90**			**40-60**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4250	0.054	1150	2920	0.049	710	2120	0.043	460	1330	0.059	400
	8	3180	0.064	1020	2190	0.058	630	1590	0.051	410	1000	0.070	350
	10	2550	0.076	970	1750	0.068	600	1270	0.061	390	800	0.084	330
	12	2120	0.086	910	1460	0.077	570	1060	0.069	360	660	0.095	310
	16	1590	0.098	780	1090	0.088	480	800	0.078	310	500	0.108	270
	20	1270	0.132	840	880	0.119	520	640	0.106	340	400	0.145	290

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF742 PARAMETERS.

HF861

weldon shank, SC smooth cut for low cutting force, chamfer + radius

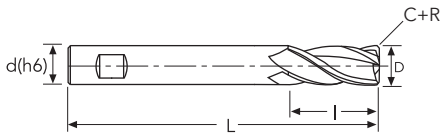
OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C+R | Z4 UP

from D1 to D2.5: cylindrical shank

from D3: weldon shank

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable



D	D Tol.	C+R	C+R Tol	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020		+/-0.020	4	3		50	4	HF861010	●
1.5	0/-0.020		+/-0.020	4	4.5		50	4	HF861015	●
2	0/-0.020		+/-0.020	4	6.5		50	4	HF861020	●
2.5	0/-0.020		+/-0.020	4	6.5		50	4	HF861025	●
3	0/-0.025	0.1	+/-0.020	6	9		50	4	HF861030	●
3.5	0/-0.025	0.1	+/-0.020	6	12		50	4	HF861035	●
4	0/-0.025	0.1	+/-0.020	6	12		50	4	HF861040	●
4.5	0/-0.025	0.1	+/-0.020	6	15		50	4	HF861045	●
5	0/-0.025	0.1	+/-0.020	6	15		50	4	HF861050	●
6	0/-0.025	0.1	+/-0.020	6	20		60	4	HF861060	●
7	0/-0.030	0.2	+/-0.020	8	22		64	4	HF861070	●
8	0/-0.030	0.2	+/-0.020	8	22		64	4	HF861080	●
9	0/-0.030	0.2	+/-0.020	10	27		70	4	HF861090	●
10	0/-0.030	0.2	+/-0.020	10	27		70	4	HF861100	●
11	0/-0.030	0.2	+/-0.020	12	32		75	4	HF861110	●
12	0/-0.030	0.2	+/-0.020	12	32		75	4	HF861120	●
13	0/-0.030	0.2	+/-0.020	14	32		90	4	HF861130	●
14	0/-0.030	0.2	+/-0.020	14	32		90	4	HF861140	●
15	0/-0.030	0.2	+/-0.020	16	32		90	4	HF861150	●
16	0/-0.030	0.2	+/-0.020	16	32		90	4	HF861160	●
18	0/-0.030	0.2	+/-0.020	18	38		100	4	HF861180	●
20	0/-0.030	0.2	+/-0.020	20	38		100	4	HF861200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF861

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	30000	0.005	600	28660	0.005	520	22290	0.004	330	12740	0.004	180
	1.5	29720	0.008	890	19110	0.007	520	14860	0.006	330	8490	0.005	180
	2	22290	0.010	890	14330	0.009	520	11150	0.008	330	6370	0.007	180
	3	14860	0.014	830	9550	0.013	480	7430	0.011	310	4250	0.010	170
	4	11150	0.019	830	7170	0.017	480	5570	0.014	310	3180	0.013	160
	5	8920	0.023	820	5730	0.021	470	4460	0.017	310	2550	0.016	160
	6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
	8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
	10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
	12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
	14	3180	0.054	690	2050	0.049	400	1590	0.041	260	910	0.038	140
	16	2790	0.060	670	1790	0.054	390	1390	0.045	250	800	0.042	130
	18	2480	0.066	650	1590	0.059	380	1240	0.050	250	710	0.046	130
	20	2230	0.073	650	1430	0.066	380	1110	0.055	240	640	0.051	130

ap x ae	**D1**	0.25D x D
ap x ae	**≤ D3**	0.5D x D

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**100-120**			**60-80**								
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	8	4380	0.028	490	2790	0.025	280						
	10	3500	0.034	470	2230	0.030	270						
	12	2920	0.038	450	1860	0.035	260						
	14	2500	0.043	430	1590	0.039	250						
	16	2190	0.048	420	1390	0.043	240						
	18	1950	0.053	410	1240	0.048	240						
	20	1750	0.058	410	1110	0.053	230						

	Material Group ISO 513	P1 P2 M1 K1											
	Hardness/Rm	≤ 700 N/mm²											
	ap x ae	**2D x D**											
	Vc (m/min)	**75-95**											
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)									
	10	2710	0.025	270									
	12	2260	0.029	260									
	14	1930	0.032	250									
	16	1690	0.036	240									
	18	1500	0.040	240									
	20	1350	0.044	240									

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF840 PARAMETERS.

CUTTING PARAMETERS

HF861

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**160-180**			**100-120**			**70-90**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	30000	0.006	720	30000	0.005	650	25480	0.005	490	15920	0.007	420
	1.5	36090	0.009	1300	23350	0.008	760	16990	0.007	490	10620	0.010	420
	2	27070	0.012	1300	17520	0.011	760	12740	0.010	490	7960	0.013	420
	3	18050	0.017	1210	11680	0.015	710	8490	0.013	460	5310	0.018	390
	4	13540	0.022	1200	8760	0.020	700	6370	0.018	450	3980	0.024	390
	5	10830	0.028	1200	7010	0.025	700	5100	0.022	450	3180	0.030	390
	6	9020	0.032	1170	5840	0.029	680	4250	0.026	440	2650	0.036	380
	8	6770	0.042	1140	4380	0.038	660	3180	0.034	430	1990	0.046	370
	10	5410	0.050	1090	3500	0.045	640	2550	0.040	410	1590	0.055	350
	12	4510	0.058	1040	2920	0.052	610	2120	0.046	390	1330	0.063	340
	14	3870	0.065	1000	2500	0.058	580	1820	0.052	380	1140	0.071	330
	16	3380	0.072	970	2190	0.065	570	1590	0.058	370	1000	0.079	320
	18	3010	0.079	950	1950	0.071	560	1420	0.063	360	880	0.087	310
	20	2710	0.088	950	1750	0.079	550	1270	0.070	360	800	0.096	310
ap x ae	**≤ D3**	1.5D x 0.1D											

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	30000	0.004	435	28660	0.003	390	22290	0.003	268	12740	0.003	143
	1.5	29720	0.005	650	19110	0.005	390	14860	0.005	268	8490	0.004	143
	2	22290	0.007	650	14330	0.007	390	11150	0.006	268	6370	0.006	143
	3	14860	0.010	605	9550	0.010	365	7430	0.008	250	4250	0.008	133
	4	11150	0.013	600	7170	0.013	360	5570	0.011	247	3180	0.010	132
	5	8920	0.017	600	5730	0.016	360	4460	0.014	246	2550	0.013	131
	6	7430	0.020	585	4780	0.018	350	3720	0.016	241	2120	0.015	128
	8	5570	0.025	570	3580	0.024	340	2790	0.021	235	1590	0.020	125
	10	4460	0.031	545	2870	0.029	325	2230	0.025	225	1270	0.024	120
	12	3720	0.035	520	2390	0.033	310	1860	0.029	214	1060	0.027	114
	14	3180	0.039	500	2050	0.037	300	1590	0.032	206	910	0.030	110
	16	2790	0.044	490	1790	0.041	290	1390	0.036	200	800	0.034	108
	18	2480	0.048	475	1590	0.045	285	1240	0.040	197	710	0.037	105
	20	2230	0.053	475	1430	0.050	285	1110	0.044	195	640	0.041	105
α° max	**≤ D3**	1°											

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF840 PARAMETERS.

CUTTING PARAMETERS

HF861

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
RAMPING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.022	640	4780	0.020	380	3720	0.019	281	2120	0.026	220
	8	5570	0.028	620	3580	0.026	370	2790	0.024	273	1590	0.034	214
	10	4460	0.034	600	2870	0.031	355	2230	0.029	262	1270	0.040	205
	12	3720	0.038	570	2390	0.035	335	1860	0.034	250	1060	0.046	196
	14	3180	0.043	550	2050	0.040	325	1590	0.038	240	910	0.052	189
	16	2790	0.048	535	1790	0.044	315	1390	0.042	233	800	0.058	185
	18	2480	0.053	520	1590	0.048	310	1240	0.046	229	710	0.063	180
	20	2230	0.058	520	1430	0.054	305	1110	0.051	227	640	0.070	180

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
VERTICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
	8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
	10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
	12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
	14	3180	0.054	690	2050	0.049	400	1590	0.041	260	910	0.038	140
	16	2790	0.060	670	1790	0.054	390	1390	0.045	250	800	0.042	130
	18	2480	0.066	650	1590	0.059	380	1240	0.050	250	710	0.046	130
	20	2230	0.073	650	1430	0.066	380	1110	0.055	240	640	0.051	130

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**100-120**			**60-80**			**45-55**			**20-40**		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	30000	0.003	300	22290	0.002	200	17520	0.002	140	9550	0.003	110
	1.5	23350	0.004	350	14860	0.003	200	11680	0.003	140	6370	0.004	110
	2	17520	0.005	350	11150	0.005	200	8760	0.004	140	4780	0.006	110
	3	11680	0.007	330	7430	0.006	190	5840	0.006	130	3180	0.008	100
	4	8760	0.009	320	5570	0.008	190	4380	0.007	130	2390	0.010	100
	5	7010	0.012	320	4460	0.010	180	3500	0.009	130	1910	0.013	100
	6	5840	0.014	320	3720	0.012	180	2920	0.011	130	1590	0.015	90
	8	4380	0.018	310	2790	0.016	180	2190	0.014	120	1190	0.019	90
	10	3500	0.021	290	2230	0.019	170	1750	0.017	120	960	0.023	90
	12	2920	0.024	280	1860	0.022	160	1460	0.019	110	800	0.026	80
	14	2500	0.027	270	1590	0.024	150	1250	0.022	110	680	0.030	80
	16	2190	0.030	260	1390	0.027	150	1090	0.024	100	600	0.033	80
	18	1950	0.033	260	1240	0.030	150	970	0.026	100	530	0.036	80
	20	1750	0.037	260	1110	0.033	150	880	0.029	100	480	0.040	80

ap x ae	**≤ D3**	0.5D x D											

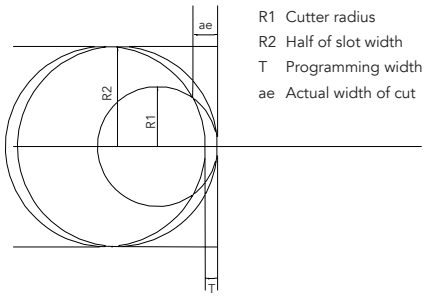
PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF840 PARAMETERS.

HF861

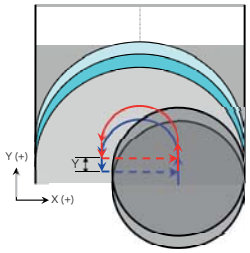
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**190-230**			**130-150**			**100-120**			**50-70**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
TROCHOIDAL	**1**	30000	0.013	1500	22290	0.011	1000	17520	0.010	700	9550	0.014	530
	1.5	23350	0.019	1750	14860	0.017	1000	11680	0.015	700	6370	0.021	530
	2	17520	0.025	1750	11150	0.023	1000	8760	0.020	700	4780	0.028	530
	3	11680	0.035	1640	7430	0.032	940	5840	0.028	650	3180	0.039	490
	4	8760	0.046	1620	5570	0.042	930	4380	0.037	650	2390	0.051	490
	5	7010	0.058	1610	4460	0.052	920	3500	0.046	640	1910	0.063	480
	6	5840	0.068	1580	3720	0.061	900	2920	0.054	630	1590	0.074	470
	8	4380	0.088	1530	2790	0.079	880	2190	0.070	610	1190	0.096	460
	10	3500	0.105	1470	2230	0.095	840	1750	0.084	590	960	0.116	440
	12	2920	0.120	1400	1860	0.108	800	1460	0.096	560	800	0.132	420
	14	2500	0.135	1350	1590	0.122	770	1250	0.108	540	680	0.149	400
	16	2190	0.150	1310	1390	0.135	750	1090	0.120	520	600	0.165	400
	18	1950	0.165	1290	1240	0.149	740	970	0.132	510	530	0.182	380
	20	1750	0.183	1280	1110	0.164	730	880	0.146	510	480	0.201	390

ap x ae	**D1**	D x 0.1D	D x 0.1D	D x 0.1D	D x 0.1D
ap x ae	**≤ D3**	1.5D x 0.1D	1.5D x 0.1D	D x 0.1D	D x 0.1D

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF840 PARAMETERS.

HF850

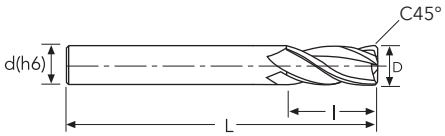
cylindrical shank, 45° chamfer

OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | C45° | Z4 UP

P	M	K	N	S	H
★	★	★		★	★

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.030	0.10	+/-0.020	6	9		57	4	HF850030	●
4	0/-0.030	0.10	+/-0.020	6	11		57	4	HF850040	●
5	0/-0.030	0.10	+/-0.020	6	13		57	4	HF850050	●
6	0/-0.030	0.10	+/-0.020	6	13		57	4	HF850060	●
8	0/-0.030	0.20	+/-0.020	8	20		64	4	HF850080	●
10	0/-0.030	0.20	+/-0.020	10	22		72	4	HF850100	●
12	0/-0.030	0.20	+/-0.020	12	26		83	4	HF850120	●
14	0/-0.030	0.30	+/-0.020	14	32		90	4	HF850140	●
16	0/-0.030	0.30	+/-0.020	16	32		92	4	HF850160	●
20	0/-0.030	0.40	+/-0.020	20	38		104	4	HF850200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF850

	Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
	Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
	ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.3D x D**		
	Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	9550	0.012	450	7430	0.011	320	5310	0.009	190	4250	0.008	140
	4	7170	0.016	450	5570	0.014	320	3980	0.012	190	3180	0.011	140
	5	5730	0.020	450	4460	0.018	310	3180	0.015	190	2550	0.014	140
	6	4780	0.023	440	3720	0.021	310	2650	0.017	180	2120	0.016	140
	8	3580	0.030	430	2790	0.027	300	1990	0.022	180	1590	0.021	130
	10	2870	0.036	410	2230	0.032	290	1590	0.027	170	1270	0.025	130
	12	2390	0.041	390	1860	0.037	270	1330	0.031	160	1060	0.029	120
	14	2050	0.046	380	1590	0.041	260	1140	0.034	160	910	0.032	120
	16	1790	0.051	370	1390	0.046	260	1000	0.038	150	800	0.036	110
	20	1430	0.062	350	1110	0.056	250	800	0.047	150	640	0.043	110
ap x ae	**≤ D5**	0.3D x D			0.3D x D			0.2D x D			0.1D x D		

	Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
	Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.2D**			**1.2D x 0.2D**			**1.2D x 0.1D**		
	Vc (m/min)	**100-120**			**70-90**			**50-70**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	11680	0.014	670	8490	0.013	440	6370	0.011	290	5310	0.016	330
	4	8760	0.019	660	6370	0.017	430	4780	0.015	290	3980	0.021	330
	5	7010	0.023	660	5100	0.021	430	3820	0.019	290	3180	0.026	330
	6	5840	0.028	640	4250	0.025	420	3180	0.022	280	2650	0.030	320
	8	4380	0.036	630	3180	0.032	410	2390	0.029	270	1990	0.039	310
	10	3500	0.043	600	2550	0.039	390	1910	0.034	260	1590	0.047	300
	12	2920	0.049	570	2120	0.044	370	1590	0.039	250	1330	0.054	290
	14	2500	0.055	550	1820	0.050	360	1360	0.044	240	1140	0.061	280
	16	2190	0.061	540	1590	0.055	350	1190	0.049	230	1000	0.067	270
	20	1750	0.074	520	1270	0.067	340	960	0.060	230	800	0.082	260
ap x ae	**≤ D5**	1.2D x 0.2D			1.2D x 0.1D			D x 0.2D			D x 0.1D		

	Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
	Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
	α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
	Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
HELICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	9550	0.009	330	7430	0.008	240	5310	0.007	152	4250	0.008	128
	4	7170	0.011	330	5570	0.011	240	3980	0.009	150	3180	0.010	126
	5	5730	0.014	325	4460	0.013	235	3180	0.012	149	2550	0.012	126
	6	4780	0.017	320	3720	0.016	230	2650	0.014	146	2120	0.015	123
	8	3580	0.022	310	2790	0.020	225	1990	0.018	142	1590	0.019	120
	10	2870	0.026	300	2230	0.024	215	1590	0.021	136	1270	0.023	115
	12	2390	0.030	285	1860	0.028	205	1330	0.024	130	1060	0.026	109
	14	2050	0.033	275	1590	0.031	200	1140	0.028	126	910	0.029	106
	16	1790	0.037	265	1390	0.035	190	1000	0.031	122	800	0.032	103
	20	1430	0.045	260	1110	0.042	185	800	0.037	119	640	0.039	100
α°	**≤ D5**	2°			2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF850

RAMPING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x D**			**4° x D**			**3° x D**			**2° x D**		
Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	4780	0.020	385	3720	0.019	280	2650	0.018	187	2120	0.027	232
8	3580	0.026	370	2790	0.024	270	1990	0.023	182	1590	0.035	226
10	2870	0.031	360	2230	0.029	260	1590	0.027	175	1270	0.043	216
12	2390	0.036	340	1860	0.033	245	1330	0.031	167	1060	0.049	206
14	2050	0.040	330	1590	0.037	240	1140	0.035	161	910	0.055	199
16	1790	0.045	320	1390	0.042	230	1000	0.039	157	800	0.061	195
20	1430	0.054	310	1110	0.051	225	800	0.048	153	640	0.074	189

VERTICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	4780	0.023	440	3720	0.021	310	2650	0.017	180	2120	0.016	140
8	3580	0.030	430	2790	0.027	300	1990	0.022	180	1590	0.021	130
10	2870	0.036	410	2230	0.032	290	1590	0.027	170	1270	0.025	130
12	2390	0.041	390	1860	0.037	270	1330	0.031	160	1060	0.029	120
14	2050	0.046	380	1590	0.041	260	1140	0.034	160	910	0.032	120
16	1790	0.051	370	1390	0.046	260	1000	0.038	150	800	0.036	110
20	1430	0.062	350	1110	0.056	250	800	0.047	150	640	0.043	110

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

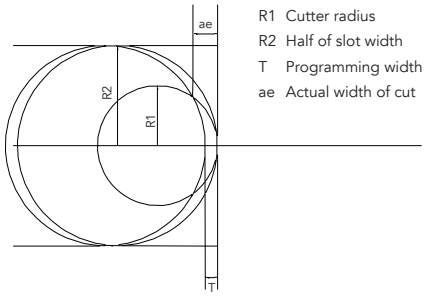
CUTTING PARAMETERS

HF850

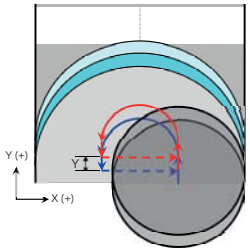
	Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
	Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**130-150**			**100-120**			**70-90**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	7430	0.030	880	5840	0.027	630	4250	0.024	400	3180	0.033	420
	4	5570	0.039	880	4380	0.035	620	3180	0.031	400	2390	0.043	410
	5	4460	0.049	870	3500	0.044	620	2550	0.039	400	1910	0.054	410
	6	3720	0.057	850	2920	0.052	600	2120	0.046	390	1590	0.063	400
	8	2790	0.074	830	2190	0.067	590	1590	0.060	380	1190	0.082	390
	10	2230	0.089	800	1750	0.080	560	1270	0.071	360	960	0.098	380
	12	1860	0.102	760	1460	0.092	540	1060	0.082	350	800	0.112	360
	14	1590	0.115	730	1250	0.103	520	910	0.092	330	680	0.126	340
	16	1390	0.128	710	1090	0.115	500	800	0.102	330	600	0.140	340
	20	1110	0.155	690	880	0.140	490	640	0.124	320	480	0.171	330

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D			D x 0.1D			D x 0.05D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF450

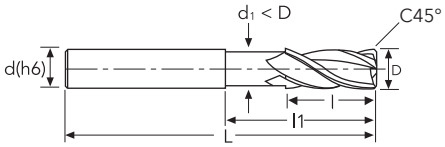
cylindrical shank and reduced neck, 45° chamfer

OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | C45° | Z4 UP

P	M	K	N	S	H
★	★	★		★	★

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.10	+/-0.020	6	9	15	2.80	57	4	HF450030	●
4	0/-0.030	0.10	+/-0.020	6	11	18	3.80	57	4	HF450040	●
5	0/-0.030	0.10	+/-0.020	6	13	19	4.80	57	4	HF450050	●
6	0/-0.030	0.10	+/-0.020	6	13	20	5.80	57	4	HF450060	●
8	0/-0.030	0.20	+/-0.020	8	20	26	7.80	64	4	HF450080	●
10	0/-0.030	0.20	+/-0.020	10	22	30	9.80	72	4	HF450100	●
12	0/-0.030	0.20	+/-0.020	12	26	36	11.80	83	4	HF450120	●
14	0/-0.030	0.20	+/-0.020	14	26	36	13.70	83	4	HF450140	●
16	0/-0.030	0.30	+/-0.020	16	32	42	15.70	92	4	HF450160	●
20	0/-0.030	0.40	+/-0.020	20	38	50	19.70	104	4	HF450200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF450

SLOTTING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.2D x D**		
Vc (m/min)	**70-90**			**50-70**			**30-50**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	8490	0.011	360	6370	0.010	250	4250	0.008	140	3180	0.007	100
4	6370	0.014	360	4780	0.013	240	3180	0.011	140	2390	0.010	90
5	5100	0.018	360	3820	0.016	240	2550	0.013	130	1910	0.012	90
6	4250	0.021	350	3180	0.019	240	2120	0.015	130	1590	0.014	90
8	3180	0.027	340	2390	0.024	230	1590	0.020	130	1190	0.019	90
10	2550	0.032	330	1910	0.029	220	1270	0.024	120	960	0.022	90
12	2120	0.037	310	1590	0.033	210	1060	0.028	120	800	0.026	80
14	1820	0.041	300	1360	0.037	200	910	0.031	110	680	0.029	80
16	1590	0.046	290	1190	0.041	200	800	0.034	110	600	0.032	80
20	1270	0.056	280	960	0.050	190	640	0.042	110	480	0.039	80
ap x ae	**≤ D5**	0.3D x D		0.3D x D			0.2D x D			0.1D x D		

SIDE MILLING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**1.5D x 0.3D**			**1.5D x 0.2D**			**1.2D x 0.2D**			**D x 0.1D**		
Vc (m/min)	**90-110**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	10620	0.013	550	7430	0.012	340	5310	0.010	220	4250	0.014	240
4	7960	0.017	540	5570	0.015	340	3980	0.014	220	3180	0.019	240
5	6370	0.021	540	4460	0.019	340	3180	0.017	210	2550	0.023	240
6	5310	0.025	530	3720	0.022	330	2650	0.020	210	2120	0.027	230
8	3980	0.032	510	2790	0.029	320	1990	0.026	200	1590	0.035	220
10	3180	0.039	490	2230	0.035	310	1590	0.031	200	1270	0.042	220
12	2650	0.044	470	1860	0.040	300	1330	0.035	190	1060	0.048	210
14	2270	0.050	450	1590	0.045	280	1140	0.040	180	910	0.055	200
16	1990	0.055	440	1390	0.050	280	1000	0.044	180	800	0.061	190
20	1590	0.067	430	1110	0.060	270	800	0.054	170	640	0.074	190
ap x ae	**≤ D5**	1.2D x 0.2D		1.2D x 0.1D			D x 0.1D			D x 0.05D		

HELICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
Vc (m/min)	**70-90**			**50-70**			**30-50**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	8490	0.008	265	6370	0.007	185	4250	0.006	109	3180	0.007	86
4	6370	0.010	265	4780	0.010	185	3180	0.008	108	2390	0.009	86
5	5100	0.013	260	3820	0.012	185	2550	0.011	108	1910	0.011	85
6	4250	0.015	255	3180	0.014	180	2120	0.012	105	1590	0.013	83
8	3180	0.019	250	2390	0.018	175	1590	0.016	102	1190	0.017	81
10	2550	0.023	240	1910	0.022	165	1270	0.019	98	960	0.020	78
12	2120	0.027	225	1590	0.025	160	1060	0.022	93	800	0.023	74
14	1820	0.030	220	1360	0.028	155	910	0.025	90	680	0.026	71
16	1590	0.033	215	1190	0.031	150	800	0.028	88	600	0.029	70
20	1270	0.041	205	960	0.038	145	640	0.034	86	480	0.035	68
α°	**≤ D5**	2°		2°			1°			1°		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF450

RAMPING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x D**			**4° x D**			**3° x D**			**2° x D**		
Vc (m/min)	**60-80**			**50-60**			**30-40**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	3720	0.018	270	2920	0.017	195	1860	0.016	118	1330	0.025	131
8	2790	0.023	260	2190	0.022	190	1390	0.021	114	1000	0.032	128
10	2230	0.028	250	1750	0.026	185	1110	0.025	110	800	0.038	123
12	1860	0.032	240	1460	0.030	175	930	0.028	105	660	0.044	116
14	1590	0.036	230	1250	0.034	170	800	0.032	102	570	0.049	112
16	1390	0.040	225	1090	0.037	165	700	0.035	99	500	0.055	109
20	1110	0.049	215	880	0.045	160	560	0.043	96	400	0.067	107

VERTICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**60-80**			**50-60**			**30-40**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	3720	0.021	310	2920	0.019	220	1860	0.015	120	1330	0.014	80
8	2790	0.027	300	2190	0.024	210	1390	0.020	110	1000	0.019	70
10	2230	0.032	290	1750	0.029	200	1110	0.024	110	800	0.022	70
12	1860	0.037	270	1460	0.033	190	930	0.028	100	660	0.026	70
14	1590	0.041	260	1250	0.037	190	800	0.031	100	570	0.029	70
16	1390	0.046	260	1090	0.041	180	700	0.034	100	500	0.032	60
20	1110	0.056	250	880	0.050	180	560	0.042	90	400	0.039	60

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

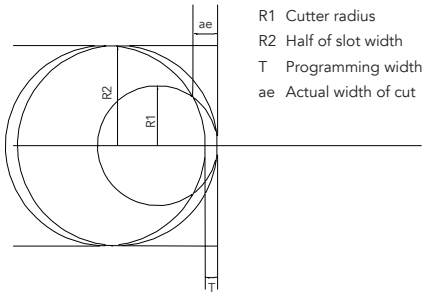
CUTTING PARAMETERS

HF450

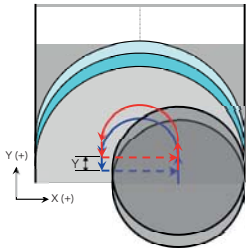
	Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
	Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**D x 0.1D**			**D x 0.1D**		
	Vc (m/min)	**110-130**			**80-100**			**50-70**			**40-60**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	6900	0.027	740	5310	0.024	510	3180	0.021	270	2650	0.029	310
	4	5180	0.035	730	3980	0.032	510	2390	0.028	270	1990	0.039	310
	5	4140	0.044	730	3180	0.040	500	1910	0.035	270	1590	0.048	310
	6	3450	0.052	710	2650	0.046	490	1590	0.041	260	1330	0.057	300
	8	2590	0.067	690	1990	0.060	480	1190	0.054	250	1000	0.074	290
	10	2070	0.080	670	1590	0.072	460	960	0.064	250	800	0.088	280
	12	1730	0.092	640	1330	0.083	440	800	0.073	240	660	0.101	270
	14	1480	0.103	610	1140	0.093	420	680	0.083	220	570	0.114	260
	16	1290	0.115	590	1000	0.103	410	600	0.092	220	500	0.126	250
	20	1040	0.140	580	800	0.126	400	480	0.112	210	400	0.154	250

ap x ae	**≤ D5**	1.5D x 0.1D	1.5D x 0.1D	D x 0.1D	D x 0.05D

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF451

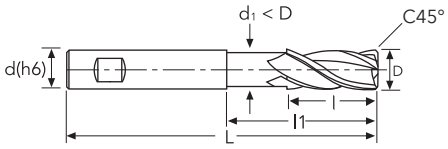
weldon shank and reduced neck, 45° chamfer

OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | C45° | Z4 UP

P	M	K	N	S	H
★	★	★		★	★

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	C45°	C45° Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.10	+/-0.020	6	9	15	2.80	57	4	HF451030	●
4	0/-0.030	0.10	+/-0.020	6	11	18	3.80	57	4	HF451040	●
5	0/-0.030	0.10	+/-0.020	6	13	19	4.80	57	4	HF451050	●
6	0/-0.030	0.10	+/-0.020	6	13	20	5.80	57	4	HF451060	●
8	0/-0.030	0.20	+/-0.020	8	20	26	7.80	64	4	HF451080	●
10	0/-0.030	0.20	+/-0.020	10	22	30	9.80	72	4	HF451100	●
12	0/-0.030	0.20	+/-0.020	12	26	36	11.80	83	4	HF451120	●
14	0/-0.030	0.20	+/-0.020	14	26	36	13.70	83	4	HF451140	●
16	0/-0.030	0.30	+/-0.020	16	32	42	15.70	92	4	HF451160	●
20	0/-0.030	0.40	+/-0.020	20	38	50	19.70	104	4	HF451200	●

● stock standard ○ non-standard stock ∇ stock exhaustion

HF451

SLOTTING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.2D x D**		
Vc (m/min)	**70-90**			**50-70**			**30-50**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	8490	0.011	360	6370	0.010	250	4250	0.008	140	3180	0.007	100
4	6370	0.014	360	4780	0.013	240	3180	0.011	140	2390	0.010	90
5	5100	0.018	360	3820	0.016	240	2550	0.013	130	1910	0.012	90
6	4250	0.021	350	3180	0.019	240	2120	0.015	130	1590	0.014	90
8	3180	0.027	340	2390	0.024	230	1590	0.020	130	1190	0.019	90
10	2550	0.032	330	1910	0.029	220	1270	0.024	120	960	0.022	90
12	2120	0.037	310	1590	0.033	210	1060	0.028	120	800	0.026	80
14	1820	0.041	300	1360	0.037	200	910	0.031	110	680	0.029	80
16	1590	0.046	290	1190	0.041	200	800	0.034	110	600	0.032	80
20	1270	0.056	280	960	0.050	190	640	0.042	110	480	0.039	80

ap x ae	**≤ D5**	0.3D x D	0.3D x D	0.2D x D	0.1D x D

SIDE MILLING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**1.5D x 0.3D**			**1.5D x 0.2D**			**1.2D x 0.2D**			**D x 0.1D**		
Vc (m/min)	**90-110**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	10620	0.013	550	7430	0.012	340	5310	0.010	220	4250	0.014	240
4	7960	0.017	540	5570	0.015	340	3980	0.014	220	3180	0.019	240
5	6370	0.021	540	4460	0.019	340	3180	0.017	210	2550	0.023	240
6	5310	0.025	530	3720	0.022	330	2650	0.020	210	2120	0.027	230
8	3980	0.032	510	2790	0.029	320	1990	0.026	200	1590	0.035	220
10	3180	0.039	490	2230	0.035	310	1590	0.031	200	1270	0.042	220
12	2650	0.044	470	1860	0.040	300	1330	0.035	190	1060	0.048	210
14	2270	0.050	450	1590	0.045	280	1140	0.040	180	910	0.055	200
16	1990	0.055	440	1390	0.050	280	1000	0.044	180	800	0.061	190
20	1590	0.067	430	1110	0.060	270	800	0.054	170	640	0.074	190

ap x ae	**≤ D5**	1.2D x 0.2D	1.2D x 0.1D	D x 0.1D	D x 0.05D

HELICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
Vc (m/min)	**70-90**			**50-70**			**30-50**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	8490	0.008	265	6370	0.007	185	4250	0.006	109	3180	0.007	86
4	6370	0.010	265	4780	0.010	185	3180	0.008	108	2390	0.009	86
5	5100	0.013	260	3820	0.012	185	2550	0.011	108	1910	0.011	85
6	4250	0.015	255	3180	0.014	180	2120	0.012	105	1590	0.013	83
8	3180	0.019	250	2390	0.018	175	1590	0.016	102	1190	0.017	81
10	2550	0.023	240	1910	0.022	165	1270	0.019	98	960	0.020	78
12	2120	0.027	225	1590	0.025	160	1060	0.022	93	800	0.023	74
14	1820	0.030	220	1360	0.028	155	910	0.025	90	680	0.026	71
16	1590	0.033	215	1190	0.031	150	800	0.028	88	600	0.029	70
20	1270	0.041	205	960	0.038	145	640	0.034	86	480	0.035	68

α°	**≤ D5**	2°	2°	1°	1°

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF450 PARAMETERS.

HF451

RAMPING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x D**			**4° x D**			**3° x D**			**2° x D**		
Vc (m/min)	**60-80**			**50-60**			**30-40**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	3720	0.018	270	2920	0.017	195	1860	0.016	118	1330	0.025	131
8	2790	0.023	260	2190	0.022	190	1390	0.021	114	1000	0.032	128
10	2230	0.028	250	1750	0.026	185	1110	0.025	110	800	0.038	123
12	1860	0.032	240	1460	0.030	175	930	0.028	105	660	0.044	116
14	1590	0.036	230	1250	0.034	170	800	0.032	102	570	0.049	112
16	1390	0.040	225	1090	0.037	165	700	0.035	99	500	0.055	109
20	1110	0.049	215	880	0.045	160	560	0.043	96	400	0.067	107

VERTICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**60-80**			**50-60**			**30-40**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	3720	0.021	310	2920	0.019	220	1860	0.015	120	1330	0.014	80
8	2790	0.027	300	2190	0.024	210	1390	0.020	110	1000	0.019	70
10	2230	0.032	290	1750	0.029	200	1110	0.024	110	800	0.022	70
12	1860	0.037	270	1460	0.033	190	930	0.028	100	660	0.026	70
14	1590	0.041	260	1250	0.037	190	800	0.031	100	570	0.029	70
16	1390	0.046	260	1090	0.041	180	700	0.034	100	500	0.032	60
20	1110	0.056	250	880	0.050	180	560	0.042	90	400	0.039	60

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF450 PARAMETERS.

CUTTING PARAMETERS

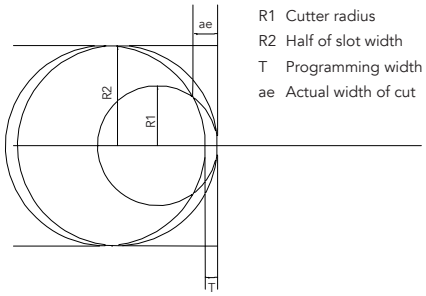
HF451

TROCHOIDAL

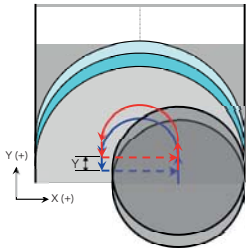
Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**D x 0.1D**			**D x 0.1D**		
Vc (m/min)	**110-130**			**80-100**			**50-70**			**40-60**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	6900	0.027	740	5310	0.024	510	3180	0.021	270	2650	0.029	310
4	5180	0.035	730	3980	0.032	510	2390	0.028	270	1990	0.039	310
5	4140	0.044	730	3180	0.040	500	1910	0.035	270	1590	0.048	310
6	3450	0.052	710	2650	0.046	490	1590	0.041	260	1330	0.057	300
8	2590	0.067	690	1990	0.060	480	1190	0.054	250	1000	0.074	290
10	2070	0.080	670	1590	0.072	460	960	0.064	250	800	0.088	280
12	1730	0.092	640	1330	0.083	440	800	0.073	240	660	0.101	270
14	1480	0.103	610	1140	0.093	420	680	0.083	220	570	0.114	260
16	1290	0.115	590	1000	0.103	410	600	0.092	220	500	0.126	250
20	1040	0.140	580	800	0.126	400	480	0.112	210	400	0.154	250

ap x ae	**≤ D5**	1.5D x 0.1D	1.5D x 0.1D	D x 0.1D	D x 0.05D

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF450 PARAMETERS.

HF852

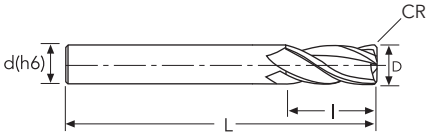
cylindrical shank, corner radius

OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	★

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
4	0/-0.025	0.30	+/-0.010	6	11		57	4	HF85203040	●
4	0/-0.025	0.50	+/-0.010	6	11		57	4	HF85205040	●
5	0/-0.025	0.30	+/-0.010	6	15		57	4	HF85203050	●
5	0/-0.025	0.50	+/-0.010	6	15		57	4	HF85205050	●
6	0/-0.025	0.30	+/-0.010	6	13		57	4	HF85203060	●
6	0/-0.025	0.50	+/-0.010	6	13		57	4	HF85205060	●
6	0/-0.025	1.00	+/-0.010	6	13		57	4	HF85210060	●
8	0/-0.030	0.50	+/-0.010	8	20		64	4	HF85205080	●
8	0/-0.030	1.00	+/-0.010	8	20		64	4	HF85210080	●
10	0/-0.030	0.50	+/-0.010	10	22		72	4	HF85205100	●
10	0/-0.030	1.00	+/-0.010	10	22		72	4	HF85210100	●
12	0/-0.030	0.50	+/-0.010	12	26		83	4	HF85205120	●
12	0/-0.030	1.00	+/-0.010	12	26		83	4	HF85210120	●
12	0/-0.030	2.00	+/-0.010	12	26		83	4	HF85220120	●
12	0/-0.030	3.00	+/-0.010	12	26		83	4	HF85230120	●
14	0/-0.030	1.00	+/-0.010	14	26		83	4	HF85210140	●
16	0/-0.030	1.00	+/-0.010	16	32		92	4	HF85210160	●
16	0/-0.030	2.00	+/-0.010	16	32		92	4	HF85220160	●
20	0/-0.030	1.00	+/-0.010	20	38		104	4	HF85210200	●
20	0/-0.030	2.00	+/-0.010	20	38		104	4	HF85220200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF852

SLOTTING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.2D x D**		
Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	7170	0.016	450	5570	0.014	320	3980	0.012	190	3180	0.011	140
5	5730	0.020	450	4460	0.018	310	3180	0.015	190	2550	0.014	140
6	4780	0.023	440	3720	0.021	310	2650	0.017	180	2120	0.016	140
8	3580	0.030	430	2790	0.027	300	1990	0.022	180	1590	0.021	130
10	2870	0.036	410	2230	0.032	290	1590	0.027	170	1270	0.025	130
12	2390	0.041	390	1860	0.037	270	1330	0.031	160	1060	0.029	120
14	2050	0.046	380	1590	0.041	260	1140	0.034	160	910	0.032	120
16	1790	0.051	370	1390	0.046	260	1000	0.038	150	800	0.036	110
20	1430	0.062	350	1110	0.056	250	800	0.047	150	640	0.043	110

ap x ae	**≤ D5**	0.3D x D	0.3D x D	0.2D x D	0.1D x D

SIDE MILLING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**1.5D x 0.3D**			**1.5D x 0.2D**			**1.2D x 0.2D**			**1.2D x 0.1D**		
Vc (m/min)	**100-120**			**70-90**			**50-70**			**40-60**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	8760	0.019	660	6370	0.017	430	4780	0.015	290	3980	0.021	330
5	7010	0.023	660	5100	0.021	430	3820	0.019	290	3180	0.026	330
6	5840	0.028	640	4250	0.025	420	3180	0.022	280	2650	0.030	320
8	4380	0.036	630	3180	0.032	410	2390	0.029	270	1990	0.039	310
10	3500	0.043	600	2550	0.039	390	1910	0.034	260	1590	0.047	300
12	2920	0.049	570	2120	0.044	370	1590	0.039	250	1330	0.054	290
14	2500	0.055	550	1820	0.050	360	1360	0.044	240	1140	0.061	280
16	2190	0.061	540	1590	0.055	350	1190	0.049	230	1000	0.067	270
20	1750	0.074	520	1270	0.067	340	960	0.060	230	800	0.082	260

ap x ae	**≤ D5**	1.2D x 0.2D	1.2D x 0.1D	D x 0.2D	D x 0.1D

HELICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	7170	0.011	330	5570	0.011	240	3980	0.009	150	3180	0.010	126
5	5730	0.014	325	4460	0.013	235	3180	0.012	149	2550	0.012	126
6	4780	0.017	320	3720	0.016	230	2650	0.014	146	2120	0.015	123
8	3580	0.022	310	2790	0.020	225	1990	0.018	142	1590	0.019	120
10	2870	0.026	300	2230	0.024	215	1590	0.021	136	1270	0.023	115
12	2390	0.030	285	1860	0.028	205	1330	0.024	130	1060	0.026	109
14	2050	0.033	275	1590	0.031	200	1140	0.028	126	910	0.029	106
16	1790	0.037	265	1390	0.035	190	1000	0.031	122	800	0.032	103
20	1430	0.045	260	1110	0.042	185	800	0.037	119	640	0.039	100

α°	**≤ D5**	2°	2°	1°	1°

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF852

RAMPING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x D**			**4° x D**			**3° x D**			**2° x D**		
Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	4780	0.020	385	3720	0.019	280	2650	0.018	187	2120	0.027	232
8	3580	0.026	370	2790	0.024	270	1990	0.023	182	1590	0.035	226
10	2870	0.031	360	2230	0.029	260	1590	0.027	175	1270	0.043	216
12	2390	0.036	340	1860	0.033	245	1330	0.031	167	1060	0.049	206
14	2050	0.040	330	1590	0.037	240	1140	0.035	161	910	0.055	199
16	1790	0.045	320	1390	0.042	230	1000	0.039	157	800	0.061	195
20	1430	0.054	310	1110	0.051	225	800	0.048	153	640	0.074	189

VERTICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	4780	0.023	440	3720	0.021	310	2650	0.017	180	2120	0.016	140
8	3580	0.030	430	2790	0.027	300	1990	0.022	180	1590	0.021	130
10	2870	0.036	410	2230	0.032	290	1590	0.027	170	1270	0.025	130
12	2390	0.041	390	1860	0.037	270	1330	0.031	160	1060	0.029	120
14	2050	0.046	380	1590	0.041	260	1140	0.034	160	910	0.032	120
16	1790	0.051	370	1390	0.046	260	1000	0.038	150	800	0.036	110
20	1430	0.062	350	1110	0.056	250	800	0.047	150	640	0.043	110

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

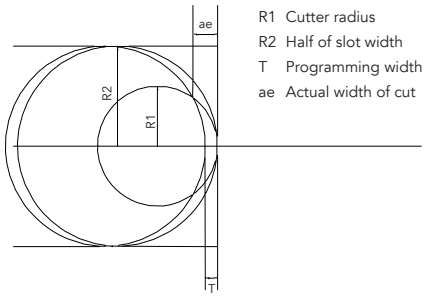
CUTTING PARAMETERS

HF852

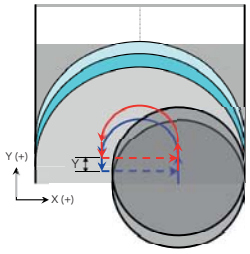
	Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
	Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**130-150**			**100-120**			**70-90**			**50-70**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	5570	0.039	880	4380	0.035	620	3180	0.031	400	2390	0.043	410
	5	4460	0.049	870	3500	0.044	620	2550	0.039	400	1910	0.054	410
	6	3720	0.057	850	2920	0.052	600	2120	0.046	390	1590	0.063	400
	8	2790	0.074	830	2190	0.067	590	1590	0.060	380	1190	0.082	390
	10	2230	0.089	800	1750	0.080	560	1270	0.071	360	960	0.098	380
	12	1860	0.102	760	1460	0.092	540	1060	0.082	350	800	0.112	360
	14	1590	0.115	730	1250	0.103	520	910	0.092	330	680	0.126	340
	16	1390	0.128	710	1090	0.115	500	800	0.102	330	600	0.140	340
	20	1110	0.155	690	880	0.140	490	640	0.124	320	480	0.171	330

ap x ae	**≤ D5**	1.5D x 0.1D			1.5D x 0.1D			D x 0.1D			D x 0.05D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF452

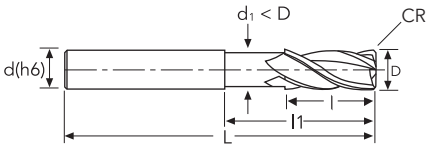
cylindrical shank and reduced neck, corner radius

OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | RADIUS | Z4 UP

P	M	K	N	S	H
★	★	★		★	★

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | TROCHOIDAL



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.30	+/-0.020	6	9	15	2.80	57	4	HF45203030	●
3	0/-0.030	0.50	+/-0.020	6	9	15	2.80	57	4	HF45205030	●
4	0/-0.030	0.30	+/-0.020	6	11	18	3.80	57	4	HF45203040	●
4	0/-0.030	0.50	+/-0.020	6	11	18	3.80	57	4	HF45205040	●
5	0/-0.030	0.50	+/-0.020	6	13	19	4.80	57	4	HF45205050	●
6	0/-0.030	0.50	+/-0.020	6	13	20	5.80	57	4	HF45205060	●
6	0/-0.030	1.00	+/-0.020	6	13	20	5.80	57	4	HF45210060	●
8	0/-0.030	0.50	+/-0.020	8	20	26	7.80	64	4	HF45205080	●
8	0/-0.030	1.00	+/-0.020	8	20	26	7.80	64	4	HF45210080	●
10	0/-0.030	0.50	+/-0.020	10	22	30	9.80	72	4	HF45205100	●
10	0/-0.030	1.00	+/-0.020	10	22	30	9.80	72	4	HF45210100	●
12	0/-0.030	0.50	+/-0.020	12	26	36	11.80	83	4	HF45205120	●
12	0/-0.030	1.00	+/-0.020	12	26	36	11.80	83	4	HF45210120	●
16	0/-0.030	1.00	+/-0.020	16	32	42	15.70	92	4	HF45210160	●
16	0/-0.030	2.00	+/-0.020	16	32	42	15.70	92	4	HF45220160	●
20	0/-0.030	1.00	+/-0.020	20	38	50	19.70	104	4	HF45210200	●
20	0/-0.030	2.00	+/-0.020	20	38	50	19.70	104	4	HF45220200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF452

SLOTTING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.2D x D**		
Vc (m/min)	**70-90**			**50-70**			**30-50**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	8490	0.011	360	6370	0.010	250	4250	0.008	140	3180	0.007	100
4	6370	0.014	360	4780	0.013	240	3180	0.011	140	2390	0.010	90
5	5100	0.018	360	3820	0.016	240	2550	0.013	130	1910	0.012	90
6	4250	0.021	350	3180	0.019	240	2120	0.015	130	1590	0.014	90
8	3180	0.027	340	2390	0.024	230	1590	0.020	130	1190	0.019	90
10	2550	0.032	330	1910	0.029	220	1270	0.024	120	960	0.022	90
12	2120	0.037	310	1590	0.033	210	1060	0.028	120	800	0.026	80
14	1820	0.041	300	1360	0.037	200	910	0.031	110	680	0.029	80
16	1590	0.046	290	1190	0.041	200	800	0.034	110	600	0.032	80
20	1270	0.056	280	960	0.050	190	640	0.042	110	480	0.039	80

ap x ae	**≤ D5**	0.3D x D	0.3D x D	0.2D x D	0.1D x D

SIDE MILLING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**1.5D x 0.3D**			**1.5D x 0.2D**			**1.2D x 0.2D**			**D x 0.1D**		
Vc (m/min)	**90-110**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	10620	0.013	550	7430	0.012	340	5310	0.010	220	4250	0.014	240
4	7960	0.017	540	5570	0.015	340	3980	0.014	220	3180	0.019	240
5	6370	0.021	540	4460	0.019	340	3180	0.017	210	2550	0.023	240
6	5310	0.025	530	3720	0.022	330	2650	0.020	210	2120	0.027	230
8	3980	0.032	510	2790	0.029	320	1990	0.026	200	1590	0.035	220
10	3180	0.039	490	2230	0.035	310	1590	0.031	200	1270	0.042	220
12	2650	0.044	470	1860	0.040	300	1330	0.035	190	1060	0.048	210
14	2270	0.050	450	1590	0.045	280	1140	0.040	180	910	0.055	200
16	1990	0.055	440	1390	0.050	280	1000	0.044	180	800	0.061	190
20	1590	0.067	430	1110	0.060	270	800	0.054	170	640	0.074	190

ap x ae	**≤ D5**	1.2D x 0.2D	1.2D x 0.1D	D x 0.1D	D x 0.05D

HELICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**2° x 0.4D**		
Vc (m/min)	**70-90**			**50-70**			**30-50**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	8490	0.008	265	6370	0.007	185	4250	0.006	109	3180	0.007	86
4	6370	0.010	265	4780	0.010	185	3180	0.008	108	2390	0.009	86
5	5100	0.013	260	3820	0.012	185	2550	0.011	108	1910	0.011	85
6	4250	0.015	255	3180	0.014	180	2120	0.012	105	1590	0.013	83
8	3180	0.019	250	2390	0.018	175	1590	0.016	102	1190	0.017	81
10	2550	0.023	240	1910	0.022	165	1270	0.019	98	960	0.020	78
12	2120	0.027	225	1590	0.025	160	1060	0.022	93	800	0.023	74
14	1820	0.030	220	1360	0.028	155	910	0.025	90	680	0.026	71
16	1590	0.033	215	1190	0.031	150	800	0.028	88	600	0.029	70
20	1270	0.041	205	960	0.038	145	640	0.034	86	480	0.035	68

α°	**≤ D5**	2°	2°	1°	1°

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF452

RAMPING

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
α° x ae	**5° x D**			**4° x D**			**3° x D**			**2° x D**		
Vc (m/min)	**60-80**			**50-60**			**30-40**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	3720	0.018	270	2920	0.017	195	1860	0.016	118	1330	0.025	131
8	2790	0.023	260	2190	0.022	190	1390	0.021	114	1000	0.032	128
10	2230	0.028	250	1750	0.026	185	1110	0.025	110	800	0.038	123
12	1860	0.032	240	1460	0.030	175	930	0.028	105	660	0.044	116
14	1590	0.036	230	1250	0.034	170	800	0.032	102	570	0.049	112
16	1390	0.040	225	1090	0.037	165	700	0.035	99	500	0.055	109
20	1110	0.049	215	880	0.045	160	560	0.043	96	400	0.067	107

VERTICAL

Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
Vc (m/min)	**60-80**			**50-60**			**30-40**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	3720	0.021	310	2920	0.019	220	1860	0.015	120	1330	0.014	80
8	2790	0.027	300	2190	0.024	210	1390	0.020	110	1000	0.019	70
10	2230	0.032	290	1750	0.029	200	1110	0.024	110	800	0.022	70
12	1860	0.037	270	1460	0.033	190	930	0.028	100	660	0.026	70
14	1590	0.041	260	1250	0.037	190	800	0.031	100	570	0.029	70
16	1390	0.046	260	1090	0.041	180	700	0.034	100	500	0.032	60
20	1110	0.056	250	880	0.050	180	560	0.042	90	400	0.039	60

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

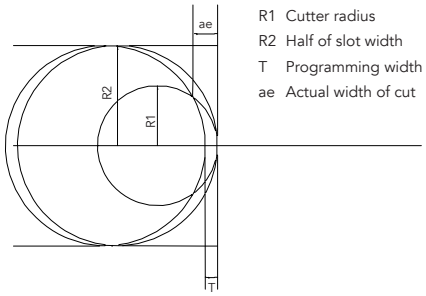
CUTTING PARAMETERS

HF452

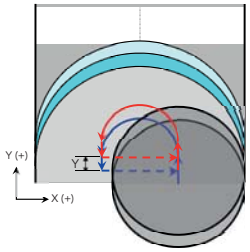
	Material Group ISO 513	P4 M4 K4			P4 P5 M4 M5 K4 S1			P5 P6 M5 K4 S2 S3			H1 H4 H5		
	Hardness/Rm	800-1000 N/mm²			900-1200 N/mm²			35-45 HRC			≤ 55 HRC		
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**D x 0.1D**			**D x 0.1D**		
	Vc (m/min)	**110-130**			**80-100**			**50-70**			**40-60**		
TROCHOIDAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	6900	0.027	740	5310	0.024	510	3180	0.021	270	2650	0.029	310
	4	5180	0.035	730	3980	0.032	510	2390	0.028	270	1990	0.039	310
	5	4140	0.044	730	3180	0.040	500	1910	0.035	270	1590	0.048	310
	6	3450	0.052	710	2650	0.046	490	1590	0.041	260	1330	0.057	300
	8	2590	0.067	690	1990	0.060	480	1190	0.054	250	1000	0.074	290
	10	2070	0.080	670	1590	0.072	460	960	0.064	250	800	0.088	280
	12	1730	0.092	640	1330	0.083	440	800	0.073	240	660	0.101	270
	14	1480	0.103	610	1140	0.093	420	680	0.083	220	570	0.114	260
	16	1290	0.115	590	1000	0.103	410	600	0.092	220	500	0.126	250
	20	1040	0.140	580	800	0.126	400	480	0.112	210	400	0.154	250

ap x ae	**≤ D5**	1.5D x 0.1D	1.5D x 0.1D	D x 0.1D	D x 0.05D

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

MEF

STAINLESS STEEL AND SUPER ALLOYS

Ultra-fine micrograin and Endless Black coating for high performance machining on stainless steel, HRSA and titanium alloy, carbon and low alloy steel. The unique design of the cutting geometry and the Endless Black coating are specifically developed to control the cutting friction delivering longer tool life through the reduction of the heat generation.

Micrograna ultrafine e rivestimento Endless Black per la lavorazione ad alto rendimento di acciai al carbonio, acciai inossidabili, HRSA e leghe di titanio. La geometria e il rivestimento specifici consentono di generare bassi sforzi di taglio e l'abbassamento del coefficiente di attrito, garantendo una riduzione dello sviluppo del calore con conseguente rallentamento del processo di usura del tagliente.

Besonders feine Mikrokörnung und Beschichtung Endless Black für Hochleistungsbearbeitungen von Kohlenstoffstahl, Edelstahl, HRSA und Titanlegierungen. Dank der speziellen Geometrie und der spezifischen Beschichtung werden ein niedriger Schneiddruck erzeugt und der Reibungsfaktor gesenkt, wodurch die Hitzeentwicklung reduziert und in Folge die Abnutzung der Schneidkante verzögert werden.

Ultra Micrograin et revêtement Endless Black pour l'usinage à haute performance pour les aciers au carbone, aciers inoxydables, HRSA et alliages de titane. La géométrie et le revêtement spécifiques permettent de générer peu d'efforts de coupe et de réduire le coefficient de frottement, en garantissant une diminution du développement de la chaleur et le ralentissement consécutif du processus d'usure de l'arête.

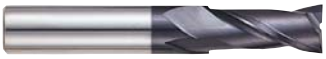
Micrograno ultrafino y revestimiento Endless Black para el mecanizado a alto rendimiento de aceros al carbono, aceros inoxidables, HRSA y aleaciones de titanio. La geometría y revestimiento específicos permiten generar bajos esfuerzos de corte y reducción del coeficiente de rozamiento, garantizando una reducción del desarrollo de calor con la consiguiente ralentización del proceso de desgaste del filo.

Микрозернистая супермелкая структура твердого сплава и покрытие Endless Black служат для высокоэффективной обработки нержавеющей стали, жаропрочных и титановых сплавов, низко- и высокоуглеродистых сталей. Специальные геометрия и покрытие позволяют снизить трение и тепловыделение при резании и, тем самым, увеличить стойкость инструмента.

MEFCS2

cylindrical shank, 2 flutes

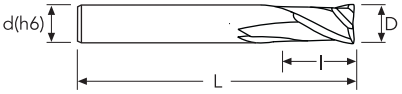
OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 35° | SQUARE | Z2



P	M	K	N	S	H
★	★			★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.030			4	2.5		40	2	MEFCS2010	●
1.5	0/-0.030			4	4		40	2	MEFCS2015	●
2	0/-0.030			4	6		40	2	MEFCS2020	●
2.5	0/-0.030			4	8		40	2	MEFCS2025	●
3	0/-0.030			6	8		45	2	MEFCS2030	●
4	0/-0.030			6	11		45	2	MEFCS2040	●
5	0/-0.030			6	13		50	2	MEFCS2050	●
6	0/-0.030			6	13		50	2	MEFCS2060	●
8	0/-0.030			8	19		60	2	MEFCS2080	●
10	0/-0.030			10	22		70	2	MEFCS2100	●
12	0/-0.030			12	26		75	2	MEFCS2120	●
14	0/-0.030			14	26		85	2	MEFCS2140	●
16	0/-0.030			16	32		100	2	MEFCS2160	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEFCS2

Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.2D x D**		
Vc (m/min)	**90-110**			**50-70**			**30-50**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	31850	0.005	290	19110	0.004	150	12740	0.004	90	9550	0.004	70
2	15920	0.009	290	9550	0.008	150	6370	0.007	90	4780	0.007	70
3	10620	0.012	240	6370	0.010	120	4250	0.009	80	3180	0.009	60
4	7960	0.017	270	4780	0.015	140	3180	0.014	90	2390	0.014	70
5	6370	0.023	290	3820	0.020	150	2550	0.018	90	1910	0.018	70
6	5310	0.029	310	3180	0.024	160	2120	0.023	100	1590	0.023	70
8	3980	0.035	270	2390	0.029	140	1590	0.028	90	1190	0.028	70
10	3180	0.040	260	1910	0.034	130	1270	0.032	80	960	0.032	60
12	2650	0.046	240	1590	0.039	120	1060	0.037	80	800	0.037	60
14	2270	0.052	230	1360	0.044	120	910	0.041	80	680	0.041	60
16	1990	0.058	230	1190	0.049	120	800	0.046	70	600	0.046	60

< D3 mm: ap = 0.1D - 0.2D

Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**D x 0.3D**			**D x 0.1D**		
Vc (m/min)	**90-110**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	31850	0.006	350	22290	0.005	210	15920	0.004	140	12740	0.004	110
2	15920	0.011	350	11150	0.009	210	7960	0.009	140	6370	0.009	110
3	10620	0.014	290	7430	0.012	170	5310	0.011	120	4250	0.011	90
4	7960	0.021	330	5570	0.018	200	3980	0.017	130	3180	0.017	110
5	6370	0.028	350	4460	0.023	210	3180	0.022	140	2550	0.022	110
6	5310	0.035	370	3720	0.029	220	2650	0.028	150	2120	0.028	120
8	3980	0.041	330	2790	0.035	200	1990	0.033	130	1590	0.033	110
10	3180	0.048	310	2230	0.041	180	1590	0.039	120	1270	0.039	100
12	2650	0.055	290	1860	0.047	170	1330	0.044	120	1060	0.044	90
14	2270	0.062	280	1590	0.053	170	1140	0.050	110	910	0.050	90
16	1990	0.069	270	1390	0.059	160	1000	0.055	110	800	0.055	90

< D3 mm: ae = 0.05D - 0.2D

Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.2D x D**		
Vc (m/min)	**90-110**			**50-70**			**30-50**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	31850	0.003	180	19110	0.002	90	12740	0.002	60	9550	0.022	420
2	15920	0.006	180	9550	0.005	90	6370	0.004	60	4780	0.044	420
3	10620	0.007	150	6370	0.006	70	4250	0.006	50	3180	0.055	350
4	7960	0.010	160	4780	0.009	80	3180	0.008	50	2390	0.083	400
5	6370	0.014	180	3820	0.012	90	2550	0.011	60	1910	0.110	420
6	5310	0.017	180	3180	0.015	90	2120	0.014	60	1590	0.138	440
8	3980	0.021	160	2390	0.018	80	1590	0.017	50	1190	0.166	390
10	3180	0.024	150	1910	0.021	80	1270	0.019	50	960	0.193	370
12	2650	0.028	150	1590	0.023	70	1060	0.022	50	800	0.221	350
14	2270	0.031	140	1360	0.026	70	910	0.025	50	680	0.248	340
16	1990	0.035	140	1190	0.029	70	800	0.028	40	600	0.276	330

< D3 mm: ap = 0.1D - 0.2D

MEFCSH3

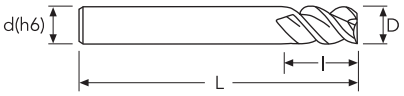
cylindrical shank, 3 flutes

OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 50° | SQUARE | Z3 ≤ Ø18 | Z4 > Ø18

P	M	K	N	S	H
★	★			★	

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.030			6	13		50	3	MEFCSH3060	●
8	0/-0.030			8	19		60	3	MEFCSH3080	●
10	0/-0.030			10	22		70	3	MEFCSH3100	●
12	0/-0.030			12	26		75	3	MEFCSH3120	●
16	0/-0.030			16	32		100	3	MEFCSH3160	●
18	0/-0.030			18	32		90	3	MEFCSH3180	●
20	0/-0.030			20	38		105	4	MEFCSH4200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEFCSH3

	Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
	ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.2D x D**		
	Vc (m/min)	**80-100**			**60-80**			**40-60**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4780	0.022	220	3720	0.013	140	2650	0.012	100	2120	0.012	80
	8	3580	0.029	210	2790	0.017	140	1990	0.015	90	1590	0.016	80
	10	2870	0.036	220	2230	0.021	140	1590	0.019	90	1270	0.020	80
	12	2390	0.046	230	1860	0.027	150	1330	0.024	100	1060	0.026	80
	14	2050	0.053	230	1590	0.031	150	1140	0.028	90	910	0.030	80
	16	1790	0.065	240	1390	0.038	160	1000	0.034	100	800	0.036	90
	18	1590	0.075	250	1240	0.044	160	880	0.039	100	710	0.042	90
	20	1430	0.086	260	1110	0.051	170	800	0.045	110	640	0.048	90

	Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.2D**			**1.5D x 0.1D**		
	Vc (m/min)	**80-120**			**60-80**			**40-60**			**100-140**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4780	0.026	260	3720	0.015	170	2650	0.014	110	2120	0.014	90
	8	3580	0.035	260	2790	0.020	170	1990	0.019	110	1590	0.019	90
	10	2870	0.043	260	2230	0.026	170	1590	0.024	110	1270	0.024	90
	12	2390	0.055	280	1860	0.033	180	1330	0.031	120	1060	0.031	100
	14	2050	0.064	270	1590	0.038	180	1140	0.036	120	910	0.036	100
	16	1790	0.078	290	1390	0.046	190	1000	0.043	130	800	0.043	100
	18	1590	0.090	300	1240	0.053	200	880	0.050	130	710	0.050	110
	20	1430	0.104	310	1110	0.061	200	800	0.058	140	640	0.058	110

MEFCS4

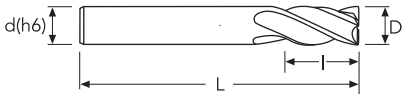
cylindrical shank, 4 flutes

OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 35° | SQUARE | Z4

P	M	K	N	S	H
★	★			★	

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.030			4	6		40	4	MEFCS4020	●
2.5	0/-0.030			4	8		40	4	MEFCS4025	●
3	0/-0.030			6	8		45	4	MEFCS4030	●
4	0/-0.030			6	11		45	4	MEFCS4040	●
5	0/-0.030			6	13		50	4	MEFCS4050	●
6	0/-0.030			6	13		50	4	MEFCS4060	●
8	0/-0.030			8	19		60	4	MEFCS4080	●
10	0/-0.030			10	22		70	4	MEFCS4100	●
12	0/-0.030			12	26		75	4	MEFCS4120	●
14	0/-0.030			14	26		85	4	MEFCS4140	●
16	0/-0.030			16	32		100	4	MEFCS4160	●
20	0/-0.030			20	38		105	4	MEFCS4200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEFCS4

	Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**90-110**			**60-80**			**40-60**			**30-50**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	10620	0.012	510	7430	0.010	300	5310	0.010	200	4250	0.010	160
	4	7960	0.015	480	5570	0.013	280	3980	0.012	190	3180	0.012	150
	5	6370	0.018	460	4460	0.015	270	3180	0.014	180	2550	0.014	150
	6	5310	0.023	490	3720	0.020	290	2650	0.018	200	2120	0.018	160
	8	3980	0.030	480	2790	0.026	280	1990	0.024	190	1590	0.024	150
	10	3180	0.038	480	2230	0.032	290	1590	0.030	190	1270	0.030	150
	12	2650	0.045	480	1860	0.038	280	1330	0.036	190	1060	0.036	150
	14	2270	0.052	470	1590	0.044	280	1140	0.042	190	910	0.042	150
	16	1990	0.058	460	1390	0.049	270	1000	0.046	190	800	0.046	150
	18	1770	0.066	470	1240	0.056	280	880	0.053	190	710	0.053	150
	20	1590	0.075	480	1110	0.064	280	800	0.060	190	640	0.060	150

MEF600

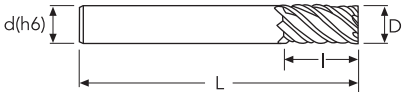
cylindrical shank, multi flute

OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 50° | SQUARE | Z6~Z8

P	M	K	N	S	H
★	★			★	

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.030			6	13		57	6	MEF600060	●
8	0/-0.030			8	19		63	6	MEF600080	●
10	0/-0.030			10	22		72	6	MEF600100	●
12	0/-0.030			12	26		83	6	MEF600120	●
16	0/-0.030			16	32		92	6	MEF600160	●
20	0/-0.030			20	38		104	8	MEF600200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEF600

	Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
	ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.05D**		
	Vc (m/min)	**100-140**			**70-110**			**50-90**			**50-70**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	6370	0.015	570	4780	0.013	370	3720	0.012	270	3180	0.012	230
	8	4780	0.020	570	3580	0.017	370	2790	0.016	270	2390	0.016	230
	10	3820	0.025	570	2870	0.021	370	2230	0.020	270	1910	0.020	230
	12	3180	0.030	570	2390	0.026	370	1860	0.024	270	1590	0.024	230
	14	2730	0.035	570	2050	0.030	370	1590	0.028	270	1360	0.028	230
	16	2390	0.040	570	1790	0.034	370	1390	0.032	270	1190	0.032	230
	20	1910	0.050	760	1430	0.043	490	1110	0.040	360	960	0.040	310

MEF901

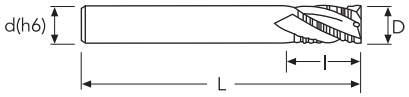
cylindrical shank, roughing

OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 45° | SQUARE | HR FINE | Z3~Z6

P	M	K	N	S	H
★	★			★	

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
4	0/-0.048	0.10	+/-0.020	6	11		57	3	MEF901040	●
5	0/-0.048	0.10	+/-0.020	6	13		57	4	MEF901050	●
6	0/-0.048	0.15	+/-0.020	6	16		57	4	MEF901060	●
8	0/-0.058	0.20	+/-0.020	8	16		63	4	MEF901080	●
10	0/-0.058	0.20	+/-0.020	10	22		72	4	MEF901100	●
12	0/-0.070	0.20	+/-0.020	12	26		83	4	MEF901120	●
14	0/-0.070	0.20	+/-0.020	14	26		83	5	MEF901140	●
16	0/-0.070	0.20	+/-0.020	16	32		92	5	MEF901160	●
20	0/-0.084	0.20	+/-0.020	20	38		104	6	MEF901200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEF901

	Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
	Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.2D**			**D x 0.1D**		
	Vc (m/min)	**100-140**			**70-90**			**50-70**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	9550	0.018	520	6370	0.015	290	4780	0.014	210	3980	0.014	170
	5	7640	0.022	670	5100	0.019	380	3820	0.018	270	3180	0.018	220
	6	6370	0.028	710	4250	0.024	400	3180	0.022	280	2650	0.022	240
	8	4780	0.035	670	3180	0.030	380	2390	0.028	270	1990	0.028	220
	10	3820	0.040	610	2550	0.034	350	1910	0.032	240	1590	0.032	200
	12	3180	0.045	570	2120	0.038	320	1590	0.036	230	1330	0.036	190
	14	2730	0.050	680	1820	0.043	390	1360	0.040	270	1140	0.040	230
	16	2390	0.057	680	1590	0.048	390	1190	0.046	270	1000	0.046	230
	20	1910	0.073	840	1270	0.062	470	960	0.058	340	800	0.058	280

MEF902

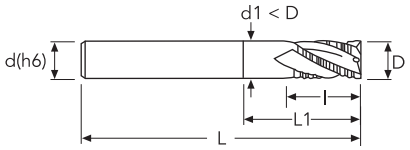
cylindrical shank, reduced neck, roughing

OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 45° | SQUARE | HR FINE | Z4~Z6

P	M	K	N	S	H
★	★			★	

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
6	0/-0.048	0.15	+/-0.020	6	16	20	5.50	57	4	MEF902060	●
8	0/-0.058	0.20	+/-0.020	8	16	26	7.50	63	4	MEF902080	●
10	0/-0.058	0.20	+/-0.020	10	22	31	9.50	72	4	MEF902100	●
12	0/-0.070	0.20	+/-0.020	12	26	37	11.50	83	4	MEF902120	●
16	0/-0.070	0.20	+/-0.020	16	32	51	15.50	92	5	MEF902160	●
20	0/-0.084	0.20	+/-0.020	20	38	59	19.20	104	6	MEF902200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEF902

SIDE MILLING

Material Group ISO 513	P1 P2 P3			P4 M1 M2			P5 M3 M4 S1 S2 S4			M5 S3 S5		
Hardness/Rm	< 700 N/mm²			700-1000 N/mm²			< 35 HRC			< 45 HRC		
ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**1.5D x 0.2D**			**D x 0.1D**		
Vc (m/min)	**100-120**			**60-80**			**40-60**			**40-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	5840	0.027	620	3720	0.023	340	2650	0.021	230	2390	0.021	200
8	4380	0.033	580	2790	0.028	320	1990	0.027	210	1790	0.027	190
10	3500	0.038	530	2230	0.032	290	1590	0.030	190	1430	0.030	170
12	2920	0.043	500	1860	0.036	270	1330	0.034	180	1190	0.034	160
14	2500	0.048	590	1590	0.040	320	1140	0.038	220	1020	0.038	190
16	2190	0.054	590	1390	0.046	320	1000	0.043	220	900	0.043	190
20	1750	0.069	730	1110	0.059	390	800	0.055	270	720	0.055	240

ALU

NON-FERROUS MATERIALS

Uncoated polished micrograin with cutting geometry specifically designed for aluminium and non-ferrous materials. The polished edge and the wide chip pockets, deliver low cutting friction, high precision, excellent surface finishing and smooth chip ejection.

Micrograna non rivestita e geometria di taglio sviluppata specificamente per la lavorazione di materiali non-ferrosi. Taglienti lappati e particolare profilo del vano truciolo per bassi sforzi di taglio e un'eccellente finitura superficiale. Disponibile anche la versione HF Alu con passo differenziato (UP) con un particolare design che permette finiture a specchio e lavorazioni DxD, anche nella versione a 4 taglienti.

Unbeschichtete Mikrokörnung und eigens für die Bearbeitung von NE-Metallen entwickelte Schnittgeometrie. Dank der geläppten Schneiden und der besonderen Form der Nuten ist die aufzubringende Schnittkraft gering, bei gleichzeitig ausgezeichnetem Oberflächenfinish. Auch in der Version HF Alu mit ungleicher Teilung (UP) und besonderer Form erhältlich, die auch in der Version mit 4 Schneiden ein spiegelblankes Oberflächenfinish und DxD-Bearbeitungen ermöglicht.

Micrograin non revêtu et poli avec une géométrie de coupe développée spécialement pour l'usinage d'aluminium, d'alliages et de matériaux non ferreux en général. La finition polie des arêtes, associée au profil particulier de la goujure, permet de générer peu d'efforts de coupe et d'obtenir précision et qualité de finition ; une capacité exceptionnelle d'évacuation des copeaux garantit une possibilité de débit copeaux très élevée.

Micrograna no revestida y geometría de corte desarrollada específicamente para la elaboración de materiales no ferrosos. Filos de corte lapeados y perfil especial del compartimento de virutas, para bajos esfuerzos de corte y un excelente acabado de la superfície. También está disponible la versión HF Alu con paso diferenciado (UP) con un diseño especial que permite acabados a espejo y elaboraciones D x D, incluso en la versión de 4 filos.

Микрозернистая структура твердого сплава без покрытия, отполированная поверхность и специальная геометрия предназначены для обработки алюминия и цветных металлов. Отполированные кромки и широкие стружечные канавки обеспечивают снижение трения, увеличение точности, снижение шероховатости и улучшение вывода стружки.

HFAL4

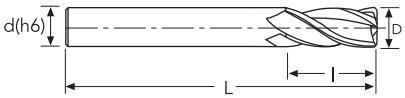
cylindrical shank, 4 flutes

OSAWA NORM | ALU | MG / BR | 40° | SQUARE | Z4 UP

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.025			6	9		57	4	HFAL4030	●
4	0/-0.025			6	12		57	4	HFAL4040	●
5	0/-0.025			6	13		57	4	HFAL4050	●
6	0/-0.025			6	13		57	4	HFAL4060	●
8	0/-0.030			8	20		64	4	HFAL4080	●
10	0/-0.030			10	22		72	4	HFAL4100	●
12	0/-0.030			12	26		83	4	HFAL4120	●
14	0/-0.030			14	32		90	4	HFAL4140	●
16	0/-0.030			16	32		92	4	HFAL4160	●
20	0/-0.030			20	38		104	4	HFAL4200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HFAL4

SLOTTING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	D x D			D x D			D x D			D x D		
Vc (m/min)	300-500			200-400			150-350			600-1000		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	42460	0.030	5040	31850	0.025	3220	26540	0.021	2210	50000	0.033	6530
4	31850	0.040	5050	23890	0.034	3220	19900	0.028	2210	50000	0.044	8710
5	25480	0.050	5050	19110	0.042	3220	15920	0.035	2210	50000	0.054	10890
6	21230	0.059	4970	15920	0.050	3170	13270	0.041	2170	42460	0.064	10930
8	15920	0.077	4930	11940	0.066	3140	9950	0.054	2160	31850	0.085	10850
10	12740	0.095	4820	9550	0.080	3070	7960	0.066	2110	25480	0.104	10590
12	10620	0.108	4590	7960	0.092	2920	6630	0.076	2000	21230	0.119	10090
14	9100	0.126	4590	6820	0.107	2920	5690	0.088	2010	18200	0.139	10090
16	7960	0.144	4580	5970	0.122	2920	4980	0.101	2010	15920	0.158	10090
18	7080	0.158	4490	5310	0.135	2860	4420	0.111	1960	14150	0.174	9860
20	6370	0.176	4470	4780	0.149	2850	3980	0.123	1960	12740	0.193	9840

SIDE MILLING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
Vc (m/min)	300-600			200-500			200-400			600-1000		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	47770	0.036	6810	37150	0.032	4770	31850	0.029	3630	50000	0.039	7840
4	35830	0.048	6810	27870	0.043	4770	23890	0.038	3630	50000	0.052	10450
5	28660	0.059	6810	22290	0.053	4770	19110	0.048	3630	50000	0.065	13070
6	23890	0.070	6710	18580	0.063	4700	15920	0.056	3580	42460	0.077	13120
8	17910	0.093	6650	13930	0.084	4660	11940	0.074	3550	31850	0.102	13020
10	14330	0.113	6500	11150	0.102	4550	9550	0.091	3470	25480	0.125	12710
12	11940	0.130	6190	9290	0.117	4330	7960	0.104	3300	21230	0.143	12110
14	10240	0.151	6190	7960	0.136	4330	6820	0.121	3300	18200	0.166	12110
16	8960	0.173	6190	6970	0.156	4340	5970	0.138	3300	15920	0.190	12100
18	7960	0.190	6050	6190	0.171	4240	5310	0.152	3230	14150	0.209	11830
20	7170	0.211	6040	5570	0.190	4220	4780	0.168	3220	12740	0.232	11810

HELICAL

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
α° x ae	8° x 0.5D			5° x 0.5D			5° x 0.5D			8° x 0.5D		
Vc (m/min)	300-600			200-500			200-400			600-1000		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	47770	0.021	3925	37150	0.018	2730	31850	0.015	1929	50000	0.023	4517
4	35830	0.027	3925	27870	0.025	2730	23890	0.020	1929	50000	0.030	6023
5	28660	0.034	3925	22290	0.031	2730	19110	0.025	1929	50000	0.038	7529
6	23890	0.040	3865	18580	0.036	2690	15920	0.030	1899	42460	0.044	7556
8	17910	0.054	3835	13930	0.048	2670	11940	0.039	1884	31850	0.059	7499
10	14330	0.065	3745	11150	0.058	2610	9550	0.048	1840	25480	0.072	7325
12	11940	0.075	3565	9290	0.067	2485	7960	0.055	1753	21230	0.082	6975
14	10240	0.087	3570	7960	0.078	2485	6820	0.064	1752	18200	0.096	6976
16	8960	0.100	3570	6970	0.089	2485	5970	0.073	1753	15920	0.110	6974
18	7960	0.110	3485	6190	0.098	2425	5310	0.081	1715	14150	0.120	6818
20	7170	0.121	3480	5570	0.109	2420	4780	0.089	1710	12740	0.133	6801

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HFAL4

RAMPING	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	α° x ae	15° x 0.5D			10° x 0.5D			7° x 0.5D			15° x 0.5D		
	Vc (m/min)	300-500			200-400			200-300			600-1000		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	42460	0.020	3355	31850	0.017	2185	26540	0.015	1545	50000	0.022	4344
	4	31850	0.026	3355	23890	0.023	2185	19900	0.019	1544	50000	0.029	5792
	5	25480	0.033	3355	19110	0.029	2185	15920	0.024	1544	50000	0.036	7240
	6	21230	0.039	3305	15920	0.034	2150	13270	0.029	1521	42460	0.043	7266
	8	15920	0.051	3275	11940	0.045	2135	9950	0.038	1509	31850	0.057	7211
	10	12740	0.063	3200	9550	0.055	2085	7960	0.046	1474	25480	0.069	7043
	12	10620	0.072	3050	7960	0.062	1985	6630	0.053	1403	21230	0.079	6707
	14	9100	0.084	3050	6820	0.073	1985	5690	0.062	1405	18200	0.092	6708
	16	7960	0.096	3050	5970	0.083	1985	4980	0.071	1405	15920	0.105	6706
	18	7080	0.105	2980	5310	0.092	1945	4420	0.078	1372	14150	0.116	6556
	20	6370	0.117	2975	4780	0.101	1940	3980	0.086	1369	12740	0.128	6540

VERTICAL	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	D x 0.4D			D x 0.4D			D x 0.4D			D x 0.4D		
	Vc (m/min)	300-500			200-400			150-350			600-1000		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	42460	0.030	5040	31850	0.027	3410	26540	0.024	2520	50000	0.033	6530
	4	31850	0.040	5050	23890	0.036	3410	19900	0.032	2520	50000	0.044	8710
	5	25480	0.050	5050	19110	0.045	3410	15920	0.040	2520	50000	0.054	10890
	6	21230	0.059	4970	15920	0.053	3350	13270	0.047	2480	42460	0.064	10930
	8	15920	0.077	4930	11940	0.070	3330	9950	0.062	2460	31850	0.085	10850
	10	12740	0.095	4820	9550	0.085	3250	7960	0.076	2410	25480	0.104	10590
	12	10620	0.108	4590	7960	0.097	3090	6630	0.086	2290	21230	0.119	10090
	14	9100	0.126	4590	6820	0.113	3090	5690	0.101	2290	18200	0.139	10090
	16	7960	0.144	4580	5970	0.130	3090	4980	0.115	2290	15920	0.158	10090
	18	7080	0.158	4490	5310	0.143	3030	4420	0.127	2240	14150	0.174	9860
	20	6370	0.176	4470	4780	0.158	3020	3980	0.140	2240	12740	0.193	9840

DRILLING	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	D x D			D x D			0.5D x D			0.5D x D		
	Vc (m/min)	270-370			190-290			150-250			590-690		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	33970	0.015	2020	25480	0.013	1360	21230	0.012	1010	50000	0.016	3270
	4	25480	0.020	2020	19110	0.018	1360	15920	0.016	1010	50000	0.022	4360
	5	20380	0.025	2020	15290	0.022	1360	12740	0.020	1010	40760	0.027	4440
	6	16990	0.029	1990	12740	0.026	1340	10620	0.023	990	33970	0.032	4370
	8	12740	0.039	1970	9550	0.035	1330	7960	0.031	990	25480	0.043	4340
	10	10190	0.047	1930	7640	0.043	1300	6370	0.038	960	20380	0.052	4240
	12	8490	0.054	1830	6370	0.049	1240	5310	0.043	920	16990	0.059	4040
	14	7280	0.063	1830	5460	0.057	1240	4550	0.050	920	14560	0.069	4040
	16	6370	0.072	1830	4780	0.065	1240	3980	0.058	920	12740	0.079	4040
	18	5660	0.079	1790	4250	0.071	1210	3540	0.063	900	11320	0.087	3940
	20	5100	0.088	1790	3820	0.079	1210	3180	0.070	890	10190	0.097	3930

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HFAL3

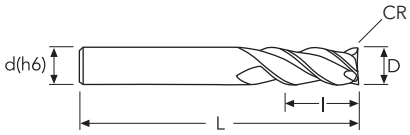
cylindrical shank, 3 flutes, corner radius

OSAWA NORM | ALU | MG POLISHED | 30° | RADIUS | Z3 UP

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.030	0.10	+/-0.010	6	6.5		50	3	HFAL301020	●
3	0/-0.030	0.10	+/-0.010	6	9		50	3	HFAL301030	●
4	0/-0.030	0.10	+/-0.010	6	12		50	3	HFAL301040	●
5	0/-0.030	0.10	+/-0.010	6	15		50	3	HFAL301050	●
6	0/-0.030	0.10	+/-0.010	6	20		60	3	HFAL301060	●
8	0/-0.030	0.10	+/-0.010	8	20		64	3	HFAL301080	●
10	0/-0.030	0.10	+/-0.010	10	22		75	3	HFAL301100	●
12	0/-0.030	0.10	+/-0.010	12	25		75	3	HFAL301120	●
14	0/-0.030	0.10	+/-0.010	14	32		90	3	HFAL301140	●
16	0/-0.030	0.10	+/-0.010	16	32		90	3	HFAL301160	●
20	0/-0.030	0.10	+/-0.010	20	38		100	3	HFAL301200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HFAL3

SLOTTING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	D x D			D x D			D x D			D x D		
Vc (m/min)	300-500			200-400			150-350			600-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
2	50000	0.022	3300	47770	0.019	2680	39810	0.015	1840	50000	0.024	3630
3	42460	0.033	4200	31850	0.028	2680	26540	0.023	1840	50000	0.036	5450
4	31850	0.044	4200	23890	0.037	2680	19900	0.031	1840	50000	0.048	7260
5	25480	0.055	4200	19110	0.047	2680	15920	0.039	1840	47770	0.061	8670
6	21230	0.065	4140	15920	0.055	2640	13270	0.046	1810	39810	0.072	8540
8	15920	0.086	4110	11940	0.073	2620	9950	0.060	1800	29860	0.095	8470
10	12740	0.105	4010	9550	0.089	2560	7960	0.074	1760	23890	0.116	8280
12	10620	0.120	3820	7960	0.102	2440	6630	0.084	1670	19900	0.132	7880
14	9100	0.140	3820	6820	0.119	2430	5690	0.098	1670	17060	0.154	7880
16	7960	0.160	3820	5970	0.136	2440	4980	0.112	1670	14930	0.176	7880
18	7080	0.176	3740	5310	0.150	2380	4420	0.123	1630	13270	0.194	7710
20	6370	0.195	3730	4780	0.166	2380	3980	0.137	1630	11940	0.215	7680

SIDE MILLING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
Vc (m/min)	300-600			200-500			200-400			600-1000		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
2	50000	0.026	3960	55730	0.024	3970	47770	0.021	3030	50000	0.029	4360
3	47770	0.040	5680	37150	0.036	3970	31850	0.032	3030	50000	0.044	6530
4	35830	0.053	5680	27870	0.048	3970	23890	0.042	3030	50000	0.058	8710
5	28660	0.066	5670	22290	0.059	3970	19110	0.053	3030	50000	0.073	10890
6	23890	0.078	5590	18580	0.070	3910	15920	0.062	2980	42460	0.086	10930
8	17910	0.103	5540	13930	0.093	3880	11940	0.083	2960	31850	0.114	10850
10	14330	0.126	5420	11150	0.113	3790	9550	0.101	2890	25480	0.139	10590
12	11940	0.144	5160	9290	0.130	3610	7960	0.115	2750	21230	0.158	10090
14	10240	0.168	5160	7960	0.151	3610	6820	0.134	2750	18200	0.185	10090
16	8960	0.192	5160	6970	0.173	3610	5970	0.154	2750	15920	0.211	10090
18	7960	0.211	5040	6190	0.190	3530	5310	0.169	2690	14150	0.232	9860
20	7170	0.234	5030	5570	0.211	3520	4780	0.187	2680	12740	0.257	9840

HELICAL

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
α° x ae	8° x 0.5D			5° x 0.5D			5° x 0.5D			8° x 0.5D		
Vc (m/min)	300-500			200-400			150-350			600-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
2	50000	0.015	2280	47770	0.014	1950	39810	0.011	1339	50000	0.017	2510
3	42460	0.023	2905	31850	0.020	1950	26540	0.017	1339	50000	0.025	3764
4	31850	0.030	2905	23890	0.027	1950	19900	0.022	1339	50000	0.033	5019
5	25480	0.038	2905	19110	0.034	1950	15920	0.028	1339	47770	0.042	5994
6	21230	0.045	2860	15920	0.040	1920	13270	0.033	1319	39810	0.049	5904
8	15920	0.059	2840	11940	0.053	1905	9950	0.044	1308	29860	0.065	5859
10	12740	0.073	2775	9550	0.065	1860	7960	0.054	1278	23890	0.080	5723
12	10620	0.083	2645	7960	0.074	1775	6630	0.061	1217	19900	0.091	5448
14	9100	0.097	2640	6820	0.087	1775	5690	0.071	1218	17060	0.106	5449
16	7960	0.111	2640	5970	0.099	1775	4980	0.082	1218	14930	0.122	5450
18	7080	0.122	2585	5310	0.109	1735	4420	0.090	1189	13270	0.134	5328
20	6370	0.135	2575	4780	0.121	1730	3980	0.099	1187	11940	0.148	5312

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HFAL3

RAMPING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
α° x ae	15° x 0.5D			10° x 0.5D			7° x 0.5D			15° x 0.5D		
Vc (m/min)	300-500			200-400			150-350			600-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
2	50000	0.015	2194	47770	0.013	1822	39810	0.011	1287	50000	0.016	2413
3	42460	0.022	2794	31850	0.019	1822	26540	0.016	1287	50000	0.024	3620
4	31850	0.029	2795	23890	0.025	1822	19900	0.022	1287	50000	0.032	4826
5	25480	0.037	2795	19110	0.032	1822	15920	0.027	1287	47770	0.040	5764
6	21230	0.043	2752	15920	0.038	1794	13270	0.032	1268	39810	0.048	5677
8	15920	0.057	2731	11940	0.050	1780	9950	0.042	1258	29860	0.063	5634
10	12740	0.070	2668	9550	0.061	1738	7960	0.051	1228	23890	0.077	5503
12	10620	0.080	2542	7960	0.069	1656	6630	0.059	1169	19900	0.088	5239
14	9100	0.093	2541	6820	0.081	1655	5690	0.069	1171	17060	0.102	5240
16	7960	0.106	2540	5970	0.092	1656	4980	0.078	1171	14930	0.117	5241
18	7080	0.117	2485	5310	0.102	1620	4420	0.086	1143	13270	0.129	5124
20	6370	0.130	2477	4780	0.113	1616	3980	0.096	1141	11940	0.143	5108

VERTICAL

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	D x 0.4D			D x 0.4D			D x 0.4D			D x 0.4D		
Vc (m/min)	300-500			200-400			150-350			600-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
2	50000	0.022	3300	47770	0.020	2840	39810	0.018	2100	50000	0.024	3630
3	42460	0.033	4200	31850	0.030	2840	26540	0.026	2100	50000	0.036	5450
4	31850	0.044	4200	23890	0.040	2840	19900	0.035	2100	50000	0.048	7260
5	25480	0.055	4200	19110	0.050	2840	15920	0.044	2100	47770	0.061	8670
6	21230	0.065	4140	15920	0.059	2790	13270	0.052	2070	39810	0.072	8540
8	15920	0.086	4110	11940	0.077	2770	9950	0.069	2050	29860	0.095	8470
10	12740	0.105	4010	9550	0.095	2710	7960	0.084	2010	23890	0.116	8280
12	10620	0.120	3820	7960	0.108	2580	6630	0.096	1910	19900	0.132	7880
14	9100	0.140	3820	6820	0.126	2580	5690	0.112	1910	17060	0.154	7880
16	7960	0.160	3820	5970	0.144	2580	4980	0.128	1910	14930	0.176	7880
18	7080	0.176	3740	5310	0.158	2520	4420	0.141	1870	13270	0.194	7710
20	6370	0.195	3730	4780	0.176	2520	3980	0.156	1860	11940	0.215	7680

DRILLING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	D x D			D x D			0.5D x D			0.5D x D		
Vc (m/min)	270-370			190-290			150-250			500-700		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
2	50000	0.011	1650	38220	0.010	1140	31850	0.009	840	50000	0.012	1820
3	33970	0.017	1680	25480	0.015	1140	21230	0.013	840	50000	0.018	2720
4	25480	0.022	1680	19110	0.020	1140	15920	0.018	840	47770	0.024	3470
5	20380	0.028	1680	15290	0.025	1140	12740	0.022	840	38220	0.030	3470
6	16990	0.033	1660	12740	0.029	1120	10620	0.026	830	31850	0.036	3420
8	12740	0.043	1640	9550	0.039	1110	7960	0.034	820	23890	0.047	3390
10	10190	0.053	1600	7640	0.047	1080	6370	0.042	800	19110	0.058	3310
12	8490	0.060	1530	6370	0.054	1030	5310	0.048	760	15920	0.066	3150
14	7280	0.070	1530	5460	0.063	1030	4550	0.056	760	13650	0.077	3150
16	6370	0.080	1530	4780	0.072	1030	3980	0.064	760	11940	0.088	3150
18	5660	0.088	1490	4250	0.079	1010	3540	0.070	750	10620	0.097	3080
20	5100	0.098	1490	3820	0.088	1010	3180	0.078	740	9550	0.107	3070

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HFA53

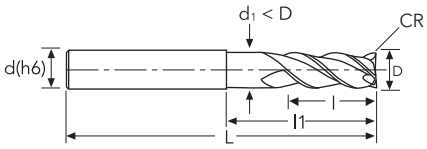
cylincrical shank, reduced neck, 3 flutes, long reach, corner radius

OSAWA NORM | ALU | MG | BR | 30° | RADIUS | Z3 UP

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | HELICAL | RAMPING | VERTICAL | DRILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.030	0.2	+/-0.010	6	5	18	2.80	60	3	HFA5302030	●
3	0/-0.030	0.5	+/-0.010	6	5	18	2.80	60	3	HFA5305030	●
4	0/-0.030	0.5	+/-0.010	6	6	22	3.80	60	3	HFA5305040	●
4	0/-0.030	1.0	+/-0.010	6	6	22	3.80	60	3	HFA5310040	●
5	0/-0.030	0.5	+/-0.010	6	8	24	4.80	60	3	HFA5305050	●
5	0/-0.030	1.0	+/-0.010	6	8	24	4.80	60	3	HFA5310050	●
6	0/-0.030	0.5	+/-0.010	6	9	29	5.80	65	3	HFA5305060	●
6	0/-0.030	1.0	+/-0.010	6	9	29	5.80	65	3	HFA5310060	●
6	0/-0.030	2.0	+/-0.010	6	9	29	5.80	65	3	HFA5320060	●
8	0/-0.030	0.5	+/-0.010	8	12	39	7.80	75	3	HFA5305080	●
8	0/-0.030	1.0	+/-0.010	8	12	39	7.80	75	3	HFA5310080	●
8	0/-0.030	2.0	+/-0.010	8	12	39	7.80	75	3	HFA5320080	●
8	0/-0.030	3.0	+/-0.010	8	12	39	7.80	75	3	HFA5330080	●
10	0/-0.030	0.5	+/-0.010	10	15	52	9.80	100	3	HFA5305100	●
10	0/-0.030	1.0	+/-0.010	10	15	52	9.80	100	3	HFA5310100	●
10	0/-0.030	2.0	+/-0.010	10	15	52	9.80	100	3	HFA5320100	●
10	0/-0.030	3.0	+/-0.010	10	15	52	9.80	100	3	HFA5330100	●
10	0/-0.030	4.0	+/-0.010	10	15	52	9.80	100	3	HFA5340100	●
12	0/-0.030	0.5	+/-0.010	12	18	62	11.80	120	3	HFA5305120	●
12	0/-0.030	1.0	+/-0.010	12	18	62	11.80	120	3	HFA5310120	●
12	0/-0.030	2.0	+/-0.010	12	18	62	11.80	120	3	HFA5320120	●
12	0/-0.030	3.0	+/-0.010	12	18	62	11.80	120	3	HFA5330120	●
12	0/-0.030	4.0	+/-0.010	12	18	62	11.80	120	3	HFA5340120	●
16	0/-0.030	0.5	+/-0.010	16	24	82	15.70	130	3	HFA5305160	●
16	0/-0.030	1.0	+/-0.010	16	24	82	15.70	130	3	HFA5310160	●
16	0/-0.030	2.0	+/-0.010	16	24	82	15.70	130	3	HFA5320160	●
16	0/-0.030	3.0	+/-0.010	16	24	82	15.70	130	3	HFA5330160	●
16	0/-0.030	4.0	+/-0.010	16	24	82	15.70	130	3	HFA5340160	●
20	0/-0.030	0.5	+/-0.010	20	30	100	19.70	150	3	HFA5305200	●
20	0/-0.030	1.0	+/-0.010	20	30	100	19.70	150	3	HFA5310200	●
20	0/-0.030	2.0	+/-0.010	20	30	100	19.70	150	3	HFA5320200	●
20	0/-0.030	3.0	+/-0.010	20	30	100	19.70	150	3	HFA5330200	●
20	0/-0.030	4.0	+/-0.010	20	30	100	19.70	150	3	HFA5340200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HFA53

SLOTTING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
Vc (m/min)	200-500			150-350			150-250			500-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	37150	0.026	2940	26540	0.022	1790	21230	0.018	1180	50000	0.029	4360
4	27870	0.035	2940	19900	0.030	1790	15920	0.025	1180	50000	0.039	5810
5	22290	0.044	2940	15920	0.037	1790	12740	0.031	1180	44590	0.048	6470
6	18580	0.052	2900	13270	0.044	1760	10620	0.036	1160	37150	0.057	6370
8	13930	0.069	2880	9950	0.058	1750	7960	0.048	1150	27870	0.076	6330
10	11150	0.084	2810	7960	0.071	1710	6370	0.059	1120	22290	0.092	6180
12	9290	0.096	2680	6630	0.082	1620	5310	0.067	1070	18580	0.106	5890
14	7960	0.112	2670	5690	0.095	1630	4550	0.078	1070	15920	0.123	5880
16	6970	0.128	2680	4980	0.109	1630	3980	0.090	1070	13930	0.141	5880
18	6190	0.141	2610	4420	0.120	1590	3540	0.099	1050	12380	0.155	5750
20	5570	0.156	2610	3980	0.133	1580	3180	0.109	1040	11150	0.172	5740

SIDE MILLING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
Vc (m/min)	300-500			200-400			150-350			600-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	42460	0.032	4040	31850	0.029	2720	26540	0.025	2020	50000	0.035	5230
4	31850	0.042	4040	23890	0.038	2720	19900	0.034	2020	50000	0.046	6970
5	25480	0.053	4040	19110	0.048	2720	15920	0.042	2020	47770	0.058	8320
6	21230	0.062	3970	15920	0.056	2680	13270	0.050	1990	39810	0.069	8200
8	15920	0.083	3940	11940	0.074	2660	9950	0.066	1970	29860	0.091	8140
10	12740	0.101	3850	9550	0.091	2600	7960	0.081	1930	23890	0.111	7950
12	10620	0.115	3670	7960	0.104	2480	6630	0.092	1830	19900	0.127	7570
14	9100	0.134	3670	6820	0.121	2470	5690	0.108	1840	17060	0.148	7570
16	7960	0.154	3670	5970	0.138	2480	4980	0.123	1840	14930	0.169	7570
18	7080	0.169	3590	5310	0.152	2420	4420	0.135	1790	13270	0.186	7400
20	6370	0.187	3580	4780	0.168	2420	3980	0.150	1790	11940	0.206	7380

HELICAL

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
α° x ae	8° x 0.5D			5° x 0.5D			5° x 0.5D			8° x 0.5D		
Vc (m/min)	200-500			150-350			200-400			500-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	37150	0.018	2035	26540	0.016	1300	31850	0.013	1285	50000	0.020	3010
4	27870	0.024	2035	19900	0.022	1300	23890	0.018	1285	50000	0.027	4015
5	22290	0.030	2035	15920	0.027	1300	19110	0.022	1285	44590	0.033	4475
6	18580	0.036	2005	13270	0.032	1280	15920	0.027	1265	37150	0.040	4405
8	13930	0.048	1990	9950	0.043	1270	11940	0.035	1255	27870	0.052	4375
10	11150	0.058	1945	7960	0.052	1240	9550	0.043	1225	22290	0.064	4270
12	9290	0.066	1850	6630	0.059	1180	7960	0.049	1170	18580	0.073	4070
14	7960	0.077	1850	5690	0.069	1185	6820	0.057	1170	15920	0.085	4070
16	6970	0.088	1850	4980	0.079	1185	5970	0.065	1170	13930	0.097	4070
18	6190	0.097	1810	4420	0.087	1155	5310	0.072	1145	12380	0.107	3975
20	5570	0.108	1800	3980	0.097	1155	4780	0.080	1140	11150	0.119	3970

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HFA53

RAMPING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
α° x ae	15° x D			10° x D			7° x D			15° x D		
Vc (m/min)	200-500			150-350			200-400			500-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	37150	0.018	1955	26540	0.014	1095	21230	0.013	825	50000	0.019	2895
4	27870	0.023	1955	19900	0.018	1095	15920	0.017	825	50000	0.026	3860
5	22290	0.029	1955	15920	0.023	1095	12740	0.022	825	44590	0.032	4305
6	18580	0.035	1925	13270	0.027	1075	10620	0.025	810	37150	0.038	4240
8	13930	0.046	1910	9950	0.036	1070	7960	0.034	805	27870	0.050	4205
10	11150	0.056	1870	7960	0.044	1045	6370	0.041	785	22290	0.061	4110
12	9290	0.064	1780	6630	0.050	995	5310	0.047	750	18580	0.070	3915
14	7960	0.074	1780	5690	0.058	995	4550	0.055	750	15920	0.082	3910
16	6970	0.085	1780	4980	0.067	995	3980	0.063	750	13930	0.094	3910
18	6190	0.094	1740	4420	0.073	970	3540	0.069	735	12380	0.103	3825
20	5570	0.104	1735	3980	0.081	970	3180	0.076	730	11150	0.114	3815

VERTICAL

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	D x 0.4D			D x 0.4D			D x 0.4D			D x 0.4D		
Vc (m/min)	200-500			150-350			150-250			500-900		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	37150	0.026	2940	26540	0.024	1890	21230	0.021	1350	50000	0.029	4360
4	27870	0.035	2940	19900	0.032	1890	15920	0.028	1340	50000	0.039	5810
5	22290	0.044	2940	15920	0.040	1890	12740	0.035	1350	44590	0.048	6470
6	18580	0.052	2900	13270	0.047	1860	10620	0.042	1330	37150	0.057	6370
8	13930	0.069	2880	9950	0.062	1850	7960	0.055	1310	27870	0.076	6330
10	11150	0.084	2810	7960	0.076	1810	6370	0.067	1280	22290	0.092	6180
12	9290	0.096	2680	6630	0.086	1720	5310	0.077	1220	18580	0.106	5890
14	7960	0.112	2670	5690	0.101	1720	4550	0.090	1220	15920	0.123	5880
16	6970	0.128	2680	4980	0.115	1720	3980	0.102	1220	13930	0.141	5880
18	6190	0.141	2610	4420	0.127	1680	3540	0.113	1200	12380	0.155	5750
20	5570	0.156	2610	3980	0.140	1680	3180	0.125	1190	11150	0.172	5740

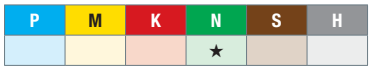
DRILLING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
Vc (m/min)	230-330			150-250			110-210			510-610		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	29720	0.013	1180	21230	0.012	760	16990	0.011	540	50000	0.015	2180
4	22290	0.018	1180	15920	0.016	760	12740	0.014	540	44590	0.019	2590
5	17830	0.022	1180	12740	0.020	760	10190	0.018	540	35670	0.024	2590
6	14860	0.026	1160	10620	0.023	750	8490	0.021	530	29720	0.029	2550
8	11150	0.034	1150	7960	0.031	740	6370	0.028	530	22290	0.038	2530
10	8920	0.042	1120	6370	0.038	720	5100	0.034	510	17830	0.046	2470
12	7430	0.048	1070	5310	0.043	690	4250	0.038	490	14860	0.053	2350
14	6370	0.056	1070	4550	0.050	690	3640	0.045	490	12740	0.062	2350
16	5570	0.064	1070	3980	0.058	690	3180	0.051	490	11150	0.070	2350
18	4950	0.070	1050	3540	0.063	670	2830	0.056	480	9910	0.077	2300
20	4460	0.078	1040	3180	0.070	670	2550	0.062	480	8920	0.086	2300

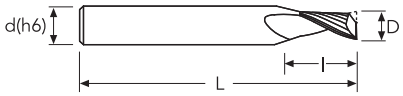
PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

MDCSA1

cylindrical shank, 1 flute, polished



★ 1st choice ☆ suitable



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.020			2	10		40	1	MDCSA1020	●
3	0/-0.020			3	12		40	1	MDCSA1030	●
4	0/-0.020			4	15		50	1	MDCSA1040	●
5	0/-0.020			5	16		50	1	MDCSA1050	●
6	0/-0.020			6	20		60	1	MDCSA1060	●
8	0/-0.020			8	22		63	1	MDCSA1080	●
10	0/-0.020			10	25		72	1	MDCSA1100	●
12	0/-0.020			12	30		83	1	MDCSA1120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDCSA1

SLOTTING	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	300-500			200-400			150-350			400-600		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	50000	0.023	1130	47770	0.019	910	39810	0.016	630	50000	0.023	1130
	3	42460	0.030	1270	31850	0.026	810	31850	0.021	670	50000	0.030	1500
	4	35830	0.039	1400	27870	0.033	920	23890	0.027	650	39810	0.039	1550
	5	28660	0.049	1400	22290	0.041	920	19110	0.034	650	38220	0.049	1860
	6	23890	0.058	1380	18580	0.049	910	15920	0.040	640	31850	0.058	1840
	8	17910	0.079	1410	13930	0.067	930	11940	0.055	660	23890	0.079	1880
	10	14330	0.098	1400	11150	0.083	920	9550	0.068	650	19110	0.098	1860
	12	11940	0.116	1390	9290	0.099	920	7960	0.081	650	15920	0.116	1850

< D3 ap x ae D x 0.25D

SIDE MILLING	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	D x 0.5D			D x 0.5D			D x 0.5D			D x 0.5D		
	Vc (m/min)	300-600			200-500			200-400			400-800		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	50000	0.030	1500	50000	0.026	1280	47770	0.021	1000	50000	0.030	1500
	3	47770	0.040	1910	37150	0.034	1260	31850	0.028	890	50000	0.040	2000
	4	35830	0.052	1860	27870	0.044	1230	23890	0.036	870	47770	0.052	2480
	5	28660	0.065	1860	22290	0.055	1230	19110	0.046	870	38220	0.065	2480
	6	23890	0.077	1840	18580	0.065	1220	15920	0.054	860	31850	0.077	2450
	8	17910	0.105	1880	13930	0.089	1240	11940	0.074	880	23890	0.105	2510
	10	14330	0.130	1860	11150	0.111	1230	9550	0.091	870	19110	0.130	2480
	12	11940	0.155	1850	9290	0.132	1220	7960	0.109	860	15920	0.155	2470

< D3 ap x ae D x 0.25D

DRILLING	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	D x D			D x D			D x D			0.5D x D		
	Vc (m/min)	200-400			150-350			100-300			300-500		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	47770	0.011	540	39810	0.010	380	31850	0.008	250	50000	0.011	560
	3	31850	0.015	480	26540	0.013	340	21230	0.011	220	42460	0.015	640
	4	23890	0.020	470	19900	0.017	330	15920	0.014	220	31850	0.020	620
	5	19110	0.024	470	15920	0.021	330	12740	0.017	220	25480	0.024	620
	6	15920	0.029	460	13270	0.025	330	10620	0.020	210	21230	0.029	610
	8	11940	0.039	470	9950	0.033	330	7960	0.028	220	15920	0.039	630
	10	9550	0.049	470	7960	0.041	330	6370	0.034	220	12740	0.049	620
	12	7960	0.058	460	6630	0.049	330	5310	0.041	220	10620	0.058	620

< D3 ap x ae 0.5D x D

MDCSA2

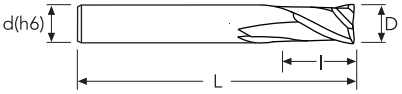
cylindrical shank, 2 flutes, polished

OSAWA NORM | ALU | MG POLISHED | 45° | SQUARE | Z2

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			4	3		40	2	MDCSA2010	●
1.5	0/-0.020			4	4.5		40	2	MDCSA2015	●
2	0/-0.020			4	6.5		40	2	MDCSA2020	●
2.5	0/-0.020			4	6.5		40	2	MDCSA2025	●
3	0/-0.030			6	8		57	2	MDCSA2030	●
4	0/-0.030			6	11		57	2	MDCSA2040	●
5	0/-0.030			6	13		57	2	MDCSA2050	●
6	0/-0.030			6	13		57	2	MDCSA2060	●
8	0/-0.030			8	19		63	2	MDCSA2080	●
10	0/-0.030			10	22		72	2	MDCSA2100	●
12	0/-0.030			12	26		83	2	MDCSA2120	●
14	0/-0.030			14	26		83	2	MDCSA2140	●
16	0/-0.030			16	32		92	2	MDCSA2160	●
18	0/-0.030			18	32		92	2	MDCSA2180	●
20	0/-0.030			20	38		104	2	MDCSA2200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MDCSA2

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	200-600			150-350			150-250			500-900		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
SLOTTING	1	50000	0.011	1120	50000	0.010	950	50000	0.008	780	50000	0.011	1120
	1.5	50000	0.017	1680	50000	0.014	1430	42460	0.012	1000	50000	0.017	1680
	2	50000	0.022	2240	39810	0.019	1520	31850	0.016	1000	50000	0.022	2240
	3	37150	0.028	2100	26540	0.024	1270	21230	0.020	840	50000	0.028	2820
	4	27870	0.038	2090	19900	0.032	1270	15920	0.026	840	50000	0.038	3750
	5	22290	0.047	2100	15920	0.040	1270	12740	0.033	840	44590	0.047	4200
	6	18580	0.056	2090	13270	0.048	1270	10620	0.039	840	37150	0.056	4190
	8	13930	0.075	2080	9950	0.064	1270	7960	0.052	830	27870	0.075	4170
	10	11150	0.094	2090	7960	0.080	1270	6370	0.066	840	22290	0.094	4170
	12	9290	0.112	2080	6630	0.095	1260	5310	0.078	830	18580	0.112	4160
	14	7960	0.130	2080	5690	0.111	1260	4550	0.091	830	15920	0.130	4150
	16	6970	0.148	2060	4980	0.126	1250	3980	0.103	820	13930	0.148	4120
	18	6190	0.166	2060	4420	0.141	1250	3540	0.116	820	12380	0.166	4120
	20	5570	0.185	2060	3980	0.157	1250	3180	0.129	820	11150	0.185	4120

< D3 ap x ae 0.25D x D

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	D x 0.5D			D x 0.5D			D x 0.5D			D x 0.5D		
	Vc (m/min)	300-500			200-400			150-350			600-1000		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
SIDE MILLING	1	50000	0.013	1340	50000	0.011	1140	50000	0.009	940	50000	0.013	1340
	1.5	50000	0.020	2020	50000	0.017	1710	50000	0.014	1410	50000	0.020	2020
	2	50000	0.027	2690	50000	0.023	2280	39810	0.019	1500	50000	0.027	2690
	3	42460	0.034	2880	31850	0.029	1830	26540	0.024	1260	50000	0.034	3390
	4	31850	0.045	2870	23890	0.038	1830	19900	0.032	1250	50000	0.045	4500
	5	25480	0.056	2880	19110	0.048	1830	15920	0.040	1260	50000	0.056	5640
	6	21230	0.068	2870	15920	0.057	1830	13270	0.047	1260	42460	0.068	5740
	8	15920	0.090	2860	11940	0.076	1820	9950	0.063	1250	31850	0.090	5720
	10	12740	0.112	2860	9550	0.096	1820	7960	0.079	1250	25480	0.112	5730
	12	10620	0.134	2850	7960	0.114	1820	6630	0.094	1250	21230	0.134	5710
	14	9100	0.157	2850	6820	0.133	1820	5690	0.110	1250	18200	0.157	5700
	16	7960	0.177	2820	5970	0.151	1800	4980	0.124	1240	15920	0.177	5650
	18	7080	0.200	2830	5310	0.170	1800	4420	0.140	1240	14150	0.200	5650
	20	6370	0.222	2830	4780	0.188	1800	3980	0.155	1240	12740	0.222	5650

< D3 ap x ae D x 0.5D

CUTTING PARAMETERS

MDCSA2

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	200-400			150-350			150-350			500-900		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	50000	0.006	560	50000	0.005	480	50000	0.004	390	50000	0.006	560
	1.5	50000	0.008	840	50000	0.007	710	50000	0.006	590	50000	0.008	840
	2	47770	0.011	1070	39810	0.010	760	39810	0.008	620	50000	0.011	1120
	3	31850	0.014	900	26540	0.012	640	26540	0.010	520	50000	0.014	1410
	4	23890	0.019	900	19900	0.016	630	19900	0.013	520	50000	0.019	1880
	5	19110	0.024	900	15920	0.020	640	15920	0.016	520	44590	0.024	2100
	6	15920	0.028	900	13270	0.024	640	13270	0.020	520	37150	0.028	2090
	8	11940	0.037	890	9950	0.032	630	9950	0.026	520	27870	0.037	2090
	10	9550	0.047	890	7960	0.040	630	7960	0.033	520	22290	0.047	2090
	12	7960	0.056	890	6630	0.048	630	6630	0.039	520	18580	0.056	2080
	14	6820	0.065	890	5690	0.055	630	5690	0.046	520	15920	0.065	2080
	16	5970	0.074	880	4980	0.063	630	4980	0.052	520	13930	0.074	2060
	18	5310	0.083	880	4420	0.071	620	4420	0.058	510	12380	0.083	2060
	20	4780	0.092	880	3980	0.079	630	3980	0.065	510	11150	0.092	2060

< D3 ap x ae 0.25D x D

MDCSA3

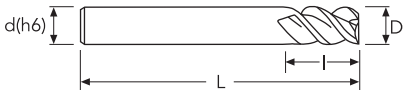
cylindrical shank, 3 flutes, polished

OSAWA NORM | ALU | MG POLISHED | 55° | SQUARE | Z3

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020			4	3		50	3	MDCSA3010	●
1.5	0/-0.020			4	4.5		50	3	MDCSA3015	●
2	0/-0.020			4	6		50	3	MDCSA3020	●
3	0/-0.020			4	8		50	3	MDCSA3030	●
4	0/-0.020			4	11		50	3	MDCSA3040	●
5	0/-0.020			6	13		50	3	MDCSA3050	●
6	0/-0.020			6	15		50	3	MDCSA3060	●
8	0/-0.025			8	20		60	3	MDCSA3080	●
10	0/-0.025			10	25		75	3	MDCSA3100	●
12	0/-0.025			12	30		75	3	MDCSA3120	●
16	0/-0.030			16	40		100	3	MDCSA3160	●
20	0/-0.030			20	40		100	3	MDCSA3200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDCSA3

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	200-600			150-350			150-250			500-900		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	50000	0.010	1510	50000	0.009	1290	50000	0.007	1060	50000	0.010	1510
	1.5	50000	0.015	2270	50000	0.013	1930	42460	0.011	1350	50000	0.015	2270
	2	50000	0.020	3020	39810	0.017	2050	31850	0.014	1350	50000	0.020	3020
	3	37150	0.025	2830	26540	0.022	1720	21230	0.018	1130	50000	0.025	3810
	4	27870	0.034	2820	19900	0.029	1710	15920	0.024	1130	50000	0.034	5070
	5	22290	0.042	2830	15920	0.036	1720	12740	0.030	1130	44590	0.042	5660
	6	18580	0.051	2830	13270	0.043	1720	10620	0.035	1130	37150	0.051	5650
	8	13930	0.067	2810	9950	0.057	1710	7960	0.047	1130	27870	0.067	5630
	10	11150	0.084	2820	7960	0.072	1710	6370	0.059	1130	22290	0.084	5640
	12	9290	0.101	2810	6630	0.086	1700	5310	0.071	1120	18580	0.101	5620
	14	7960	0.117	2800	5690	0.100	1700	4550	0.082	1120	15920	0.117	5610
	16	6970	0.133	2780	4980	0.113	1690	3980	0.093	1110	13930	0.133	5560
	18	6190	0.150	2780	4420	0.127	1690	3540	0.105	1110	12380	0.150	5560
	20	5570	0.166	2780	3980	0.141	1690	3180	0.116	1110	11150	0.166	5560

< D3 ap x ae 0.25D x D

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	1.5D x 0.3D			1.5D x 0.3D			1.5D x 0.3D			1.5D x 0.3D		
	Vc (m/min)	300-500			200-400			150-350			600-1000		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	50000	0.012	1810	50000	0.010	1540	50000	0.008	1270	50000	0.012	1810
	1.5	50000	0.018	2720	50000	0.015	2310	50000	0.013	1910	50000	0.018	2720
	2	50000	0.024	3630	50000	0.021	3080	39810	0.017	2020	50000	0.024	3630
	3	42460	0.030	3880	31850	0.026	2480	26540	0.021	1700	50000	0.030	4570
	4	31850	0.041	3870	23890	0.034	2470	19900	0.028	1690	50000	0.041	6080
	5	25480	0.051	3880	19110	0.043	2480	15920	0.036	1700	50000	0.051	7620
	6	21230	0.061	3880	15920	0.052	2470	13270	0.043	1700	42460	0.061	7750
	8	15920	0.081	3860	11940	0.069	2460	9950	0.057	1690	31850	0.081	7720
	10	12740	0.101	3860	9550	0.086	2460	7960	0.071	1690	25480	0.101	7730
	12	10620	0.121	3850	7960	0.103	2460	6630	0.085	1680	21230	0.121	7700
	14	9100	0.141	3850	6820	0.120	2450	5690	0.099	1680	18200	0.141	7690
	16	7960	0.160	3810	5970	0.136	2430	4980	0.112	1670	15920	0.160	7630
	18	7080	0.180	3820	5310	0.153	2430	4420	0.126	1670	14150	0.180	7630
	20	6370	0.200	3810	4780	0.170	2430	3980	0.140	1670	12740	0.200	7630

< D3 ap x ae D x 0.1D

MDA310-11-12

cylindrical shank, 3 flutes polished, long

OSAWA NORM | ALU | MG POLISHED | 55° | SQUARE | Z3

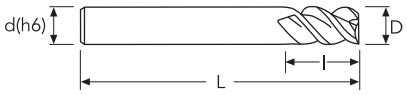
MDA310

MDA311 - MDA312

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.030			6	12		75	3	MDA310030	●
4	0/-0.030			6	16		75	3	MDA310040	●
5	0/-0.030			6	20		75	3	MDA310050	●
6	0/-0.030			6	25		75	3	MDA310060	●
3	0/-0.030			6	15		100	3	MDA311030	●
4	0/-0.030			6	20		100	3	MDA311040	●
5	0/-0.030			6	25		100	3	MDA311050	●
6	0/-0.030			6	30		100	3	MDA311060	●
8	0/-0.035			8	35		100	3	MDA311080	●
10	0/-0.035			10	40		100	3	MDA311100	●
12	0/-0.035			12	45		100	3	MDA311120	●
8	0/-0.035			8	40		150	3	MDA312080	●
10	0/-0.035			10	50		150	3	MDA312100	●
12	0/-0.035			12	50		150	3	MDA312120	●
16	0/-0.040			16	70		150	3	MDA312160	●
20	0/-0.040			20	80		150	3	MDA312200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MDA310

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	0.3D x D			0.3D x D			0.3D x D			0.3D x D		
SLOTTING	Vc (m/min)	220-340			150-250			100-200			400-700		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	29720	0.023	2040	21230	0.019	1240	15920	0.016	760	50000	0.023	3430
	4	22290	0.030	2030	15920	0.026	1230	11940	0.021	760	50000	0.030	4560
	5	17830	0.038	2040	12740	0.032	1240	9550	0.027	760	35030	0.038	4000
	6	14860	0.046	2030	10620	0.039	1240	7960	0.032	760	29190	0.046	4000

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	1.5D x 0.1D			1.5D x 0.1D			1.5D x 0.1D			1.5D x 0.1D		
SIDE MILLING	Vc (m/min)	270-370			200-300			150-250			500-800		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	33970	0.027	2800	26540	0.023	1860	21230	0.019	1220	50000	0.027	4120
	4	25480	0.036	2790	19900	0.031	1850	15920	0.026	1220	50000	0.036	5470
	5	20380	0.046	2800	15920	0.039	1860	12740	0.032	1220	50000	0.046	6860
	6	16990	0.055	2790	13270	0.047	1850	10620	0.038	1220	34500	0.055	5670

MDA311

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	0.3D x D			0.3D x D			0.3D x D			0.3D x D		
SLOTTING	Vc (m/min)	180-280			110-210			100-160			350-550		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	24420	0.019	1400	16990	0.016	830	13800	0.013	550	50000	0.019	2860
	4	18310	0.025	1390	12740	0.022	820	10350	0.018	550	50000	0.025	3800
	5	14650	0.032	1400	10190	0.027	830	8280	0.022	550	28660	0.032	2730
	6	12210	0.038	1390	8490	0.032	820	6900	0.027	550	23890	0.038	2730
	8	9160	0.051	1390	6370	0.043	820	5180	0.035	550	17910	0.051	2710
	10	7320	0.063	1390	5100	0.054	820	4140	0.044	550	14330	0.063	2720
	12	6100	0.076	1380	4250	0.064	820	3450	0.053	550	11940	0.076	2710

	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	2D x 0.05D			2D x 0.05D			2D x 0.05D			2D x 0.05D		
SIDE MILLING	Vc (m/min)	210-310			150-250			110-210			420-620		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	27600	0.023	1890	21230	0.019	1240	16990	0.016	820	50000	0.023	3430
	4	20700	0.030	1890	15920	0.026	1230	12740	0.021	810	50000	0.030	4560
	5	16560	0.038	1890	12740	0.032	1240	10190	0.027	820	50000	0.038	5720
	6	13800	0.046	1890	10620	0.039	1240	8490	0.032	810	27600	0.046	3780
	8	10350	0.061	1880	7960	0.052	1230	6370	0.042	810	20700	0.061	3760
	10	8280	0.076	1880	6370	0.064	1230	5100	0.053	810	16560	0.076	3770
	12	6900	0.091	1880	5310	0.077	1230	4250	0.064	810	13800	0.091	3760

CUTTING PARAMETERS

MDA312

SLOTTING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	0.1D x D			0.1D x D			0.1D x D			0.1D x D		
Vc (m/min)	130-230			100-160			80-120			250-450		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
8	7170	0.040	870	5180	0.034	530	3980	0.028	340	13930	0.040	1690
10	5730	0.051	870	4140	0.043	530	3180	0.035	340	11150	0.051	1690
12	4780	0.060	870	3450	0.051	530	2650	0.042	340	9290	0.060	1690
16	3580	0.080	860	2590	0.068	530	1990	0.056	330	6970	0.080	1670
20	2870	0.100	860	2070	0.085	530	1590	0.070	330	5570	0.100	1670

SIDE MILLING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	2.5D x 0.05D			2.5D x 0.05D			2.5D x 0.05D			2.5D x 0.05D		
Vc (m/min)	150-250			100-200			100-160			300-500		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
8	7960	0.048	1160	5970	0.041	740	5180	0.034	530	15920	0.048	2320
10	6370	0.061	1160	4780	0.052	740	4140	0.042	530	12740	0.061	2320
12	5310	0.073	1160	3980	0.062	740	3450	0.051	530	10620	0.073	2310
16	3980	0.096	1140	2990	0.081	730	2590	0.067	520	7960	0.096	2290
20	3180	0.120	1140	2390	0.102	730	2070	0.084	520	6370	0.120	2290

MDCSAM

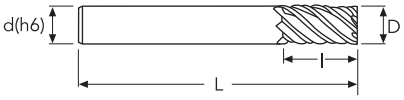
cylindrical shank, 6F, polished

OSAWA NORM | ALU | MG POLISHED | 50° | SQUARE | Z6

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.025			6	15		57	6	MDCSAM060	●
8	0/-0.030			8	20		64	6	MDCSAM080	●
10	0/-0.030			10	22		75	6	MDCSAM100	●
12	0/-0.030			12	25		75	6	MDCSAM120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDCSAM

SIDE MILLING

Material Group ISO 513	N1			N2 N3			N4			N5		
Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae	1.5D x 0.05D			1.5D x 0.05D			1.5D x 0.05D			1.5D x 0.05D		
Vc (m/min)	600-1000			400-800			300-700			900-1300		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	42460	0.050	12810	31850	0.043	8170	26540	0.035	5610	50000	0.050	15090
8	31850	0.067	12770	23890	0.057	8140	19900	0.047	5580	43790	0.067	17550
10	25480	0.084	12780	19110	0.071	8150	15920	0.059	5590	35030	0.084	17570
12	21230	0.100	12740	15920	0.085	8120	13270	0.070	5570	29190	0.100	17510

MCA212R

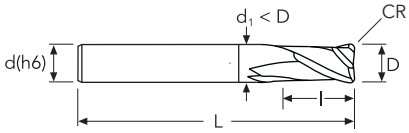
cylindrical shank, 2 flutes, corner radius

OSAWA NORM | ALU | MG PV200 | 25° | RADIUS | Z2

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
2	0/-0.030	0.20	+/-0.020	3	3	6	1.90	40	2	MCA212R02020	●
3	0/-0.030	0.20	+/-0.020	3	4	8	2.80	40	2	MCA212R02030	●
4	0/-0.030	0.20	+/-0.020	4	5	12	3.70	50	2	MCA212R02040	●
5	0/-0.030	0.20	+/-0.020	5	8	14	4.80	50	2	MCA212R02050	●
6	0/-0.030	0.20	+/-0.020	6	8	18	5.50	65	2	MCA212R02060	●
8	0/-0.030	0.20	+/-0.020	8	10	22	7.40	70	2	MCA212R02080	●
10	0/-0.030	0.20	+/-0.020	10	14	28	9.70	80	2	MCA212R02100	●
12	0/-0.030	0.20	+/-0.020	12	16	35	11.00	90	2	MCA212R02120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MCA212R

SLOTTING	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	200-600			200-400			150-350			600-1000w		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	50000	0.022	2240	47770	0.019	1820	39810	0.016	1250	50000	0.022	2240
	3	42460	0.028	2400	31850	0.024	1530	26540	0.020	1050	50000	0.028	2820
	4	31850	0.038	2390	23890	0.032	1520	19900	0.026	1050	50000	0.038	3750
	5	25480	0.047	2400	19110	0.040	1530	15920	0.033	1050	50000	0.047	4700
	6	21230	0.056	2390	15920	0.048	1520	13270	0.039	1050	42460	0.056	4780
	8	15920	0.075	2380	11940	0.064	1520	9950	0.052	1040	31850	0.075	4770
	10	12740	0.094	2390	9550	0.080	1520	7960	0.066	1040	25480	0.094	4770
	12	10620	0.112	2380	7960	0.095	1520	6630	0.078	1040	21230	0.112	4760

< D3 ap x ae 0.25D x D

SIDE MILLING	Material Group ISO 513	N1			N2 N3			N4			N5		
	Material	Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
	ap x ae	1.5D x 0.3D			1.5D x 0.3D			1.5D x 0.3D			1.5D x 0.3D		
	Vc (m/min)	300-600			250-450			200-400			600-1000		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	50000	0.027	2690	50000	0.023	2280	47770	0.019	1800	50000	0.027	2690
	3	47770	0.034	3240	37150	0.029	2140	31850	0.024	1510	50000	0.034	3390
	4	35830	0.045	3230	27870	0.038	2130	23890	0.032	1510	50000	0.045	4500
	5	28660	0.056	3240	22290	0.048	2140	19110	0.040	1510	50000	0.056	5640
	6	23890	0.068	3230	18580	0.057	2140	15920	0.047	1510	42460	0.068	5740
	8	17910	0.090	3220	13930	0.076	2130	11940	0.063	1500	31850	0.090	5720
	10	14330	0.112	3220	11150	0.096	2130	9550	0.079	1500	25480	0.112	5730
	12	11940	0.134	3210	9290	0.114	2120	7960	0.094	1500	21230	0.134	5710

< D3 ap x ae D x 0.5D

MDCAB2

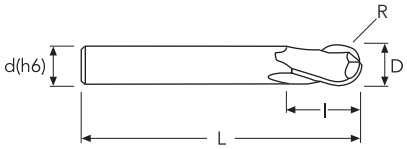
cylindrical shank, 2 flutes ball nose, polished

OSAWA NORM | ALU | MG POLISHED | 40° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.50	+/-0.010	4	2		50	2	MDCAB2010	●
1.5	0/-0.020	0.75	+/-0.010	4	3		50	2	MDCAB2015	●
2	0/-0.020	1.00	+/-0.010	4	4		50	2	MDCAB2020	●
3	0/-0.020	1.50	+/-0.010	4	6		50	2	MDCAB2030	●
4	0/-0.020	2.00	+/-0.010	4	8		50	2	MDCAB2040	●
5	0/-0.020	2.50	+/-0.010	6	10		50	2	MDCAB2050	●
6	0/-0.020	3.00	+/-0.010	6	12		50	2	MDCAB2060	●
8	0/-0.025	4.00	+/-0.010	8	16		60	2	MDCAB2080	●
10	0/-0.025	5.00	+/-0.010	10	20		75	2	MDCAB2100	●
12	0/-0.025	6.00	+/-0.010	12	24		75	2	MDCAB2120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDCAB2

Material Group ISO 513		N1			N2 N3			N4			N5		
Material		Alluminium ≤ 12% Si - Copper Alloy			Alluminium > 12% Si - Copper Alloy			Brass and bronze			Plastics		
ap x ae		0.2D x 0.4D			0.2D x 0.4D			0.2D x 0.4D			0.2D x 0.4D		
Vc (m/min)		200-600			250-450			200-400			600-1000		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	**0.80**	40000	0.013	1010	111460	0.011	2530	95540	0.010	1930	254780	0.013	6420
1.5	**1.20**	84930	0.017	2850	74310	0.015	2250	63690	0.013	1710	169850	0.017	5710
2	**1.60**	63690	0.017	2140	55730	0.015	1690	47770	0.013	1280	127390	0.017	4280
2.5	**2.00**	50960	0.021	2140	44590	0.019	1690	38220	0.017	1280	101910	0.021	4280
3	**2.40**	42460	0.025	2140	37150	0.023	1690	31850	0.020	1280	84930	0.025	4280
4	**3.20**	31850	0.035	2230	27870	0.032	1760	23890	0.028	1340	63690	0.035	4460
5	**4.00**	25480	0.045	2280	22290	0.040	1800	19110	0.036	1370	50960	0.045	4570
6	**4.80**	21230	0.053	2260	18580	0.048	1780	15920	0.043	1360	42460	0.053	4520
8	**6.40**	15920	0.067	2140	13930	0.060	1680	11940	0.054	1280	31850	0.067	4280
10	**8.00**	12740	0.080	2030	11150	0.072	1600	9550	0.064	1220	25480	0.080	4070
12	**9.60**	10620	0.094	1990	9290	0.084	1570	7960	0.075	1190	21230	0.094	3980

MEX

STEEL AND HARDENED STEEL 30÷55 HRC

Ultra-fine micrograin and Endless Orange coating for high perfromance machining on 30÷55 HRC materials. Wide range of tools available for general milling, roughing, copying and super finishing.

Micrograna ultrafine e rivestimento Endless Orange per lavorazione ad alto rendimento di materiali con durezza compresa tra 30÷55 HRC. Ampia gamma per soddisfare applicazioni di fresatura generale, sgrossatura, copiatura e super finitura.

Besonders feine Mikrokörnung und Beschichtung Endless Orange für Hochleistungsbearbeitungen von Materialien mit einer Härte zwischen 30 und 55 HRC. Große Produktpalette für Anwendungen zum Fräsen im Allgemeinen, Schruppen, Kopierfräsen und Schlichtbearbeitung.

Ultra Micrograin et revêtement Endless Orange pour un usinage à rendement élevé de matériaux ayant une dureté comprise entre 30÷55 HRC. Une large gamme pour satisfaire les applications de fraisage général, ébauche, copiage et super finition.

Micrograno ultrafino y revestimiento Endless Orange para el mecanizado a alto rendimiento de materiales con una dureza comprendida entre 30 y 55 HRC. Amplia gama para satisfacer aplicaciones de fresado general, desbaste, copiado y súper acabado.

Микрозернистая структура твердого сплава и покрытие Endless Orange служат для высокоэффективной обработки материалов с твёрдостью 30÷55 HRC. Представлен широкий ассортимент инструментов для стандартных операций фрезерования, черновой обработки, обработки криволинейных поверхностей и чистовой обработки.

MEXM2

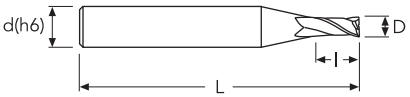
cylindrical shank, 2 flutes, miniature

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.3	0/-0.020			4	0.6		40	2	MEXM20030	●
0.4	0/-0.020			4	0.8		40	2	MEXM20040	●
0.5	0/-0.020			4	1		40	2	MEXM20050	●
0.6	0/-0.020			4	1.2		40	2	MEXM20060	●
0.7	0/-0.020			4	1.4		40	2	MEXM20070	●
0.8	0/-0.020			4	1.6		40	2	MEXM20080	●
0.9	0/-0.020			4	1.8		40	2	MEXM20090	●
1	0/-0.020			3	2		40	2	MEXM20100	●
1.1	0/-0.020			3	2.2		40	2	MEXM20110	●
1.2	0/-0.020			3	2.4		40	2	MEXM20120	●
1.3	0/-0.020			3	2.6		40	2	MEXM20130	●
1.4	0/-0.020			3	2.8		40	2	MEXM20140	●
1.5	0/-0.020			3	3		40	2	MEXM20150	●
1.6	0/-0.020			3	3.2		40	2	MEXM20160	●
1.7	0/-0.020			3	3.4		40	2	MEXM20170	●
1.8	0/-0.020			3	3.6		40	2	MEXM20180	●
1.9	0/-0.020			3	3.8		40	2	MEXM20190	●
2	0/-0.020			3	4		40	2	MEXM20200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXM2

	Material Group ISO 513		P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm		< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae		ap x D			ap x D			ap x D			ap x D		
	Vc (m/min)		70-110			50-90			30-70			20-40		
	D (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
SLOTTING	**0.3**	**0.02**	40000	0.004	320	40000	0.004	290	40000	0.003	255	31800	0.003	180
	0.4	**0.02**	40000	0.006	480	40000	0.005	430	39800	0.005	380	23900	0.004	200
	0.5	**0.03**	40000	0.007	560	40000	0.006	500	31800	0.006	355	19100	0.005	185
	0.6	**0.03**	40000	0.008	640	37200	0.007	540	26500	0.006	340	15900	0.006	180
	0.8	**0.04**	35800	0.010	720	27900	0.009	500	19900	0.008	320	11900	0.007	165
	1	**0.05**	28700	0.012	690	22300	0.011	480	15900	0.010	305	9600	0.008	160
	1.2	**0.06**	23900	0.022	1050	18600	0.020	740	13300	0.018	470	8000	0.015	245
	1.4	**0.07**	20500	0.024	980	15900	0.022	690	11400	0.019	440	6800	0.017	230
	1.5	**0.08**	19100	0.025	960	14900	0.023	670	10600	0.020	425	6400	0.018	225
	1.6	**0.08**	17900	0.026	930	13900	0.023	650	10000	0.021	415	6000	0.018	220
	1.8	**0.09**	15900	0.028	890	12400	0.025	620	8800	0.022	395	5300	0.020	210
	2	**0.10**	14300	0.030	860	11100	0.027	600	8000	0.024	190	4800	0.021	200

MEXM2SC

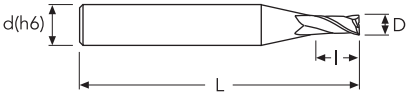
cylindrical shank, 2 flutes, short cutting length, miniature

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.2	0/-0.020			4	0.3		50	2	MEXM2SC0020	●
0.3	0/-0.020			4	0.4		50	2	MEXM2SC0030	●
0.4	0/-0.020			4	0.6		50	2	MEXM2SC0040	●
0.5	0/-0.020			4	0.7		50	2	MEXM2SC0050	●
0.6	0/-0.020			4	0.9		50	2	MEXM2SC0060	●
0.7	0/-0.020			4	1		50	2	MEXM2SC0070	●
0.8	0/-0.020			4	1.2		50	2	MEXM2SC0080	●
0.9	0/-0.020			4	1.4		50	2	MEXM2SC0090	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

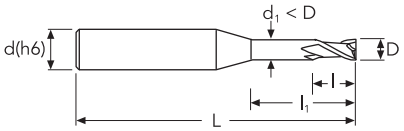
MEXM2SC

	Material Group ISO 513		P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm		< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae		ap x D			ap x D			ap x D			ap x D		
	Vc (m/min)		70-110			50-90			30-70			20-40		
SLOTTING	D (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	0.2	**0.01**	40000	0.003	240	40000	0.003	220	40000	0.002	190	40000	0.002	170
	0.3	**0.02**	40000	0.004	320	40000	0.004	290	40000	0.003	255	31850	0.003	180
	0.4	**0.02**	40000	0.006	480	40000	0.005	430	39810	0.005	380	23890	0.004	200
	0.5	**0.03**	40000	0.007	560	40000	0.006	500	31850	0.006	355	19110	0.005	185
	0.6	**0.03**	40000	0.008	640	37150	0.007	530	26540	0.006	340	15920	0.006	180
	0.8	**0.04**	35830	0.010	720	27870	0.009	500	19900	0.008	320	11940	0.007	165
	0.9	**0.05**	31850	0.012	760	24770	0.011	540	17690	0.010	340	10620	0.008	180

MEXLN2

cylindrical shank, 2 flutes, extended and reduced neck

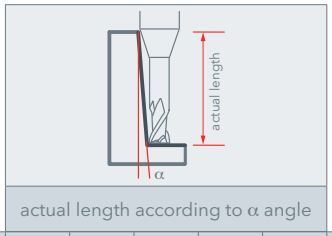
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

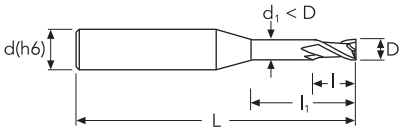
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.2	0/-0.020			4	0.3	0.5	0.16	50	2	0.57	0.59	0.61	0.63	0.68	MEXLN2002005	●
0.2	0/-0.020			4	0.3	1	0.16	50	2	1.09	1.12	1.16	1.21	1.30	MEXLN200201	●
0.2	0/-0.020			4	0.3	1.5	0.16	50	2	1.60	1.66	1.72	1.78	1.91	MEXLN2002015	●
0.3	0/-0.020			4	0.4	1	0.26	50	2	1.09	1.12	1.16	1.21	1.30	MEXLN200301	●
0.3	0/-0.020			4	0.4	2	0.26	50	2	2.12	2.19	2.27	2.35	2.53	MEXLN200302	●
0.3	0/-0.020			4	0.4	3	0.26	50	2	3.15	3.26	3.38	3.50	3.76	MEXLN200303	●
0.4	0/-0.020			4	0.6	2	0.37	50	2	2.12	2.19	2.27	2.35	2.53	MEXLN200402	●
0.4	0/-0.020			4	0.6	3	0.37	50	2	3.15	3.26	3.38	3.50	3.76	MEXLN200403	●
0.4	0/-0.020			4	0.6	4	0.37	50	2	4.19	4.33	4.49	4.65	5.00	MEXLN200404	●
0.4	0/-0.020			4	0.6	5	0.37	50	2	5.22	5.40	5.59	5.79	6.23	MEXLN200405	●
0.5	0/-0.020			4	0.7	2	0.45	50	2	2.16	2.23	2.31	2.40	2.57	MEXLN200502	●
0.5	0/-0.020			4	0.7	4	0.45	50	2	4.23	4.37	4.53	4.69	5.04	MEXLN200504	●
0.5	0/-0.020			4	0.7	6	0.45	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200506	●
0.5	0/-0.020			4	0.7	8	0.45	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200508	●
0.6	0/-0.020			4	0.9	2	0.55	50	2	2.16	2.23	2.31	2.40	2.57	MEXLN200602	●
0.6	0/-0.020			4	0.9	4	0.55	50	2	4.23	4.37	4.53	4.69	5.04	MEXLN200604	●
0.6	0/-0.020			4	0.9	6	0.55	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200606	●
0.6	0/-0.020			4	0.9	8	0.55	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200608	●
0.6	0/-0.020			4	0.9	10	0.55	50	2	10.43	10.79	11.17	11.57	12.44	MEXLN200610	●
0.7	0/-0.020			4	1.0	2	0.65	50	2	2.16	2.23	2.31	2.40	2.57	MEXLN200702	●
0.7	0/-0.020			4	1.0	4	0.65	50	2	4.23	4.37	4.53	4.69	5.04	MEXLN200704	●
0.7	0/-0.020			4	1.0	6	0.65	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200706	●
0.7	0/-0.020			4	1.0	8	0.65	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200708	●
0.7	0/-0.020			4	1.0	10	0.65	50	2	10.43	10.79	11.17	11.57	12.44	MEXLN200710	●
0.8	0/-0.020			4	1.2	4	0.75	50	2	4.23	4.37	4.53	4.69	5.04	MEXLN200804	●
0.8	0/-0.020			4	1.2	6	0.75	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200806	●
0.8	0/-0.020			4	1.2	8	0.75	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200808	●
0.8	0/-0.020			4	1.2	10	0.75	50	2	10.43	10.79	11.17	11.57	12.44	MEXLN200810	●
0.8	0/-0.020			4	1.2	12	0.75	50	2	12.49	12.93	13.38	13.87	14.91	MEXLN200812	●
0.9	0/-0.020			4	1.4	6	0.85	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200906	●
0.9	0/-0.020			4	1.4	8	0.85	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200908	●
0.9	0/-0.020			4	1.4	10	0.85	50	2	10.43	10.79	11.17	11.57	12.44	MEXLN200910	●
0.9	0/-0.020			4	1.4	15	0.85	50	2	15.6	16.14	16.71	17.31	18.61	MEXLN200915	●
1.0	0/-0.020			4	1.5	6	0.95	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201006	●
1.0	0/-0.020			4	1.5	8	0.95	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201008	●
1.0	0/-0.020			4	1.5	10	0.95	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201010	●
1.0	0/-0.020			4	1.5	12	0.95	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201012	●
1.0	0/-0.020			4	1.5	14	0.95	50	2	14.66	15.17	15.70	16.27	17.49	MEXLN201014	●
1.0	0/-0.020			4	1.5	16	0.95	50	2	16.73	17.3	17.92	18.56	19.96	MEXLN201016	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2

cylindrical shank, 2 flutes, extended and reduced neck

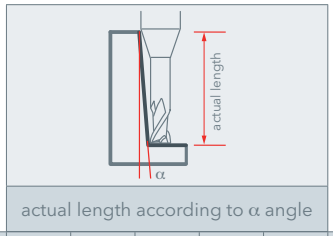
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

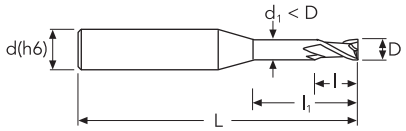
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1.2	0/-0.020			4	1.8	6	1.15	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201206	●
1.2	0/-0.020			4	1.8	8	1.15	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201208	●
1.2	0/-0.020			4	1.8	10	1.15	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201210	●
1.2	0/-0.020			4	1.8	12	1.15	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201212	●
1.4	0/-0.020			4	2.1	6	1.35	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201406	●
1.4	0/-0.020			4	2.1	8	1.35	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201408	●
1.4	0/-0.020			4	2.1	10	1.35	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201410	●
1.4	0/-0.020			4	2.1	12	1.35	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201412	●
1.4	0/-0.020			4	2.1	16	1.35	50	2	16.73	17.3	17.92	18.56	19.96	MEXLN201416	●
1.5	0/-0.020			4	2.3	6	1.45	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201506	●
1.5	0/-0.020			4	2.3	8	1.45	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201508	●
1.5	0/-0.020			4	2.3	10	1.45	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201510	●
1.5	0/-0.020			4	2.3	12	1.45	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201512	●
1.5	0/-0.020			4	2.3	14	1.45	50	2	14.66	15.17	15.70	16.27	17.49	MEXLN201514	●
1.5	0/-0.020			4	2.3	16	1.45	50	2	16.73	17.30	17.92	18.56	19.96	MEXLN201516	●
1.5	0/-0.020			4	2.3	18	1.45	60	2	18.79	19.44	20.13	20.86	22.43	MEXLN201518	●
1.5	0/-0.020			4	2.3	20	1.45	60	2	20.86	21.58	22.35	23.15	-	MEXLN201520	●
1.6	0/-0.020			4	2.4	6	1.55	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201606	●
1.6	0/-0.020			4	2.4	8	1.55	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201608	●
1.6	0/-0.020			4	2.4	10	1.55	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201610	●
1.6	0/-0.020			4	2.4	12	1.55	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201612	●
1.6	0/-0.020			4	2.4	14	1.55	50	2	14.66	15.17	15.70	16.27	17.49	MEXLN201614	●
1.6	0/-0.020			4	2.4	16	1.55	50	2	16.73	17.30	17.92	18.56	19.96	MEXLN201616	●
1.6	0/-0.020			4	2.4	18	1.55	60	2	18.79	19.44	20.13	20.86	22.43	MEXLN201618	●
1.6	0/-0.020			4	2.4	20	1.55	60	2	20.86	21.58	22.35	23.15	-	MEXLN201620	●
1.8	0/-0.020			4	2.7	6	1.75	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201806	●
1.8	0/-0.020			4	2.7	8	1.75	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201808	●
1.8	0/-0.020			4	2.7	10	1.75	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201810	●
1.8	0/-0.020			4	2.7	12	1.75	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201812	●
1.8	0/-0.020			4	2.7	16	1.75	50	2	16.73	17.30	17.92	18.56	19.96	MEXLN201816	●
1.8	0/-0.020			4	2.7	20	1.75	60	2	20.86	21.58	22.35	23.15	-	MEXLN201820	●
2	0/-0.020			4	3	6	1.95	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN202006	●
2	0/-0.020			4	3	8	1.95	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN202008	●
2	0/-0.020			4	3	10	1.95	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN202010	●
2	0/-0.020			4	3	12	1.95	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN202012	●
2	0/-0.020			4	3	14	1.95	50	2	14.66	15.17	15.70	16.27	17.49	MEXLN202014	●
2	0/-0.020			4	3	16	1.95	50	2	16.73	17.30	17.92	18.56	-	MEXLN202016	●
2	0/-0.020			4	3	18	1.95	60	2	18.79	19.44	20.13	20.86	-	MEXLN202018	●
2	0/-0.020			4	3	20	1.95	60	2	20.86	21.58	22.35	23.15	-	MEXLN202020	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2

cylindrical shank, 2 flutes, extended and reduced neck

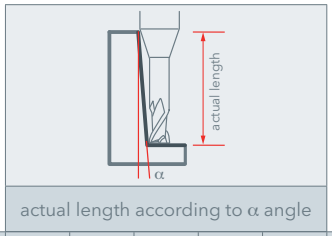
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
2	0/-0.020			4	3	25	1.95	75	2	26.03	26.93	27.88	-	-	MEXLN202025	●
2	0/-0.020			4	3	30	1.95	75	2	31.20	32.28	33.42	-	-	MEXLN202030	●
2.5	0/-0.020			4	3.7	8	2.40	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN202508	●
2.5	0/-0.020			4	3.7	10	2.40	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN202510	●
2.5	0/-0.020			4	3.7	12	2.40	50	2	12.59	13.03	13.49	13.97	-	MEXLN202512	●
2.5	0/-0.020			4	3.7	16	2.40	50	2	16.73	17.3	17.92	18.56	-	MEXLN202516	●
2.5	0/-0.020			4	3.7	20	2.40	60	2	20.86	21.58	22.35	-	-	MEXLN202520	●
2.5	0/-0.020			4	3.7	25	2.40	60	2	26.03	26.93	27.88	-	-	MEXLN202525	●
2.5	0/-0.020			4	3.7	30	2.40	75	2	31.20	32.28	-	-	-	MEXLN202530	●
3	0/-0.025			6	4.5	8	2.85	50	2	8.65	8.95	9.26	9.60	10.31	MEXLN203008	●
3	0/-0.025			6	4.5	10	2.85	50	2	10.72	11.09	11.48	11.89	12.78	MEXLN203010	●
3	0/-0.025			6	4.5	12	2.85	50	2	12.78	13.23	13.69	14.18	15.25	MEXLN203012	●
3	0/-0.025			6	4.5	14	2.85	50	2	14.85	15.36	15.91	16.48	17.72	MEXLN203014	●
3	0/-0.025			6	4.5	16	2.85	60	2	16.92	17.50	18.12	18.77	20.18	MEXLN203016	●
3	0/-0.025			6	4.5	18	2.85	60	2	18.99	19.64	20.34	21.07	22.65	MEXLN203018	●
3	0/-0.025			6	4.5	20	2.85	60	2	21.05	21.78	22.55	23.36	25.12	MEXLN203020	●
3	0/-0.025			6	4.5	25	2.85	75	2	26.22	27.13	28.09	29.10	-	MEXLN203025	●
4	0/-0.025			6	4.5	10	3.85	60	2	10.91	11.29	11.68	12.10	13.00	MEXLN204010	●
4	0/-0.025			6	4.5	15	3.85	60	2	16.08	16.63	17.22	17.84	19.17	MEXLN204015	●
4	0/-0.025			6	4.5	20	3.85	60	2	21.25	21.98	22.76	23.57	-	MEXLN204020	●
4	0/-0.025			6	4.5	25	3.85	75	2	26.41	27.33	28.29	-	-	MEXLN204025	●
4	0/-0.025			6	4.5	30	3.85	75	2	31.58	32.67	33.83	-	-	MEXLN204030	●
4	0/-0.025			6	4.5	40	3.85	75	2	41.92	43.37	-	-	-	MEXLN204040	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2

	Material Group ISO 513		P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm		< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae		ap x D			ap x D			ap x D			ap x D		
	Vc (m/min)		70-110			50-90			30-70			20-40		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
0.2	≤ 6D	0.01	40000	0.003	240	40000	0.003	220	40000	0.002	190	40000	0.002	170
	≤ 8D	0.01	40000	0.003	200	40000	0.002	180	40000	0.002	165	40000	0.002	145
	≤ 10D	0.01	40000	0.002	170	40000	0.002	150	40000	0.002	135	38200	0.001	110
	≤ 12D	0.01	40000	0.002	130	40000	0.001	120	40000	0.001	105	33400	0.001	75
0.3	≤ 6D	0.02	40000	0.004	320	40000	0.004	290	40000	0.003	255	31800	0.003	180
	≤ 8D	0.01	40000	0.004	290	40000	0.003	260	40000	0.003	230	28700	0.003	145
	≤ 10D	0.01	40000	0.003	260	40000	0.003	230	40000	0.003	205	25500	0.002	115
	≤ 12D	0.01	40000	0.003	220	40000	0.003	200	37200	0.002	165	22300	0.002	85
0.4	≤ 6D	0.02	40000	0.006	480	40000	0.005	430	39800	0.005	380	23900	0.004	200
	≤ 8D	0.02	40000	0.005	430	40000	0.005	390	35800	0.004	310	21500	0.004	165
	≤ 10D	0.01	40000	0.005	380	40000	0.004	350	31800	0.004	245	19100	0.003	130
	≤ 12D	0.01	40000	0.004	340	40000	0.004	300	27900	0.003	185	16700	0.003	100
0.5	≤ 6D	0.03	40000	0.007	560	40000	0.006	500	31800	0.006	355	19100	0.005	185
	≤ 8D	0.02	40000	0.006	500	40000	0.006	450	28700	0.005	290	17200	0.004	150
	≤ 10D	0.02	40000	0.006	450	35700	0.005	360	25500	0.004	230	15300	0.004	120
	≤ 12D	0.01	40000	0.005	390	31200	0.004	280	22300	0.004	175	13400	0.003	90
0.6	≤ 6D	0.03	40000	0.008	640	37200	0.007	540	26500	0.006	340	15900	0.006	180
	≤ 8D	0.03	40000	0.007	580	33400	0.006	430	23900	0.006	275	14300	0.005	145
	≤ 10D	0.02	38200	0.006	490	29700	0.006	340	21200	0.005	215	12700	0.004	115
	≤ 12D	0.02	33400	0.006	370	26000	0.005	260	18600	0.004	165	11100	0.004	85
0.8	≤ 6D	0.04	35800	0.010	720	27900	0.009	500	19900	0.008	320	11900	0.007	165
	≤ 8D	0.03	32200	0.009	580	25100	0.008	410	17900	0.007	260	10700	0.006	135
	≤ 10D	0.03	28700	0.008	460	22300	0.007	320	15900	0.006	205	9600	0.006	110
	≤ 12D	0.02	25100	0.007	350	19500	0.006	250	13900	0.006	155	8400	0.005	80
1	≤ 6D	0.05	28700	0.012	690	22300	0.011	480	15900	0.010	305	9600	0.008	160
	≤ 8D	0.04	25800	0.011	560	20100	0.010	390	14300	0.009	245	8600	0.008	130
	≤ 10D	0.04	22900	0.010	440	17800	0.009	310	12700	0.008	195	7600	0.007	100
	≤ 12D	0.03	20100	0.008	340	15600	0.008	240	11100	0.007	150	6700	0.006	80
1.2	≤ 6D	0.06	23900	0.022	1050	18600	0.020	740	13300	0.018	470	8000	0.015	245
	≤ 8D	0.05	21500	0.020	850	16700	0.018	600	11900	0.016	375	7200	0.014	200
	≤ 10D	0.04	19100	0.018	670	14900	0.016	470	10600	0.014	300	6400	0.012	160
	≤ 12D	0.03	16700	0.015	510	13000	0.014	360	9300	0.012	230	5600	0.011	120
1.4	≤ 6D	0.07	20500	0.024	980	15900	0.022	690	11400	0.019	440	6800	0.017	230
	≤ 8D	0.06	18400	0.022	790	14300	0.019	560	10200	0.017	355	6100	0.015	185
	≤ 10D	0.05	16400	0.019	630	12700	0.017	440	9100	0.015	280	5500	0.013	150
	≤ 12D	0.04	14300	0.017	480	11100	0.015	340	8000	0.013	215	4800	0.012	115
	≤ 15D	0.03	12300	0.014	350	9600	0.013	250	6800	0.012	155	4100	0.010	85
	> 15D	0.02	10200	0.012	240	8000	0.011	170	5700	0.010	110	3400	0.008	55
1.5	≤ 6D	0.08	19100	0.025	960	14900	0.023	670	10600	0.020	425	6400	0.018	225
	≤ 8D	0.06	17200	0.023	770	13400	0.020	540	9600	0.018	345	5700	0.016	180
	≤ 10D	0.05	15300	0.020	610	11900	0.018	430	8500	0.016	270	5100	0.014	145
	≤ 12D	0.04	13400	0.018	470	10400	0.016	330	7400	0.014	205	4500	0.012	110
	≤ 15D	0.03	11500	0.015	350	8900	0.014	240	6400	0.012	155	3800	0.011	80
	> 15D	0.02	9600	0.013	240	7400	0.011	170	5300	0.010	105	3200	0.009	55
1.6	≤ 6D	0.08	17900	0.026	930	13900	0.023	650	10000	0.021	415	6000	0.018	220
	≤ 8D	0.07	16100	0.023	750	12500	0.021	530	9000	0.019	335	5400	0.016	175
	≤ 10D	0.06	14300	0.021	590	11100	0.019	420	8000	0.017	265	4800	0.015	140
	≤ 12D	0.04	12500	0.018	450	9800	0.016	320	7000	0.015	205	4200	0.013	105
	≤ 15D	0.04	10700	0.016	330	8400	0.014	240	6000	0.012	150	3600	0.011	80
	> 15D	0.02	9000	0.013	230	7000	0.012	160	5000	0.010	105	3000	0.009	55

SQUARE RIB

CUTTING PARAMETERS

MEXLN2

SQUARE RIB

Material Group ISO 513			P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm			< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae			ap x D			ap x D			ap x D			ap x D		
Vc (m/min)			70-110			50-90			30-70			20-40		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1.8	≤ 6D	0.09	15900	0.028	890	12400	0.025	620	8800	0.022	395	5300	0.020	210
	≤ 8D	0.08	14300	0.025	720	11100	0.023	500	8000	0.020	325	4800	0.018	170
	≤ 10D	0.06	12700	0.022	570	9900	0.020	400	7100	0.018	255	4200	0.016	130
	≤ 12D	0.05	11100	0.020	440	8700	0.018	310	6200	0.016	195	3700	0.014	100
	≤ 15D	0.04	9600	0.017	320	7400	0.015	220	5300	0.013	140	3200	0.012	75
	> 15D	0.03	8000	0.014	220	6200	0.013	160	4400	0.011	100	2700	0.010	55
2	≤ 6D	0.10	14300	0.030	860	11100	0.027	600	8000	0.024	385	4800	0.021	200
	≤ 8D	0.09	12900	0.027	700	10000	0.024	490	7200	0.022	310	4300	0.019	165
	≤ 10D	0.07	11500	0.024	550	8900	0.022	380	6400	0.019	245	3800	0.017	130
	≤ 12D	0.06	10000	0.021	420	7800	0.019	290	5600	0.017	190	3300	0.015	95
	≤ 15D	0.05	8600	0.018	310	6700	0.016	220	4800	0.014	140	2900	0.013	75
	> 15D	0.03	8600	0.018	310	6700	0.016	220	4800	0.014	140	2900	0.013	75
2.5	≤ 6D	0.13	11500	0.035	810	8900	0.032	560	6400	0.028	360	3800	0.025	185
	≤ 8D	0.11	10300	0.032	650	8000	0.028	450	5700	0.025	285	3400	0.022	150
	≤ 10D	0.09	9200	0.028	520	7100	0.025	360	5100	0.022	230	3100	0.020	120
	≤ 12D	0.07	8000	0.025	390	6200	0.022	270	4500	0.020	175	2700	0.017	95
	≤ 15D	0.06	6900	0.021	290	5400	0.019	200	3800	0.017	130	2300	0.015	70
	> 15D	0.04	6900	0.021	290	5400	0.019	200	3800	0.017	130	2300	0.015	70
3	≤ 6D	0.15	9600	0.040	770	7400	0.036	530	5300	0.032	340	3200	0.028	180
	≤ 8D	0.13	8600	0.036	620	6700	0.032	430	4800	0.029	275	2900	0.025	145
	≤ 10D	0.11	7600	0.032	490	5900	0.029	340	4200	0.026	215	2500	0.022	110
	≤ 12D	0.08	6700	0.028	380	5200	0.025	260	3700	0.022	165	2200	0.020	85
	≤ 15D	0.07	5700	0.024	270	4500	0.022	190	3200	0.019	125	1900	0.017	65
	> 15D	0.05	5700	0.024	270	4500	0.022	190	3200	0.019	125	1900	0.017	65
4	≤ 6D	0.20	7200	0.050	720	5600	0.045	500	4000	0.040	320	2400	0.035	170
	≤ 8D	0.17	6400	0.045	580	5000	0.041	410	3600	0.036	260	2100	0.032	130
	≤ 10D	0.14	5700	0.040	460	4500	0.036	320	3200	0.032	205	1900	0.028	105
	≤ 12D	0.11	5000	0.035	350	3900	0.032	250	2800	0.028	155	1700	0.025	85
	≤ 15D	0.09	4300	0.030	260	3300	0.027	180	2400	0.024	115	1400	0.021	60
	> 15D	0.06	4300	0.030	260	3300	0.027	180	2400	0.024	115	1400	0.021	60

OSAWA

MEXCS2

cylindrical shank, 2 flutes

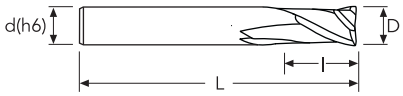
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | 40° | SQUARE | Z2

≥ Ø14

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.030			4	2.5		40	2	MEXCS2010	●
1.5	0/-0.030			4	4		40	2	MEXCS2015	●
2	0/-0.030			4	6		40	2	MEXCS2020	●
2.5	0/-0.030			4	8		40	2	MEXCS2025	●
3	0/-0.012			6	8		55	2	MEXCS2030	●
3.5	0/-0.012			6	10		55	2	MEXCS2035	●
4	0/-0.012			6	10		55	2	MEXCS2040	●
4.5	0/-0.012			6	12		55	2	MEXCS2045	●
5	0/-0.012			6	13		55	2	MEXCS2050	●
5.5	0/-0.012			6	14		55	2	MEXCS2055	●
6	0/-0.012			6	15		60	2	MEXCS2060	●
6.5	0/-0.012			8	17		65	2	MEXCS2065	●
7	0/-0.012			8	18		65	2	MEXCS2070	●
8	0/-0.012			8	20		70	2	MEXCS2080	●
8.5	0/-0.012			10	21		70	2	MEXCS2085	●
9	0/-0.012			10	23		70	2	MEXCS2090	●
10	0/-0.012			10	22		75	2	MEXCS2100	●
11	0/-0.012			12	28		75	2	MEXCS2110	●
12	0/-0.012			12	26		80	2	MEXCS2120	●
14	0/-0.030			14	32		90	2	MEXCS2140	●
16	0/-0.030			16	32		90	2	MEXCS2160	●
18	0/-0.030			18	38		100	2	MEXCS2180	●
20	0/-0.030			20	38		100	2	MEXCS2200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCS2

SLOTTING

Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae	**0.5D x D**			**0.3D x D**			**0.2D x D**			**0.1D x D**		
Vc (m/min)	**70-110**			**50-90**			**30-70**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	28660	0.006	340	22290	0.005	240	15920	0.005	150	9550	0.004	80
2	14330	0.010	290	11150	0.009	200	7960	0.008	130	4780	0.007	70
3	9550	0.014	280	7430	0.013	190	5310	0.012	125	3180	0.010	65
4	7170	0.020	280	5570	0.018	200	3980	0.016	125	2390	0.014	65
5	5730	0.026	290	4460	0.023	200	3180	0.020	130	1910	0.018	70
6	4780	0.032	310	3720	0.029	220	2650	0.026	135	1590	0.023	70
8	3580	0.038	270	2790	0.034	190	1990	0.031	120	1190	0.027	65
10	2870	0.046	260	2230	0.041	180	1590	0.037	115	960	0.032	60
12	2390	0.055	260	1860	0.050	180	1330	0.044	120	800	0.039	60
14	2050	0.064	260	1590	0.057	180	1140	0.051	115	680	0.045	60
16	1790	0.072	260	1390	0.065	180	1000	0.058	115	600	0.051	60
18	1590	0.082	260	1240	0.074	180	880	0.066	115	530	0.058	60
20	1430	0.094	270	1110	0.084	190	800	0.075	120	480	0.065	65

MEXCL2

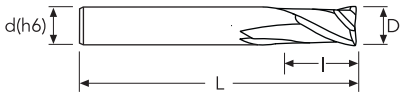
cylindrical shank, 2 flutes, long

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | SQUARE | Z2

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.030			6	8		60	2	MEXCL2010	●
1.5	0/-0.030			6	12		60	2	MEXCL2015	●
2	0/-0.030			6	12		60	2	MEXCL2020	●
3	0/-0.030			6	15		60	2	MEXCL2030	●
4	0/-0.030			6	20		60	2	MEXCL2040	●
5	0/-0.030			6	25		70	2	MEXCL2050	●
6	0/-0.030			6	25		70	2	MEXCL2060	●
8	0/-0.030			8	30		80	2	MEXCL2080	●
10	0/-0.030			10	35		90	2	MEXCL2100	●
12	0/-0.030			12	40		90	2	MEXCL2120	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCL2

SLOTTING

Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae	**0.3D x D**			**0.3D x D**			**0.2D x D**			**0.05D x D**		
Vc (m/min)	**70-110**			**50-90**			**30-70**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	28700	0.005	290	22300	0.005	200	15900	0.004	125	9600	0.004	65
1.5	19100	0.006	230	14900	0.005	160	10600	0.005	100	6400	0.004	55
2	14300	0.009	260	11100	0.008	180	8000	0.007	115	4800	0.006	60
3	9600	0.012	230	7400	0.011	160	5300	0.010	100	3200	0.008	55
4	7200	0.018	260	5600	0.016	180	4000	0.014	115	2400	0.013	60
5	5700	0.024	270	4500	0.022	190	3200	0.019	125	1900	0.017	65
6	4800	0.029	280	3700	0.026	190	2700	0.023	125	1600	0.020	65
8	3600	0.035	250	2800	0.032	180	2000	0.028	110	1200	0.025	60
10	2900	0.041	240	2200	0.037	160	1600	0.033	105	1000	0.029	55
12	2400	0.050	240	1900	0.045	170	1300	0.040	105	800	0.035	55

< D3: ap = 0.4 mm max

MEXCS4

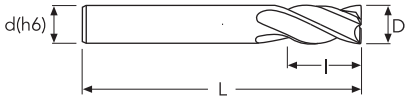
cylindrical shank, 4 flutes

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | SQUARE | Z4

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.030			4	3		50	4	MEXCS401050	●
1.5	0/-0.030			4	4.5		50	4	MEXCS401550	●
2	0/-0.030			4	6		40	4	MEXCS4020	●
2.5	0/-0.030			4	8		40	4	MEXCS4025	●
3	0/-0.030			6	8		55	4	MEXCS4030	●
3.5	0/-0.030			6	10		55	4	MEXCS4035	●
4	0/-0.030			6	11		55	4	MEXCS4040	●
4.5	0/-0.030			6	11		55	4	MEXCS4045	●
5	0/-0.030			6	13		55	4	MEXCS4050	●
5.5	0/-0.030			6	13		55	4	MEXCS4055	●
6	0/-0.030			6	15		60	4	MEXCS4060	●
6.5	0/-0.030			8	17		65	4	MEXCS4065	●
7	0/-0.030			8	18		65	4	MEXCS4070	●
8	0/-0.030			8	20		70	4	MEXCS4080	●
9	0/-0.030			10	23		70	4	MEXCS4090	●
10	0/-0.030			10	22		75	4	MEXCS4100	●
11	0/-0.030			12	28		75	4	MEXCS4110	●
12	0/-0.030			12	26		80	4	MEXCS4120	●
14	0/-0.030			12	35		90	4	MEXCS4140	●
16	0/-0.030			16	32		100	4	MEXCS4160	●
20	0/-0.030			20	40		100	4	MEXCS4200	●
25	0/-0.030			25	40		100	4	MEXCS4250	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCS4

Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae	D x 0.01D			D x 0.01D			D x 0.05D			D x 0.05D		
Vc (m/min)	80-120			50-90			40-60			20-40		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	31850	0.009	1080	22290	0.008	680	15920	0.007	435	9550	0.006	225
2	15920	0.017	1080	11150	0.015	680	7960	0.014	435	4780	0.012	230
3	10620	0.026	1080	7430	0.023	680	5310	0.020	435	3180	0.018	225
4	7960	0.034	1080	5570	0.031	680	3980	0.027	435	2390	0.024	230
5	6370	0.038	970	4460	0.034	610	3180	0.031	390	1910	0.027	205
6	5310	0.043	900	3720	0.038	570	2650	0.034	360	1590	0.030	190
8	3980	0.055	880	2790	0.050	550	1990	0.044	350	1190	0.039	185
10	3180	0.071	900	2230	0.064	570	1590	0.057	360	960	0.050	190
12	2650	0.085	900	1860	0.077	570	1330	0.068	360	800	0.060	190
14	2270	0.098	890	1590	0.088	560	1140	0.078	355	680	0.068	185
16	1990	0.110	880	1390	0.099	550	1000	0.088	350	600	0.077	185
18	1770	0.125	890	1240	0.113	560	880	0.100	350	530	0.088	185
20	1590	0.140	890	1110	0.126	560	800	0.112	360	480	0.098	190
22	1450	0.155	900	1010	0.140	560	720	0.124	355	430	0.109	185
25	1270	0.177	900	890	0.159	570	640	0.142	360	380	0.124	190

MEXCL4

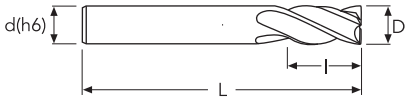
cylindrical shank, 4 flutes, long

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | 40° * | SQUARE | Z4

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

L SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.020			6	8		60	4	MEXCL4020	●
3	0/-0.020			6	15		60	4	MEXCL4030	●
4	0/-0.020			6	20		60	4	MEXCL4040	●
5	0/-0.020			6	25		70	4	MEXCL4050	●
6	0/-0.020			6	25		70	4	MEXCL4060	●
8	0/-0.020			8	30		80	4	MEXCL4080	●
10	0/-0.020			10	35		90	4	MEXCL4100	●
12	0/-0.020			12	40		90	4	MEXCL4120	●
14	0/-0.020			16	50		110	4	MEXCL4140	●
16	0/-0.020			16	50		110	4	MEXCL4160	●
20	0/-0.020			20	50		110	4	MEXCL4200	●
25	0/-0.050			25	70		130	4	MEXCL4250	●
3	0/-0.025			6	25		100	4	MEXCL4030100 *	●
4	0/-0.025			6	31		100	4	MEXCL4040100 *	●
5	0/-0.025			6	31		100	4	MEXCL4050100 *	●
6	0/-0.025			6	38		100	4	MEXCL4060100 *	●
8	0/-0.030			8	41		100	4	MEXCL4080100 *	●
10	0/-0.030			10	57		125	4	MEXCL4100125 *	●
12	0/-0.030			12	75		150	4	MEXCL4120150 *	●
14	0/-0.030			14	75		150	4	MEXCL4140150 *	●
16	0/-0.030			16	75		150	4	MEXCL4160150 *	●
20	0/-0.030			20	75		150	4	MEXCL4200150 *	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCL4

SIDE MILLING

Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae	**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**		
Vc (m/min)	**60-100**			**40-80**			**20-60**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
2	12740	0.014	740	9550	0.013	500	6370	0.012	295	4780	0.010	195
3	8490	0.022	740	6370	0.020	500	4250	0.017	295	3180	0.015	195
4	6370	0.029	740	4780	0.026	500	3180	0.023	295	2390	0.020	195
5	5100	0.033	660	3820	0.029	450	2550	0.026	265	1910	0.023	175
6	4250	0.036	610	3180	0.033	410	2120	0.029	245	1590	0.025	160
8	3180	0.047	600	2390	0.042	400	1590	0.038	240	1190	0.033	155
10	2550	0.060	620	1910	0.054	410	1270	0.048	245	960	0.042	160
12	2120	0.072	610	1590	0.065	410	1060	0.058	245	800	0.051	160
14	1820	0.083	600	1360	0.075	410	910	0.066	240	680	0.058	160
16	1590	0.094	590	1190	0.084	400	800	0.075	240	600	0.065	155
20	1270	0.119	600	960	0.107	410	640	0.095	245	480	0.083	160
25	1020	0.150	610	760	0.135	410	510	0.120	245	380	0.105	160

MEXCSHM

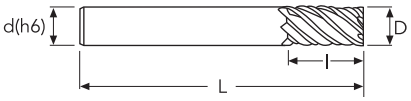
cylindrical shank, multi flute

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 50° | SQUARE | Z6~Z8

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.025			6	8		50	6	MEXCSHM030	●
4	0/-0.025			6	11		50	6	MEXCSHM040	●
5	0/-0.025			6	13		50	6	MEXCSHM050	●
6	0/-0.030			6	15		60	6	MEXCSHM060	●
8	0/-0.030			8	20		70	6	MEXCSHM080	●
10	0/-0.030			10	25		80	6	MEXCSHM100	●
12	0/-0.030			12	30		80	6	MEXCSHM120	●
14	0/-0.030			14	30		90	6	MEXCSHM140	●
16	0/-0.030			16	40		100	6	MEXCSHM160	●
18	0/-0.030			18	35		100	8	MEXCSHM180	●
20	0/-0.030			20	50		100	8	MEXCSHM200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCSHM

SIDE MILLING

Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae	**1.5D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.05D**			**1.5D x 0.05D**		
Vc (m/min)	**120-160**			**90-130**			**60-100**			**50-70**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	14860	0.008	750	11680	0.008	530	8490	0.007	340	6370	0.006	220
4	11150	0.012	800	8760	0.011	570	6370	0.010	370	4780	0.008	240
5	8920	0.014	770	7010	0.013	550	5100	0.012	350	3820	0.010	230
6	7430	0.018	800	5840	0.016	570	4250	0.014	370	3180	0.013	240
8	5570	0.028	920	4380	0.025	650	3180	0.022	420	2390	0.019	280
10	4460	0.034	900	3500	0.030	640	2550	0.027	410	1910	0.024	270
12	3720	0.041	910	2920	0.037	640	2120	0.033	420	1590	0.029	270
14	3180	0.048	920	2500	0.043	650	1820	0.038	420	1360	0.034	270
16	2790	0.056	940	2190	0.051	670	1590	0.045	430	1190	0.039	280
18	2480	0.065	970	1950	0.059	680	1420	0.052	440	1060	0.046	290
20	2230	0.073	1300	1750	0.066	920	1270	0.058	590	960	0.051	390

MEXCLHM

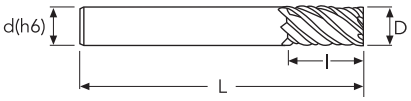
cylindrical shank, multi flute, long

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 45° | SQUARE | Z6~Z8

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.025			6	19		75	6	MEXCLHM030	●
4	0/-0.025			6	19		75	6	MEXCLHM040	●
5	0/-0.025			6	19		75	6	MEXCLHM050	●
6	0/-0.030			6	25		80	6	MEXCLHM060	●
8	0/-0.030			8	40		100	6	MEXCLHM080	●
10	0/-0.030			10	45		120	6	MEXCLHM100	●
12	0/-0.030			12	60		120	6	MEXCLHM120	●
16	0/-0.030			16	80		150	6	MEXCLHM160	●
20	0/-0.030			20	80		150	8	MEXCLHM200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCLHM

SIDE MILLING

Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae	**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**		
Vc (m/min)	**80-120**			**50-90**			**40-60**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	10620	0.007	450	7430	0.006	290	5310	0.006	180	3180	0.005	100
4	7960	0.010	490	5570	0.009	310	3980	0.008	190	2390	0.007	100
5	6370	0.012	470	4460	0.011	290	3180	0.010	190	1910	0.009	100
6	5310	0.015	490	3720	0.014	310	2650	0.012	190	1590	0.011	100
8	3980	0.023	560	2790	0.021	350	1990	0.019	220	1190	0.016	120
10	3180	0.029	540	2230	0.026	340	1590	0.023	220	960	0.020	120
12	2650	0.035	550	1860	0.031	350	1330	0.028	220	800	0.024	120
14	2270	0.041	560	1590	0.037	350	1140	0.033	220	680	0.029	120
16	1990	0.048	570	1390	0.043	360	1000	0.038	230	600	0.034	120
18	1770	0.055	580	1240	0.050	370	880	0.044	230	530	0.039	120
20	1590	0.063	800	1110	0.057	500	800	0.050	320	480	0.044	170

MEXCSFR

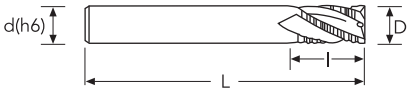
cylindrical shank, roughing

OSAWA NORM | MEX | UMG ENDLESS | <55 HRC | 20° | SQUARE | Z3~Z4

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.048	0.40	+/-0.020	6	15		60	3	MEXCSFR060	●
8	0/-0.058	0.40	+/-0.020	8	20		65	3	MEXCSFR080	●
10	0/-0.058	0.50	+/-0.020	10	25		70	4	MEXCSFR100	●
12	0/-0.070	0.50	+/-0.020	12	30		80	4	MEXCSFR120	●
14	0/-0.070	0.50	+/-0.020	14	25		100	4	MEXCSFR140	●
16	0/-0.070	0.50	+/-0.020	16	40		100	4	MEXCSFR160	●
20	0/-0.084	0.50	+/-0.020	20	50		100	4	MEXCSFR200	●

CUTTING PARAMETERS

MEXCSFR

SLOTTING	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**0.5D x D**			**0.5D x D**			**0.3D x D**			**0.1D x D**		
	Vc (m/min)	**70-90**			**50-70**			**40-60**			**20-40**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4250	0.043	720	3180	0.038	490	2650	0.034	360	1590	0.030	190
	8	3180	0.055	700	2390	0.050	480	1990	0.044	350	1190	0.039	185
	10	2550	0.071	720	1910	0.064	490	1590	0.057	360	960	0.050	190
	12	2120	0.085	720	1590	0.077	490	1330	0.068	360	800	0.060	190
	14	1820	0.098	710	1360	0.088	480	1140	0.078	355	680	0.068	185
	16	1590	0.110	700	1190	0.099	470	1000	0.088	350	600	0.077	185
	20	1270	0.140	710	960	0.126	480	800	0.112	360	480	0.098	190

D6-8: Z=3

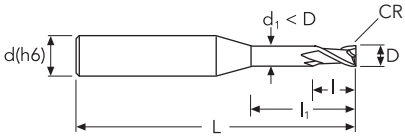
SIDE MILLING	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**1.5D x 0.3D**			**1.5D x 0.3D**			**D x 0.1D**			**D x 0.05D**		
	Vc (m/min)	**80-100**			**60-80**			**50-70**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	4250	0.047	790	3180	0.042	540	2650	0.037	395	1590	0.033	210
	8	3180	0.061	770	2390	0.055	520	1990	0.049	385	1190	0.043	205
	10	2550	0.078	800	1910	0.070	540	1590	0.062	395	960	0.055	210
	12	2120	0.094	790	1590	0.084	540	1330	0.075	400	800	0.065	210
	14	1820	0.108	780	1360	0.097	530	1140	0.086	390	680	0.075	205
	16	1590	0.121	770	1190	0.109	520	1000	0.097	385	600	0.085	205
	20	1270	0.154	780	960	0.139	530	800	0.123	395	480	0.108	205

D6-8: Z=3

MEXLN2R

cylindrical shank, 2 flutes, extended and reduced neck, corner radius

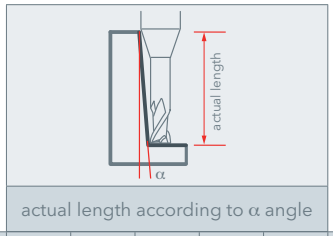
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

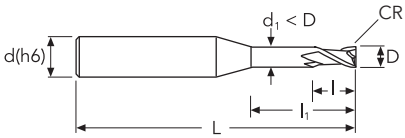
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.3	0/-0.020	0.05	+/-0.010	4	0.4	1	0.26	50	2	1.08	1.12	1.15	1.19	1.25	MEXLN20030001	●
0.3	0/-0.020	0.05	+/-0.010	4	0.4	1.5	0.26	50	2	1.60	1.65	1.70	1.75	1.85	MEXLN20030065	●
0.3	0/-0.020	0.05	+/-0.010	4	0.4	2	0.26	50	2	2.12	2.19	2.25	2.32	2.46	MEXLN20030002	●
0.3	0/-0.020	0.05	+/-0.010	4	0.4	3	0.26	50	2	3.15	3.25	3.35	3.46	3.66	MEXLN20030003	●
0.3	0/-0.020	0.10	+/-0.010	4	0.4	1	0.26	50	2	1.08	1.12	1.15	1.18	1.24	MEXLN20030101	●
0.3	0/-0.020	0.10	+/-0.010	4	0.4	1.5	0.26	50	2	1.60	1.65	1.70	1.75	1.84	MEXLN20030165	●
0.3	0/-0.020	0.10	+/-0.010	4	0.4	2	0.26	50	2	2.12	2.18	2.25	2.31	2.45	MEXLN20030102	●
0.3	0/-0.020	0.10	+/-0.010	4	0.4	3	0.26	50	2	3.15	3.25	3.35	3.45	3.65	MEXLN20030103	●
0.4	0/-0.020	0.05	+/-0.010	4	0.6	1	0.37	50	2	1.08	1.12	1.15	1.19	1.25	MEXLN20040001	●
0.4	0/-0.020	0.05	+/-0.010	4	0.6	2	0.37	50	2	2.12	2.19	2.25	2.32	2.46	MEXLN20040006	●
0.4	0/-0.020	0.05	+/-0.010	4	0.6	3	0.37	50	2	3.15	3.25	3.35	3.46	3.66	MEXLN20040003	●
0.4	0/-0.020	0.05	+/-0.010	4	0.6	4	0.37	50	2	4.19	4.32	4.46	4.59	4.86	MEXLN20040004	●
0.4	0/-0.020	0.10	+/-0.010	4	0.6	1	0.37	50	2	1.08	1.12	1.15	1.18	1.24	MEXLN20040101	●
0.4	0/-0.020	0.10	+/-0.010	4	0.6	2	0.37	50	2	2.12	2.18	2.25	2.31	2.45	MEXLN20040102	●
0.4	0/-0.020	0.10	+/-0.010	4	0.6	3	0.37	50	2	3.15	3.25	3.35	3.45	3.65	MEXLN20040103	●
0.4	0/-0.020	0.10	+/-0.010	4	0.6	4	0.37	50	2	4.18	4.32	4.45	4.58	4.85	MEXLN20040104	●
0.5	0/-0.020	0.05	+/-0.010	4	0.7	2	0.45	50	2	2.16	2.23	2.29	2.36	2.50	MEXLN20050002	●
0.5	0/-0.020	0.05	+/-0.010	4	0.7	4	0.45	50	2	4.22	4.36	4.50	4.63	4.90	MEXLN20050004	●
0.5	0/-0.020	0.05	+/-0.010	4	0.7	6	0.45	50	2	6.29	6.49	6.70	6.90	7.31	MEXLN20050006	●
0.5	0/-0.020	0.10	+/-0.010	4	0.7	2	0.45	50	2	2.16	2.22	2.29	2.36	2.49	MEXLN20050102	●
0.5	0/-0.020	0.10	+/-0.010	4	0.7	4	0.45	50	2	4.22	4.36	4.49	4.63	4.89	MEXLN20050104	●
0.5	0/-0.020	0.10	+/-0.010	4	0.7	6	0.45	50	2	6.29	6.49	6.69	6.89	7.30	MEXLN20050106	●
0.6	0/-0.020	0.10	+/-0.010	4	0.9	2	0.55	50	2	2.16	2.22	2.29	2.36	2.49	MEXLN20060102	●
0.6	0/-0.020	0.10	+/-0.010	4	0.9	4	0.55	50	2	4.22	4.36	4.49	4.63	4.89	MEXLN20060104	●
0.6	0/-0.020	0.10	+/-0.010	4	0.9	6	0.55	50	2	6.29	6.49	6.69	6.89	7.30	MEXLN20060106	●
0.7	0/-0.020	0.10	+/-0.010	4	1.0	4	0.65	50	2	4.22	4.36	4.49	4.63	4.89	MEXLN20070104	●
0.7	0/-0.020	0.10	+/-0.010	4	1.0	6	0.65	50	2	6.29	6.49	6.69	6.89	7.30	MEXLN20070106	●
0.8	0/-0.020	0.05	+/-0.010	4	1.2	4	0.75	50	2	4.22	4.36	4.50	4.63	4.90	MEXLN20080004	●
0.8	0/-0.020	0.05	+/-0.010	4	1.2	6	0.75	50	2	6.29	6.49	6.70	6.90	7.31	MEXLN20080006	●
0.8	0/-0.020	0.05	+/-0.010	4	1.2	8	0.75	50	2	8.36	8.63	8.90	9.17	9.71	MEXLN20080008	●
0.8	0/-0.020	0.10	+/-0.010	4	1.2	4	0.75	50	2	4.22	4.36	4.49	4.63	4.89	MEXLN20080104	●
0.8	0/-0.020	0.10	+/-0.010	4	1.2	6	0.75	50	2	6.29	6.49	6.69	6.89	7.30	MEXLN20080106	●
0.8	0/-0.020	0.10	+/-0.010	4	1.2	8	0.75	50	2	8.36	8.63	8.89	9.16	9.70	MEXLN20080108	●
0.9	0/-0.020	0.10	+/-0.010	4	1.4	8	0.85	50	2	8.36	8.63	8.89	9.16	9.70	MEXLN20090108	●
0.9	0/-0.020	0.10	+/-0.010	4	1.4	15	0.85	50	2	15.59	16.1	16.6	17.11	18.12	MEXLN20090115	●
1	0/-0.020	0.10	+/-0.010	4	1.5	4	0.95	50	2	4.32	4.46	4.59	4.73	5.01	MEXLN20100104	●
1	0/-0.020	0.10	+/-0.010	4	1.5	6	0.95	50	2	6.39	6.59	6.80	7.00	7.41	MEXLN20100106	●
1	0/-0.020	0.10	+/-0.010	4	1.5	8	0.95	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20100108	●
1	0/-0.020	0.10	+/-0.010	4	1.5	10	0.95	50	2	10.52	10.86	11.20	11.54	12.22	MEXLN20100110	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2R

cylindrical shank, 2 flutes, extended and reduced neck, corner radius

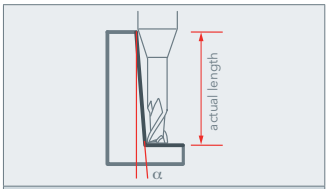
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

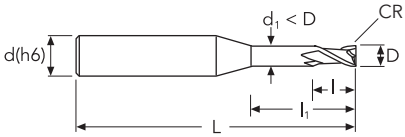
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1	0/-0.020	0.10	+/-0.010	4	1.5	12	0.95	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20100112	●
1	0/-0.020	0.10	+/-0.010	4	1.5	16	0.95	50	2	16.72	17.26	17.80	18.35	19.43	MEXLN20100116	●
1	0/-0.020	0.10	+/-0.010	4	1.5	20	0.95	50	2	20.86	21.53	22.21	22.88	24.24	MEXLN20100120	●
1	0/-0.020	0.20	+/-0.010	4	1.5	4	0.95	50	2	4.32	4.45	4.58	4.72	4.99	MEXLN20100204	●
1	0/-0.020	0.20	+/-0.010	4	1.5	6	0.95	50	2	6.38	6.58	6.79	6.99	7.39	MEXLN20100206	●
1	0/-0.020	0.20	+/-0.010	4	1.5	8	0.95	50	2	8.45	8.72	8.99	9.26	9.79	MEXLN20100208	●
1	0/-0.020	0.20	+/-0.010	4	1.5	10	0.95	50	2	10.52	10.85	11.19	11.52	12.20	MEXLN20100210	●
1	0/-0.020	0.20	+/-0.010	4	1.5	12	0.95	50	2	12.58	12.99	13.39	13.79	14.60	MEXLN20100212	●
1	0/-0.020	0.20	+/-0.010	4	1.5	16	0.95	50	2	16.72	17.26	17.79	18.33	19.41	MEXLN20100216	●
1	0/-0.020	0.20	+/-0.010	4	1.5	20	0.95	50	2	20.85	21.53	22.20	22.87	24.22	MEXLN20100220	●
1	0/-0.020	0.30	+/-0.010	4	1.5	6	0.95	50	2	6.38	6.58	6.78	6.97	7.37	MEXLN20100306	●
1	0/-0.020	0.30	+/-0.010	4	1.5	10	0.95	50	2	10.51	10.85	11.18	11.51	12.18	MEXLN20100310	●
1	0/-0.020	0.30	+/-0.010	4	1.5	16	0.95	50	2	16.72	17.25	17.78	18.32	19.39	MEXLN20100316	●
1	0/-0.020	0.30	+/-0.010	4	1.5	20	0.95	50	2	20.85	21.52	22.19	22.86	24.20	MEXLN20100320	●
1.2	0/-0.020	0.10	+/-0.010	4	1.8	6	1.15	50	2	6.39	6.59	6.80	7.00	7.41	MEXLN20120106	●
1.2	0/-0.020	0.10	+/-0.010	4	1.8	8	1.15	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20120108	●
1.2	0/-0.020	0.10	+/-0.010	4	1.8	10	1.15	50	2	10.52	10.86	11.20	11.54	12.22	MEXLN20120110	●
1.2	0/-0.020	0.10	+/-0.010	4	1.8	12	1.15	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20120112	●
1.4	0/-0.020	0.10	+/-0.010	4	2.1	6	1.35	50	2	6.39	6.59	6.80	7.00	7.41	MEXLN20140106	●
1.4	0/-0.020	0.10	+/-0.010	4	2.1	8	1.35	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20140108	●
1.4	0/-0.020	0.10	+/-0.010	4	2.1	10	1.35	50	2	10.52	10.86	11.20	11.54	12.22	MEXLN20140110	●
1.4	0/-0.020	0.10	+/-0.010	4	2.1	12	1.35	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20140112	●
1.4	0/-0.020	0.10	+/-0.010	4	2.1	16	1.35	50	2	16.72	17.26	17.80	18.35	19.43	MEXLN20140116	●
1.5	0/-0.020	0.10	+/-0.010	4	2.3	4	1.45	50	2	4.32	4.46	4.59	4.73	5.01	MEXLN20150104	●
1.5	0/-0.020	0.10	+/-0.010	4	2.3	8	1.45	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20150108	●
1.5	0/-0.020	0.10	+/-0.010	4	2.3	12	1.45	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20150112	●
1.5	0/-0.020	0.10	+/-0.010	4	2.3	16	1.45	50	2	16.72	17.26	17.80	18.35	19.43	MEXLN20150116	●
1.5	0/-0.020	0.10	+/-0.010	4	2.3	20	1.45	60	2	20.86	21.53	22.21	22.88	24.24	MEXLN20150120	●
1.5	0/-0.020	0.20	+/-0.010	4	2.3	8	1.45	50	2	8.45	8.72	8.99	9.26	9.79	MEXLN20150208	●
1.5	0/-0.020	0.20	+/-0.010	4	2.3	10	1.45	50	2	10.52	10.85	11.19	11.52	12.20	MEXLN20150210	●
1.5	0/-0.020	0.20	+/-0.010	4	2.3	12	1.45	50	2	12.58	12.99	13.39	13.79	14.60	MEXLN20150212	●
1.5	0/-0.020	0.20	+/-0.010	4	2.3	16	1.45	50	2	16.72	17.26	17.79	18.33	19.41	MEXLN20150216	●
1.5	0/-0.020	0.20	+/-0.010	4	2.3	20	1.45	60	2	20.85	21.53	22.20	22.87	24.22	MEXLN20150220	●
1.5	0/-0.020	0.30	+/-0.010	4	2.3	8	1.45	50	2	8.45	8.71	8.98	9.24	9.77	MEXLN20150308	●
1.5	0/-0.020	0.30	+/-0.010	4	2.3	16	1.45	50	2	16.72	17.25	17.78	18.32	19.39	MEXLN20150316	●
1.5	0/-0.020	0.30	+/-0.010	4	2.3	20	1.45	60	2	20.85	21.52	22.19	22.86	24.20	MEXLN20150320	●
1.6	0/-0.020	0.10	+/-0.010	4	2.4	8	1.55	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20160108	●
1.6	0/-0.020	0.10	+/-0.010	4	2.4	12	1.55	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20160112	●
1.6	0/-0.020	0.10	+/-0.010	4	2.4	16	1.55	50	2	16.72	17.26	17.80	18.35	19.43	MEXLN20160116	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2R

cylindrical shank, 2 flutes, extended and reduced neck, corner radius

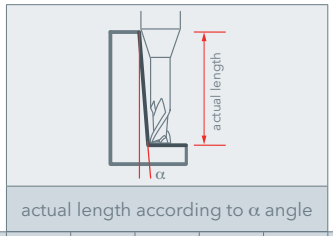
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

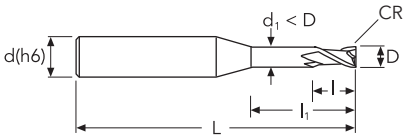
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1.8	0/-0.020	0.20	+/-0.010	4	2.7	8	1.75	50	2	8.45	8.72	8.99	9.26	9.79	MEXLN20180208	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	12	1.75	50	2	12.58	12.99	13.39	13.79	14.60	MEXLN20180212	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	16	1.75	50	2	16.72	17.26	17.79	18.33	19.41	MEXLN20180216	●
2	0/-0.020	0.20	+/-0.010	4	3	6	1.95	50	2	6.38	6.58	6.79	6.99	7.39	MEXLN20200206	●
2	0/-0.020	0.20	+/-0.010	4	3	8	1.95	50	2	8.45	8.72	8.99	9.26	9.79	MEXLN20200208	●
2	0/-0.020	0.20	+/-0.010	4	3	10	1.95	50	2	10.52	10.85	11.19	11.52	12.20	MEXLN20200210	●
2	0/-0.020	0.20	+/-0.010	4	3	12	1.95	50	2	12.58	12.99	13.39	13.79	14.60	MEXLN20200212	●
2	0/-0.020	0.20	+/-0.010	4	3	14	1.95	50	2	14.65	15.12	15.59	16.06	17.01	MEXLN20200214	●
2	0/-0.020	0.20	+/-0.010	4	3	16	1.95	50	2	16.72	17.26	17.79	18.33	19.41	MEXLN20200216	●
2	0/-0.020	0.20	+/-0.010	4	3	20	1.95	60	2	20.85	21.53	22.20	22.87	-	MEXLN20200220	●
2	0/-0.020	0.20	+/-0.010	4	3	25	1.95	75	2	26.02	26.86	27.70	28.54	-	MEXLN20200225	●
2	0/-0.020	0.20	+/-0.010	4	3	30	1.95	75	2	31.19	32.20	33.21	-	-	MEXLN20200230	●
2	0/-0.020	0.50	+/-0.010	4	3	6	1.95	50	2	6.37	6.56	6.75	6.95	7.33	MEXLN20200506	●
2	0/-0.020	0.50	+/-0.010	4	3	8	1.95	50	2	8.44	8.70	8.96	9.22	9.73	MEXLN20200508	●
2	0/-0.020	0.50	+/-0.010	4	3	12	1.95	50	2	12.57	12.97	13.36	13.75	14.54	MEXLN20200512	●
2	0/-0.020	0.50	+/-0.010	4	3	16	1.95	50	2	16.71	17.24	17.76	18.29	19.35	MEXLN20200516	●
2	0/-0.020	0.50	+/-0.010	4	3	20	1.95	60	2	20.84	21.51	22.17	22.83	-	MEXLN20200520	●
2	0/-0.020	0.50	+/-0.010	4	3	25	1.95	75	2	26.01	26.84	27.67	28.50	-	MEXLN20200525	●
2	0/-0.020	0.50	+/-0.010	4	3	30	1.95	75	2	31.18	32.18	33.18	-	-	MEXLN20200530	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	8	2.40	50	2	8.45	8.71	8.98	9.24	9.77	MEXLN20250308	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	12	2.40	50	2	12.58	12.98	13.38	13.78	14.58	MEXLN20250312	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	16	2.40	50	2	16.72	17.25	17.78	18.32	-	MEXLN20250316	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	20	2.40	60	2	20.85	21.52	22.19	-	-	MEXLN20250320	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	25	2.40	60	2	26.02	26.86	27.69	-	-	MEXLN20250325	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	30	2.40	75	2	31.19	32.19	-	-	-	MEXLN20250330	●
2.5	0/-0.020	0.50	+/-0.010	4	3.7	8	2.40	50	2	8.44	8.70	8.96	9.22	9.73	MEXLN20250508	●
2.5	0/-0.020	0.50	+/-0.010	4	3.7	12	2.40	50	2	12.57	12.97	13.36	13.75	14.54	MEXLN20250512	●
2.5	0/-0.020	0.50	+/-0.010	4	3.7	16	2.40	50	2	16.71	17.24	17.76	18.29	-	MEXLN20250516	●
2.5	0/-0.020	0.50	+/-0.010	4	3.7	20	2.40	60	2	20.84	21.51	22.17	-	-	MEXLN20250520	●
2.5	0/-0.020	0.50	+/-0.010	4	3.7	25	2.40	60	2	26.01	26.84	27.67	-	-	MEXLN20250525	●
2.5	0/-0.020	0.50	+/-0.010	4	3.7	30	2.40	75	2	31.18	32.18	-	-	-	MEXLN20250530	●
3	0/-0.025	0.20	+/-0.010	6	4.5	10	2.85	50	2	10.71	11.05	11.39	11.74	12.42	MEXLN20300210	●
3	0/-0.025	0.20	+/-0.010	6	4.5	12	2.85	50	2	12.78	13.19	13.60	14.00	14.82	MEXLN20300212	●
3	0/-0.025	0.20	+/-0.010	6	4.5	16	2.85	60	2	16.91	17.46	18.00	18.54	19.63	MEXLN20300216	●
3	0/-0.025	0.20	+/-0.010	6	4.5	20	2.85	60	2	21.05	21.72	22.40	23.08	24.44	MEXLN20300220	●
3	0/-0.025	0.20	+/-0.010	6	4.5	25	2.85	75	2	26.21	27.06	27.91	28.75	30.45	MEXLN20300225	●
3	0/-0.025	0.30	+/-0.010	6	4.5	10	2.85	50	2	10.71	11.04	11.38	11.72	12.40	MEXLN20300310	●
3	0/-0.025	0.30	+/-0.010	6	4.5	12	2.85	50	2	12.77	13.18	13.59	13.99	14.80	MEXLN20300312	●
3	0/-0.025	0.30	+/-0.010	6	4.5	16	2.85	60	2	16.91	17.45	17.99	18.53	19.61	MEXLN20300316	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2R

cylindrical shank, 2 flutes, extended and reduced neck, corner radius

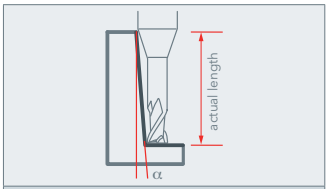
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
3	0/-0.025	0.30	+/-0.010	6	4.5	20	2.85	60	2	21.04	21.72	22.39	23.07	24.42	MEXLN20300320	●
3	0/-0.025	0.30	+/-0.010	6	4.5	25	2.85	75	2	26.21	27.05	27.90	28.74	30.43	MEXLN20300325	●
3	0/-0.025	0.50	+/-0.010	6	4.5	10	2.85	50	2	10.70	11.03	11.36	11.70	12.36	MEXLN20300510	●
3	0/-0.025	0.50	+/-0.010	6	4.5	12	2.85	50	2	12.77	13.17	13.57	13.96	14.76	MEXLN20300512	●
3	0/-0.025	0.50	+/-0.010	6	4.5	16	2.85	60	2	16.90	17.44	17.97	18.50	19.57	MEXLN20300516	●
3	0/-0.025	0.50	+/-0.010	6	4.5	20	2.85	60	2	21.04	21.70	22.37	23.04	24.38	MEXLN20300520	●
3	0/-0.025	0.50	+/-0.010	6	4.5	25	2.85	75	2	26.20	27.04	27.88	28.71	30.39	MEXLN20300525	●
4	0/-0.025	0.30	+/-0.010	6	4.5	10	3.85	60	2	10.90	11.24	11.59	11.93	12.62	MEXLN20400310	●
4	0/-0.025	0.30	+/-0.010	6	4.5	15	3.85	60	2	16.07	16.58	17.09	17.61	18.63	MEXLN20400315	●
4	0/-0.025	0.30	+/-0.010	6	4.5	20	3.85	60	2	21.24	21.92	22.60	23.28	-	MEXLN20400320	●
4	0/-0.025	0.30	+/-0.010	6	4.5	25	3.85	75	2	26.40	27.25	28.10	28.95	-	MEXLN20400325	●
4	0/-0.025	0.30	+/-0.010	6	4.5	30	3.85	75	2	31.57	32.59	33.61	-	-	MEXLN20400330	●
4	0/-0.025	0.30	+/-0.010	6	4.5	40	3.85	75	2	41.91	43.26	-	-	-	MEXLN20400340	●
4	0/-0.025	0.50	+/-0.010	6	4.5	10	3.85	60	2	10.89	11.23	11.57	11.91	12.58	MEXLN20400510	●
4	0/-0.025	0.50	+/-0.010	6	4.5	15	3.85	60	2	16.06	16.57	17.07	17.58	18.59	MEXLN20400515	●
4	0/-0.025	0.50	+/-0.010	6	4.5	20	3.85	60	2	21.23	21.90	22.58	23.25	-	MEXLN20400520	●
4	0/-0.025	0.50	+/-0.010	6	4.5	25	3.85	75	2	26.40	27.24	28.08	28.92	-	MEXLN20400525	●
4	0/-0.025	0.50	+/-0.010	6	4.5	30	3.85	75	2	31.57	32.58	33.59	-	-	MEXLN20400530	●
4	0/-0.025	0.50	+/-0.010	6	4.5	40	3.85	75	2	41.9	43.25	-	-	-	MEXLN20400540	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2R

SQUARE RIB

Material Group ISO 513			P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm			< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae			ap x D			ap x D			ap x D			ap x D		
Vc (m/min)			70-110			50-90			30-70			20-40		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
0.3	≤ 6D	0.02	40000	0.004	320	40000	0.004	290	40000	0.003	255	31800	0.003	180
	≤ 8D	0.01	40000	0.004	290	40000	0.003	260	40000	0.003	230	28700	0.003	145
	≤ 10D	0.01	40000	0.003	260	40000	0.003	230	40000	0.003	205	25500	0.002	115
	≤ 12D	0.01	40000	0.003	220	40000	0.003	200	37200	0.002	165	22300	0.002	85
0.4	≤ 6D	0.02	40000	0.006	480	40000	0.005	430	39800	0.005	380	23900	0.004	200
	≤ 8D	0.02	40000	0.005	430	40000	0.005	390	35800	0.004	310	21500	0.004	165
	≤ 10D	0.01	40000	0.005	380	40000	0.004	350	31800	0.004	245	19100	0.003	130
	≤ 12D	0.01	40000	0.004	340	39000	0.004	290	27900	0.003	185	16700	0.003	100
0.5	≤ 6D	0.03	40000	0.007	560	40000	0.006	500	31800	0.006	355	19100	0.005	185
	≤ 8D	0.02	40000	0.006	500	40000	0.006	450	28700	0.005	290	17200	0.004	150
	≤ 10D	0.02	40000	0.006	450	35700	0.005	360	25500	0.004	230	15300	0.004	120
	≤ 12D	0.01	40000	0.005	390	31200	0.004	280	22300	0.004	175	13400	0.003	90
0.6	≤ 6D	0.03	40000	0.008	640	37200	0.007	540	26500	0.006	340	15900	0.006	180
	≤ 8D	0.03	40000	0.007	580	33400	0.006	430	23900	0.006	275	14300	0.005	145
	≤ 10D	0.02	38200	0.006	490	29700	0.006	340	21200	0.005	215	12700	0.004	115
	≤ 12D	0.02	33400	0.006	370	26000	0.005	260	18600	0.004	165	11100	0.004	85
0.8	≤ 6D	0.04	35800	0.010	720	27900	0.009	500	19900	0.008	320	11900	0.007	165
	≤ 8D	0.03	32200	0.009	580	25100	0.008	410	17900	0.007	260	10700	0.006	135
	≤ 10D	0.03	28700	0.008	460	22300	0.007	320	15900	0.006	205	9600	0.006	110
	≤ 12D	0.02	25100	0.007	350	19500	0.006	250	13900	0.006	155	8400	0.005	80
1	≤ 6D	0.05	28700	0.012	690	22300	0.011	480	15900	0.010	305	9600	0.008	160
	≤ 8D	0.04	25800	0.011	560	20100	0.010	390	14300	0.009	245	8600	0.008	130
	≤ 10D	0.04	22900	0.010	440	17800	0.009	310	12700	0.008	195	7600	0.007	100
	≤ 12D	0.03	20100	0.008	340	15600	0.008	240	11100	0.007	150	6700	0.006	80
1.2	≤ 6D	0.06	23900	0.022	1050	18600	0.020	740	13300	0.018	470	8000	0.015	245
	≤ 8D	0.05	21500	0.020	850	16700	0.018	600	11900	0.016	375	7200	0.014	200
	≤ 10D	0.04	19100	0.018	670	14900	0.016	470	10600	0.014	300	6400	0.012	160
	≤ 12D	0.03	16700	0.015	510	13000	0.014	360	9300	0.012	230	5600	0.011	120
1.4	≤ 6D	0.07	20500	0.024	980	15900	0.022	690	11400	0.019	440	6800	0.017	230
	≤ 8D	0.06	18400	0.022	790	14300	0.019	560	10200	0.017	355	6100	0.015	185
	≤ 10D	0.05	16400	0.019	630	12700	0.017	440	9100	0.015	280	5500	0.013	150
	≤ 12D	0.04	14300	0.017	480	11100	0.015	340	8000	0.013	215	4800	0.012	115
	≤ 15D	0.03	12300	0.014	350	9600	0.013	250	6800	0.012	155	4100	0.010	85
	> 15D	0.02	10200	0.012	240	8000	0.011	170	5700	0.010	110	3400	0.008	55
1.5	≤ 6D	0.08	19100	0.025	960	14900	0.023	670	10600	0.020	425	6400	0.018	225
	≤ 8D	0.06	17200	0.023	770	13400	0.020	540	9600	0.018	345	5700	0.016	180
	≤ 10D	0.05	15300	0.020	610	11900	0.018	430	8500	0.016	270	5100	0.014	145
	≤ 12D	0.04	13400	0.018	470	10400	0.016	330	7400	0.014	205	4500	0.012	110
	≤ 15D	0.03	11500	0.015	350	8900	0.014	240	6400	0.012	155	3800	0.011	80
	> 15D	0.02	9600	0.013	240	7400	0.011	170	5300	0.010	105	3200	0.009	55
1.6	≤ 6D	0.08	17900	0.026	930	13900	0.023	650	10000	0.021	415	6000	0.018	220
	≤ 8D	0.07	16100	0.023	750	12500	0.021	530	9000	0.019	335	5400	0.016	175
	≤ 10D	0.06	14300	0.021	590	11100	0.019	420	8000	0.017	265	4800	0.015	140
	≤ 12D	0.04	12500	0.018	450	9800	0.016	320	7000	0.015	205	4200	0.013	105
	≤ 15D	0.04	10700	0.016	330	8400	0.014	240	6000	0.012	150	3600	0.011	80
	> 15D	0.02	9000	0.013	230	7000	0.012	160	5000	0.010	105	3000	0.009	55

CUTTING PARAMETERS

MEXLN2R

SQUARE RIB

Material Group ISO 513			P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm			< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae			ap x D			ap x D			ap x D			ap x D		
Vc (m/min)			70-110			50-90			30-70			20-40		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1.8	≤ 6D	0.09	15900	0.028	890	12400	0.025	620	8800	0.022	395	5300	0.020	210
	≤ 8D	0.08	14300	0.025	720	11100	0.023	500	8000	0.020	325	4800	0.018	170
	≤ 10D	0.06	12700	0.022	570	9900	0.020	400	7100	0.018	255	4200	0.016	130
	≤ 12D	0.05	11100	0.020	440	8700	0.018	310	6200	0.016	195	3700	0.014	100
	≤ 15D	0.04	9600	0.017	320	7400	0.015	220	5300	0.013	140	3200	0.012	75
	> 15D	0.03	8000	0.014	220	6200	0.013	160	4400	0.011	100	2700	0.010	55
2	≤ 6D	0.10	14300	0.030	860	11100	0.027	600	8000	0.024	385	4800	0.021	200
	≤ 8D	0.09	12900	0.027	700	10000	0.024	490	7200	0.022	310	4300	0.019	165
	≤ 10D	0.07	11500	0.024	550	8900	0.022	380	6400	0.019	245	3800	0.017	130
	≤ 12D	0.06	10000	0.021	420	7800	0.019	290	5600	0.017	190	3300	0.015	95
	≤ 15D	0.05	8600	0.018	310	6700	0.016	220	4800	0.014	140	2900	0.013	75
	> 15D	0.03	8600	0.018	310	6700	0.016	220	4800	0.014	140	2900	0.013	75
2.5	≤ 6D	0.13	11500	0.035	810	8900	0.032	560	6400	0.028	360	3800	0.025	185
	≤ 8D	0.11	10300	0.032	650	8000	0.028	450	5700	0.025	285	3400	0.022	150
	≤ 10D	0.09	9200	0.028	520	7100	0.025	360	5100	0.022	230	3100	0.020	120
	≤ 12D	0.07	8000	0.025	390	6200	0.022	270	4500	0.020	175	2700	0.017	95
	≤ 15D	0.06	6900	0.021	290	5400	0.019	200	3800	0.017	130	2300	0.015	70
	> 15D	0.04	6900	0.021	290	5400	0.019	200	3800	0.017	130	2300	0.015	70
3	≤ 6D	0.15	9600	0.040	770	7400	0.036	530	5300	0.032	340	3200	0.028	180
	≤ 8D	0.13	8600	0.036	620	6700	0.032	430	4800	0.029	275	2900	0.025	145
	≤ 10D	0.11	7600	0.032	490	5900	0.029	340	4200	0.026	215	2500	0.022	110
	≤ 12D	0.08	6700	0.028	380	5200	0.025	260	3700	0.022	165	2200	0.020	85
	≤ 15D	0.07	5700	0.024	270	4500	0.022	190	3200	0.019	125	1900	0.017	65
	> 15D	0.05	5700	0.024	270	4500	0.022	190	3200	0.019	125	1900	0.017	65
4	≤ 6D	0.20	7200	0.050	720	5600	0.045	500	4000	0.040	320	2400	0.035	170
	≤ 8D	0.17	6400	0.045	580	5000	0.041	410	3600	0.036	260	2100	0.032	130
	≤ 10D	0.14	5700	0.040	460	4500	0.036	320	3200	0.032	205	1900	0.028	105
	≤ 12D	0.11	5000	0.035	350	3900	0.032	250	2800	0.028	155	1700	0.025	85
	≤ 15D	0.09	4300	0.030	260	3300	0.027	180	2400	0.024	115	1400	0.021	60
	> 15D	0.06	4300	0.030	260	3300	0.027	180	2400	0.024	115	1400	0.021	60

MEXLS2R

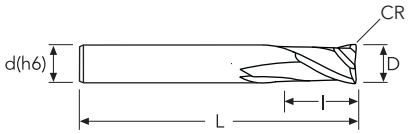
cylindrical shank, 2 flutes, long, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.020	0.30	+/-0.010	6	4		75	2	MEXLS2R03020	●
3	0/-0.025	0.30	+/-0.010	6	5		75	2	MEXLS2R03030	●
3	0/-0.025	0.50	+/-0.010	6	5		75	2	MEXLS2R05030	●
4	0/-0.025	0.30	+/-0.010	6	8		75	2	MEXLS2R03040	●
4	0/-0.025	0.50	+/-0.010	6	8		75	2	MEXLS2R05040	●
5	0/-0.025	0.30	+/-0.010	6	9		75	2	MEXLS2R03050	●
5	0/-0.025	0.50	+/-0.010	6	9		75	2	MEXLS2R05050	●
6	0/-0.025	0.30	+/-0.010	6	10		75	2	MEXLS2R03060	●
6	0/-0.025	0.50	+/-0.010	6	10		75	2	MEXLS2R05060	●
6	0/-0.025	1.00	+/-0.010	6	10		75	2	MEXLS2R10060	●
8	0/-0.030	0.30	+/-0.010	8	12		75	2	MEXLS2R03080	●
8	0/-0.030	0.50	+/-0.010	8	12		75	2	MEXLS2R05080	●
8	0/-0.030	1.00	+/-0.010	8	12		75	2	MEXLS2R10080	●
10	0/-0.030	0.50	+/-0.010	10	14		100	2	MEXLS2R05100	●
10	0/-0.030	1.00	+/-0.010	10	14		100	2	MEXLS2R10100	●
12	0/-0.030	0.50	+/-0.010	12	16		100	2	MEXLS2R05120	●
12	0/-0.030	1.00	+/-0.010	12	16		100	2	MEXLS2R10120	●
16	0/-0.030	0.50	+/-0.010	16	22		125	2	MEXLS2R05160	●
16	0/-0.030	1.00	+/-0.010	16	22		125	2	MEXLS2R10160	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXLS2R

SLOTTING

Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae	**0.3D x D**			**0.3D x D**			**0.2D x D**			**0.05D x D**		
Vc (m/min)	**70-110**			**50-90**			**30-70**			**20-40**		
D (mm)	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**
2	14300	0.009	260	11440	0.008	190	8580	0.007	125	5150	0.006	65
3	9600	0.012	230	7680	0.011	170	5760	0.010	110	3460	0.008	60
4	7200	0.018	260	5760	0.016	190	4320	0.014	125	2590	0.013	65
5	5700	0.024	270	4560	0.022	200	3420	0.019	130	2050	0.017	70
6	4800	0.029	280	3840	0.026	200	2880	0.023	135	1730	0.020	70
8	3600	0.035	250	2880	0.032	180	2160	0.028	120	1300	0.025	65
10	2900	0.041	240	2320	0.037	170	1740	0.033	115	1040	0.029	60
12	2400	0.050	240	1920	0.045	170	1440	0.040	115	860	0.035	60
16	1800	0.065	230	1400	0.059	160	1000	0.052	105	600	0.046	55

< D3: ap = 0.4 mm max

MEXCS4R

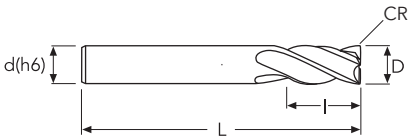
cylindrical shank, 4 flutes, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z4

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.20	+/-0.010	4	3		50	4	MEXCS4R01002	●
1.5	0/-0.020	0.20	+/-0.010	4	4.5		50	4	MEXCS4R01502	●
2	0/-0.020	0.20	+/-0.010	4	6.5		50	4	MEXCS4R02002	●
2	0/-0.020	0.30	+/-0.010	4	6.5		50	4	MEXCS4R02003	●
2.5	0/-0.020	0.20	+/-0.010	4	6.5		50	4	MEXCS4R02502	●
2.5	0/-0.020	0.50	+/-0.010	4	6.5		50	4	MEXCS4R02505	●
3	0/-0.025	0.20	+/-0.010	4	9		50	4	MEXCS4R03002	●
3	0/-0.025	0.30	+/-0.010	4	9		50	4	MEXCS4R03003	●
3	0/-0.025	0.50	+/-0.010	4	9		50	4	MEXCS4R03005	●
4	0/-0.025	0.30	+/-0.010	4	12		50	4	MEXCS4R04003	●
4	0/-0.025	0.50	+/-0.010	4	12		50	4	MEXCS4R04005	●
4	0/-0.025	1.00	+/-0.010	4	12		50	4	MEXCS4R04010	●
5	0/-0.025	0.30	+/-0.010	5	15		50	4	MEXCS4R05003	●
5	0/-0.025	0.50	+/-0.010	5	15		50	4	MEXCS4R05005	●
5	0/-0.025	1.00	+/-0.010	5	15		50	4	MEXCS4R05010	●
6	0/-0.025	0.30	+/-0.010	6	16		50	4	MEXCS4R06003	●
6	0/-0.025	0.50	+/-0.010	6	16		50	4	MEXCS4R06005	●
6	0/-0.025	1.00	+/-0.010	6	16		50	4	MEXCS4R06010	●
8	0/-0.030	0.30	+/-0.010	8	20		64	4	MEXCS4R08003	●
8	0/-0.030	0.50	+/-0.010	8	20		64	4	MEXCS4R08005	●
8	0/-0.030	1.00	+/-0.010	8	20		64	4	MEXCS4R08010	●
8	0/-0.030	1.50	+/-0.010	8	20		64	4	MEXCS4R08015	●
8	0/-0.030	2.00	+/-0.010	8	20		64	4	MEXCS4R08020	●
10	0/-0.030	0.30	+/-0.010	10	22		75	4	MEXCS4R10003	●
10	0/-0.030	0.50	+/-0.010	10	22		75	4	MEXCS4R10005	●
10	0/-0.030	1.00	+/-0.010	10	22		75	4	MEXCS4R10010	●
10	0/-0.030	1.50	+/-0.010	10	22		75	4	MEXCS4R10015	●
10	0/-0.030	2.00	+/-0.010	10	22		75	4	MEXCS4R10020	●
12	0/-0.030	0.30	+/-0.010	12	25		75	4	MEXCS4R12003	●
12	0/-0.030	0.50	+/-0.010	12	25		75	4	MEXCS4R12005	●
12	0/-0.030	1.00	+/-0.010	12	25		75	4	MEXCS4R12010	●
12	0/-0.030	1.50	+/-0.010	12	25		75	4	MEXCS4R12015	●
12	0/-0.030	2.00	+/-0.010	12	25		75	4	MEXCS4R12020	●
12	0/-0.030	3.00	+/-0.010	12	25		75	4	MEXCS4R12030	●
14	0/-0.030	0.50	+/-0.010	14	32		90	4	MEXCS4R14005	○
14	0/-0.030	1.00	+/-0.010	14	32		90	4	MEXCS4R14010	●
14	0/-0.030	2.00	+/-0.010	14	32		90	4	MEXCS4R14020	○
16	0/-0.030	0.50	+/-0.010	16	32		90	4	MEXCS4R16005	●
16	0/-0.030	1.00	+/-0.010	16	32		90	4	MEXCS4R16010	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXCS4R

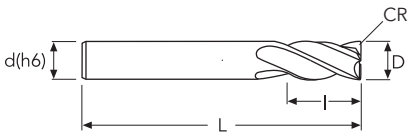
cylindrical shank, 4 flutes, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z4

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
16	0/-0.030	2.00	+/-0.010	16	32		90	4	MEXCS4R16020	●
16	0/-0.030	3.00	+/-0.010	16	32		90	4	MEXCS4R16030	●
18	0/-0.030	0.50	+/-0.010	18	38		100	4	MEXCS4R18005	●
18	0/-0.030	1.00	+/-0.010	18	38		100	4	MEXCS4R18010	●
20	0/-0.030	0.50	+/-0.010	20	38		100	4	MEXCS4R20005	●
20	0/-0.030	1.00	+/-0.010	20	38		100	4	MEXCS4R20010	●
20	0/-0.030	2.00	+/-0.010	20	38		100	4	MEXCS4R20020	●
20	0/-0.030	3.00	+/-0.010	20	38		100	4	MEXCS4R20030	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXCS4R

	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**D x 0.1D**			**D x 0.1D**			**D x 0.05D**			**D x 0.05D**		
	Vc (m/min)	**80-120**			**50-90**			**40-60**			**20-40**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	31850	0.009	1080	22290	0.008	680	15920	0.007	435	9550	0.006	225
	2	15920	0.017	1080	11150	0.015	680	7960	0.014	435	4780	0.012	230
	3	10620	0.026	1080	7430	0.023	680	5310	0.020	435	3180	0.018	225
	4	7960	0.034	1080	5570	0.031	680	3980	0.027	435	2390	0.024	230
	5	6370	0.038	970	4460	0.034	610	3180	0.031	390	1910	0.027	205
	6	5310	0.043	900	3720	0.038	570	2650	0.034	360	1590	0.030	190
	8	3980	0.055	880	2790	0.050	550	1990	0.044	350	1190	0.039	185
	10	3180	0.071	900	2230	0.064	570	1590	0.057	360	960	0.050	190
	12	2650	0.085	900	1860	0.077	570	1330	0.068	360	800	0.060	190
	14	2270	0.098	890	1590	0.088	560	1140	0.078	355	680	0.068	185
	16	1990	0.110	880	1390	0.099	550	1000	0.088	350	600	0.077	185
	18	1770	0.125	890	1240	0.113	560	880	0.100	350	530	0.088	185
	20	1590	0.140	890	1110	0.126	560	800	0.112	360	480	0.098	190

MEX410R

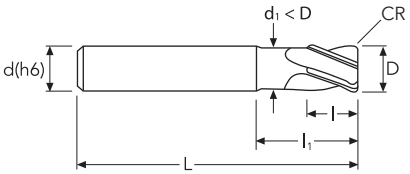
cylindrical shank, 4 flutes, short, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | RADIUS | Z4

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
2	0/-0.012	0.20	+/-0.020	6	2.5	5	1.90	50	4	MEX410R02020	●
2.5	0/-0.012	0.25	+/-0.020	6	3	6	2.40	50	4	MEX410R025025	●
3	0/-0.012	0.30	+/-0.020	6	4	7	2.80	50	4	MEX410R03030	●
4	0/-0.012	0.50	+/-0.020	6	5	9	3.70	50	4	MEX410R05040	●
5	0/-0.012	0.50	+/-0.020	6	6	12	4.60	50	4	MEX410R05050	●
6	0/-0.012	0.50	+/-0.020	6	7	14	5.60	60	4	MEX410R05060	●
8	0/-0.015	1.00	+/-0.020	8	10	18	7.40	70	4	MEX410R10080	●
10	0/-0.015	1.00	+/-0.020	10	12	25	9.40	75	4	MEX410R10100	●
12	0/-0.015	1.00	+/-0.020	12	15	30	11.40	80	4	MEX410R10120	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEX410R

	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**D x 0.1D**			**D x 0.1D**			**D x 0.05D**			**D x 0.05D**		
	Vc (m/min)	**80-120**			**50-90**			**40-60**			**20-40**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	15920	0.015	970	11150	0.014	610	7960	0.012	390	4780	0.011	205
	3	10620	0.023	970	7430	0.021	610	5310	0.018	390	3180	0.016	205
	4	7960	0.031	970	5570	0.028	610	3980	0.024	390	2390	0.021	205
	5	6370	0.034	880	4460	0.031	550	3180	0.028	350	1910	0.024	185
	6	5310	0.038	810	3720	0.034	510	2650	0.031	325	1590	0.027	170
	8	3980	0.050	790	2790	0.045	500	1990	0.040	315	1190	0.035	165
	10	3180	0.065	830	2230	0.059	520	1590	0.052	330	960	0.046	175
	12	2650	0.077	810	1860	0.069	510	1330	0.061	325	800	0.054	170

MEXLS4R

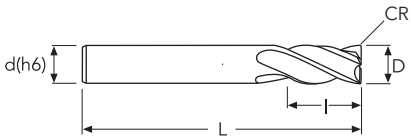
cylindrical shank, 4 flutes, long, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z4

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	0/-0.020	0.30	+/-0.010	6	4		75	4	MEXLS4R03020	●
3	0/-0.025	0.30	+/-0.010	6	5		75	4	MEXLS4R03030	●
3	0/-0.025	0.50	+/-0.010	6	5		75	4	MEXLS4R05030	●
4	0/-0.025	0.30	+/-0.010	6	8		75	4	MEXLS4R03040	●
4	0/-0.025	0.50	+/-0.010	6	8		75	4	MEXLS4R05040	●
5	0/-0.025	0.30	+/-0.010	6	9		75	4	MEXLS4R03050	●
5	0/-0.025	0.50	+/-0.010	6	9		75	4	MEXLS4R05050	●
6	0/-0.025	0.30	+/-0.010	6	10		75	4	MEXLS4R03060	●
6	0/-0.025	0.50	+/-0.010	6	10		75	4	MEXLS4R05060	●
6	0/-0.025	1.00	+/-0.010	6	10		75	4	MEXLS4R10060	●
8	0/-0.030	0.30	+/-0.010	8	12		75	4	MEXLS4R03080	●
8	0/-0.030	0.50	+/-0.010	8	12		75	4	MEXLS4R05080	●
8	0/-0.030	1.00	+/-0.010	8	12		75	4	MEXLS4R10080	●
10	0/-0.030	0.50	+/-0.010	10	14		100	4	MEXLS4R05100	●
10	0/-0.030	1.00	+/-0.010	10	14		100	4	MEXLS4R10100	●
12	0/-0.030	0.50	+/-0.010	12	16		100	4	MEXLS4R05120	●
12	0/-0.030	1.00	+/-0.010	12	16		100	4	MEXLS4R10120	●
16	0/-0.030	0.50	+/-0.010	16	22		125	4	MEXLS4R05160	●
16	0/-0.030	1.00	+/-0.010	16	22		125	4	MEXLS4R10160	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXLS4R

	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**D x 0.05D**			**D x 0.05D**			**D x 0.05D**			**D x 0.05D**		
	Vc (m/min)	**70-110**			**50-90**			**40-60**			**20-40**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	14330	0.014	830	11150	0.013	580	7960	0.012	370	4780	0.010	195
	3	9550	0.022	830	7430	0.020	580	5310	0.017	370	3180	0.015	195
	4	7170	0.029	830	5570	0.026	580	3980	0.023	370	2390	0.020	195
	5	5730	0.033	750	4460	0.029	520	3180	0.026	330	1910	0.023	175
	6	4780	0.036	690	3720	0.033	480	2650	0.029	305	1590	0.025	160
	8	3580	0.047	670	2790	0.042	470	1990	0.038	300	1190	0.033	155
	10	2870	0.060	690	2230	0.054	480	1590	0.048	305	960	0.042	160
	12	2390	0.072	690	1860	0.065	480	1330	0.058	305	800	0.051	160
	16	1790	0.094	670	1390	0.084	470	1000	0.075	300	600	0.065	155

MEX610R

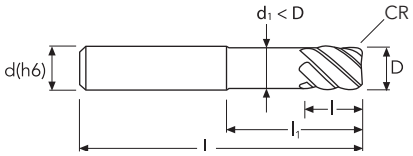
cylindrical shank, multi flute, short, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 45° | RADIUS | Z6

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
6	0/-0.030	0.50	+/-0.020	6	6	14	5.50	50	6	MEX610R05060	●
8	0/-0.030	0.50	+/-0.020	8	8	24	7.40	60	6	MEX610R05080	●
10	0/-0.030	1.00	+/-0.020	10	10	30	9.20	70	6	MEX610R10100	●
12	0/-0.030	1.00	+/-0.020	12	12	30	11.00	75	6	MEX610R10120	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEX610R

SIDE MILLING	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**D x 0.1D**			**D x 0.1D**			**D x 0.05D**			**D x 0.05D**		
	Vc (m/min)	**120-160**			**90-130**			**60-100**			**50-70**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.018	800	5840	0.016	570	4250	0.014	370	3180	0.013	240
	8	5570	0.028	920	4380	0.025	650	3180	0.022	420	2390	0.019	280
	10	4460	0.034	900	3500	0.030	640	2550	0.027	410	1910	0.024	270
	12	3720	0.041	910	2920	0.037	640	2120	0.033	420	1590	0.029	270

MEX611R

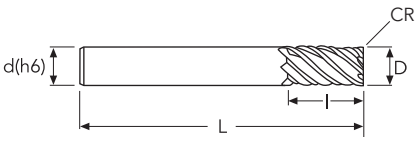
cylindrical shank, multi flute, long, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 45° | RADIUS | Z6

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.030	0.50	+/-0.020	6	15		90	6	MEX611R05060	●
8	0/-0.030	0.50	+/-0.020	8	20		100	6	MEX611R05080	●
10	0/-0.030	0.50	+/-0.020	10	25		100	6	MEX611R05100	●
10	0/-0.030	1.00	+/-0.020	10	25		100	6	MEX611R10100	●
12	0/-0.030	0.50	+/-0.020	12	30		100	6	MEX611R05120	●
12	0/-0.030	1.00	+/-0.020	12	30		100	6	MEX611R10120	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEX611R

	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**		
	Vc (m/min)	**100-140**			**80-120**			**40-80**			**20-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	6370	0.015	580	5310	0.014	440	3180	0.012	230	2120	0.011	140
	8	4780	0.023	670	3980	0.021	500	2390	0.019	270	1590	0.016	160
	10	3820	0.029	650	3180	0.026	490	1910	0.023	260	1270	0.020	150
	12	3180	0.035	660	2650	0.031	500	1590	0.028	260	1060	0.024	150
	14	2730	0.041	670	2270	0.037	500	1360	0.033	270	910	0.029	160
	16	2390	0.048	690	1990	0.043	520	1190	0.038	270	800	0.034	160
	18	2120	0.055	700	1770	0.050	530	1060	0.044	280	710	0.039	160
	20	1910	0.063	720	1590	0.057	540	960	0.050	290	640	0.044	170

MEXMB2

cylindrical shank, 2 flutes ball nose, miniature

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

COPYING

D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.2	0/-0.020	0.10	0/-0.020	4	0.4		40	2	MEXMB20020	●
0.3	0/-0.020	0.15	0/-0.020	4	0.6		40	2	MEXMB20030	●
0.4	0/-0.020	0.20	0/-0.020	4	0.8		40	2	MEXMB20040	●
0.5	0/-0.020	0.25	0/-0.020	4	1.2		40	2	MEXMB20050	●
0.6	0/-0.020	0.30	0/-0.020	4	1.4		40	2	MEXMB20060	●
0.7	0/-0.020	0.35	0/-0.020	4	1.6		40	2	MEXMB20070	●
0.8	0/-0.020	0.40	0/-0.020	4	1.8		40	2	MEXMB20080	●
0.9	0/-0.020	0.45	0/-0.020	4	2		40	2	MEXMB20090	●
1	0/-0.020	0.50	0/-0.020	4	3		50	2	MEXMB2010050	●
1.5	0/-0.020	0.75	0/-0.020	4	3		50	2	MEXMB2015050	●
2	0/-0.020	1.00	0/-0.020	4	4		50	2	MEXMB2020050	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXMB2

	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**0.05D x 0.2D**			**0.05D x 0.1D**			**0.05D x 0.1D**			**0.05D x 0.1D**		
	Vc (m/min)	**110-130**			**90-110**			**50-70**			**45-55**		
	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
COPYING	**0.2**	**0.09**	40000	0.006	480	40000	0.005	430	40000	0.005	360	40000	0.004	310
	0.3	**0.13**	40000	0.007	580	40000	0.006	520	40000	0.006	460	40000	0.005	405
	0.4	**0.17**	40000	0.009	720	40000	0.008	650	40000	0.007	575	40000	0.006	505
	0.5	**0.22**	40000	0.011	860	40000	0.010	780	38220	0.009	660	31850	0.008	480
	0.6	**0.26**	40000	0.014	1080	40000	0.012	970	31850	0.011	690	26540	0.009	500
	0.7	**0.31**	40000	0.016	1300	40000	0.015	1170	27300	0.013	710	22750	0.011	515
	0.8	**0.35**	40000	0.018	1440	40000	0.016	1300	23890	0.014	690	19900	0.013	500
	0.9	**0.39**	40000	0.021	1660	35390	0.019	1320	21230	0.017	705	17690	0.014	515
	1	**0.44**	38220	0.023	1790	40000	0.021	1680	19110	0.019	715	15920	0.016	520
	1.5	**0.65**	25480	0.036	1830	21230	0.032	1380	12740	0.029	735	10620	0.025	535
	2	**0.87**	19110	0.050	1890	15920	0.045	1420	9550	0.040	755	7960	0.035	550

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

MEXMB2SC

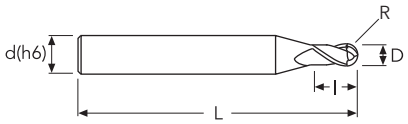
cylindrical shank, 2 flutes ball nose, short cutting length, miniature

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.2	0/-0.020	0.10	0/-0.020	4	0.2		50	2	MEXMB2SC0020	●
0.3	0/-0.020	0.15	0/-0.020	4	0.3		50	2	MEXMB2SC0030	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4		50	2	MEXMB2SC0040	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4		50	2	MEXMB2SC0050	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5		50	2	MEXMB2SC0060	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6		50	2	MEXMB2SC0080	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXMB2SC

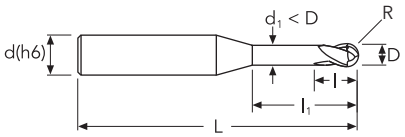
	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**0.05D x 0.1D**			**0.05D x 0.1D**			**0.05D x 0.1D**			**0.05D x 0.1D**		
	Vc (m/min)	**110-130**			**90-110**			**50-70**			**45-55**		
COPYING	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	0.2	**0.09**	40000	0.006	480	40000	0.005	430	40000	0.005	385	40000	0.004	335
	0.3	**0.13**	40000	0.008	640	40000	0.007	580	40000	0.006	510	40000	0.006	450
	0.4	**0.17**	40000	0.010	800	40000	0.009	720	40000	0.008	640	40000	0.007	560
	0.5	**0.22**	40000	0.012	960	40000	0.011	860	38220	0.010	735	31850	0.008	535
	0.6	**0.26**	40000	0.015	1200	40000	0.014	1080	31850	0.012	765	26540	0.011	555
	0.8	**0.35**	40000	0.018	1440	40000	0.016	1300	27300	0.014	785	22750	0.013	575

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

MEXLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck

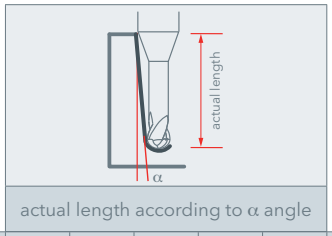
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

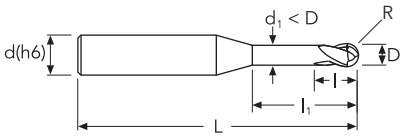
D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.2	0/-0.020	0.10	0/-0.020	4	0.2	0.5	0.15	50	2	0.57	0.58	0.6	0.62	0.66	MEXLNB2002005	●
0.2	0/-0.020	0.10	0/-0.020	4	0.2	1	0.15	50	2	1.08	1.12	1.15	1.19	1.27	MEXLNB200201	●
0.2	0/-0.020	0.10	0/-0.020	4	0.2	1.5	0.15	50	2	1.60	1.65	1.71	1.76	1.89	MEXLNB2002015	●
0.3	0/-0.020	0.15	0/-0.020	4	0.3	1	0.25	50	2	1.08	1.11	1.15	1.18	1.26	MEXLNB200301	●
0.3	0/-0.020	0.15	0/-0.020	4	0.3	2	0.25	50	2	2.12	2.18	2.25	2.33	2.49	MEXLNB200302	●
0.3	0/-0.020	0.15	0/-0.020	4	0.3	3	0.25	50	2	3.15	3.25	3.36	3.48	3.73	MEXLNB200303	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	1	0.35	50	2	1.08	1.11	1.14	1.18	1.25	MEXLNB200401	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	2	0.35	50	2	2.11	2.18	2.25	2.32	2.48	MEXLNB200402	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	3	0.35	50	2	3.15	3.25	3.36	3.47	3.72	MEXLNB200403	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	4	0.35	50	2	4.18	4.32	4.46	4.62	4.95	MEXLNB200404	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	5	0.35	50	2	5.21	5.39	5.57	5.77	6.18	MEXLNB200405	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	2	0.45	50	2	2.15	2.22	2.29	2.36	2.52	MEXLNB200502	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	3	0.45	50	2	3.18	3.29	3.39	3.51	3.75	MEXLNB200503	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	4	0.45	50	2	4.22	4.35	4.5	4.65	4.98	MEXLNB200504	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	5	0.45	50	2	5.25	5.42	5.61	5.8	6.22	MEXLNB200505	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	6	0.45	50	2	6.28	6.49	6.71	6.95	7.45	MEXLNB200506	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	8	0.45	50	2	8.35	8.63	8.93	9.24	9.92	MEXLNB200508	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	2	0.55	50	2	2.15	2.21	2.28	2.35	2.50	MEXLNB200602	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	3	0.55	50	2	3.18	3.28	3.39	3.50	3.74	MEXLNB200603	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	4	0.55	50	2	4.22	4.35	4.49	4.65	4.97	MEXLNB200604	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	5	0.55	50	2	5.25	5.42	5.60	5.79	6.21	MEXLNB200605	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	6	0.55	50	2	6.28	6.49	6.71	6.94	7.44	MEXLNB200606	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	8	0.55	50	2	8.35	8.63	8.92	9.23	9.91	MEXLNB200608	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	2	0.75	50	2	2.15	2.21	2.27	2.34	2.48	MEXLNB200802	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	4	0.75	50	2	4.21	4.34	4.48	4.63	4.95	MEXLNB200804	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	5	0.75	50	2	5.25	5.41	5.59	5.78	6.18	MEXLNB200805	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	6	0.75	50	2	6.28	6.48	6.70	6.93	7.42	MEXLNB200806	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	7	0.75	50	2	7.31	7.55	7.81	8.07	8.65	MEXLNB200807	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	8	0.75	50	2	8.35	8.62	8.91	9.22	9.88	MEXLNB200808	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	10	0.75	50	2	10.41	10.76	11.13	11.51	12.35	MEXLNB200810	●
1	0/-0.020	0.50	0/-0.020	4	0.8	3	0.95	50	2	3.27	3.37	3.47	3.57	3.80	MEXLNB201003	●
1	0/-0.020	0.50	0/-0.020	4	0.8	4	0.95	50	2	4.31	4.44	4.58	4.72	5.04	MEXLNB201004	●
1	0/-0.020	0.50	0/-0.020	4	0.8	5	0.95	50	2	5.34	5.51	5.68	5.87	6.27	MEXLNB201005	●
1	0/-0.020	0.50	0/-0.020	4	0.8	6	0.95	50	2	6.37	6.58	6.79	7.02	7.50	MEXLNB201006	●
1	0/-0.020	0.50	0/-0.020	4	0.8	7	0.95	50	2	7.41	7.64	7.90	8.16	8.74	MEXLNB201007	●
1	0/-0.020	0.50	0/-0.020	4	0.8	8	0.95	50	2	8.44	8.71	9.00	9.31	9.97	MEXLNB201008	●
1	0/-0.020	0.50	0/-0.020	4	0.8	9	0.95	50	2	9.47	9.78	10.11	10.46	11.21	MEXLNB201009	●
1	0/-0.020	0.50	0/-0.020	4	0.8	10	0.95	50	2	10.51	10.85	11.22	11.61	12.44	MEXLNB201010	●
1	0/-0.020	0.50	0/-0.020	4	0.8	12	0.95	50	2	12.57	12.99	13.43	13.9	14.91	MEXLNB201012	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck

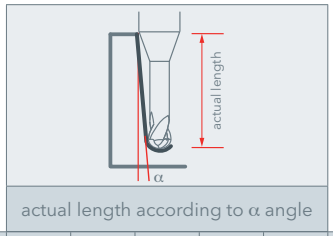
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

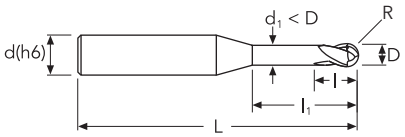
D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1	0/-0.020	0.50	0/-0.020	4	0.8	14	0.95	50	2	14.64	15.13	15.65	16.19	17.37	MEXLNB201014	●
1	0/-0.020	0.50	0/-0.020	4	0.8	16	0.95	50	2	16.71	15.13	15.65	16.19	17.37	MEXLNB201016	●
1	0/-0.020	0.50	0/-0.020	4	0.8	20	0.95	60	2	20.84	21.55	22.29	23.08	24.78	MEXLNB201020	●
1.2	0/-0.020	0.60	0/-0.020	4	1	6	1.15	50	2	6.37	6.57	6.78	7.00	7.48	MEXLNB201206	●
1.2	0/-0.020	0.60	0/-0.020	4	1	8	1.15	50	2	8.44	8.71	8.99	9.30	9.95	MEXLNB201208	●
1.2	0/-0.020	0.60	0/-0.020	4	1	10	1.15	50	2	10.50	10.85	11.21	11.59	12.42	MEXLNB201210	●
1.2	0/-0.020	0.60	0/-0.020	4	1	12	1.15	50	2	12.57	12.98	13.42	13.89	14.88	MEXLNB201212	●
1.4	0/-0.020	0.70	0/-0.020	4	1.1	8	1.35	50	2	8.43	8.70	8.98	9.28	9.93	MEXLNB201408	●
1.4	0/-0.020	0.70	0/-0.020	4	1.1	12	1.35	50	2	12.57	12.98	13.41	13.87	14.86	MEXLNB201412	●
1.4	0/-0.020	0.70	0/-0.020	4	1.1	16	1.35	50	2	16.70	17.26	17.84	18.46	19.8	MEXLNB201416	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	8	1.45	50	2	8.43	8.70	8.98	9.27	9.91	MEXLNB201508	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	12	1.45	50	2	12.57	12.97	13.41	13.86	14.85	MEXLNB201512	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	16	1.45	50	2	16.7	17.25	17.84	18.45	19.78	MEXLNB201516	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	18	1.45	60	2	18.77	19.39	20.05	20.75	22.25	MEXLNB201518	●
1.6	0/-0.020	0.80	0/-0.020	4	1.3	8	1.55	50	2	8.43	8.69	8.97	9.27	9.90	MEXLNB201608	●
1.6	0/-0.020	0.80	0/-0.020	4	1.3	12	1.55	50	2	12.56	12.97	13.40	13.86	14.84	MEXLNB201612	●
1.6	0/-0.020	0.80	0/-0.020	4	1.3	16	1.55	50	2	16.7	17.25	17.83	18.45	19.77	MEXLNB201616	●
1.6	0/-0.020	0.80	0/-0.020	4	1.3	20	1.55	60	2	20.83	21.53	22.26	23.03	-	MEXLNB201620	●
1.8	0/-0.020	0.90	0/-0.020	4	1.4	8	1.75	50	2	8.43	8.69	8.96	9.25	9.88	MEXLNB201808	●
1.8	0/-0.020	0.90	0/-0.020	4	1.4	12	1.75	50	2	12.56	12.96	13.39	13.84	14.81	MEXLNB201812	●
1.8	0/-0.020	0.90	0/-0.020	4	1.4	16	1.75	50	2	16.7	17.24	17.82	18.43	19.75	MEXLNB201816	●
1.8	0/-0.020	0.90	0/-0.020	4	1.4	20	1.75	60	2	20.83	21.52	22.25	23.02	-	MEXLNB201820	●
2	0/-0.020	1.00	0/-0.020	4	1.6	4	1.95	50	2	4.29	4.40	4.52	4.65	4.92	MEXLNB202004	●
2	0/-0.020	1.00	0/-0.020	4	1.6	6	1.95	50	2	6.36	6.54	6.74	6.94	7.39	MEXLNB202006	●
2	0/-0.020	1.00	0/-0.020	4	1.6	8	1.95	50	2	8.42	8.68	8.95	9.24	9.86	MEXLNB202008	●
2	0/-0.020	1.00	0/-0.020	4	1.6	10	1.95	50	2	10.49	10.82	11.17	11.53	12.32	MEXLNB202010	●
2	0/-0.020	1.00	0/-0.020	4	1.6	12	1.95	50	2	12.56	12.96	13.38	13.83	14.79	MEXLNB202012	●
2	0/-0.020	1.00	0/-0.020	4	1.6	14	1.95	50	2	14.62	15.10	15.59	16.12	17.26	MEXLNB202014	●
2	0/-0.020	1.00	0/-0.020	4	1.6	16	1.95	50	2	16.69	17.23	17.81	18.42	19.73	MEXLNB202016	●
2	0/-0.020	1.00	0/-0.020	4	1.6	18	1.95	60	2	18.76	19.37	20.02	20.71	-	MEXLNB202018	●
2	0/-0.020	1.00	0/-0.020	4	1.6	20	1.95	60	2	20.83	21.51	22.24	23.00	-	MEXLNB202020	●
2	0/-0.020	1.00	0/-0.020	4	1.6	25	1.95	75	2	25.99	26.86	27.77	28.74	-	MEXLNB202025	●
2	0/-0.020	1.00	0/-0.020	4	1.6	30	1.95	75	2	31.16	32.21	33.31	-	-	MEXLNB202030	●
3	0/-0.025	1.50	0/-0.020	6	2.4	8	2.85	50	2	8.60	8.84	9.10	9.37	9.96	MEXLNB203008	●
3	0/-0.025	1.50	0/-0.020	6	2.4	10	2.85	50	2	10.67	10.98	11.32	11.67	12.43	MEXLNB203010	●
3	0/-0.025	1.50	0/-0.020	6	2.4	16	2.85	60	2	16.87	17.4	17.96	18.55	19.83	MEXLNB203016	●
3	0/-0.025	1.50	0/-0.020	6	2.4	20	2.85	60	2	21.00	21.68	22.39	23.14	24.77	MEXLNB203020	●
3	0/-0.025	1.50	0/-0.020	6	2.4	25	2.85	75	2	26.17	27.02	27.93	28.88	-	MEXLNB203025	●
3	0/-0.025	1.50	0/-0.020	6	2.4	30	2.85	75	2	31.34	32.37	33.46	34.62	-	MEXLNB203030	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck

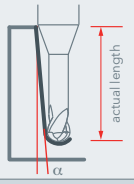
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
3	0/-0.025	1.50	0/-0.020	6	2.4	35	2.85	75	2	36.51	37.72	39.00	40.35	-	MEXLNB203035	●
4	0/-0.025	2.00	0/-0.020	6	3.2	10	3.85	50	2	10.84	11.15	11.47	11.81	12.54	MEXLNB204010	●
4	0/-0.025	2.00	0/-0.020	6	3.2	16	3.85	60	2	17.04	17.56	18.11	18.69	19.94	MEXLNB204016	●
4	0/-0.025	2.00	0/-0.020	6	3.2	20	3.85	60	2	21.18	21.84	22.54	23.28	-	MEXLNB204020	●
4	0/-0.025	2.00	0/-0.020	6	3.2	25	3.85	75	2	26.35	27.19	28.08	29.02	-	MEXLNB204025	●
4	0/-0.025	2.00	0/-0.020	6	3.2	30	3.85	75	2	31.51	32.53	33.61	-	-	MEXLNB204030	●
4	0/-0.025	2.00	0/-0.020	6	3.2	35	3.85	75	2	36.68	37.88	39.15	-	-	MEXLNB204035	●
4	0/-0.025	2.00	0/-0.020	6	3.2	40	3.85	100	2	41.85	43.23	-	-	-	MEXLNB204040	●
4	0/-0.025	2.00	0/-0.020	6	3.2	50	3.85	100	2	52.19	53.92	-	-	-	MEXLNB204050	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLNB2

	Material Group ISO 513				P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm				< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae				ap x 0.2D			ap x 0.1D			ap x 0.1D			ap x 0.1D		
	Vc (m/min)				110-130			90-110			50-70			45-55		
	D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
ROUND RIB	0.2	≤ 6D	0.01	0.09	40000	0.007	580	40000	0.006	520	40000	0.006	460	40000	0.005	405
		≤ 8D	0.01	0.08	40000	0.006	520	40000	0.005	420	40000	0.005	375	40000	0.004	325
		≤ 10D	0.01	0.07	40000	0.006	460	40000	0.004	330	40000	0.004	295	40000	0.003	260
	0.3	≤ 6D	0.02	0.13	40000	0.009	720	40000	0.008	650	40000	0.007	575	40000	0.006	505
		≤ 8D	0.01	0.12	40000	0.008	650	40000	0.007	520	40000	0.006	465	40000	0.005	410
		≤ 10D	0.01	0.11	40000	0.007	580	40000	0.005	410	40000	0.005	370	40000	0.004	325
	0.4	≤ 6D	0.02	0.17	40000	0.012	940	40000	0.011	840	40000	0.009	750	40000	0.008	655
		≤ 8D	0.02	0.16	40000	0.011	840	40000	0.009	680	40000	0.008	605	35830	0.007	475
		≤ 10D	0.01	0.15	40000	0.009	750	40000	0.007	540	38220	0.006	460	31850	0.005	335
	0.5	≤ 6D	0.03	0.22	40000	0.015	1220	40000	0.014	1100	38220	0.012	935	31850	0.011	680
		≤ 8D	0.02	0.20	40000	0.014	1100	40000	0.011	890	34390	0.010	680	28660	0.009	495
		≤ 10D	0.02	0.18	40000	0.012	980	40000	0.009	710	30570	0.008	480	25480	0.007	350
	0.6	≤ 6D	0.03	0.26	40000	0.019	1510	40000	0.017	1360	31850	0.015	965	26540	0.013	700
		≤ 8D	0.03	0.24	40000	0.017	1360	40000	0.014	1100	28660	0.012	700	23890	0.011	510
		≤ 10D	0.02	0.22	40000	0.015	1210	40000	0.011	870	25480	0.010	495	21230	0.008	360
	0.8	≤ 6D	0.04	0.35	40000	0.023	1800	39810	0.020	1610	23890	0.018	860	19900	0.016	625
		≤ 8D	0.03	0.32	40000	0.020	1620	35830	0.016	1180	21500	0.015	625	17910	0.013	455
		≤ 10D	0.03	0.29	38220	0.018	1380	31850	0.013	830	19110	0.012	440	15920	0.010	320
	1	≤ 6D	0.05	0.44	38220	0.027	2060	31850	0.024	1550	19110	0.022	825	15920	0.019	600
		≤ 8D	0.04	0.40	34390	0.024	1670	28660	0.020	1130	17200	0.017	600	14330	0.015	440
		≤ 10D	0.04	0.37	30570	0.022	1320	25480	0.016	790	15290	0.014	425	12740	0.012	310
		≤ 12D	0.03	0.33	26750	0.019	1010	22290	0.012	530	13380	0.011	285	11150	0.009	205
		> 12D	0.02	0.30	22930	0.016	740	19110	0.009	330	11460	0.008	180	9550	0.007	130
	1.2	≤ 6D	0.06	0.52	31850	0.032	2010	21230	0.028	1200	15920	0.025	800	13270	0.022	585
		≤ 8D	0.05	0.48	28660	0.028	1630	19110	0.023	880	14330	0.020	585	11940	0.018	425
		≤ 10D	0.04	0.44	25480	0.025	1280	16990	0.018	620	12740	0.016	410	10620	0.014	300
		≤ 12D	0.03	0.39	22290	0.022	980	14860	0.014	410	11150	0.012	275	9290	0.011	200
		> 12D	0.03	0.36	19110	0.019	720	12740	0.010	260	9550	0.009	175	7960	0.008	125
	1.5	≤ 6D	0.08	0.65	25480	0.041	2060	21230	0.036	1550	12740	0.032	825	10620	0.028	600
		≤ 8D	0.06	0.61	22930	0.036	1670	19110	0.030	1130	11460	0.026	600	9550	0.023	440
		≤ 10D	0.05	0.55	20380	0.032	1320	16990	0.023	790	10190	0.021	425	8490	0.018	310
		≤ 12D	0.04	0.49	17830	0.028	1010	14860	0.018	530	8920	0.016	285	7430	0.014	205
		> 12D	0.03	0.44	15290	0.024	740	12740	0.013	330	7640	0.012	180	6370	0.010	130
	2	≤ 6D	0.10	0.87	19110	0.054	2060	15920	0.049	1550	9550	0.043	825	7960	0.038	600
		≤ 8D	0.09	0.81	17200	0.049	1670	14330	0.039	1130	8600	0.035	600	7170	0.031	440
		≤ 10D	0.07	0.74	15290	0.043	1320	12740	0.031	790	7640	0.028	420	6370	0.024	310
		≤ 12D	0.06	0.65	13380	0.038	1010	11150	0.024	530	6690	0.021	285	5570	0.019	205
		> 12D	0.05	0.59	11460	0.032	740	9550	0.017	330	5730	0.016	180	4780	0.014	130
	2.5	≤ 6D	0.13	1.09	15290	0.054	1650	12740	0.049	1240	7640	0.043	660	6370	0.038	480
		≤ 8D	0.11	1.01	13760	0.049	1340	11460	0.039	900	6880	0.035	480	5730	0.031	350
		≤ 10D	0.09	0.92	12230	0.043	1060	10190	0.031	630	6110	0.028	340	5100	0.024	245
		≤ 12D	0.07	0.82	10700	0.038	810	8920	0.024	420	5350	0.021	225	4460	0.019	165
		> 12D	0.06	0.74	9170	0.032	590	7640	0.017	270	4590	0.016	145	3820	0.014	105

α	n (rpm)	Vf (mm/min)
45°	x 1.65	x 1.65
30°	x 1.30	x 1.30
15°	x 1.15	x 1.15

CUTTING PARAMETERS

MEXLNB2

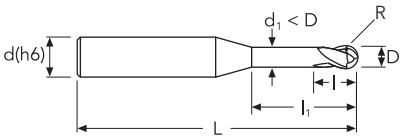
ROUND RIB	Material Group ISO 513				P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm				< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae				ap x 0.2D			ap x 0.1D			ap x 0.1D			ap x 0.1D		
	Vc (m/min)				110-130			90-110			50-70			45-55		
	D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	≤ 6D	0.15	1.31	12740	0.068	1720	10620	0.061	1290	6370	0.054	690	5310	0.047	500
		≤ 8D	0.13	1.21	11460	0.061	1390	9550	0.049	940	5730	0.044	500	4780	0.038	365
		≤ 10D	0.11	1.10	10190	0.054	1100	8490	0.039	660	5100	0.035	355	4250	0.030	255
		≤ 12D	0.08	0.98	8920	0.047	840	7430	0.030	440	4460	0.026	235	3720	0.023	170
		> 12D	0.07	0.89	7640	0.041	620	6370	0.022	280	3820	0.019	150	3180	0.017	110
	4	≤ 6D	0.20	1.74	9550	0.086	1630	7960	0.077	1230	4780	0.068	655	3980	0.060	475
		≤ 8D	0.17	1.61	8600	0.077	1320	7170	0.062	890	4300	0.055	475	3580	0.048	345
		≤ 10D	0.14	1.47	7640	0.068	1050	6370	0.049	630	3820	0.044	335	3180	0.038	245
		≤ 12D	0.11	1.31	6690	0.060	800	5570	0.038	420	3340	0.034	225	2790	0.029	165
		> 12D	0.09	1.19	5730	0.051	590	4780	0.028	260	2870	0.025	140	2390	0.022	105

α	n (rpm)	Vf (mm/min)
45°	x 1.65	x 1.65
30°	x 1.30	x 1.30
15°	x 1.15	x 1.15

MEXLNB206

cylindrical shank, 2 flutes ball nose,
extended and reduced neck, 6 mm. shank

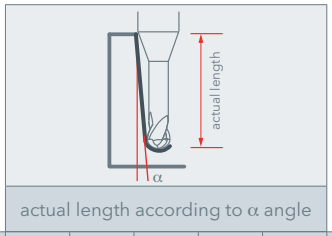
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.5	0/-0.020	0.25	0/-0.020	6	0.5	2.5	0.45	60	2	2.67	2.75	2.82	2.90	2.90	MEXLNB2005026	●
0.6	0/-0.020	0.30	0/-0.020	6	0.6	6	0.55	60	2	6.28	6.48	6.67	6.87	6.87	MEXLNB2006066	●
0.8	0/-0.020	0.40	0/-0.020	6	0.8	4	0.75	60	2	4.21	4.34	4.46	4.58	4.58	MEXLNB2008046	●
0.8	0/-0.020	0.40	0/-0.020	6	0.8	8	0.75	60	2	8.35	8.61	8.86	9.12	9.12	MEXLNB2008086	●
1	0/-0.020	0.50	0/-0.020	6	1.5	5	0.95	60	2	5.34	5.50	5.65	5.81	5.81	MEXLNB2010056	●
1	0/-0.020	0.50	0/-0.020	6	1.5	8	0.95	60	2	8.44	8.70	8.96	9.22	9.22	MEXLNB2010086	●
1	0/-0.020	0.50	0/-0.020	6	1.5	12	0.95	60	2	12.57	12.97	13.36	13.75	13.75	MEXLNB2010126	●
1.2	0/-0.020	0.60	0/-0.020	6	1.8	6	1.15	60	2	6.37	6.56	6.74	6.93	6.93	MEXLNB2012066	●
1.5	0/-0.020	0.75	0/-0.020	6	2.3	8	1.45	60	2	8.43	8.68	8.93	9.18	9.18	MEXLNB2015086	●
1.5	0/-0.020	0.75	0/-0.020	6	2.3	12	1.45	60	2	12.57	12.95	13.34	13.72	13.72	MEXLNB2015126	●
1.5	0/-0.020	0.75	0/-0.020	6	2.3	16	1.45	60	2	16.70	17.22	17.74	18.26	18.26	MEXLNB2015166	●
1.6	0/-0.020	0.80	0/-0.020	6	2.4	16	1.55	60	2	16.70	17.22	17.73	18.25	18.25	MEXLNB2016166	●
1.8	0/-0.020	0.90	0/-0.020	6	2.7	16	1.75	60	2	16.70	17.21	17.72	18.24	18.24	MEXLNB2018166	●
2	0/-0.020	1.00	0/-0.020	6	3	12	1.95	60	2	12.56	12.93	13.31	13.69	13.69	MEXLNB2020126	●
2	0/-0.020	1.00	0/-0.020	6	3	16	1.95	60	2	16.69	17.2	17.71	18.22	18.22	MEXLNB2020166	●
2	0/-0.020	1.00	0/-0.020	6	3	20	1.95	75	2	20.83	21.47	22.12	22.76	22.76	MEXLNB2020206	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXLNB206

ROUND RIB

Material Group ISO 513				P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm				< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae				ap x 0.2D			ap x 0.1D			ap x 0.1D			ap x 0.1D		
Vc (m/min)				110-130			90-110			50-70			45-55		
D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
0.5	≤ 6D	0.03	0.22	40000	0.015	1220	40000	0.014	1100	38220	0.012	935	31850	0.011	680
	≤ 10D	0.02	0.22	40000	0.015	1210	40000	0.011	870	25480	0.010	495	21230	0.008	360
0.8	≤ 6D	0.04	0.35	40000	0.023	1800	39810	0.020	1610	23890	0.018	860	19900	0.016	625
	≤ 10D	0.03	0.29	38220	0.018	1380	31850	0.013	830	19110	0.012	440	15920	0.010	320
1	≤ 6D	0.05	0.44	38220	0.027	2060	31850	0.024	1550	19110	0.022	825	15920	0.019	600
	≤ 8D	0.04	0.40	34390	0.024	1670	28660	0.020	1130	17200	0.017	600	14330	0.015	440
	≤ 12D	0.03	0.33	26750	0.019	1010	22290	0.012	530	13380	0.011	285	11150	0.009	205
1.2	≤ 6D	0.06	0.52	31850	0.032	2010	21230	0.028	1200	15920	0.025	800	13270	0.022	585
1.5	≤ 6D	0.08	0.65	25480	0.041	2060	21230	0.036	1550	12740	0.032	825	10620	0.028	600
	≤ 8D	0.06	0.61	22930	0.036	1670	19110	0.030	1130	11460	0.026	600	9550	0.023	440
	≤ 12D	0.04	0.49	17830	0.028	1010	14860	0.018	530	8920	0.016	285	7430	0.014	205
1.6	≤ 10D	0.06	0.59	19110	0.030	1130	15920	0.021	680	9550	0.019	360	7960	0.017	265
1.8	≤ 10D	0.06	0.66	16990	0.032	1100	14150	0.023	660	8490	0.021	350	7080	0.018	255
2	≤ 6D	0.10	0.87	19110	0.054	2060	15920	0.049	1550	9550	0.043	825	7960	0.038	600
	≤ 8D	0.09	0.81	17200	0.049	1670	14330	0.039	1130	8600	0.035	600	7170	0.031	440
	≤ 10D	0.07	0.74	15290	0.043	1320	12740	0.031	790	7640	0.028	420	6370	0.024	310

α

α	n (rpm)	Vf (mm/min)
45°	x 1.65	x 1.65
30°	x 1.30	x 1.30
15°	x 1.15	x 1.15

MEXCSB2

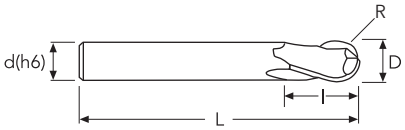
cylindrical shank, 2 flutes ball nose

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.030	0.50	+/-0.010	3	3		38	2	MEXCSB2010	●
1.5	0/-0.030	0.75	+/-0.010	3	3		38	2	MEXCSB2015	●
2	0/-0.030	1.00	+/-0.010	6	3		50	2	MEXCSB2020	●
2.5	0/-0.030	1.25	0/-0.020	4	4		50	2	MEXCSB202550	●
3	0/-0.030	1.50	+/-0.010	6	4		50	2	MEXCSB2030	●
4	0/-0.030	2.00	+/-0.010	6	5		54	2	MEXCSB2040	●
5	0/-0.030	2.50	+/-0.010	6	6		54	2	MEXCSB2050	●
6	0/-0.030	3.00	+/-0.010	6	12		60	2	MEXCSB2060	●
8	0/-0.030	4.00	+/-0.010	8	14		60	2	MEXCSB2080	●
10	0/-0.030	5.00	+/-0.010	10	18		70	2	MEXCSB2100	●
12	0/-0.030	6.00	+/-0.010	12	22		80	2	MEXCSB2120	●
14	0/-0.030	7.00	0/-0.020	14	32		90	2	MEXCSB2140	●
16	0/-0.030	8.00	0/-0.020	16	32		90	2	MEXCSB2160	●
18	0/-0.030	9.00	0/-0.020	18	38		100	2	MEXCSB2180	●
20	0/-0.030	10.00	0/-0.020	20	38		100	2	MEXCSB2200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCSB2

	Material Group ISO 513	P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**0.05D x 0.2D**			**0.05D x 0.1D**			**0.05D x 0.1D**			**0.05D x 0.1D**		
	Vc (m/min)	**120-160**			**80-120**			**60-100**			**50-70**		
	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
COPYING	**1**	**0.44**	40000	0.009	720	31850	0.008	520	25480	0.007	370	19110	0.006	240
	1.5	**0.79**	29720	0.012	710	21230	0.011	460	16990	0.010	330	12740	0.008	210
	2	**1.20**	22290	0.012	530	15920	0.011	340	12740	0.010	240	9550	0.008	160
	2.5	**1.65**	17830	0.015	530	12740	0.014	340	10190	0.012	240	7640	0.011	160
	3	**2.14**	14860	0.018	530	10620	0.016	340	8490	0.014	240	6370	0.013	160
	4	**3.20**	11150	0.025	560	7960	0.023	360	6370	0.020	250	4780	0.018	170
	5	**4.33**	8920	0.032	570	6370	0.029	370	5100	0.026	260	3820	0.022	170
	6	**5.50**	7430	0.038	560	5310	0.034	360	4250	0.030	260	3180	0.027	170
	8	**7.84**	5570	0.048	530	3980	0.043	340	3180	0.038	240	2390	0.034	160
	10	**10.00**	4460	0.057	510	3180	0.051	330	2550	0.046	230	1910	0.040	150
	12	**11.76**	3720	0.067	500	2650	0.060	320	2120	0.054	230	1590	0.047	150
	14	**12.83**	3180	0.08	510	2270	0.072	330	1820	0.064	230	1360	0.056	150
	16	**12.80**	2790	0.095	530	1990	0.086	340	1590	0.076	240	1190	0.067	160
	18	**10.80**	2480	0.108	540	1770	0.097	340	1420	0.086	250	1060	0.076	160
	20	**12.00**	2230	0.108	480	1590	0.097	310	1270	0.086	220	960	0.076	150

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

MEXCLSB2

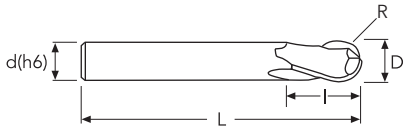
cylindrical shank, 2 flutes ball nose, long reach

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.012	0.50	+/-0.010	4	2.5		50	2	MEXCLSB2010	●
1.2	0/-0.030	0.60	0/-0.020	4	3		50	2	MEXCLSB2012	●
1.5	0/-0.012	0.75	+/-0.010	4	4		50	2	MEXCLSB2015	●
2	0/-0.012	1.00	+/-0.010	6	5		50	2	MEXCLSB2020	●
2.5	0/-0.012	1.25	+/-0.010	6	6		60	2	MEXCLSB2025	●
3	0/-0.012	1.50	+/-0.010	6	8		60	2	MEXCLSB2030	●
4	0/-0.012	2.00	+/-0.010	6	8		70	2	MEXCLSB2040	●
5	0/-0.012	2.50	+/-0.010	6	10		80	2	MEXCLSB2050	●
6	0/-0.012	3.00	+/-0.010	6	12		90	2	MEXCLSB2060	●
8	0/-0.015	4.00	+/-0.010	8	14		100	2	MEXCLSB2080	●
10	0/-0.015	5.00	+/-0.010	10	18		100	2	MEXCLSB2100	●
12	0/-0.015	6.00	+/-0.010	12	22		110	2	MEXCLSB2120	●
14	0/-0.030	7.00	0/-0.020	14	32		125	2	MEXCLSB2140	●
16	0/-0.030	8.00	0/-0.020	16	32		150	2	MEXCLSB2160	●
20	0/-0.030	10.00	0/-0.020	20	38		150	2	MEXCLSB2200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCLSB2

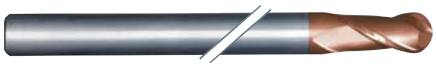
Material Group ISO 513		P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm		< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae		**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**		
Vc (m/min)		**100-140**			**80-120**			**60-80**			**40-60**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	**0.44**	38220	0.015	1150	31850	0.014	860	22290	0.012	530	15920	0.011	330
2	**0.87**	19110	0.021	810	15920	0.019	610	11150	0.017	380	7960	0.015	240
3	**1.31**	12740	0.027	690	10620	0.024	520	7430	0.022	320	5310	0.019	200
4	**1.74**	9550	0.037	700	7960	0.033	520	5570	0.029	330	3980	0.026	200
5	**2.18**	7640	0.045	690	6370	0.041	520	4460	0.036	320	3180	0.032	200
6	**2.62**	6370	0.051	650	5310	0.046	490	3720	0.041	300	2650	0.036	190
8	**3.49**	4780	0.060	570	3980	0.054	430	2790	0.048	270	1990	0.042	170
10	**4.36**	3820	0.068	520	3180	0.061	390	2230	0.054	240	1590	0.048	150
12	**5.23**	3180	0.077	490	2650	0.069	360	1860	0.061	230	1330	0.054	140
14	**6.10**	2730	0.089	490	2270	0.080	360	1590	0.071	230	1140	0.062	140
16	**6.97**	2390	0.102	490	1990	0.092	370	1390	0.082	230	1000	0.071	140
18	**7.85**	2120	0.115	490	1770	0.103	370	1240	0.092	230	880	0.080	140
20	**8.72**	1910	0.132	500	1590	0.119	380	1110	0.106	230	800	0.092	150

α	n (rpm)	Vf (mm/min)
30°	x 0.8	x 0.8
15°	x 0.7	x 0.7
0°	x 0.6	x 0.6

MEX253

cylindrical shank, 2 flutes ball nose, extra long reach

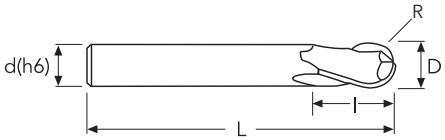
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.50	0/-0.020	4	3		75	2	MEX25301075	●
1	0/-0.020	0.50	0/-0.020	4	3		100	2	MEX253010100	●
1.5	0/-0.020	0.75	0/-0.020	4	3		75	2	MEX25301575	●
1.5	0/-0.020	0.75	0/-0.020	4	3		100	2	MEX253015100	●
2	0/-0.020	1.00	0/-0.020	4	4		75	2	MEX25302075	●
2	0/-0.020	1.00	0/-0.020	4	4		100	2	MEX253020100	●
3	0/-0.025	1.50	0/-0.020	6	5		75	2	MEX25303075	●
3	0/-0.025	1.50	0/-0.020	6	5		100	2	MEX253030	●
4	0/-0.025	2.00	0/-0.020	6	8		100	2	MEX253040	●
5	0/-0.025	2.50	0/-0.020	6	9		100	2	MEX253050100	●
6	0/-0.025	3.00	0/-0.020	6	10		150	2	MEX253060150	●
8	0/-0.030	4.00	0/-0.020	8	12		150	2	MEX253080	●
10	0/-0.030	5.00	0/-0.020	10	14		150	2	MEX25310150	●
12	0/-0.030	6.00	0/-0.020	12	16		150	2	MEX25312150	●
16	0/-0.030	8.00	0/-0.020	16	32		200	2	MEX253160	●
20	0/-0.030	10.00	0/-0.020	20	38		200	2	MEX253200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEX253

Material Group ISO 513		P2 P3 P4 K1 K2			P4 P5 K3			P6 K4			H1 H4 H5		
Hardness/Rm		< 1000 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
ap x ae		0.05D x 0.2D			0.05D x 0.2D			0.05D x 0.2D			0.05D x 0.2D		
Vc (m/min)		90-130			60-100			50-70			30-50		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	0.44	35030	0.015	1050	25480	0.014	690	19110	0.012	460	12740	0.011	270
2	0.87	17520	0.021	740	12740	0.019	490	9550	0.017	320	6370	0.015	190
3	1.31	11680	0.027	640	8490	0.024	420	6370	0.022	280	4250	0.019	160
4	1.74	8760	0.037	640	6370	0.033	420	4780	0.029	280	3180	0.026	160
5	2.18	7010	0.045	630	5100	0.041	410	3820	0.036	280	2550	0.032	160
6	2.62	5840	0.051	600	4250	0.046	390	3180	0.041	260	2120	0.036	150
8	3.49	4380	0.060	520	3180	0.054	340	2390	0.048	230	1590	0.042	130
10	4.36	3500	0.068	480	2550	0.061	310	1910	0.054	210	1270	0.048	120
12	5.23	2920	0.077	450	2120	0.069	290	1590	0.061	190	1060	0.054	110
14	6.10	2500	0.089	450	1820	0.080	290	1360	0.071	190	910	0.062	110
16	6.97	2190	0.102	450	1590	0.092	290	1190	0.082	190	800	0.071	110
18	7.85	1950	0.115	450	1420	0.103	290	1060	0.092	190	710	0.080	110
20	8.72	1750	0.132	460	1270	0.119	300	960	0.106	200	640	0.092	120

α	n (rpm)	Vf (mm/min)
30°	x 0.8	x 0.8
15°	x 0.7	x 0.7
0°	x 0.6	x 0.6

UH

STEEL AND HARDENED STEEL < 70 HRC

Nano micrograin and UH RED TiSi base coating for high performance milling on hardened steel up to 70 HRC. High reliability and long life in dry milling operation adopting high speed or high feed strategy. The cutting geometry has been specifically designed to obtain high precision and high quality surface finishing.

Nano micrograna e rivestimento UH RED a base TiSi per la fresatura di materiali temprati sino a 70 HRC. Grande affidabilità e durata nell'utilizzo di strategie di lavorazione ad alta velocità o alto avanzamento e con la possibilità di evitare l'utilizzo del refrigerante. Le geometrie di taglio specifiche garantiscono elevata precisione ed eccellente finitura della superficie lavorata.

Nano-Mikrokörnung und Beschichtung UH RED auf TiSi-Basis für das Fräsen von gehärteten Materialien bis zu 70 HRC. Hohe Zuverlässigkeit und lange Standzeit auch bei Bearbeitungsverfahren mit hoher Geschwindigkeit und großem Vorschub und mit der Möglichkeit, ohne Kühlmittel zu arbeiten. Die spezifischen Schnittgeometrien gewährleisten eine hohe Präzision und eine hervorragende Endbearbeitung der bearbeiteten Fläche.

Nano micrograin et revêtement UH RED à base TiSi pour le fraisage de matériaux trempés jusqu'à 70 HRC. Grande fiabilité et durée dans l'utilisation stratégique d'usinage à haute vitesse ou avancement élevé et avec la possibilité d'éviter l'utilisation de lubrifiant. Les géométries de coupe spécifiques garantissent une précision élevée et une excellente finition de la surface usinée.

Nano micrograno y revestimiento UH RED a base de TiSi para el fresado de materiales templados hasta 70 HRC. Gran fiabilidad y duración en la utilización de estrategias de elaboración a alta velocidad o alto avance con la posibilidad de evitar la utilización del refrigerante. Las geometrías de corte específicas garantizan una elevada precisión y excelente acabado de la superficie trabajada.

Микрозернистая наноструктура твердого сплава и покрытие UH RED на основе TiSi служат для фрезерования закалённых сталей с твёрдостью до 70 HRC. Высокая надёжность и стойкость при работе с высокой скоростью резания и подачей без использования СОЖ. Режущая геометрия специально создана для достижения высокой точности и низкой шероховатости обработанной поверхности.

UHM204

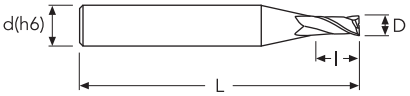
cylindrical shank, 2F, miniature

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | Z2

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.1	0/-0.020			4	0.2		40	2	UHM200104	●
0.2	0/-0.020			4	0.3		50	2	UHM200204	●
0.3	0/-0.020			4	0.4		50	2	UHM200304	●
0.4	0/-0.020			4	0.6		50	2	UHM200404	●
0.5	0/-0.020			4	0.7		50	2	UHM200504	●
0.6	0/-0.020			4	0.9		50	2	UHM200604	●
0.7	0/-0.020			4	1		50	2	UHM200704	●
0.8	0/-0.020			4	1.2		50	2	UHM200804	●
0.9	0/-0.020			4	1.4		50	2	UHM200904	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

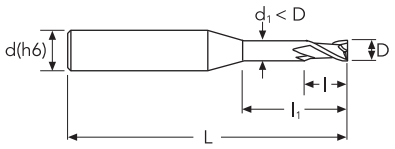
UHM204

	Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae		ap x D			ap x D			ap x D			ap x D		
	Vc (m/min)		80-120			60-100			50-70			30-50		
SLOTTING	D (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	0.1	**0.01**	40000	0.002	160	40000	0.002	140	40000	0.002	130	40000	0.001	110
	0.2	**0.01**	40000	0.003	240	40000	0.003	220	40000	0.002	190	40000	0.002	170
	0.3	**0.02**	40000	0.004	320	40000	0.004	290	40000	0.003	255	40000	0.003	225
	0.4	**0.02**	40000	0.006	480	40000	0.005	430	40000	0.005	385	31850	0.004	270
	0.5	**0.03**	40000	0.007	560	40000	0.006	500	38220	0.006	430	25480	0.005	250
	0.6	**0.03**	40000	0.008	640	40000	0.007	580	31850	0.006	410	21230	0.006	240
	0.8	**0.04**	39810	0.010	800	31850	0.009	570	23890	0.008	380	15920	0.007	225
	0.9	**0.05**	35390	0.012	850	28310	0.011	610	21230	0.010	410	14150	0.008	240

UHLN2

cylindrical shank, 2F, extended and reduced neck

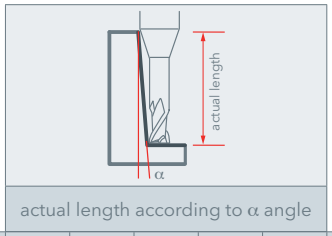
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

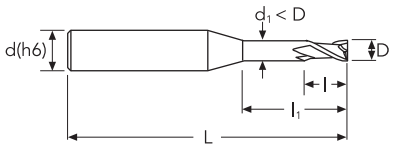
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.2	0/-0.020			4	0.3	0.5	0.16	50	2	0.57	0.59	0.61	0.63	0.68	UHLN2002005	●
0.2	0/-0.020			4	0.3	1	0.16	50	2	1.09	1.12	1.16	1.21	1.30	UHLN200201	●
0.2	0/-0.020			4	0.3	1.5	0.16	50	2	1.60	1.66	1.72	1.78	1.91	UHLN2002015	●
0.3	0/-0.020			4	0.4	1	0.26	50	2	1.09	1.12	1.16	1.21	1.30	UHLN200301	●
0.3	0/-0.020			4	0.4	2	0.26	50	2	2.12	2.19	2.27	2.35	2.53	UHLN200302	●
0.3	0/-0.020			4	0.4	3	0.26	50	2	3.15	3.26	3.38	3.50	3.76	UHLN200303	●
0.4	0/-0.020			4	0.6	2	0.37	50	2	2.12	2.19	2.27	2.35	2.53	UHLN200402	●
0.4	0/-0.020			4	0.6	3	0.37	50	2	3.15	3.26	3.38	3.50	3.76	UHLN200403	●
0.4	0/-0.020			4	0.6	4	0.37	50	2	4.19	4.33	4.49	4.65	5.00	UHLN200404	●
0.4	0/-0.020			4	0.6	5	0.37	50	2	5.22	5.40	5.59	5.79	6.23	UHLN200405	●
0.5	0/-0.020			4	0.7	2	0.45	50	2	2.16	2.23	2.31	2.40	2.57	UHLN200502	●
0.5	0/-0.020			4	0.7	4	0.45	50	2	4.23	4.37	4.53	4.69	5.04	UHLN200504	●
0.5	0/-0.020			4	0.7	6	0.45	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200506	●
0.5	0/-0.020			4	0.7	8	0.45	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200508	●
0.6	0/-0.020			4	0.9	2	0.55	50	2	2.16	2.23	2.31	2.40	2.57	UHLN200602	●
0.6	0/-0.020			4	0.9	4	0.55	50	2	4.23	4.37	4.53	4.69	5.04	UHLN200604	●
0.6	0/-0.020			4	0.9	6	0.55	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200606	●
0.6	0/-0.020			4	0.9	8	0.55	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200608	●
0.6	0/-0.020			4	0.9	10	0.55	50	2	10.43	10.79	11.17	11.57	12.44	UHLN200610	●
0.7	0/-0.020			4	1.0	2	0.65	50	2	2.16	2.23	2.31	2.40	2.57	UHLN200702	●
0.7	0/-0.020			4	1.0	4	0.65	50	2	4.23	4.37	4.53	4.69	5.04	UHLN200704	●
0.7	0/-0.020			4	1.0	6	0.65	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200706	●
0.7	0/-0.020			4	1.0	8	0.65	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200708	●
0.7	0/-0.020			4	1.0	10	0.65	50	2	10.43	10.79	11.17	11.57	12.44	UHLN200710	●
0.8	0/-0.020			4	1.2	4	0.75	50	2	4.23	4.37	4.53	4.69	5.04	UHLN200804	●
0.8	0/-0.020			4	1.2	6	0.75	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200806	●
0.8	0/-0.020			4	1.2	8	0.75	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200808	●
0.8	0/-0.020			4	1.2	10	0.75	50	2	10.43	10.79	11.17	11.57	12.44	UHLN200810	●
0.8	0/-0.020			4	1.2	12	0.75	50	2	12.49	12.93	13.38	13.87	14.91	UHLN200812	●
0.9	0/-0.020			4	1.4	6	0.85	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200906	●
0.9	0/-0.020			4	1.4	8	0.85	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200908	●
0.9	0/-0.020			4	1.4	10	0.85	50	2	10.43	10.79	11.17	11.57	12.44	UHLN200910	●
0.9	0/-0.020			4	1.4	15	0.85	50	2	15.6	16.14	16.71	17.31	18.61	UHLN200915	●
1	0/-0.020			4	1.5	6	0.95	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201006	●
1	0/-0.020			4	1.5	8	0.95	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201008	●
1	0/-0.020			4	1.5	10	0.95	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201010	●
1	0/-0.020			4	1.5	12	0.95	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201012	●
1	0/-0.020			4	1.5	14	0.95	50	2	14.66	15.17	15.70	16.27	17.49	UHLN201014	●
1	0/-0.020			4	1.5	16	0.95	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201016	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHLN2

cylindrical shank, 2F, extended and reduced neck

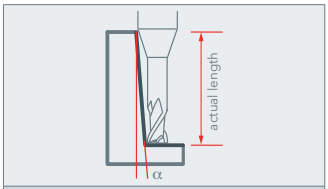
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

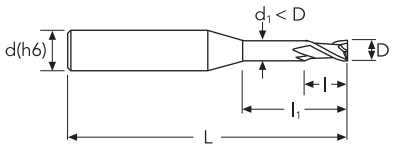
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1.2	0/-0.020			4	1.8	6	1.15	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201206	●
1.2	0/-0.020			4	1.8	8	1.15	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201208	●
1.2	0/-0.020			4	1.8	10	1.15	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201210	●
1.2	0/-0.020			4	1.8	12	1.15	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201212	●
1.4	0/-0.020			4	2.1	6	1.35	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201406	●
1.4	0/-0.020			4	2.1	8	1.35	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201408	●
1.4	0/-0.020			4	2.1	10	1.35	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201410	●
1.4	0/-0.020			4	2.1	12	1.35	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201412	●
1.4	0/-0.020			4	2.1	14	1.35	50	2	14.66	15.17	15.70	16.27	17.49	UHLN201414	●
1.4	0/-0.020			4	2.1	16	1.35	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201416	●
1.5	0/-0.020			4	2.3	6	1.45	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201506	●
1.5	0/-0.020			4	2.3	8	1.45	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201508	●
1.5	0/-0.020			4	2.3	10	1.45	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201510	●
1.5	0/-0.020			4	2.3	12	1.45	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201512	●
1.5	0/-0.020			4	2.3	14	1.45	50	2	14.66	15.17	15.7	16.27	17.49	UHLN201514	●
1.5	0/-0.020			4	2.3	16	1.45	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201516	●
1.5	0/-0.020			4	2.3	18	1.45	60	2	18.79	19.44	20.13	20.86	22.43	UHLN201518	●
1.5	0/-0.020			4	2.3	20	1.45	60	2	20.86	21.58	22.35	23.15	-	UHLN201520	●
1.6	0/-0.020			4	2.4	6	1.55	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201606	●
1.6	0/-0.020			4	2.4	8	1.55	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201608	●
1.6	0/-0.020			4	2.4	10	1.55	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201610	●
1.6	0/-0.020			4	2.4	12	1.55	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201612	●
1.6	0/-0.020			4	2.4	14	1.55	50	2	14.66	15.17	15.70	16.27	17.49	UHLN201614	●
1.6	0/-0.020			4	2.4	16	1.55	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201616	●
1.6	0/-0.020			4	2.4	18	1.55	60	2	18.79	19.44	20.13	20.86	22.43	UHLN201618	●
1.6	0/-0.020			4	2.4	20	1.55	60	2	20.86	21.58	22.35	23.15	-	UHLN201620	●
1.8	0/-0.020			4	2.7	6	1.75	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201806	●
1.8	0/-0.020			4	2.7	8	1.75	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201808	●
1.8	0/-0.020			4	2.7	10	1.75	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201810	●
1.8	0/-0.020			4	2.7	12	1.75	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201812	●
1.8	0/-0.020			4	2.7	14	1.75	50	2	14.66	15.17	15.70	16.27	17.49	UHLN201814	●
1.8	0/-0.020			4	2.7	16	1.75	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201816	●
1.8	0/-0.020			4	2.7	18	1.75	60	2	18.79	19.44	20.13	20.86	-	UHLN201818	●
1.8	0/-0.020			4	2.7	20	1.75	60	2	20.86	21.58	22.35	23.15	-	UHLN201820	●
2	0/-0.020			4	3	6	1.95	50	2	6.39	6.61	6.84	7.09	7.62	UHLN202006	●
2	0/-0.020			4	3	8	1.95	50	2	8.46	8.75	9.06	9.38	10.09	UHLN202008	●
2	0/-0.020			4	3	10	1.95	50	2	10.52	10.89	11.27	11.68	12.56	UHLN202010	●
2	0/-0.020			4	3	12	1.95	50	2	12.59	13.03	13.49	13.97	15.02	UHLN202012	●
2	0/-0.020			4	3	14	1.95	50	2	14.66	15.17	15.70	16.27	17.49	UHLN202014	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHLN2

cylindrical shank, 2F, extended and reduced neck

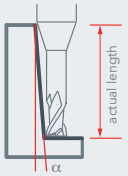
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
2	0/-0.020			4	3	16	1.95	50	2	16.73	17.30	17.92	18.56	-	UHLN202016	●
2	0/-0.020			4	3	18	1.95	60	2	18.79	19.44	20.13	20.86	-	UHLN202018	●
2	0/-0.020			4	3	20	1.95	60	2	20.86	21.58	22.35	23.15	-	UHLN202020	●
2	0/-0.020			4	3	25	1.95	75	2	26.03	26.93	27.88	-	-	UHLN202025	●
2	0/-0.020			4	3	30	1.95	75	2	31.2	32.28	33.42	-	-	UHLN202030	●
2.5	0/-0.020			4	3.7	8	2.4	50	2	8.46	8.75	9.06	9.38	10.09	UHLN202508	●
2.5	0/-0.020			4	3.7	10	2.4	50	2	10.52	10.89	11.27	11.68	12.56	UHLN202510	●
2.5	0/-0.020			4	3.7	12	2.4	50	2	12.59	13.03	13.49	13.97	-	UHLN202512	●
2.5	0/-0.020			4	3.7	14	2.4	50	2	14.66	15.17	15.70	16.27	-	UHLN202514	●
2.5	0/-0.020			4	3.7	16	2.4	50	2	16.73	17.30	17.92	18.56	-	UHLN202516	●
2.5	0/-0.020			4	3.7	18	2.4	60	2	18.79	19.44	20.13	20.86	-	UHLN202518	●
2.5	0/-0.020			4	3.7	20	2.4	60	2	20.86	21.58	22.35	-	-	UHLN202520	●
2.5	0/-0.020			4	3.7	25	2.4	75	2	24.1	24.94	25.83	-	-	UHLN202525	●
2.5	0/-0.020			4	3.7	30	2.4	75	2	31.2	32.28	-	-	-	UHLN202530	●
3	0/-0.025			6	4.5	8	2.85	50	2	8.65	8.95	9.26	9.60	10.31	UHLN203008	●
3	0/-0.025			6	4.5	10	2.85	50	2	10.72	11.09	11.48	11.89	12.78	UHLN203010	●
3	0/-0.025			6	4.5	12	2.85	50	2	12.78	13.23	13.69	14.18	15.25	UHLN203012	●
3	0/-0.025			6	4.5	14	2.85	50	2	14.85	15.36	15.91	16.48	17.72	UHLN203014	●
3	0/-0.025			6	4.5	16	2.85	60	2	16.92	17.50	18.12	18.77	20.18	UHLN203016	●
3	0/-0.025			6	4.5	18	2.85	60	2	18.99	19.64	20.34	21.07	22.65	UHLN203018	●
3	0/-0.025			6	4.5	20	2.85	60	2	21.05	21.78	22.55	23.36	25.12	UHLN203020	●
3	0/-0.025			6	4.5	25	2.85	75	2	26.22	27.13	28.09	29.10	-	UHLN203025	●
4	0/-0.025			6	4.5	10	3.85	60	2	10.91	11.29	11.68	12.10	13.00	UHLN204010	●
4	0/-0.025			6	4.5	15	3.85	60	2	16.08	16.63	17.22	17.84	19.17	UHLN204015	●
4	0/-0.025			6	4.5	20	3.85	60	2	21.25	21.98	22.76	23.57	-	UHLN204020	●
4	0/-0.025			6	4.5	25	3.85	75	2	26.41	27.33	28.29	-	-	UHLN204025	●
4	0/-0.025			6	4.5	30	3.85	75	2	31.58	32.67	33.83	-	-	UHLN204030	●
4	0/-0.025			6	4.5	40	3.85	75	2	41.92	43.37	-	-	-	UHLN204040	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHLN2

SQUARE RIB

Material Group ISO 513			P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm			< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae			ap x D			ap x D			ap x D			ap x D		
Vc (m/min)			80-120			60-100			50-70			30-50		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
0.2	≤ 6D	0.01	40000	0.003	240	40000	0.003	220	40000	0.002	190	40000	0.002	170
	≤ 8D	0.01	40000	0.003	200	40000	0.002	180	40000	0.002	165	40000	0.002	145
	≤ 10D	0.01	40000	0.002	170	40000	0.002	150	40000	0.002	135	40000	0.001	120
	≤ 12D	0.01	40000	0.002	130	40000	0.001	120	40000	0.001	105	40000	0.001	90
0.3	≤ 6D	0.02	40000	0.004	320	40000	0.004	290	40000	0.003	255	40000	0.003	225
	≤ 8D	0.01	40000	0.003	270	40000	0.003	240	40000	0.003	220	38200	0.002	180
	≤ 10D	0.01	40000	0.003	220	40000	0.003	200	40000	0.002	180	34000	0.002	135
	≤ 12D	0.01	40000	0.002	180	40000	0.002	160	40000	0.002	140	29700	0.002	90
0.4	≤ 6D	0.02	40000	0.006	480	40000	0.005	430	40000	0.005	385	31800	0.004	265
	≤ 8D	0.02	40000	0.005	410	40000	0.005	370	40000	0.004	325	28700	0.004	205
	≤ 10D	0.01	40000	0.004	340	40000	0.004	300	38200	0.003	255	25500	0.003	150
	≤ 12D	0.01	40000	0.003	260	40000	0.003	240	33400	0.003	175	22300	0.002	105
0.5	≤ 6D	0.03	40000	0.007	560	40000	0.006	500	38200	0.006	430	25500	0.005	250
	≤ 8D	0.02	40000	0.006	480	40000	0.005	430	34400	0.005	325	22900	0.004	190
	≤ 10D	0.02	40000	0.005	390	40000	0.004	350	30600	0.004	240	20400	0.003	140
	≤ 12D	0.01	35000	0.004	270	35700	0.003	250	26800	0.003	165	17800	0.003	95
0.6	≤ 6D	0.03	40000	0.008	640	40000	0.007	580	31800	0.006	405	21200	0.006	235
	≤ 8D	0.03	40000	0.007	540	38200	0.006	470	28700	0.005	310	19100	0.005	180
	≤ 10D	0.02	40000	0.006	450	34000	0.005	340	25500	0.004	230	17000	0.004	135
	≤ 12D	0.02	37200	0.004	330	29700	0.004	240	22300	0.004	155	14900	0.003	90
0.8	≤ 6D	0.04	39800	0.010	800	31800	0.009	570	23900	0.008	380	15900	0.007	225
	≤ 8D	0.03	35800	0.009	610	28700	0.008	440	21500	0.007	290	14300	0.006	170
	≤ 10D	0.03	31800	0.007	450	25500	0.006	320	19100	0.006	215	12700	0.005	125
	≤ 12D	0.02	27900	0.006	310	22300	0.005	220	16700	0.004	145	11100	0.004	85
1	≤ 6D	0.05	31800	0.012	760	25500	0.011	550	19100	0.010	365	12700	0.008	215
	≤ 8D	0.04	28700	0.010	590	22900	0.009	420	17200	0.008	280	11500	0.007	165
	≤ 10D	0.04	25500	0.008	430	20400	0.008	310	15300	0.007	205	10200	0.006	120
	≤ 12D	0.03	22300	0.007	290	17800	0.006	210	13400	0.005	140	8900	0.005	80
1.2	≤ 6D	0.06	26500	0.022	1170	21200	0.020	840	15900	0.018	560	10600	0.015	325
	≤ 8D	0.05	23900	0.019	890	19120	0.017	640	14340	0.015	430	9560	0.013	250
	≤ 10D	0.04	21200	0.015	650	16960	0.014	470	12720	0.012	315	8480	0.011	185
	≤ 12D	0.03	18600	0.012	450	14880	0.011	320	11160	0.010	215	7440	0.008	125
1.4	≤ 6D	0.07	22700	0.024	1090	18160	0.022	780	13620	0.019	525	9080	0.017	305
	≤ 8D	0.06	20500	0.020	840	16400	0.018	600	12300	0.016	400	8200	0.014	235
	≤ 10D	0.05	18200	0.017	610	14560	0.015	440	10920	0.013	295	7280	0.012	170
	≤ 12D	0.04	15900	0.013	420	12720	0.012	300	9540	0.011	200	6360	0.009	120
	≤ 15D	0.03	13600	0.011	290	10880	0.010	210	8160	0.009	140	5440	0.008	80
	> 15D	0.02	11400	0.007	160	9120	0.006	120	6840	0.006	80	4560	0.005	45
1.5	≤ 6D	0.08	21200	0.025	1060	16960	0.023	760	12720	0.020	510	8480	0.018	295
	≤ 8D	0.06	19100	0.021	810	15280	0.019	580	11460	0.017	390	7640	0.015	225
	≤ 10D	0.05	17000	0.018	590	13600	0.016	430	10200	0.014	285	6800	0.012	165
	≤ 12D	0.04	14900	0.014	410	11920	0.012	300	8940	0.011	195	5960	0.010	115
	≤ 15D	0.03	12700	0.011	290	10160	0.010	210	7620	0.009	135	5080	0.008	80
	> 15D	0.02	10600	0.008	160	8480	0.007	110	6360	0.006	75	4240	0.005	45
1.6	≤ 6D	0.08	19900	0.026	1030	15920	0.023	750	11940	0.021	495	7960	0.018	290
	≤ 8D	0.07	17900	0.022	790	14320	0.020	570	10740	0.018	380	7160	0.015	220
	≤ 10D	0.06	15900	0.018	580	12720	0.016	420	9540	0.015	280	6360	0.013	160
	≤ 12D	0.04	13900	0.014	400	11120	0.013	290	8340	0.011	190	5560	0.010	110
	≤ 15D	0.04	11900	0.012	280	9520	0.011	200	7140	0.009	135	4760	0.008	80
	> 15D	0.02	10000	0.008	160	8000	0.007	110	6000	0.006	75	4000	0.005	45

CUTTING PARAMETERS

UHLN2

SQUARE RIB

Material Group ISO 513			P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm			< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae			ap x D			ap x D			ap x D			ap x D		
Vc (m/min)			80-120			60-100			50-70			30-50		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1.8	≤ 6D	0.09	17700	0.028	990	14160	0.025	710	10620	0.022	475	7080	0.020	280
	≤ 8D	0.08	15900	0.024	760	12720	0.021	540	9540	0.019	365	6360	0.017	210
	≤ 10D	0.06	14200	0.020	560	11360	0.018	400	8520	0.016	265	5680	0.014	155
	≤ 12D	0.05	12400	0.015	380	9920	0.014	270	7440	0.012	185	4960	0.011	105
	≤ 15D	0.04	10600	0.013	270	8480	0.011	190	6360	0.010	130	4240	0.009	75
	> 15D	0.03	8800	0.008	150	7040	0.008	110	5280	0.007	70	3520	0.006	40
2	≤ 6D	0.10	15900	0.030	950	12720	0.027	690	9540	0.024	460	6360	0.021	265
	≤ 8D	0.09	14300	0.026	730	11440	0.023	530	8580	0.020	350	5720	0.018	205
	≤ 10D	0.07	12700	0.021	530	10160	0.019	380	7620	0.017	255	5080	0.015	150
	≤ 12D	0.06	11100	0.017	370	8880	0.015	260	6660	0.013	175	4440	0.012	105
	≤ 15D	0.05	9600	0.014	260	7680	0.012	190	5760	0.011	125	3840	0.009	75
	> 15D	0.03	9600	0.009	170	7680	0.008	120	5760	0.007	85	3840	0.006	50
2.5	≤ 6D	0.13	12700	0.035	890	10160	0.032	640	7620	0.028	425	5080	0.025	250
	≤ 8D	0.11	11500	0.030	680	9200	0.027	490	6900	0.024	330	4600	0.021	190
	≤ 10D	0.09	10200	0.025	500	8160	0.022	360	6120	0.020	240	4080	0.017	140
	≤ 12D	0.07	8900	0.019	340	7120	0.017	250	5340	0.015	165	3560	0.013	95
	≤ 15D	0.06	7600	0.016	240	6080	0.014	170	4560	0.013	115	3040	0.011	65
	> 15D	0.04	7600	0.011	160	6080	0.009	110	4560	0.008	75	3040	0.007	45
3	≤ 6D	0.15	10600	0.040	850	8480	0.036	610	6360	0.032	405	4240	0.028	235
	≤ 8D	0.13	9600	0.034	650	7680	0.031	470	5760	0.027	315	3840	0.024	185
	≤ 10D	0.11	8500	0.028	480	6800	0.025	340	5100	0.022	230	3400	0.020	135
	≤ 12D	0.08	7400	0.022	330	5920	0.020	230	4440	0.018	155	2960	0.015	90
	≤ 15D	0.07	6400	0.018	230	5120	0.016	170	3840	0.014	110	2560	0.013	65
	> 15D	0.05	6400	0.012	150	5120	0.011	110	3840	0.010	75	2560	0.008	45
4	≤ 6D	0.20	8000	0.050	800	6400	0.045	580	4800	0.040	385	3200	0.035	225
	≤ 8D	0.17	7200	0.043	610	5760	0.038	440	4320	0.034	295	2880	0.030	170
	≤ 10D	0.14	6400	0.035	450	5120	0.032	320	3840	0.028	215	2560	0.025	125
	≤ 12D	0.11	5600	0.028	310	4480	0.025	220	3360	0.022	150	2240	0.019	85
	≤ 15D	0.09	4800	0.023	220	3840	0.020	160	2880	0.018	105	1920	0.016	60
	> 15D	0.06	4800	0.015	140	3840	0.014	100	2880	0.012	70	1920	0.011	40

UH600

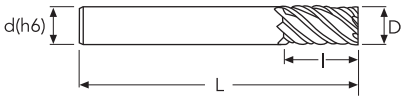
cylindrical shank, multi flute

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 50° | SQUARE | Z6~Z8

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.025			6	8		50	6	UH600030	●
4	0/-0.025			6	11		50	6	UH600040	●
5	0/-0.025			6	13		50	6	UH600050	●
6	0/-0.025			6	20		60	6	UH600060	●
8	0/-0.030			8	20		64	6	UH600080	●
10	0/-0.030			10	22		70	6	UH600100	●
12	0/-0.030			12	25		75	6	UH600120	●
14	0/-0.030			14	30		90	6	UH600140	●
16	0/-0.030			16	30		90	8	UH600160	●
20	0/-0.030			20	38		100	8	UH600200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH600

Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae	**1.5D x 0.1D**			**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**		
Vc (m/min)	**140-180**			**100-140**			**80-100**			**60-80**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	16990	0.008	860	12740	0.008	580	9550	0.007	390	7430	0.006	260
4	12740	0.012	920	9550	0.011	620	7170	0.010	410	5570	0.008	280
5	10190	0.014	880	7640	0.013	590	5730	0.012	400	4460	0.010	270
6	8490	0.018	920	6370	0.016	620	4780	0.014	410	3720	0.013	280
8	6370	0.028	1050	4780	0.025	710	3580	0.022	470	2790	0.019	320
10	5100	0.034	1030	3820	0.030	690	2870	0.027	460	2230	0.024	310
12	4250	0.041	1040	3180	0.037	700	2390	0.033	470	1860	0.029	320
14	3640	0.048	1050	2730	0.043	710	2050	0.038	470	1590	0.034	320
16	3180	0.056	1080	2390	0.051	730	1790	0.045	480	1390	0.039	330
18	2830	0.066	1120	2120	0.059	760	1590	0.053	500	1240	0.046	340
20	2550	0.078	1190	1910	0.070	800	1430	0.062	540	1110	0.055	360

UH612

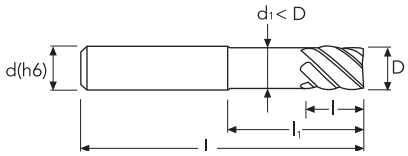
cylindrical shank, multi flute, long

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 50° | SQUARE | Z6~Z8

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.025			6	19	30	2.80	75	6	UH612030	●
4	0/-0.025			6	19	32	3.70	75	6	UH612040	●
5	0/-0.025			6	19	32	4.60	75	6	UH612050	●
6	0/-0.025			6	38	60	5.50	100	6	UH612060	●
8	0/-0.030			8	41	60	7.40	100	6	UH612080	●
10	0/-0.030			10	57	85	9.20	125	6	UH612100	●
12	0/-0.030			12	75	110	11.00	150	6	UH612120	●
16	0/-0.030			16	75	110	15.00	150	8	UH612160	●
20	0/-0.030			20	75	110	19.00	150	8	UH612200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH612

SIDE MILLING

Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae	**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**		
Vc (m/min)	**90-130**			**70-110**			**50-70**			**20-40**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
3	11680	0.007	500	9550	0.006	370	6370	0.006	220	3180	0.005	100
4	8760	0.010	540	7170	0.009	390	4780	0.008	230	2390	0.007	100
5	7010	0.012	510	5730	0.011	380	3820	0.010	220	1910	0.009	100
6	5840	0.015	540	4780	0.014	390	3180	0.012	230	1590	0.011	100
8	4380	0.023	620	3580	0.021	450	2390	0.019	270	1190	0.016	120
10	3500	0.029	600	2870	0.026	440	1910	0.023	260	960	0.020	120
12	2920	0.035	610	2390	0.031	450	1590	0.028	260	800	0.024	120
14	2500	0.041	610	2050	0.037	450	1360	0.033	270	680	0.029	120
16	2190	0.048	630	1790	0.043	460	1190	0.038	270	600	0.034	120
18	1950	0.056	660	1590	0.050	480	1060	0.045	290	530	0.039	120
20	1750	0.066	700	1430	0.060	510	960	0.053	310	480	0.046	130

UHM206

cylindrical shank, 2F, miniature, 6 mm. shank

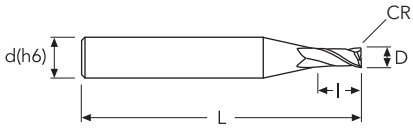
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | RADIUS | Z2

< Ø0.5 ≤ Ø0.5

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.3	0/-0.012			6	0.45		50	2	UHM200306	●
0.4	0/-0.012			6	0.6		50	2	UHM200406	●
0.5	0/-0.012	0.05	+/-0.010	6	0.7		50	2	UHM200506	●
0.6	0/-0.012	0.05	+/-0.010	6	0.9		50	2	UHM200606	●
0.8	0/-0.012	0.05	+/-0.010	6	1.2		50	2	UHM200806	●
1	0/-0.012	0.10	+/-0.010	6	1.5		50	2	UHM201006	●
1.5	0/-0.012	0.15	+/-0.010	6	2.2		50	2	UHM201506	●
2	0/-0.012	0.15	+/-0.010	6	2.2		50	2	UHM202006	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

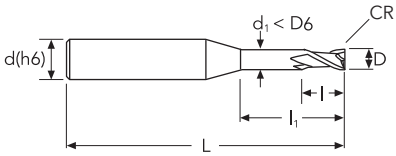
UHM206

	Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae		ap x D			ap x D			ap x D			ap x D		
	Vc (m/min)		80-120			60-100			50-70			30-50		
SLOTTING	D (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	0.3	**0.02**	40000	0.004	320	40000	0.004	290	40000	0.003	255	40000	0.003	225
	0.4	**0.02**	40000	0.006	480	40000	0.005	430	40000	0.005	385	31850	0.004	270
	0.5	**0.03**	40000	0.007	560	40000	0.006	500	38220	0.006	430	25480	0.005	250
	0.6	**0.03**	40000	0.008	640	40000	0.007	580	31850	0.006	410	21230	0.006	240
	0.8	**0.04**	39810	0.010	800	31850	0.009	570	23890	0.008	380	15920	0.007	225
	1	**0.05**	31850	0.012	760	25480	0.011	550	19110	0.010	365	12740	0.008	215
	1.5	**0.08**	21230	0.025	1060	16990	0.023	760	12740	0.020	510	8490	0.018	295
	2	**0.10**	15920	0.030	960	12740	0.027	690	9550	0.024	460	6370	0.021	270

UH211

cylindrical shank, 2F, extended and reduced neck, corner radius

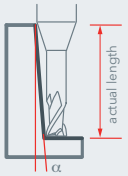
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | RADIUS | Z2



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1	0/-0.012	0.10	+/-0.010	4	2	4	0.95	50	2	4.36	4.60	4.86	5.16	5.89	UH2110100104	●
1	0/-0.012	0.10	+/-0.010	4	2	6	0.95	50	2	6.46	6.82	7.21	7.66	8.74	UH2110100106	●
1	0/-0.012	0.10	+/-0.010	4	2	8	0.90	50	2	8.45	8.73	9.00	9.27	9.81	UH2110100108	●
1	0/-0.012	0.20	+/-0.010	4	2	4	0.95	50	2	4.36	4.60	4.86	5.16	5.89	UH2110100204	●
1	0/-0.012	0.20	+/-0.010	4	2	8	0.95	50	2	8.57	9.04	9.56	10.15	11.18	UH2110100208	●
1	0/-0.012	0.30	+/-0.010	4	2	4	0.90	50	2	4.31	4.44	4.57	4.70	4.97	UH2110100304	●
1	0/-0.012	0.30	+/-0.010	4	2	8	0.95	50	2	8.57	9.04	9.56	10.15	11.18	UH2110100308	●
1.5	0/-0.012	0.10	+/-0.010	4	2.5	6	1.45	50	2	6.30	6.52	6.75	7.01	7.57	UH2110150106	●
1.5	0/-0.012	0.10	+/-0.010	4	2.5	10	1.45	50	2	10.43	10.8	11.19	11.61	12.55	UH2110150110	●
1.5	0/-0.012	0.20	+/-0.010	4	2.5	8	1.45	50	2	8.37	8.66	8.97	9.31	10.06	UH2110150208	●
1.5	0/-0.012	0.20	+/-0.010	4	2.5	12	1.45	50	2	12.50	12.94	13.40	13.91	15.03	UH2110150212	●
2	0/-0.012	0.10	+/-0.010	4	3	6	1.95	50	2	6.30	6.52	6.75	7.01	7.57	UH2110200106	●
2	0/-0.012	0.10	+/-0.010	4	3	12	1.95	50	2	12.50	12.94	13.40	13.91	15.03	UH2110200112	●
2	0/-0.012	0.20	+/-0.010	4	3	6	1.95	50	2	6.30	6.52	6.75	7.01	7.57	UH2110200206	●
2	0/-0.012	0.20	+/-0.010	4	3	12	1.95	50	2	12.50	12.94	13.40	13.91	15.03	UH2110200212	●
2	0/-0.012	0.30	+/-0.010	4	3	8	1.95	50	2	8.37	8.66	8.97	9.31	10.06	UH2110200308	●
2	0/-0.012	0.30	+/-0.010	4	3	12	1.95	50	2	12.50	12.94	13.40	13.91	15.03	UH2110200312	●
2	0/-0.012	0.30	+/-0.010	4	3	16	1.95	50	2	16.64	17.21	17.84	18.50	-	UH2110200316	●
2	0/-0.012	0.50	+/-0.010	4	3	6	1.95	50	2	6.30	6.52	6.75	7.01	7.57	UH2110200506	●
2	0/-0.012	0.50	+/-0.010	4	3	12	1.95	50	2	12.50	12.94	13.40	13.91	15.03	UH2110200512	●
3	0/-0.012	0.30	+/-0.010	6	4.5	10	2.80	55	2	10.71	11.04	11.38	11.72	12.40	UH2110300310	●
3	0/-0.012	0.30	+/-0.010	6	4.5	16	2.85	55	2	16.83	17.41	18.04	18.72	20.24	UH2110300316	●
3	0/-0.012	0.50	+/-0.010	6	4.5	10	2.85	55	2	10.63	11.00	11.39	11.82	12.78	UH2110300510	●
3	0/-0.012	0.50	+/-0.010	6	4.5	16	2.85	55	2	16.83	17.41	18.04	18.72	20.24	UH2110300516	●
4	0/-0.012	0.20	+/-0.010	6	6	20	3.85	60	2	20.96	21.69	22.48	23.32	-	UH2110400220	●
4	0/-0.012	0.30	+/-0.010	6	6	12	3.85	55	2	12.69	13.14	13.61	14.12	15.27	UH2110400312	●
4	0/-0.012	0.30	+/-0.010	6	6	20	3.85	60	2	20.96	21.69	22.48	23.32	-	UH2110400320	●
4	0/-0.012	0.50	+/-0.010	6	6	12	3.85	55	2	12.69	13.14	13.61	14.12	15.27	UH2110400512	●
4	0/-0.012	0.50	+/-0.010	6	6	20	3.85	60	2	20.96	21.69	22.48	23.32	-	UH2110400520	●
4	0/-0.012	1.00	+/-0.010	6	6	16	3.85	55	2	16.83	17.41	18.04	18.72	-	UH2110401016	●
6	0/-0.015	0.50	+/-0.015	6	9	15	5.85	60	2	-	-	-	-	-	UH2110600520	●
6	0/-0.015	1.00	+/-0.015	6	9	15	5.85	60	2	-	-	-	-	-	UH2110601020	●
6	0/-0.015	2.00	+/-0.015	6	9	15	5.85	60	2	-	-	-	-	-	UH2110602020	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH211

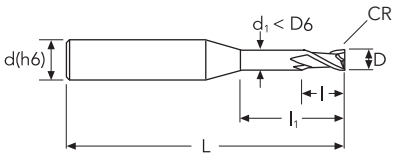
SQUARE RIB

Material Group ISO 513			P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm			< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae			ap x D			ap x D			ap x D			ap x D		
Vc (m/min)			80-120			60-100			50-70			30-50		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	≤ 6D	0.05	30000	0.012	720	24000	0.011	520	18000	0.010	345	12000	0.008	200
	≤ 8D	0.04	28700	0.010	590	22960	0.009	420	17220	0.008	280	11480	0.007	165
	≤ 10D	0.04	25500	0.008	430	20400	0.008	310	15300	0.007	205	10200	0.006	120
	≤ 12D	0.03	22300	0.007	290	17840	0.006	210	13380	0.005	140	8920	0.005	80
1.5	≤ 6D	0.08	21200	0.025	1060	16960	0.023	760	12720	0.020	510	8480	0.018	295
	≤ 8D	0.06	19100	0.021	810	15280	0.019	580	11460	0.017	390	7640	0.015	225
	≤ 10D	0.05	17000	0.018	590	13600	0.016	430	10200	0.014	285	6800	0.012	165
	≤ 12D	0.04	14900	0.014	410	11920	0.012	300	8940	0.011	195	5960	0.010	115
	≤ 15D	0.03	12700	0.011	290	10160	0.010	210	7620	0.009	135	5080	0.008	80
	> 15D	0.02	10600	0.008	160	8480	0.007	110	6360	0.006	75	4240	0.005	45
2	≤ 6D	0.10	15900	0.030	950	12720	0.027	690	9540	0.024	460	6360	0.021	265
	≤ 8D	0.09	14300	0.026	730	11440	0.023	530	8580	0.020	350	5720	0.018	205
	≤ 10D	0.07	12700	0.021	530	10160	0.019	380	7620	0.017	255	5080	0.015	150
	≤ 12D	0.06	11100	0.017	370	8880	0.015	260	6660	0.013	175	4440	0.012	105
	≤ 15D	0.05	9600	0.014	260	7680	0.012	190	5760	0.011	125	3840	0.009	75
	> 15D	0.03	9600	0.009	170	7680	0.008	120	5760	0.007	85	3840	0.006	50
2.5	≤ 6D	0.13	12700	0.035	890	10160	0.032	640	7620	0.028	425	5080	0.025	250
	≤ 8D	0.11	11500	0.030	680	9200	0.027	490	6900	0.024	330	4600	0.021	190
	≤ 10D	0.09	10200	0.025	500	8160	0.022	360	6120	0.020	240	4080	0.017	140
	≤ 12D	0.07	8900	0.019	340	7120	0.017	250	5340	0.015	165	3560	0.013	95
	≤ 15D	0.06	7600	0.016	240	6080	0.014	170	4560	0.013	115	3040	0.011	65
	> 15D	0.04	7600	0.011	160	6080	0.009	110	4560	0.008	75	3040	0.007	45
3	≤ 6D	0.15	10600	0.040	850	8480	0.036	610	6360	0.032	405	4240	0.028	235
	≤ 8D	0.13	9600	0.034	650	7680	0.031	470	5760	0.027	315	3840	0.024	185
	≤ 10D	0.11	8500	0.028	480	6800	0.025	340	5100	0.022	230	3400	0.020	135
	≤ 12D	0.08	7400	0.022	330	5920	0.020	230	4440	0.018	155	2960	0.015	90
	≤ 15D	0.07	6400	0.018	230	5120	0.016	170	3840	0.014	110	2560	0.013	65
	> 15D	0.05	6400	0.012	150	5120	0.011	110	3840	0.010	75	2560	0.008	45
4	≤ 6D	0.20	8000	0.050	800	6400	0.045	580	4800	0.040	385	3200	0.035	225
	≤ 8D	0.17	7200	0.043	610	5760	0.038	440	4320	0.034	295	2880	0.030	170
	≤ 10D	0.14	6400	0.035	450	5120	0.032	320	3840	0.028	215	2560	0.025	125
	≤ 12D	0.11	5600	0.028	310	4480	0.025	220	3360	0.022	150	2240	0.019	85
	≤ 15D	0.09	4800	0.023	220	3840	0.020	160	2880	0.018	105	1920	0.016	60
	> 15D	0.06	4800	0.015	140	3840	0.014	100	2880	0.012	70	1920	0.011	40
6	≤ 6D	0.30	5300	0.070	740	4240	0.063	530	3180	0.056	355	2120	0.049	210
	≤ 8D	0.26	4800	0.060	570	3840	0.054	410	2880	0.048	275	1920	0.042	160
	≤ 10D	0.21	4200	0.049	410	3360	0.044	300	2520	0.039	200	1680	0.034	115
	≤ 12D	0.17	3700	0.039	280	2960	0.035	210	2220	0.031	135	1480	0.027	80
	> 12D	0.14	3200	0.032	200	2560	0.028	150	1920	0.025	95	1280	0.022	55

UH212

cylindrical shank, 2F, extended and reduced neck, corner radius

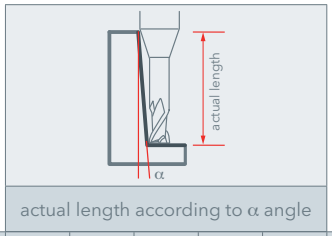
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

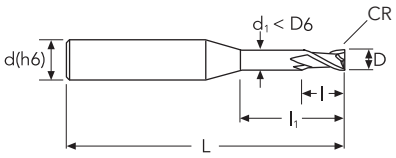
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.2	0/-0.020	0.02	+/-0.010	4	0.3	0.5	0.16	50	2	0.57	0.59	0.6	0.62	0.66	UH21200202005	●
0.2	0/-0.020	0.02	+/-0.010	4	0.3	1	0.16	50	2	1.09	1.12	1.16	1.19	1.26	UH2120020201	●
0.2	0/-0.020	0.02	+/-0.010	4	0.3	1.5	0.16	50	2	1.60	1.65	1.71	1.76	1.86	UH21200202015	●
0.3	0/-0.020	0.03	+/-0.010	4	0.4	1	0.26	50	2	1.09	1.12	1.15	1.19	1.26	UH21200300301	●
0.3	0/-0.020	0.03	+/-0.010	4	0.4	2	0.26	50	2	2.12	2.19	2.26	2.32	2.46	UH21200300302	●
0.3	0/-0.020	0.03	+/-0.010	4	0.4	3	0.26	50	2	3.15	3.25	3.36	3.46	3.66	UH21200300303	●
0.4	0/-0.020	0.03	+/-0.010	4	0.6	2	0.37	50	2	2.12	2.19	2.26	2.32	2.46	UH21200400302	●
0.4	0/-0.020	0.03	+/-0.010	4	0.6	3	0.37	50	2	3.15	3.25	3.36	3.46	3.66	UH21200400303	●
0.4	0/-0.020	0.03	+/-0.010	4	0.6	4	0.37	50	2	4.19	4.32	4.46	4.59	4.86	UH21200400304	●
0.4	0/-0.020	0.03	+/-0.010	4	0.6	5	0.37	50	2	5.22	5.39	5.56	5.73	6.07	UH21200400305	●
0.5	0/-0.020	0.05	+/-0.010	4	0.7	2	0.45	50	2	2.16	2.23	2.29	2.36	2.50	UH21200500502	●
0.5	0/-0.020	0.05	+/-0.010	4	0.7	4	0.45	50	2	4.22	4.36	4.50	4.63	4.90	UH21200500504	●
0.5	0/-0.020	0.05	+/-0.010	4	0.7	6	0.45	50	2	6.29	6.49	6.70	6.90	7.31	UH21200500506	●
0.5	0/-0.020	0.05	+/-0.010	4	0.7	8	0.45	50	2	8.36	8.63	8.90	9.17	9.71	UH21200500508	●
0.6	0/-0.020	0.05	+/-0.010	4	0.9	2	0.55	50	2	2.16	2.23	2.29	2.36	2.50	UH21200600502	●
0.6	0/-0.020	0.05	+/-0.010	4	0.9	4	0.55	50	2	4.22	4.36	4.50	4.63	4.90	UH21200600504	●
0.6	0/-0.020	0.05	+/-0.010	4	0.9	6	0.55	50	2	6.29	6.49	6.70	6.90	7.31	UH21200600506	●
0.6	0/-0.020	0.05	+/-0.010	4	0.9	8	0.55	50	2	8.36	8.63	8.90	9.17	9.71	UH21200600508	●
0.6	0/-0.020	0.05	+/-0.010	4	0.9	10	0.55	50	2	10.43	10.76	11.10	11.44	12.12	UH21200600510	●
0.7	0/-0.020	0.08	+/-0.010	4	1.0	2	0.65	50	2	2.16	2.22	2.29	2.36	2.49	UH21200700802	●
0.7	0/-0.020	0.08	+/-0.010	4	1.0	4	0.65	50	2	4.22	4.36	4.49	4.63	4.90	UH21200700804	●
0.7	0/-0.020	0.08	+/-0.010	4	1.0	6	0.65	50	2	6.29	6.49	6.69	6.90	7.30	UH21200700806	●
0.7	0/-0.020	0.08	+/-0.010	4	1.0	8	0.65	50	2	8.36	8.63	8.90	9.17	9.71	UH21200700808	●
0.7	0/-0.020	0.08	+/-0.010	4	1.0	10	0.65	50	2	10.42	10.76	11.10	11.44	12.11	UH21200700810	●
0.8	0/-0.020	0.08	+/-0.010	4	1.2	4	0.75	50	2	4.22	4.36	4.49	4.63	4.90	UH21200800804	●
0.8	0/-0.020	0.08	+/-0.010	4	1.2	6	0.75	50	2	6.29	6.49	6.69	6.90	7.30	UH21200800806	●
0.8	0/-0.020	0.08	+/-0.010	4	1.2	8	0.75	50	2	8.36	8.63	8.90	9.17	9.71	UH21200800808	●
0.8	0/-0.020	0.08	+/-0.010	4	1.2	10	0.75	50	2	10.42	10.76	11.10	11.44	12.11	UH21200800810	●
0.8	0/-0.020	0.08	+/-0.010	4	1.2	12	0.75	50	2	12.49	12.90	13.30	13.7	14.51	UH21200800812	●
0.9	0/-0.020	0.08	+/-0.010	4	1.4	6	0.85	50	2	6.29	6.49	6.69	6.90	7.30	UH21200900806	●
0.9	0/-0.020	0.08	+/-0.010	4	1.4	8	0.85	50	2	8.36	8.63	8.90	9.17	9.71	UH21200900808	●
0.9	0/-0.020	0.08	+/-0.010	4	1.4	10	0.85	50	2	10.42	10.76	11.10	11.44	12.11	UH21200900810	●
0.9	0/-0.020	0.08	+/-0.010	4	1.4	15	0.85	50	2	15.59	16.1	16.60	17.11	18.12	UH21200900815	●
1.0	0/-0.020	0.10	+/-0.010	4	1.5	6	0.95	50	2	6.39	6.59	6.80	7.00	7.41	UH2120100106	●
1.0	0/-0.020	0.10	+/-0.010	4	1.5	8	0.95	50	2	8.45	8.73	9.00	9.27	9.81	UH2120100108	●
1.0	0/-0.020	0.10	+/-0.010	4	1.5	10	0.95	50	2	10.52	10.86	11.20	11.54	12.22	UH2120100110	●
1.0	0/-0.020	0.10	+/-0.010	4	1.5	12	0.95	50	2	12.59	12.99	13.40	13.81	14.62	UH2120100112	●
1.0	0/-0.020	0.10	+/-0.010	4	1.5	14	0.95	50	2	14.66	15.13	15.60	16.08	17.03	UH2120100114	●
1.0	0/-0.020	0.10	+/-0.010	4	1.5	16	0.95	50	2	16.72	17.26	17.80	18.35	19.43	UH2120100116	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UH212

cylindrical shank, 2F, extended and reduced neck, corner radius

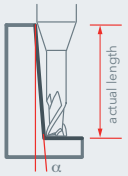
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

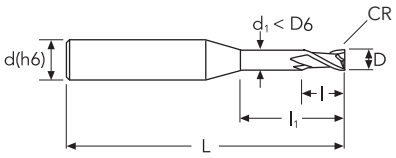
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1.2	0/-0.020	0.10	+/-0.010	4	1.8	6	1.15	50	2	6.39	6.59	6.80	7.00	7.41	UH2120120106	●
1.2	0/-0.020	0.10	+/-0.010	4	1.8	8	1.15	50	2	8.45	8.73	9.00	9.27	9.81	UH2120120108	●
1.2	0/-0.020	0.10	+/-0.010	4	1.8	10	1.15	50	2	10.52	10.86	11.20	11.54	12.22	UH2120120110	●
1.2	0/-0.020	0.10	+/-0.010	4	1.8	12	1.15	50	2	12.59	12.99	13.40	13.81	14.62	UH2120120112	●
1.4	0/-0.020	0.15	+/-0.010	4	2.1	6	1.35	50	2	6.38	6.59	6.79	6.99	7.40	UH21201401506	●
1.4	0/-0.020	0.15	+/-0.010	4	2.1	8	1.35	50	2	8.45	8.72	8.99	9.26	9.80	UH21201401508	●
1.4	0/-0.020	0.15	+/-0.010	4	2.1	10	1.35	50	2	10.52	10.86	11.19	11.53	12.21	UH21201401510	●
1.4	0/-0.020	0.15	+/-0.010	4	2.1	12	1.35	50	2	12.59	12.99	13.40	13.80	14.61	UH21201401512	●
1.4	0/-0.020	0.15	+/-0.010	4	2.1	14	1.35	50	2	14.65	15.13	15.60	16.07	17.02	UH21201401514	●
1.4	0/-0.020	0.15	+/-0.010	4	2.1	16	1.35	50	2	16.72	17.26	17.80	18.34	19.42	UH21201401516	●
1.5	0/-0.020	0.15	+/-0.010	4	2.3	6	1.45	50	2	6.38	6.59	6.79	6.99	7.40	UH21201501506	●
1.5	0/-0.020	0.15	+/-0.010	4	2.3	8	1.45	50	2	8.45	8.72	8.99	9.26	9.80	UH21201501508	●
1.5	0/-0.020	0.15	+/-0.010	4	2.3	10	1.45	50	2	10.52	10.86	11.19	11.53	12.21	UH21201501510	●
1.5	0/-0.020	0.15	+/-0.010	4	2.3	12	1.45	50	2	12.59	12.99	13.40	13.80	14.61	UH21201501512	●
1.5	0/-0.020	0.15	+/-0.010	4	2.3	14	1.45	50	2	14.65	15.13	15.60	16.07	17.02	UH21201501514	●
1.5	0/-0.020	0.15	+/-0.010	4	2.3	16	1.45	50	2	16.72	17.26	17.80	18.34	19.42	UH21201501516	●
1.5	0/-0.020	0.15	+/-0.010	4	2.3	18	1.45	60	2	18.79	19.39	20.00	20.61	21.82	UH21201501518	●
1.5	0/-0.020	0.15	+/-0.010	4	2.3	20	1.45	60	2	20.86	21.53	22.20	22.88	24.23	UH21201501520	●
1.6	0/-0.020	0.15	+/-0.010	4	2.4	6	1.55	50	2	6.38	6.59	6.79	6.99	7.40	UH21201601506	●
1.6	0/-0.020	0.15	+/-0.010	4	2.4	8	1.55	50	2	8.45	8.72	8.99	9.26	9.80	UH21201601508	●
1.6	0/-0.020	0.15	+/-0.010	4	2.4	10	1.55	50	2	10.52	10.86	11.19	11.53	12.21	UH21201601510	●
1.6	0/-0.020	0.15	+/-0.010	4	2.4	12	1.55	50	2	12.59	12.99	13.40	13.80	14.61	UH21201601512	●
1.6	0/-0.020	0.15	+/-0.010	4	2.4	14	1.55	50	2	14.65	15.13	15.60	16.07	17.02	UH21201601514	●
1.6	0/-0.020	0.15	+/-0.010	4	2.4	16	1.55	50	2	16.72	17.26	17.80	18.34	19.42	UH21201601516	●
1.6	0/-0.020	0.15	+/-0.010	4	2.4	18	1.55	60	2	18.79	19.39	20.00	20.61	21.82	UH21201601518	●
1.6	0/-0.020	0.15	+/-0.010	4	2.4	20	1.55	60	2	20.86	21.53	22.20	22.88	24.23	UH21201601520	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	6	1.75	50	2	6.38	6.58	6.79	6.99	7.39	UH2120180206	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	8	1.75	50	2	8.45	8.72	8.99	9.26	9.79	UH2120180208	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	10	1.75	50	2	10.52	10.85	11.19	11.52	12.20	UH2120180210	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	12	1.75	50	2	12.58	12.99	13.39	13.79	14.60	UH2120180212	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	14	1.75	50	2	14.65	15.12	15.59	16.06	17.01	UH2120180214	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	16	1.75	50	2	16.72	17.26	17.79	18.33	19.41	UH2120180216	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	18	1.75	60	2	18.79	19.39	20.00	20.6	21.81	UH2120180218	●
1.8	0/-0.020	0.20	+/-0.010	4	2.7	20	1.75	60	2	20.85	21.53	22.20	22.87	24.22	UH2120180220	●
2	0/-0.020	0.20	+/-0.010	4	3	6	1.95	50	2	6.38	6.58	6.79	6.99	7.39	UH2120200206	●
2	0/-0.020	0.20	+/-0.010	4	3	8	1.95	50	2	8.45	8.72	8.99	9.26	9.79	UH2120200208	●
2	0/-0.020	0.20	+/-0.010	4	3	10	1.95	50	2	10.52	10.85	11.19	11.52	12.20	UH2120200210	●
2	0/-0.020	0.20	+/-0.010	4	3	12	1.95	50	2	12.58	12.99	13.39	13.79	14.60	UH2120200212	●
2	0/-0.020	0.20	+/-0.010	4	3	14	1.95	50	2	14.65	15.12	15.59	16.06	17.01	UH2120200214	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UH212

cylindrical shank, 2F, extended and reduced neck, corner radius

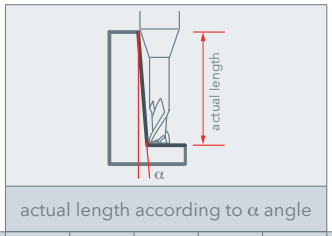
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
2	0/-0.020	0.20	+/-0.010	4	3	16	1.95	50	2	16.72	17.26	17.79	18.33	19.41	UH2120200216	●
2	0/-0.020	0.20	+/-0.010	4	3	18	1.95	60	2	18.79	19.39	20.00	20.60	21.81	UH2120200218	●
2	0/-0.020	0.20	+/-0.010	4	3	20	1.95	60	2	20.85	21.53	22.20	22.87	-	UH2120200220	●
2	0/-0.020	0.20	+/-0.010	4	3	25	1.95	75	2	26.02	26.86	27.70	28.54	-	UH2120200225	●
2	0/-0.020	0.20	+/-0.010	4	3	30	1.95	75	2	31.19	32.20	33.21	-	-	UH2120200230	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	8	2.40	50	2	8.45	8.71	8.98	9.24	9.77	UH2120250308	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	10	2.40	50	2	10.51	10.85	11.18	11.51	12.18	UH2120250310	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	12	2.40	50	2	12.58	12.98	13.38	13.78	14.58	UH2120250312	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	14	2.40	50	2	14.65	15.12	15.58	16.05	-	UH2120250314	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	16	2.40	50	2	16.72	17.25	17.78	18.32	-	UH2120250316	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	18	2.40	60	2	18.78	19.38	19.99	20.59	-	UH2120250318	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	20	2.40	60	2	20.85	21.52	22.19	22.86	-	UH2120250320	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	25	2.40	60	2	26.02	26.86	27.69	-	-	UH2120250325	●
2.5	0/-0.020	0.30	+/-0.010	4	3.7	30	2.40	75	2	31.19	32.19	-	-	-	UH2120250330	●
3	0/-0.025	0.30	+/-0.010	6	4.5	8	2.85	50	2	8.64	8.91	9.18	9.45	10.00	UH2120300308	●
3	0/-0.025	0.30	+/-0.010	6	4.5	10	2.85	50	2	10.71	11.04	11.38	11.72	12.40	UH2120300310	●
3	0/-0.025	0.30	+/-0.010	6	4.5	12	2.85	50	2	12.77	13.18	13.59	13.99	14.80	UH2120300312	●
3	0/-0.025	0.30	+/-0.010	6	4.5	14	2.85	50	2	14.84	15.31	15.79	16.26	17.21	UH2120300314	●
3	0/-0.025	0.30	+/-0.010	6	4.5	16	2.85	60	2	16.91	17.45	17.99	18.53	19.61	UH2120300316	●
3	0/-0.025	0.30	+/-0.010	6	4.5	18	2.85	60	2	18.98	19.58	20.19	20.80	22.02	UH2120300318	●
3	0/-0.025	0.30	+/-0.010	6	4.5	20	2.85	60	2	21.04	21.72	22.39	23.07	24.42	UH2120300320	●
3	0/-0.025	0.30	+/-0.010	6	4.5	25	2.85	75	2	26.21	27.05	27.90	28.74	30.43	UH2120300325	●
4	0/-0.025	0.40	+/-0.010	6	4.5	10	3.85	60	2	10.90	11.24	11.58	11.92	12.60	UH2120400410	●
4	0/-0.025	0.40	+/-0.010	6	4.5	15	3.85	60	2	16.06	16.57	17.08	17.59	18.61	UH2120400415	●
4	0/-0.025	0.40	+/-0.010	6	4.5	20	3.85	60	2	21.23	21.91	22.59	23.27	-	UH2120400420	●
4	0/-0.025	0.40	+/-0.010	6	4.5	25	3.85	75	2	26.40	27.25	28.09	28.94	-	UH2120400425	●
4	0/-0.025	0.40	+/-0.010	6	4.5	30	3.85	75	2	31.57	32.58	33.60	-	-	UH2120400430	●
4	0/-0.025	0.40	+/-0.010	6	4.5	40	3.85	75	2	41.90	43.25	-	-	-	UH2120400440	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH212

SQUARE RIB

Material Group ISO 513			P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm			< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae			ap x D			ap x D			ap x D			ap x D		
Vc (m/min)			80-120			60-100			50-70			30-50		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
0.2	≤ 6D	0.01	40000	0.003	240	40000	0.003	220	40000	0.002	190	40000	0.002	170
	≤ 8D	0.01	40000	0.003	200	40000	0.002	180	40000	0.002	165	40000	0.002	145
	≤ 10D	0.01	40000	0.002	170	40000	0.002	150	40000	0.002	135	40000	0.001	120
	≤ 12D	0.01	40000	0.002	130	40000	0.001	120	40000	0.001	105	40000	0.001	90
0.3	≤ 6D	0.02	40000	0.004	320	40000	0.004	290	40000	0.003	255	40000	0.003	225
	≤ 8D	0.01	40000	0.003	270	40000	0.003	240	40000	0.003	220	38200	0.002	180
	≤ 10D	0.01	40000	0.003	220	40000	0.003	200	40000	0.002	180	34000	0.002	135
	≤ 12D	0.01	40000	0.002	180	40000	0.002	160	40000	0.002	140	29700	0.002	90
0.4	≤ 6D	0.02	40000	0.006	480	40000	0.005	430	40000	0.005	385	31800	0.004	265
	≤ 8D	0.02	40000	0.005	410	40000	0.005	370	40000	0.004	325	28700	0.004	205
	≤ 10D	0.01	40000	0.004	340	40000	0.004	300	38200	0.003	255	25500	0.003	150
	≤ 12D	0.01	40000	0.003	260	40000	0.003	240	33400	0.003	175	22300	0.002	105
0.5	≤ 6D	0.03	40000	0.007	560	40000	0.006	500	38200	0.006	430	25500	0.005	250
	≤ 8D	0.02	40000	0.006	480	40000	0.005	430	34400	0.005	325	22900	0.004	190
	≤ 10D	0.02	40000	0.005	390	40000	0.004	350	30600	0.004	240	20400	0.003	140
	≤ 12D	0.01	35000	0.004	270	35700	0.003	250	26800	0.003	165	17800	0.003	95
0.6	≤ 6D	0.03	40000	0.008	640	40000	0.007	580	31800	0.006	405	21200	0.006	235
	≤ 8D	0.03	40000	0.007	540	38200	0.006	470	28700	0.005	310	19100	0.005	180
	≤ 10D	0.02	40000	0.006	450	34000	0.005	340	25500	0.004	230	17000	0.004	135
	≤ 12D	0.02	37200	0.004	330	29700	0.004	240	22300	0.004	155	14900	0.003	90
0.8	≤ 6D	0.04	39800	0.010	800	31840	0.009	570	23880	0.008	380	15920	0.007	225
	≤ 8D	0.03	35800	0.009	610	28640	0.008	440	21480	0.007	290	14320	0.006	170
	≤ 10D	0.03	31800	0.007	450	25440	0.006	320	19080	0.006	215	12720	0.005	125
	≤ 12D	0.02	27900	0.006	310	22320	0.005	220	16740	0.004	145	11160	0.004	85
1	≤ 6D	0.05	31800	0.012	760	25440	0.011	550	19080	0.010	365	12720	0.008	215
	≤ 8D	0.04	28700	0.010	590	22960	0.009	420	17220	0.008	280	11480	0.007	165
	≤ 10D	0.04	25500	0.008	430	20400	0.008	310	15300	0.007	205	10200	0.006	120
	≤ 12D	0.03	22300	0.007	290	17840	0.006	210	13380	0.005	140	8920	0.005	80
1.2	≤ 6D	0.06	26500	0.022	1170	21200	0.020	840	15900	0.018	560	10600	0.015	325
	≤ 8D	0.05	23900	0.019	890	19120	0.017	640	14340	0.015	430	9560	0.013	250
	≤ 10D	0.04	21200	0.015	650	16960	0.014	470	12720	0.012	315	8480	0.011	185
	≤ 12D	0.03	18600	0.012	450	14880	0.011	320	11160	0.010	215	7440	0.008	125
1.4	≤ 6D	0.07	22700	0.024	1090	18160	0.022	780	13620	0.019	525	9080	0.017	305
	≤ 8D	0.06	20500	0.020	840	16400	0.018	600	12300	0.016	400	8200	0.014	235
	≤ 10D	0.05	18200	0.017	610	14560	0.015	440	10920	0.013	295	7280	0.012	170
	≤ 12D	0.04	15900	0.013	420	12720	0.012	300	9540	0.011	200	6360	0.009	120
	≤ 15D	0.03	13600	0.011	290	10880	0.010	210	8160	0.009	140	5440	0.008	80
	> 15D	0.02	11400	0.007	160	9120	0.006	120	6840	0.006	80	4560	0.005	45
1.5	≤ 6D	0.08	21200	0.025	1060	16960	0.023	760	12720	0.020	510	8480	0.018	295
	≤ 8D	0.06	19100	0.021	810	15280	0.019	580	11460	0.017	390	7640	0.015	225
	≤ 10D	0.05	17000	0.018	590	13600	0.016	430	10200	0.014	285	6800	0.012	165
	≤ 12D	0.04	14900	0.014	410	11920	0.012	300	8940	0.011	195	5960	0.010	115
	≤ 15D	0.03	12700	0.011	290	10160	0.010	210	7620	0.009	135	5080	0.008	80
	> 15D	0.02	10600	0.008	160	8480	0.007	110	6360	0.006	75	4240	0.005	45
1.6	≤ 6D	0.08	19900	0.026	1030	15920	0.023	750	11940	0.021	495	7960	0.018	290
	≤ 8D	0.07	17900	0.022	790	14320	0.020	570	10740	0.018	380	7160	0.015	220
	≤ 10D	0.06	15900	0.018	580	12720	0.016	420	9540	0.015	280	6360	0.013	160
	≤ 12D	0.04	13900	0.014	400	11120	0.013	290	8340	0.011	190	5560	0.010	110
	≤ 15D	0.04	11900	0.012	280	9520	0.011	200	7140	0.009	135	4760	0.008	80
	> 15D	0.02	10000	0.008	160	8000	0.007	110	6000	0.006	75	4000	0.005	45

CUTTING PARAMETERS

UH212

Material Group ISO 513			P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm			< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae			ap x D			ap x D			ap x D			ap x D		
Vc (m/min)			80-120			60-100			50-70			30-50		
D (mm)	l1 (mm)	ap (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1.8	≤ 6D	0.09	17700	0.028	990	14160	0.025	710	10620	0.022	475	7080	0.020	280
	≤ 8D	0.08	15900	0.024	760	12720	0.021	540	9540	0.019	365	6360	0.017	210
	≤ 10D	0.06	14200	0.020	560	11360	0.018	400	8520	0.016	265	5680	0.014	155
	≤ 12D	0.05	12400	0.015	380	9920	0.014	270	7440	0.012	185	4960	0.011	105
	≤ 15D	0.04	10600	0.013	270	8480	0.011	190	6360	0.010	130	4240	0.009	75
	> 15D	0.03	8800	0.008	150	7040	0.008	110	5280	0.007	70	3520	0.006	40
2	≤ 6D	0.10	15900	0.030	950	12720	0.027	690	9540	0.024	460	6360	0.021	265
	≤ 8D	0.09	14300	0.026	730	11440	0.023	530	8580	0.020	350	5720	0.018	205
	≤ 10D	0.07	12700	0.021	530	10160	0.019	380	7620	0.017	255	5080	0.015	150
	≤ 12D	0.06	11100	0.017	370	8880	0.015	260	6660	0.013	175	4440	0.012	105
	≤ 15D	0.05	9600	0.014	260	7680	0.012	190	5760	0.011	125	3840	0.009	75
	> 15D	0.03	9600	0.009	170	7680	0.008	120	5760	0.007	85	3840	0.006	50
2.5	≤ 6D	0.13	12700	0.035	890	10160	0.032	640	7620	0.028	425	5080	0.025	250
	≤ 8D	0.11	11500	0.030	680	9200	0.027	490	6900	0.024	330	4600	0.021	190
	≤ 10D	0.09	10200	0.025	500	8160	0.022	360	6120	0.020	240	4080	0.017	140
	≤ 12D	0.07	8900	0.019	340	7120	0.017	250	5340	0.015	165	3560	0.013	95
	≤ 15D	0.06	7600	0.016	240	6080	0.014	170	4560	0.013	115	3040	0.011	65
	> 15D	0.04	7600	0.011	160	6080	0.009	110	4560	0.008	75	3040	0.007	45
3	≤ 6D	0.15	10600	0.040	850	8480	0.036	610	6360	0.032	405	4240	0.028	235
	≤ 8D	0.13	9600	0.034	650	7680	0.031	470	5760	0.027	315	3840	0.024	185
	≤ 10D	0.11	8500	0.028	480	6800	0.025	340	5100	0.022	230	3400	0.020	135
	≤ 12D	0.08	7400	0.022	330	5920	0.020	230	4440	0.018	155	2960	0.015	90
	≤ 15D	0.07	6400	0.018	230	5120	0.016	170	3840	0.014	110	2560	0.013	65
	> 15D	0.05	6400	0.012	150	5120	0.011	110	3840	0.010	75	2560	0.008	45
4	≤ 6D	0.20	8000	0.050	800	6400	0.045	580	4800	0.040	385	3200	0.035	225
	≤ 8D	0.17	7200	0.043	610	5760	0.038	440	4320	0.034	295	2880	0.030	170
	≤ 10D	0.14	6400	0.035	450	5120	0.032	320	3840	0.028	215	2560	0.025	125
	≤ 12D	0.11	5600	0.028	310	4480	0.025	220	3360	0.022	150	2240	0.019	85
	≤ 15D	0.09	4800	0.023	220	3840	0.020	160	2880	0.018	105	1920	0.016	60
	> 15D	0.06	4800	0.015	140	3840	0.014	100	2880	0.012	70	1920	0.011	40

UHCS2

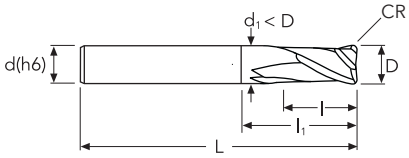
cylindrical shank, 2F, reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | RADIUS | Z2

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
1	0/-0.012	0.10	+/-0.010	4	2	3	0.95	50	2	UHCS2010	●
1.5	0/-0.012	0.10	+/-0.010	4	2.5	4	1.45	50	2	UHCS2015	●
2	0/-0.012	0.10	+/-0.010	4	3	6	1.95	50	2	UHCS2020	●
3	0/-0.012	0.10	+/-0.010	6	4.5	8	2.85	55	2	UHCS2030	●
4	0/-0.012	0.10	+/-0.010	6	6	10	3.85	55	2	UHCS2040	●
5	0/-0.012	0.20	+/-0.010	6	6	11	4.85	50	2	UHCS2050	●
6	0/-0.012	0.20	+/-0.010	6	9	15	5.85	60	2	UHCS2060	●
8	0/-0.015	0.20	+/-0.015	8	12	20	7.70	70	2	UHCS2080	●
10	0/-0.015	0.20	+/-0.015	10	15	25	9.70	70	2	UHCS2100	●
12	0/-0.015	0.30	+/-0.015	12	18	30	11.70	80	2	UHCS2120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

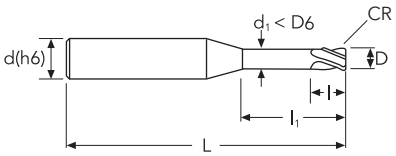
UHCS2

	Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae	**0.3D x D**			**0.2D x D**			**0.2D x D**			**0.1D x D**		
	Vc (m/min)	**80-120**			**60-100**			**50-70**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	30000	0.007	420	25480	0.006	320	19110	0.006	215	12740	0.005	125
	2	15920	0.012	380	12740	0.011	280	9550	0.010	185	6370	0.008	105
	3	10620	0.017	360	8490	0.015	260	6370	0.014	175	4250	0.012	100
	4	7960	0.023	370	6370	0.021	260	4780	0.018	175	3180	0.016	100
	5	6370	0.030	380	5100	0.027	280	3820	0.024	185	2550	0.021	105
	6	5310	0.038	400	4250	0.034	290	3180	0.030	195	2120	0.027	115
	8	3980	0.050	400	3180	0.045	290	2390	0.040	190	1590	0.035	110
	10	3180	0.065	410	2550	0.059	300	1910	0.052	200	1270	0.046	115
	12	2650	0.080	420	2120	0.072	310	1590	0.064	205	1060	0.056	120

UHF4LN

cylindrical shank, 4F Unequal Pitch,
extended and reduced neck, corner radius

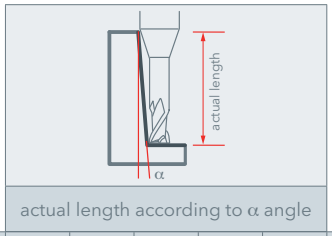
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 25° | RADIUS | Z4 UP



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

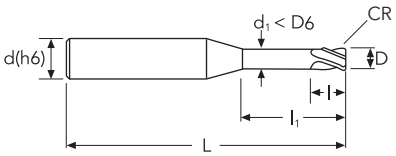
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1	0/-0.020	0.10	+/-0.010	4	1	4	0.90	50	4	4.32	4.46	4.62	4.78	5.13	UHF4LN0100104	●
1	0/-0.020	0.10	+/-0.010	4	1	6	0.90	50	4	6.39	6.60	6.83	7.08	7.60	UHF4LN0100106	●
1	0/-0.020	0.10	+/-0.010	4	1	8	0.90	50	4	8.45	8.74	9.05	9.37	10.07	UHF4LN0100108	●
1	0/-0.020	0.10	+/-0.010	4	1	10	0.90	50	4	10.52	10.88	11.26	11.66	12.53	UHF4LN0100110	●
1	0/-0.020	0.10	+/-0.010	4	1	12	0.90	50	4	12.59	13.02	13.48	13.96	15.00	UHF4LN0100112	●
1	0/-0.020	0.10	+/-0.010	4	1	14	0.90	50	4	14.66	15.16	15.69	16.25	17.47	UHF4LN0100114	●
1	0/-0.020	0.10	+/-0.010	4	1	16	0.90	50	4	16.72	17.30	17.91	18.55	19.94	UHF4LN0100116	●
1	0/-0.020	0.10	+/-0.010	4	1	20	0.90	75	4	20.86	21.57	22.33	23.14	24.87	UHF4LN0100120	●
1	0/-0.020	0.20	+/-0.010	4	1	4	0.90	50	4	4.32	4.46	4.61	4.77	5.11	UHF4LN0100204	●
1	0/-0.020	0.20	+/-0.010	4	1	6	0.90	50	4	6.38	6.60	6.82	7.06	7.57	UHF4LN0100206	●
1	0/-0.020	0.20	+/-0.010	4	1	8	0.90	50	4	8.45	8.73	9.04	9.35	10.04	UHF4LN0100208	●
1	0/-0.020	0.20	+/-0.010	4	1	10	0.90	50	4	10.52	10.87	11.25	11.65	12.51	UHF4LN0100210	●
1	0/-0.020	0.20	+/-0.010	4	1	12	0.90	50	4	12.58	13.01	13.47	13.94	14.98	UHF4LN0100212	●
1	0/-0.020	0.20	+/-0.010	4	1	14	0.90	50	4	14.65	15.15	15.68	16.24	17.45	UHF4LN0100214	●
1	0/-0.020	0.20	+/-0.010	4	1	16	0.90	50	4	16.72	17.29	17.89	18.53	19.91	UHF4LN0100216	●
1	0/-0.020	0.20	+/-0.010	4	1	20	0.90	60	4	20.85	21.57	22.32	23.12	24.85	UHF4LN0100220	●
1	0/-0.020	0.30	+/-0.010	4	1	6	0.90	50	4	6.38	6.59	6.81	7.05	7.55	UHF4LN0100306	●
1	0/-0.020	0.30	+/-0.010	4	1	10	0.90	50	4	10.51	10.87	11.24	11.63	12.49	UHF4LN0100310	●
1	0/-0.020	0.30	+/-0.010	4	1	16	0.90	50	4	16.72	17.28	17.88	18.52	19.89	UHF4LN0100316	●
1	0/-0.020	0.30	+/-0.010	4	1	20	0.90	60	4	20.85	21.56	22.31	23.11	24.82	UHF4LN0100320	●
1.5	0/-0.020	0.10	+/-0.010	4	1.5	6	1.40	50	4	6.39	6.60	6.83	7.08	7.60	UHF4LN0150106	●
1.5	0/-0.020	0.10	+/-0.010	4	1.5	8	1.40	50	4	8.45	8.74	9.05	9.37	10.07	UHF4LN0150108	●
1.5	0/-0.020	0.10	+/-0.010	4	1.5	12	1.40	50	4	12.59	13.02	13.48	13.96	15.00	UHF4LN0150112	●
1.5	0/-0.020	0.10	+/-0.010	4	1.5	16	1.40	50	4	16.72	17.3	17.91	18.55	19.94	UHF4LN0150116	●
1.5	0/-0.020	0.10	+/-0.010	4	1.5	20	1.40	60	4	20.86	21.57	22.33	23.14	-	UHF4LN0150120	●
1.5	0/-0.020	0.20	+/-0.010	4	1.5	6	1.40	50	4	6.38	6.60	6.82	7.06	7.57	UHF4LN0150206	●
1.5	0/-0.020	0.20	+/-0.010	4	1.5	8	1.40	50	4	8.45	8.73	9.04	9.35	10.04	UHF4LN0150208	●
1.5	0/-0.020	0.20	+/-0.010	4	1.5	10	1.40	50	4	10.52	10.87	11.25	11.65	12.51	UHF4LN0150210	●
1.5	0/-0.020	0.20	+/-0.010	4	1.5	12	1.40	50	4	12.58	13.01	13.47	13.94	14.98	UHF4LN0150212	●
1.5	0/-0.020	0.20	+/-0.010	4	1.5	14	1.40	50	4	14.65	15.15	15.68	16.24	17.45	UHF4LN0150214	●
1.5	0/-0.020	0.20	+/-0.010	4	1.5	16	1.40	50	4	16.72	17.29	17.89	18.53	19.91	UHF4LN0150216	●
1.5	0/-0.020	0.20	+/-0.010	4	1.5	18	1.40	60	4	18.79	19.43	20.11	20.83	22.38	UHF4LN0150218	●
1.5	0/-0.020	0.20	+/-0.010	4	1.5	20	1.40	60	4	20.85	21.57	22.32	23.12	-	UHF4LN0150220	●
1.5	0/-0.020	0.30	+/-0.010	4	1.5	8	1.40	50	4	8.45	8.73	9.03	9.34	10.02	UHF4LN0150308	●
1.5	0/-0.020	0.30	+/-0.010	4	1.5	16	1.40	50	4	16.72	17.28	17.88	18.52	19.89	UHF4LN0150316	●
1.5	0/-0.020	0.30	+/-0.010	4	1.5	20	1.40	60	4	20.85	21.56	22.31	23.11	-	UHF4LN0150320	●
2	0/-0.020	0.20	+/-0.010	4	2	6	1.90	50	4	6.38	6.60	6.82	7.06	7.57	UHF4LN0200206	●
2	0/-0.020	0.20	+/-0.010	4	2	8	1.90	50	4	8.45	8.73	9.04	9.35	10.04	UHF4LN0200208	●
2	0/-0.020	0.20	+/-0.010	4	2	10	1.90	50	4	10.52	10.87	11.25	11.65	12.51	UHF4LN0200210	●

● stock standard ○ non-standard stock ∇ stock exhaustion

UHF4LN

cylindrical shank, 4F Unequal Pitch,
extended and reduced neck, corner radius

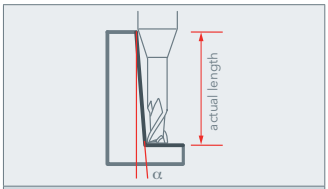
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 25° | RADIUS | Z4 UP



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

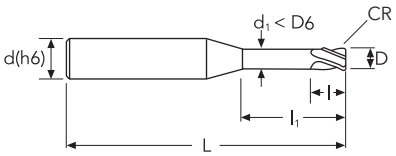
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
2	0/-0.020	0.20	+/-0.010	4	2	12	1.90	50	4	12.58	13.01	13.47	13.94	14.98	UHF4LN0200212	●
2	0/-0.020	0.20	+/-0.010	4	2	14	1.90	50	4	14.65	15.15	15.68	16.24	17.45	UHF4LN0200214	●
2	0/-0.020	0.20	+/-0.010	4	2	16	1.90	50	4	16.72	17.29	17.89	18.53	-	UHF4LN0200216	●
2	0/-0.020	0.20	+/-0.010	4	2	18	1.90	60	4	18.79	19.43	20.11	20.83	-	UHF4LN0200218	●
2	0/-0.020	0.20	+/-0.010	4	2	20	1.90	60	4	20.85	21.57	22.32	23.12	-	UHF4LN0200220	●
2	0/-0.020	0.20	+/-0.010	4	2	25	1.90	75	4	26.02	26.91	27.86	-	-	UHF4LN0200225	●
2	0/-0.020	0.20	+/-0.010	4	2	30	1.90	75	4	31.19	32.26	33.40	-	-	UHF4LN0200230	●
2	0/-0.020	0.30	+/-0.010	4	2	8	1.90	50	4	8.45	8.73	9.03	9.34	10.02	UHF4LN0200308	●
2	0/-0.020	0.30	+/-0.010	4	2	16	1.90	50	4	16.72	17.28	17.88	18.52	-	UHF4LN0200316	●
2	0/-0.020	0.30	+/-0.010	4	2	20	1.90	60	4	20.85	21.56	22.31	23.11	-	UHF4LN0200320	●
2	0/-0.020	0.50	+/-0.010	4	2	6	1.90	50	4	6.37	6.58	6.79	7.02	7.50	UHF4LN0200506	●
2	0/-0.020	0.50	+/-0.010	4	2	8	1.90	50	4	8.44	8.71	9.00	9.31	9.97	UHF4LN0200508	●
2	0/-0.020	0.50	+/-0.010	4	2	12	1.90	50	4	12.57	12.99	13.43	13.9	14.91	UHF4LN0200512	●
2	0/-0.020	0.50	+/-0.010	4	2	16	1.90	50	4	16.71	17.27	17.86	18.49	-	UHF4LN0200516	●
2	0/-0.020	0.50	+/-0.010	4	2	20	1.90	60	4	20.84	21.55	22.29	23.08	-	UHF4LN0200520	●
2	0/-0.020	0.50	+/-0.010	4	2	25	1.90	75	4	26.01	26.89	27.83	28.82	-	UHF4LN0200525	●
2	0/-0.020	0.50	+/-0.010	4	2	30	1.90	75	4	31.18	32.24	33.36	-	-	UHF4LN0200530	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	8	2.40	50	4	8.45	8.73	9.03	9.34	10.02	UHF4LN0250308	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	10	2.40	50	4	10.51	10.87	11.24	11.63	12.49	UHF4LN0250310	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	12	2.40	50	4	12.58	13.01	13.45	13.93	-	UHF4LN0250312	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	14	2.40	50	4	14.65	15.14	15.67	16.22	-	UHF4LN0250314	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	16	2.40	50	4	16.72	17.28	17.88	18.52	-	UHF4LN0250316	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	18	2.40	60	4	18.78	19.42	20.10	20.81	-	UHF4LN0250318	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	20	2.40	60	4	20.85	21.56	22.31	-	-	UHF4LN0250320	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	25	2.40	60	4	26.02	26.91	27.85	-	-	UHF4LN0250325	●
2.5	0/-0.020	0.30	+/-0.010	4	2.5	30	2.40	75	4	31.19	32.25	-	-	-	UHF4LN0250330	●
2.5	0/-0.020	0.50	+/-0.010	4	2.5	8	2.40	50	4	8.44	8.71	9.00	9.31	9.97	UHF4LN0250508	●
2.5	0/-0.020	0.50	+/-0.010	4	2.5	12	2.40	50	4	12.57	12.99	13.43	13.90	-	UHF4LN0250512	●
2.5	0/-0.020	0.50	+/-0.010	4	2.5	16	2.40	50	4	16.71	17.27	17.86	18.49	-	UHF4LN0250516	●
2.5	0/-0.020	0.50	+/-0.010	4	2.5	20	2.40	60	4	20.84	21.55	22.29	-	-	UHF4LN0250520	●
2.5	0/-0.020	0.50	+/-0.010	4	2.5	25	2.40	60	4	26.01	26.89	27.83	-	-	UHF4LN0250525	●
2.5	0/-0.020	0.50	+/-0.010	4	2.5	30	2.40	75	4	31.18	32.24	-	-	-	UHF4LN0250530	●
3	0/-0.025	0.20	+/-0.010	6	3	8	2.80	50	4	8.64	8.93	9.24	9.57	10.27	UHF4LN0300208	●
3	0/-0.025	0.20	+/-0.010	6	3	10	2.80	50	4	10.71	11.07	11.46	11.86	12.73	UHF4LN0300210	●
3	0/-0.025	0.20	+/-0.010	6	3	12	2.80	50	4	12.78	13.21	13.67	14.16	15.20	UHF4LN0300212	●
3	0/-0.025	0.20	+/-0.010	6	3	14	2.80	50	4	14.84	15.35	15.89	16.45	17.67	UHF4LN0300214	●
3	0/-0.025	0.20	+/-0.010	6	3	16	2.80	60	4	16.91	17.49	18.10	18.74	20.14	UHF4LN0300216	●
3	0/-0.025	0.20	+/-0.010	6	3	18	2.80	60	4	18.98	19.63	20.31	21.04	22.60	UHF4LN0300218	●
3	0/-0.025	0.20	+/-0.010	6	3	20	2.80	60	4	21.05	21.77	22.53	23.33	25.07	UHF4LN0300220	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHF4LN

cylindrical shank, 4F Unequal Pitch,
extended and reduced neck, corner radius

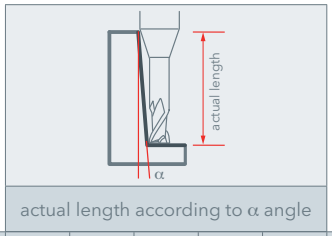
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 25° | RADIUS | Z4 UP



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
3	0/-0.025	0.20	+/-0.010	6	3	25	2.80	75	4	26.21	27.11	28.07	29.07	-	UHF4LN0300225	●
3	0/-0.025	0.30	+/-0.010	6	3	8	2.80	50	4	8.64	8.93	9.23	9.55	10.24	UHF4LN0300308	●
3	0/-0.025	0.30	+/-0.010	6	3	10	2.80	50	4	10.71	11.07	11.45	11.85	12.71	UHF4LN0300310	●
3	0/-0.025	0.30	+/-0.010	6	3	12	2.80	50	4	12.77	13.20	13.66	14.14	15.18	UHF4LN0300312	●
3	0/-0.025	0.30	+/-0.010	6	3	14	2.80	50	4	14.84	15.34	15.87	16.44	17.64	UHF4LN0300314	●
3	0/-0.025	0.30	+/-0.010	6	3	16	2.80	60	4	16.91	17.48	18.09	18.73	20.11	UHF4LN0300316	●
3	0/-0.025	0.30	+/-0.010	6	3	18	2.80	60	4	18.98	19.62	20.30	21.02	22.58	UHF4LN0300318	●
3	0/-0.025	0.30	+/-0.010	6	3	20	2.80	60	4	21.04	21.76	22.52	23.32	25.05	UHF4LN0300320	●
3	0/-0.025	0.30	+/-0.010	6	3	30	2.80	75	4	31.38	32.45	33.59	34.79	-	UHF4LN0300330	●
3	0/-0.025	0.50	+/-0.010	6	3	8	2.80	50	4	8.63	8.91	9.21	9.52	10.20	UHF4LN0300508	●
3	0/-0.025	0.50	+/-0.010	6	3	10	2.80	50	4	10.7	11.05	11.42	11.82	12.66	UHF4LN0300510	●
3	0/-0.025	0.50	+/-0.010	6	3	12	2.80	50	4	12.77	13.19	13.64	14.11	15.13	UHF4LN0300512	●
3	0/-0.025	0.50	+/-0.010	6	3	14	2.80	50	4	14.83	15.33	15.85	16.41	17.60	UHF4LN0300514	●
3	0/-0.025	0.50	+/-0.010	6	3	16	2.80	60	4	16.9	17.47	18.07	18.70	20.07	UHF4LN0300516	●
3	0/-0.025	0.50	+/-0.010	6	3	18	2.80	60	4	18.97	19.61	20.28	20.99	22.53	UHF4LN0300518	●
3	0/-0.025	0.50	+/-0.010	6	3	20	2.80	60	4	21.04	21.75	22.50	23.29	25.00	UHF4LN0300520	●
3	0/-0.025	0.50	+/-0.010	6	3	30	2.80	75	4	31.37	32.44	33.57	34.76	-	UHF4LN0300530	●
4	0/-0.025	0.30	+/-0.010	6	4	10	3.70	60	4	10.90	11.26	11.65	12.06	12.93	UHF4LN0400310	●
4	0/-0.025	0.30	+/-0.010	6	4	15	3.70	60	4	16.07	16.61	17.19	17.79	19.10	UHF4LN0400315	●
4	0/-0.025	0.30	+/-0.010	6	4	20	3.70	60	4	21.24	21.96	22.72	23.53	-	UHF4LN0400320	●
4	0/-0.025	0.30	+/-0.010	6	4	25	3.70	75	4	26.4	27.31	28.26	-	-	UHF4LN0400325	●
4	0/-0.025	0.30	+/-0.010	6	4	32	3.70	75	4	33.64	34.79	36.01	-	-	UHF4LN0400332	●
4	0/-0.025	0.30	+/-0.010	6	4	40	3.70	75	4	41.91	43.35	-	-	-	UHF4LN0400340	●
4	0/-0.025	0.50	+/-0.010	6	4	10	3.70	60	4	10.89	11.25	11.63	12.03	12.89	UHF4LN0400510	●
4	0/-0.025	0.50	+/-0.010	6	4	15	3.70	60	4	16.06	16.60	17.17	17.76	19.06	UHF4LN0400515	●
4	0/-0.025	0.50	+/-0.010	6	4	20	3.70	60	4	21.23	21.94	22.7	23.50	-	UHF4LN0400520	●
4	0/-0.025	0.50	+/-0.010	6	4	25	3.70	75	4	26.4	27.29	28.24	-	-	UHF4LN0400525	●
4	0/-0.025	0.50	+/-0.010	6	4	32	3.70	75	4	33.63	34.78	35.99	-	-	UHF4LN0400532	●
4	0/-0.025	0.50	+/-0.010	6	4	40	3.70	75	4	41.9	43.33	-	-	-	UHF4LN0400540	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UHF4LN

	Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae		ap x D			ap x D			ap x D			ap x D		
	Vc (m/min)		80-120			60-100			50-70			30-50		
	D (mm)	l1 (mm)	ae (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
SQUARE RIB	1	≤ 6D	0.05	31800	0.010	1300	25440	0.009	930	19080	0.008	625	12720	0.007	365
		≤ 8D	0.04	28700	0.009	1000	22960	0.008	720	17220	0.007	480	11480	0.006	280
		≤ 10D	0.04	25500	0.007	730	20400	0.006	520	15300	0.006	350	10200	0.005	205
		≤ 12D	0.03	22300	0.006	500	17840	0.005	360	13380	0.004	240	8920	0.004	140
	1.5	≤ 6D	0.08	21200	0.021	1800	16960	0.019	1300	12720	0.017	865	8480	0.015	505
		≤ 8D	0.06	19100	0.018	1380	15280	0.016	990	11460	0.014	660	7640	0.013	385
		≤ 10D	0.05	17000	0.015	1010	13600	0.013	730	10200	0.012	485	6800	0.010	285
		≤ 12D	0.04	14900	0.012	700	11920	0.011	500	8940	0.009	335	5960	0.008	195
		≤ 15D	0.03	12700	0.010	490	10160	0.009	350	7620	0.008	235	5080	0.007	135
		> 15D	0.02	10600	0.006	270	8480	0.006	190	6360	0.005	130	4240	0.004	75
	2	≤ 6D	0.10	15900	0.026	1620	12720	0.023	1170	9540	0.020	780	6360	0.018	455
		≤ 8D	0.09	14300	0.022	1240	11440	0.020	890	8580	0.017	595	5720	0.015	345
		≤ 10D	0.07	12700	0.018	910	10160	0.016	650	7620	0.014	435	5080	0.012	255
		≤ 12D	0.06	11100	0.014	620	8880	0.013	450	6660	0.011	300	4440	0.010	175
		≤ 15D	0.05	9600	0.011	440	7680	0.010	320	5760	0.009	210	3840	0.008	125
		> 15D	0.03	9600	0.008	290	7680	0.007	210	5760	0.006	140	3840	0.005	80
	2.5	≤ 6D	0.13	12700	0.030	1510	10160	0.027	1090	7620	0.024	725	5080	0.021	425
		≤ 8D	0.11	11500	0.025	1160	9200	0.023	840	6900	0.020	560	4600	0.018	325
		≤ 10D	0.09	10200	0.021	850	8160	0.019	610	6120	0.017	410	4080	0.015	240
		≤ 12D	0.07	8900	0.016	580	7120	0.015	420	5340	0.013	280	3560	0.011	165
		≤ 15D	0.06	7600	0.013	410	6080	0.012	290	4560	0.011	195	3040	0.009	115
		> 15D	0.04	7600	0.009	270	6080	0.008	200	4560	0.007	130	3040	0.006	75
	3	≤ 6D	0.15	10600	0.034	1440	8480	0.031	1040	6360	0.027	690	4240	0.024	405
		≤ 8D	0.13	9600	0.029	1110	7680	0.026	800	5760	0.023	535	3840	0.020	310
		≤ 10D	0.11	8500	0.024	810	6800	0.021	580	5100	0.019	390	3400	0.017	225
		≤ 12D	0.08	7400	0.019	550	5920	0.017	400	4440	0.015	265	2960	0.013	155
		≤ 15D	0.07	6400	0.015	390	5120	0.014	280	3840	0.012	190	2560	0.011	110
		> 15D	0.05	6400	0.010	260	5120	0.009	190	3840	0.008	125	2560	0.007	75
	4	≤ 6D	0.20	8000	0.043	1360	6400	0.038	980	4800	0.034	655	3200	0.030	380
		≤ 8D	0.17	7200	0.036	1040	5760	0.033	750	4320	0.029	500	2880	0.025	290
		≤ 10D	0.14	6400	0.030	760	5120	0.027	550	3840	0.024	365	2560	0.021	215
		≤ 12D	0.11	5600	0.023	520	4480	0.021	380	3360	0.019	250	2240	0.016	145
		≤ 15D	0.09	4800	0.019	370	3840	0.017	260	2880	0.015	175	1920	0.013	105
		> 15D	0.06	4800	0.013	240	3840	0.011	180	2880	0.010	120	1920	0.009	70

UHF4

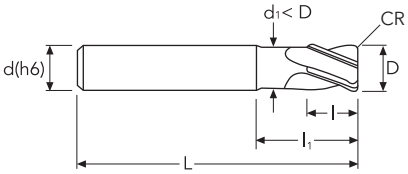
cylindrical shank, 4F corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 25° | RADIUS | Z4

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
2	0/-0.030	0.50	+/-0.020	6	1	6	1.95	70	4	UHF405020	●
3	0/-0.030	0.50	+/-0.020	6	1.2	8	2.85	70	4	UHF405030	●
4	0/-0.030	0.50	+/-0.020	6	1.5	10	3.85	70	4	UHF405040	●
5	0/-0.030	0.50	+/-0.020	6	2	10	4.85	70	4	UHF405050	●
6	0/-0.030	0.50	+/-0.020	6	2.5	12	5.85	90	4	UHF405060	●
6	0/-0.030	1.00	+/-0.020	6	2.5	12	5.85	90	4	UHF410060	●
8	0/-0.030	1.00	+/-0.020	8	3.5	16	7.7	100	4	UHF410080	●
10	0/-0.030	1.00	+/-0.020	10	4	20	9.7	100	4	UHF410100	●
8	0/-0.030	2.00	+/-0.020	8	3.5	16	7.7	100	4	UHF420080	●
10	0/-0.030	2.00	+/-0.020	10	4	20	9.7	100	4	UHF420100	●
12	0/-0.030	2.00	+/-0.020	12	5	25	11.7	110	4	UHF420120	●
12	0/-0.030	3.00	+/-0.020	12	5	25	11.7	110	4	UHF430120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UHF4

	Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae	**0.03D x 0.4D**			**0.03D x 0.3D**			**0.02D x 0.3D**			**0.02D x 0.3D**		
	Vc (m/min)	**110-150**			**90-130**			**60-100**			**50-70**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	20700	0.033	2710	17520	0.029	2070	12740	0.026	1335	9550	0.023	875
	3	13800	0.050	2730	11680	0.045	2080	8490	0.040	1345	6370	0.035	885
	4	10350	0.068	2790	8760	0.061	2130	6370	0.054	1375	4780	0.047	905
	5	8280	0.086	2830	7010	0.077	2160	5100	0.068	1395	3820	0.060	915
	6	6900	0.104	2860	5840	0.093	2180	4250	0.083	1410	3180	0.072	920
	8	5180	0.122	2520	4380	0.109	1920	3180	0.097	1235	2390	0.085	815
	10	4140	0.140	2310	3500	0.126	1760	2550	0.112	1140	1910	0.098	745
	12	3450	0.158	2170	2920	0.142	1660	2120	0.126	1070	1590	0.110	700

ap x ae	**D2 - D3**	0.02D x 0.3D	0.02D x 0.25D	0.01D x 0.02D	0.01D x 0.02D

UHCS4

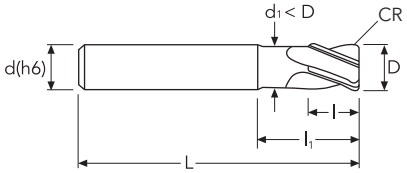
cylindrical shank, 4F, reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | RADIUS | Z4

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
1	0/-0.012	0.10	+/-0.010	4	2	3	0.95	50	4	UHCS4010	●
1.5	0/-0.012	0.10	+/-0.010	4	2.5	4	1.45	50	4	UHCS4015	●
2	0/-0.012	0.10	+/-0.010	4	3	6	1.95	50	4	UHCS4020	●
3	0/-0.012	0.10	+/-0.010	6	4	8	2.85	55	4	UHCS4030	●
4	0/-0.012	0.10	+/-0.010	6	6	10	3.85	55	4	UHCS4040	●
5	0/-0.012	0.20	+/-0.010	6	6	11	4.85	50	4	UHCS4050	●
6	0/-0.012	0.20	+/-0.010	6	9	15	5.85	60	4	UHCS4060	●
8	0/-0.015	0.20	+/-0.015	8	12	20	7.70	70	4	UHCS4080	●
10	0/-0.015	0.20	+/-0.015	10	15	25	9.70	70	4	UHCS4100	●
12	0/-0.015	0.30	+/-0.015	12	18	30	11.70	80	4	UHCS4120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UHCS4

	Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae	**0.3D x D**			**0.2D x D**			**0.2D x D**			**0.1D x D**		
	Vc (m/min)	**90-130**			**60-100**			**50-70**			**30-50**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	30000	0.010	1200	25480	0.009	920	19110	0.008	610	12740	0.007	355
	2	17520	0.020	1400	12740	0.018	920	9550	0.016	610	6370	0.014	355
	3	11680	0.030	1400	8490	0.027	920	6370	0.024	610	4250	0.021	355
	4	8760	0.040	1400	6370	0.036	920	4780	0.032	610	3180	0.028	355
	5	7010	0.045	1260	5100	0.041	830	3820	0.036	550	2550	0.032	320
	6	5840	0.050	1170	4250	0.045	770	3180	0.040	510	2120	0.035	295
	8	4380	0.065	1140	3180	0.059	740	2390	0.052	495	1590	0.046	290
	10	3500	0.085	1190	2550	0.077	780	1910	0.068	520	1270	0.060	300
	12	2920	0.100	1170	2120	0.090	760	1590	0.080	510	1060	0.070	295

UH410

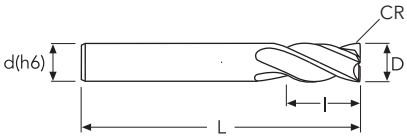
cylindrical shank, 4F, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.020	0.20	+/-0.010	6	3		50	4	UH41001002	●
1.5	0/-0.020	0.20	+/-0.010	6	4.5		50	4	UH41001502	●
2	0/-0.020	0.30	+/-0.010	6	6.5		50	4	UH41002003	●
2.5	0/-0.020	0.30	+/-0.010	6	6.5		50	4	UH41002503	●
2.5	0/-0.020	0.50	+/-0.010	6	6.5		50	4	UH41002505	●
3	0/-0.025	0.20	+/-0.010	6	9		50	4	UH41003002	●
3	0/-0.025	0.30	+/-0.010	6	9		50	4	UH41003003	●
3	0/-0.025	0.50	+/-0.010	6	9		50	4	UH41003005	●
4	0/-0.025	0.30	+/-0.010	6	12		50	4	UH41004003	●
4	0/-0.025	0.50	+/-0.010	6	12		50	4	UH41004005	●
4	0/-0.025	1.00	+/-0.010	6	12		50	4	UH41004010	●
5	0/-0.025	0.30	+/-0.010	6	15		50	4	UH41005003	●
5	0/-0.025	0.50	+/-0.010	6	15		50	4	UH41005005	●
5	0/-0.025	1.00	+/-0.010	6	15		50	4	UH41005010	●
6	0/-0.025	0.30	+/-0.010	6	16		50	4	UH41006003	●
6	0/-0.025	0.50	+/-0.010	6	16		50	4	UH41006005	●
6	0/-0.025	1.00	+/-0.010	6	16		50	4	UH41006010	●
8	0/-0.030	0.30	+/-0.010	8	20		64	4	UH41008003	●
8	0/-0.030	0.50	+/-0.010	8	20		64	4	UH41008005	●
8	0/-0.030	1.00	+/-0.010	8	20		64	4	UH41008010	●
8	0/-0.030	1.50	+/-0.010	8	20		64	4	UH41008015	●
8	0/-0.030	2.00	+/-0.010	8	20		64	4	UH41008020	●
10	0/-0.030	0.30	+/-0.010	10	22		70	4	UH41010003	●
10	0/-0.030	0.50	+/-0.010	10	22		70	4	UH41010005	●
10	0/-0.030	1.00	+/-0.010	10	22		70	4	UH41010010	●
10	0/-0.030	1.50	+/-0.010	10	22		70	4	UH41010015	●
10	0/-0.030	2.00	+/-0.010	10	22		70	4	UH41010020	●
12	0/-0.030	0.30	+/-0.010	12	25		75	4	UH41012003	●
12	0/-0.030	0.50	+/-0.010	12	25		75	4	UH41012005	●
12	0/-0.030	1.00	+/-0.010	12	25		75	4	UH41012010	●
12	0/-0.030	1.50	+/-0.010	12	25		75	4	UH41012015	●
12	0/-0.030	2.00	+/-0.010	12	25		75	4	UH41012020	●
12	0/-0.030	3.00	+/-0.010	12	25		75	4	UH41012030	●
14	0/-0.030	0.50	+/-0.010	14	32		90	4	UH41014005	●
14	0/-0.030	1.00	+/-0.010	14	32		90	4	UH41014010	●
14	0/-0.030	2.00	+/-0.010	14	32		90	4	UH41014020	○
16	0/-0.030	0.30	+/-0.010	16	32		90	4	UH41016003	○
16	0/-0.030	0.50	+/-0.010	16	32		90	4	UH41016005	●
16	0/-0.030	1.00	+/-0.010	16	32		90	4	UH41016010	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UH410

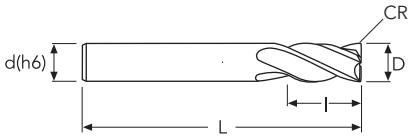
cylindrical shank, 4F, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
16	0/-0.030	1.50	+/-0.010	16	32		90	4	UH41016015	○
16	0/-0.030	2.00	+/-0.010	16	32		90	4	UH41016020	●
16	0/-0.030	3.00	+/-0.010	16	32		90	4	UH41016030	○
18	0/-0.030	0.50	+/-0.010	18	38		100	4	UH41018005	○
18	0/-0.030	1.00	+/-0.010	18	38		100	4	UH41018010	●
18	0/-0.030	2.00	+/-0.010	18	38		100	4	UH41018020	○
20	0/-0.030	0.30	+/-0.010	20	38		100	4	UH41020003	○
20	0/-0.030	0.50	+/-0.010	20	38		100	4	UH41020005	●
20	0/-0.030	1.00	+/-0.010	20	38		100	4	UH41020010	●
20	0/-0.030	1.50	+/-0.010	20	38		100	4	UH41020015	○
20	0/-0.030	2.00	+/-0.010	20	38		100	4	UH41020020	●
20	0/-0.030	3.00	+/-0.010	20	38		100	4	UH41020030	○

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH410

SIDE MILLING

Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae	**D x 0.05D**			**D x 0.05D**			**D x 0.05D**			**D x 0.05D**		
Vc (m/min)	**90-130**			**60-100**			**50-70**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	35030	0.010	1400	25480	0.009	920	19110	0.008	575	12740	0.007	330
2	17520	0.018	1260	12740	0.016	830	9550	0.014	550	6370	0.013	320
3	11680	0.027	1260	8490	0.024	830	6370	0.022	550	4250	0.019	320
4	8760	0.036	1260	6370	0.032	830	4780	0.029	550	3180	0.025	320
5	7010	0.041	1140	5100	0.036	740	3820	0.032	495	2550	0.028	290
6	5840	0.045	1050	4250	0.041	690	3180	0.036	460	2120	0.032	265
8	4380	0.059	1020	3180	0.053	670	2390	0.047	445	1590	0.041	260
10	3500	0.077	1070	2550	0.069	700	1910	0.061	470	1270	0.054	270
12	2920	0.090	1050	2120	0.081	690	1590	0.072	460	1060	0.063	265
14	2500	0.102	1020	1820	0.092	670	1360	0.082	445	910	0.071	260
16	2190	0.114	1000	1590	0.103	650	1190	0.091	435	800	0.080	255
18	1950	0.126	980	1420	0.113	640	1060	0.101	425	710	0.088	250
20	1750	0.138	970	1270	0.124	630	960	0.110	425	640	0.097	245

UH411

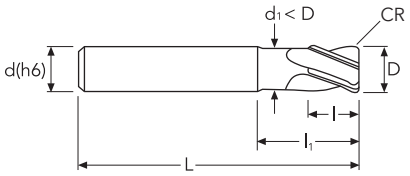
cylindrical shank, 4F, reduced neck, corner radius, long

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | RADIUS | Z4

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
3	0/-0.012	0.30	+/-0.010	6	4	12	2.85	55	4	UH4110300312	●
3	0/-0.012	0.30	+/-0.010	6	4	20	2.85	60	4	UH4110300320	●
3	0/-0.012	0.50	+/-0.010	6	4	10	2.85	55	4	UH4110300510	●
3	0/-0.012	0.50	+/-0.010	6	4	20	2.85	60	4	UH4110300520	●
4	0/-0.012	0.30	+/-0.010	6	6	12	3.85	55	4	UH4110400312	●
4	0/-0.012	0.30	+/-0.010	6	6	20	3.85	60	4	UH4110400320	●
4	0/-0.012	0.50	+/-0.010	6	6	12	3.85	55	4	UH4110400512	●
4	0/-0.012	0.50	+/-0.010	6	6	20	3.85	60	4	UH4110400520	●
4	0/-0.012	1.00	+/-0.010	6	6	12	3.85	55	4	UH4110401012	●
6	0/-0.012	0.50	+/-0.010	6	9	15	5.85	60	4	UH4110600520	●
6	0/-0.012	1.00	+/-0.010	6	9	15	5.85	60	4	UH4110601020	●
8	0/-0.015	0.50	+/-0.015	8	12	20	7.70	70	4	UH4110800525	●
8	0/-0.015	1.00	+/-0.015	8	12	20	7.70	70	4	UH4110801025	●
8	0/-0.015	2.00	+/-0.015	8	12	20	7.70	70	4	UH4110802025	●
10	0/-0.015	0.50	+/-0.015	10	15	25	9.70	70	4	UH4111000532	●
10	0/-0.015	1.00	+/-0.015	10	15	25	9.70	70	4	UH4111001032	●
10	0/-0.015	2.00	+/-0.015	10	15	25	9.70	70	4	UH4111002032	●
12	0/-0.015	0.50	+/-0.015	12	18	30	11.70	80	4	UH4111200538	●
12	0/-0.015	1.00	+/-0.015	12	18	30	11.70	80	4	UH4111201038	●
12	0/-0.015	2.00	+/-0.015	12	18	30	11.70	80	4	UH4111202038	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH411

	Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae	**D x 0.05D**			**D x 0.05D**			**D x 0.05D**			**D x 0.05D**		
	Vc (m/min)	**90-130**			**60-100**			**50-70**			**30-50**		
SIDE MILLING	**D (mm)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**
	3	11680	0.027	1260	8490	0.024	830	6370	0.022	550	4250	0.019	320
	4	8760	0.036	1260	6370	0.032	830	4780	0.029	550	3180	0.025	320
	5	7010	0.041	1140	5100	0.036	740	3820	0.032	495	2550	0.028	290
	6	5840	0.045	1050	4250	0.041	690	3180	0.036	460	2120	0.032	265
	8	4380	0.059	1020	3180	0.053	670	2390	0.047	445	1590	0.041	260
	10	3500	0.077	1070	2550	0.069	700	1910	0.061	470	1270	0.054	270
	12	2920	0.090	1050	2120	0.081	690	1590	0.072	460	1060	0.063	265

UH412

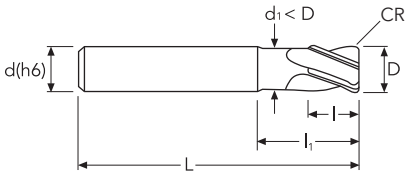
cylindrical shank, 4F, reduced neck, corner radius, long

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
2	0/-0.020	0.30	+/-0.010	6	4	30	1.90	75	4	UH4120200330	●
2	0/-0.020	0.30	+/-0.010	6	4	60	1.90	100	4	UH4120200360	●
3	0/-0.025	0.30	+/-0.010	6	5	30	2.80	75	4	UH4120300330	●
3	0/-0.025	0.30	+/-0.010	6	5	60	2.80	100	4	UH4120300360	●
3	0/-0.025	0.50	+/-0.010	6	5	30	2.80	75	4	UH4120300530	●
3	0/-0.025	0.50	+/-0.010	6	5	60	2.80	100	4	UH4120300560	●
4	0/-0.025	0.30	+/-0.010	6	8	32	3.70	75	4	UH4120400332	●
4	0/-0.025	0.30	+/-0.010	6	8	60	3.70	100	4	UH4120400360	●
4	0/-0.025	0.50	+/-0.010	6	8	32	3.70	75	4	UH4120400532	●
4	0/-0.025	0.50	+/-0.010	6	8	60	3.70	100	4	UH4120400560	●
6	0/-0.025	0.50	+/-0.010	6	9	20	5.85	90	4	UH4120600520	●
6	0/-0.025	1.00	+/-0.010	6	9	20	5.85	90	4	UH4120601020	●
8	0/-0.025	0.50	+/-0.015	8	12	25	7.70	100	4	UH4120800525	●
8	0/-0.025	1.00	+/-0.015	8	12	25	7.70	100	4	UH4120801025	●
10	0/-0.025	0.50	+/-0.015	10	15	32	9.70	100	4	UH4121000532	●
10	0/-0.025	1.00	+/-0.015	10	15	32	9.70	100	4	UH4121001032	●
10	0/-0.025	2.00	+/-0.015	10	15	32	9.70	100	4	UH4121002032	●
12	0/-0.025	0.50	+/-0.015	12	18	38	11.70	110	4	UH4121200538	●
12	0/-0.025	1.00	+/-0.015	12	18	38	11.70	110	4	UH4121201038	●
12	0/-0.025	2.00	+/-0.015	12	18	38	11.70	110	4	UH4121202038	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH412

SIDE MILLING

Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae	D x 0.05D			D x 0.05D			D x 0.05D			D x 0.05D		
Vc (m/min)	80-120			60-100			50-70			30-50		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
2	15920	0.016	1030	12740	0.015	740	9550	0.013	495	6370	0.011	290
3	10620	0.024	1030	8490	0.022	740	6370	0.019	495	4250	0.017	290
4	7960	0.032	1030	6370	0.029	740	4780	0.026	495	3180	0.023	290
5	6370	0.036	930	5100	0.033	670	3820	0.029	445	2550	0.026	260
6	5310	0.041	860	4250	0.036	620	3180	0.032	410	2120	0.028	240
8	3980	0.053	840	3180	0.047	600	2390	0.042	405	1590	0.037	235
10	3180	0.069	880	2550	0.062	630	1910	0.055	420	1270	0.048	245
12	2650	0.081	860	2120	0.073	620	1590	0.065	410	1060	0.057	240

UH413

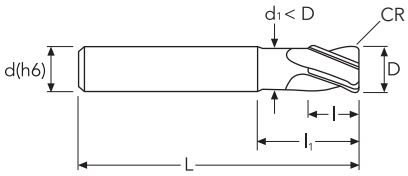
cylindrical shank, 4F, reduced neck, corner radius, long

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
6	0/-0.025	0.30	+/-0.010	6	10	60	5.50	125	4	UH4130600360	●
6	0/-0.025	0.50	+/-0.010	6	10	60	5.50	125	4	UH4130600560	●
6	0/-0.025	1.00	+/-0.010	6	10	60	5.50	125	4	UH4130601060	●
8	0/-0.030	0.30	+/-0.010	8	12	60	7.40	125	4	UH4130800360	●
8	0/-0.030	0.50	+/-0.010	8	12	60	7.40	125	4	UH4130800560	●
8	0/-0.030	1.00	+/-0.010	8	12	60	7.40	125	4	UH4130801060	●
8	0/-0.030	2.00	+/-0.010	8	12	60	7.40	125	4	UH4130802060	●
10	0/-0.030	0.30	+/-0.010	10	14	85	9.20	125	4	UH4131000385	●
10	0/-0.030	0.50	+/-0.010	10	14	85	9.20	125	4	UH4131000585	●
10	0/-0.030	1.00	+/-0.010	10	14	85	9.20	125	4	UH4131001085	●
10	0/-0.030	2.00	+/-0.010	10	14	85	9.20	125	4	UH4131002085	●
12	0/-0.030	0.50	+/-0.010	12	16	110	11.00	150	4	UH41312005110	●
12	0/-0.030	1.00	+/-0.010	12	16	110	11.00	150	4	UH41312010110	●
12	0/-0.030	2.00	+/-0.010	12	16	110	11.00	150	4	UH41312020110	●
16	0/-0.030	0.50	+/-0.010	16	22	110	15.00	150	4	UH41316005110	●
16	0/-0.030	1.00	+/-0.010	16	22	110	15.00	150	4	UH41316010110	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH413

SIDE MILLING

Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae	**D x 0.05D**			**D x 0.05D**			**D x 0.05D**			**D x 0.05D**		
Vc (m/min)	**70-110**			**60-80**			**40-60**			**30-50**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	4780	0.041	770	3720	0.036	540	2650	0.032	345	2120	0.028	240
8	3580	0.053	750	2790	0.047	530	1990	0.042	335	1590	0.037	235
10	2870	0.069	790	2230	0.062	550	1590	0.055	350	1270	0.048	245
12	2390	0.081	770	1860	0.073	540	1330	0.065	345	1060	0.057	240
16	1790	0.095	680	1390	0.086	480	1000	0.076	305	800	0.067	215

UH610R

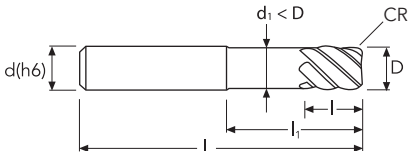
cylindrical shank, multi flute, reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 45° | RADIUS | Z6

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
6	0/-0.030	0.50	+/-0.015	6	6	15	5.50	50	6	UH610R05060	●
8	0/-0.030	0.50	+/-0.015	8	8	25	7.40	60	6	UH610R05080	●
10	0/-0.030	1.00	+/-0.015	10	10	30	9.20	70	6	UH610R10100	●
12	0/-0.030	1.00	+/-0.015	12	12	30	11.00	75	6	UH610R10120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH610R

SIDE MILLING

Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae	**D x 0.1D**			**D x 0.05D**			**D x 0.05D**			**D x 0.05D**		
Vc (m/min)	**140-180**			**100-140**			**70-110**			**60-80**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	8490	0.018	920	6370	0.016	620	4780	0.014	410	3720	0.013	280
8	6370	0.028	1050	4780	0.025	710	3580	0.022	470	2790	0.019	320
10	5100	0.034	1030	3820	0.030	690	2870	0.027	460	2230	0.024	310
12	4250	0.041	1040	3180	0.037	700	2390	0.033	470	1860	0.029	320

UH611R

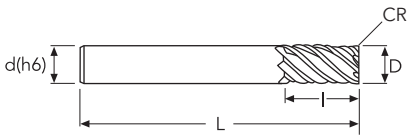
cylindrical shank, multi flute, long, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 45° | RADIUS | Z6

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/-0.030	0.50	+/-0.015	6	15		90	6	UH611R05060	●
8	0/-0.030	0.50	+/-0.015	8	20		100	6	UH611R05080	●
10	0/-0.030	0.50	+/-0.015	10	25		100	6	UH611R05100	●
10	0/-0.030	1.00	+/-0.015	10	25		100	6	UH611R10100	●
12	0/-0.030	0.50	+/-0.015	12	30		110	6	UH611R05120	●
12	0/-0.030	1.00	+/-0.015	12	30		110	6	UH611R10120	●
16	0/-0.030	1.00	+/-0.015	16	32		130	6	UH611R10160	●
20	0/-0.030	1.00	+/-0.015	20	38		140	6	UH611R10200	●
20	0/-0.030	2.00	+/-0.015	20	38		140	6	UH611R20200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH611R

	Material Group ISO 513	P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm	< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae	**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**			**1.5D x 0.05D**		
	Vc (m/min)	**110-150**			**90-130**			**60-80**			**40-60**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	6900	0.015	630	5840	0.014	480	3720	0.012	270	2650	0.011	170
	8	5180	0.023	730	4380	0.021	550	2790	0.019	310	1990	0.016	200
	10	4140	0.029	710	3500	0.026	540	2230	0.023	310	1590	0.020	190
	12	3450	0.035	720	2920	0.031	550	1860	0.028	310	1330	0.024	190
	14	2960	0.041	720	2500	0.037	550	1590	0.033	310	1140	0.029	200
	16	2590	0.048	740	2190	0.043	570	1390	0.038	320	1000	0.034	200
	18	2300	0.056	770	1950	0.050	590	1240	0.045	330	880	0.039	210
	20	2070	0.066	820	1750	0.060	630	1110	0.053	350	800	0.046	220

UHMB204

cylindrical shank, 2 flutes ball nose, miniature

OSAWA NORM | UH | NMG UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

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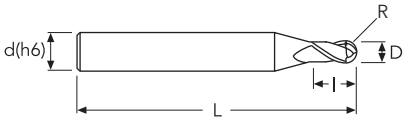


D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.2	0/-0.020	0.10	0/-0.020	4	0.2		50	2	UHMB200204	●
0.3	0/-0.020	0.15	0/-0.020	4	0.3		50	2	UHMB200304	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4		50	2	UHMB200404	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4		50	2	UHMB200504	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5		50	2	UHMB200604	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6		50	2	UHMB200804	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UHMB204

Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae		**0.05D x 0.1D**			**0.05D x 0.1D**			**0.05D x 0.1D**			**0.05D x 0.1D**		
Vc (m/min)		**80-120**			**60-100**			**50-70**			**30-50**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
0.1	**0.04**	40000	0.004	320	40000	0.004	290	40000	0.003	255	40000	0.003	225
0.2	**0.09**	40000	0.006	480	40000	0.005	430	40000	0.005	385	40000	0.004	335
0.3	**0.13**	40000	0.008	640	40000	0.007	580	40000	0.006	510	40000	0.006	450
0.4	**0.17**	40000	0.010	800	40000	0.009	720	40000	0.008	640	31850	0.007	445
0.5	**0.22**	40000	0.012	960	40000	0.011	860	38220	0.010	735	25480	0.008	430
0.6	**0.26**	40000	0.015	1200	40000	0.014	1080	31850	0.012	765	21230	0.011	445
0.7	**0.31**	40000	0.018	1440	36400	0.016	1180	27300	0.014	785	18200	0.013	460
0.8	**0.35**	39810	0.020	1590	31850	0.018	1150	23890	0.016	765	15920	0.014	445
0.9	**0.39**	35390	0.023	1630	28310	0.021	1170	21230	0.018	780	14150	0.016	455

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

UHMB206

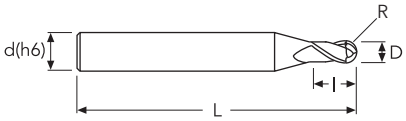
cylindrical shank, 2 flutes ball nose, miniature, 6 mm. shank

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.4	0/-0.020	0.20	0/-0.020	6	0.4		50	2	UHMB200406	●
0.5	0/-0.020	0.25	0/-0.020	6	0.5		50	2	UHMB200506	●
0.6	0/-0.020	0.30	0/-0.020	6	0.6		50	2	UHMB200606	●
0.8	0/-0.020	0.40	0/-0.020	6	0.8		50	2	UHMB200806	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UHMB206

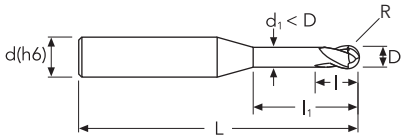
Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae		**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**		
Vc (m/min)		**80-120**			**60-100**			**50-70**			**30-50**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
0.4	**0.17**	40000	0.010	800	40000	0.009	720	40000	0.008	640	31850	0.007	445
0.5	**0.22**	40000	0.012	960	40000	0.011	860	38220	0.010	735	25480	0.008	430
0.6	**0.26**	40000	0.015	1200	40000	0.014	1080	31850	0.012	765	21230	0.011	445
0.8	**0.35**	39810	0.020	1590	31850	0.018	1150	23890	0.016	765	15920	0.014	445

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

UHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

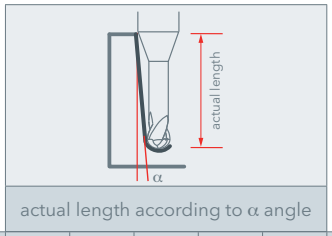
OSAWA NORM | UH | NMG UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

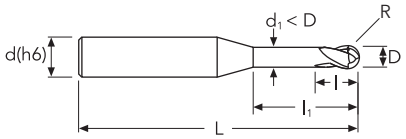
D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.2	0/-0.020	0.10	0/-0.020	4	0.2	0.5	0.15	50	2	0.57	0.58	0.60	0.62	0.66	UHLNB2002005	●
0.2	0/-0.020	0.10	0/-0.020	4	0.2	1	0.15	50	2	1.08	1.12	1.15	1.19	1.27	UHLNB200201	●
0.2	0/-0.020	0.10	0/-0.020	4	0.2	1.5	0.15	50	2	1.60	1.65	1.71	1.76	1.89	UHLNB2002015	●
0.3	0/-0.020	0.15	0/-0.020	4	0.3	1	0.25	50	2	1.08	1.11	1.15	1.18	1.26	UHLNB200301	●
0.3	0/-0.020	0.15	0/-0.020	4	0.3	2	0.25	50	2	2.12	2.18	2.25	2.33	2.49	UHLNB200302	●
0.3	0/-0.020	0.15	0/-0.020	4	0.3	3	0.25	50	2	3.15	3.25	3.36	3.48	3.73	UHLNB200303	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	1	0.35	50	2	1.08	1.11	1.14	1.18	1.25	UHLNB200401	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	2	0.35	50	2	2.11	2.18	2.25	2.32	2.48	UHLNB200402	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	3	0.35	50	2	3.15	3.25	3.36	3.47	3.72	UHLNB200403	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	4	0.35	50	2	4.18	4.32	4.46	4.62	4.95	UHLNB200404	●
0.4	0/-0.020	0.20	0/-0.020	4	0.4	5	0.35	50	2	5.21	5.39	5.57	5.77	6.18	UHLNB200405	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	2	0.45	50	2	2.15	2.22	2.29	2.36	2.52	UHLNB200502	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	3	0.45	50	2	3.18	3.29	3.39	3.51	3.75	UHLNB200503	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	4	0.45	50	2	4.22	4.35	4.50	4.65	4.98	UHLNB200504	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	5	0.45	50	2	5.25	5.42	5.61	5.80	6.22	UHLNB200505	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	6	0.45	50	2	6.28	6.49	6.71	6.95	7.45	UHLNB200506	●
0.5	0/-0.020	0.25	0/-0.020	4	0.4	8	0.45	50	2	8.35	8.63	8.93	9.24	9.92	UHLNB200508	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	2	0.55	50	2	2.15	2.21	2.28	2.35	2.50	UHLNB200602	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	3	0.55	50	2	3.18	3.28	3.39	3.50	3.74	UHLNB200603	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	4	0.55	50	2	4.22	4.35	4.49	4.65	4.97	UHLNB200604	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	5	0.55	50	2	5.25	5.42	5.60	5.79	6.21	UHLNB200605	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	6	0.55	50	2	6.28	6.49	6.71	6.94	7.44	UHLNB200606	●
0.6	0/-0.020	0.30	0/-0.020	4	0.5	8	0.55	50	2	8.35	8.63	8.92	9.23	9.91	UHLNB200608	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	2	0.75	50	2	2.15	2.21	2.27	2.34	2.48	UHLNB200802	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	4	0.75	50	2	4.21	4.34	4.48	4.63	4.95	UHLNB200804	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	6	0.75	50	2	6.28	6.48	6.70	6.93	7.42	UHLNB200806	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	8	0.75	50	2	8.35	8.62	8.91	9.22	9.88	UHLNB200808	●
0.8	0/-0.020	0.40	0/-0.020	4	0.6	10	0.75	50	2	10.41	10.76	11.13	11.51	12.35	UHLNB200810	●
1	0/-0.020	0.50	0/-0.020	4	0.8	3	0.95	50	2	3.27	3.37	3.47	3.57	3.80	UHLNB201003	●
1	0/-0.020	0.50	0/-0.020	4	0.8	4	0.95	50	2	4.31	4.44	4.58	4.72	5.04	UHLNB201004	●
1	0/-0.020	0.50	0/-0.020	4	0.8	5	0.95	50	2	5.34	5.51	5.68	5.87	6.27	UHLNB201005	●
1	0/-0.020	0.50	0/-0.020	4	0.8	6	0.95	50	2	6.37	6.58	6.79	7.02	7.50	UHLNB201006	●
1	0/-0.020	0.50	0/-0.020	4	0.8	8	0.95	50	2	8.44	8.71	9.00	9.31	9.97	UHLNB201008	●
1	0/-0.020	0.50	0/-0.020	4	0.8	10	0.95	50	2	10.51	10.85	11.22	11.61	12.44	UHLNB201010	●
1	0/-0.020	0.50	0/-0.020	4	0.8	12	0.95	50	2	12.57	12.99	13.43	13.90	14.91	UHLNB201012	●
1	0/-0.020	0.50	0/-0.020	4	0.8	14	0.95	50	2	14.64	15.13	15.65	16.19	17.37	UHLNB201014	●
1	0/-0.020	0.50	0/-0.020	4	0.8	16	0.95	50	2	16.71	17.27	17.86	18.49	19.84	UHLNB201016	●
1	0/-0.020	0.50	0/-0.020	4	0.8	20	0.95	60	2	20.84	21.55	22.29	23.08	24.78	UHLNB201020	●
1.2	0/-0.020	0.60	0/-0.020	4	1	6	1.15	50	2	6.37	6.57	6.78	7.00	7.48	UHLNB201206	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

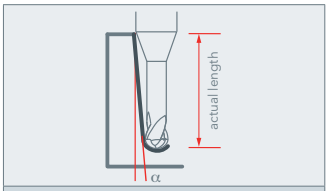
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

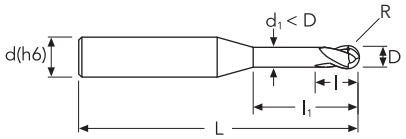
D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1.2	0/-0.020	0.60	0/-0.020	4	1	8	1.15	50	2	8.44	8.71	8.99	9.30	9.95	UHLNB201208	●
1.2	0/-0.020	0.60	0/-0.020	4	1	10	1.15	50	2	10.50	10.85	11.21	11.59	12.42	UHLNB201210	●
1.2	0/-0.020	0.60	0/-0.020	4	1	12	1.15	50	2	12.57	12.98	13.42	13.89	14.88	UHLNB201212	●
1.4	0/-0.020	0.70	0/-0.020	4	1.1	8	1.35	50	2	8.43	8.70	8.98	9.28	9.93	UHLNB201408	●
1.4	0/-0.020	0.70	0/-0.020	4	1.1	12	1.35	50	2	12.57	12.98	13.41	13.87	14.86	UHLNB201412	●
1.4	0/-0.020	0.70	0/-0.020	4	1.1	16	1.35	50	2	16.70	17.26	17.84	18.46	19.80	UHLNB201416	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	8	1.45	50	2	8.43	8.70	8.98	9.27	9.91	UHLNB201508	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	12	1.45	50	2	12.57	12.97	13.41	13.86	14.85	UHLNB201512	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	16	1.45	50	2	16.70	17.25	17.84	18.45	19.78	UHLNB201516	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	18	1.45	60	2	18.77	19.39	20.05	20.75	22.25	UHLNB201518	●
1.5	0/-0.020	0.75	0/-0.020	4	1.2	20	1.45	60	2	20.84	21.53	22.26	23.04	24.72	UHLNB201520	●
1.6	0/-0.020	0.80	0/-0.020	4	1.3	8	1.55	50	2	8.43	8.69	8.97	9.27	9.90	UHLNB201608	●
1.6	0/-0.020	0.80	0/-0.020	4	1.3	12	1.55	50	2	12.56	12.97	13.40	13.86	14.84	UHLNB201612	●
1.6	0/-0.020	0.80	0/-0.020	4	1.3	16	1.55	50	2	16.70	17.25	17.83	18.45	19.77	UHLNB201616	●
1.6	0/-0.020	0.80	0/-0.020	4	1.3	20	1.55	60	2	20.83	21.53	22.26	23.03	-	UHLNB201620	●
1.8	0/-0.020	0.90	0/-0.020	4	1.4	8	1.75	50	2	8.43	8.69	8.96	9.25	9.88	UHLNB201808	●
1.8	0/-0.020	0.90	0/-0.020	4	1.4	12	1.75	50	2	12.56	12.96	13.39	13.84	14.81	UHLNB201812	●
1.8	0/-0.020	0.90	0/-0.020	4	1.4	16	1.75	50	2	16.70	17.24	17.82	18.43	19.75	UHLNB201816	●
1.8	0/-0.020	0.90	0/-0.020	4	1.4	20	1.75	60	2	20.83	21.52	22.25	23.02	-	UHLNB201820	●
2	0/-0.020	1.00	0/-0.020	4	1.6	4	1.95	50	2	4.29	4.40	4.52	4.65	4.92	UHLNB202004	●
2	0/-0.020	1.00	0/-0.020	4	1.6	6	1.95	50	2	6.36	6.54	6.74	6.94	7.39	UHLNB202006	●
2	0/-0.020	1.00	0/-0.020	4	1.6	8	1.95	50	2	8.42	8.68	8.95	9.24	9.86	UHLNB202008	●
2	0/-0.020	1.00	0/-0.020	4	1.6	10	1.95	50	2	10.49	10.82	11.17	11.53	12.32	UHLNB202010	●
2	0/-0.020	1.00	0/-0.020	4	1.6	12	1.95	50	2	12.56	12.96	13.38	13.83	14.79	UHLNB202012	●
2	0/-0.020	1.00	0/-0.020	4	1.6	14	1.95	50	2	14.62	15.10	15.59	16.12	17.26	UHLNB202014	●
2	0/-0.020	1.00	0/-0.020	4	1.6	16	1.95	50	2	16.69	17.23	17.81	18.42	19.73	UHLNB202016	●
2	0/-0.020	1.00	0/-0.020	4	1.6	18	1.95	60	2	18.76	19.37	20.02	20.71	-	UHLNB202018	●
2	0/-0.020	1.00	0/-0.020	4	1.6	20	1.95	60	2	20.83	21.51	22.24	23.00	-	UHLNB202020	●
2	0/-0.020	1.00	0/-0.020	4	1.6	22	1.95	60	2	22.89	23.65	24.45	25.30	-	UHLNB202022	●
2	0/-0.020	1.00	0/-0.020	4	1.6	25	1.95	75	2	25.99	26.86	27.77	28.74	-	UHLNB202025	●
2	0/-0.020	1.00	0/-0.020	4	1.6	30	1.95	75	2	31.16	32.21	33.31	-	-	UHLNB202030	●
3	0/-0.025	1.50	0/-0.020	6	2.4	8	2.85	50	2	8.60	8.84	9.10	9.37	9.96	UHLNB203008	●
3	0/-0.025	1.50	0/-0.020	6	2.4	10	2.85	50	2	10.67	10.98	11.32	11.67	12.43	UHLNB203010	●
3	0/-0.025	1.50	0/-0.020	6	2.4	12	2.85	50	2	12.73	13.12	13.53	13.96	14.90	UHLNB203012	●
3	0/-0.025	1.50	0/-0.020	6	2.4	16	2.85	60	2	16.87	17.40	17.96	18.55	19.83	UHLNB203016	●
3	0/-0.025	1.50	0/-0.020	6	2.4	20	2.85	60	2	21.00	21.68	22.39	23.14	24.77	UHLNB203020	●
3	0/-0.025	1.50	0/-0.020	6	2.4	25	2.85	75	2	26.17	27.02	27.93	28.88	-	UHLNB203025	●
3	0/-0.025	1.50	0/-0.020	6	2.4	30	2.85	75	2	31.34	32.37	33.46	34.62	-	UHLNB203030	●
3	0/-0.025	1.50	0/-0.020	6	2.4	35	2.85	75	2	36.51	37.72	39.00	40.35	-	UHLNB203035	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

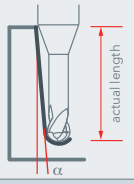
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
4	0/-0.025	2.00	0/-0.020	6	3.2	10	3.85	50	2	10.84	11.15	11.47	11.81	12.54	UHLNB204010	●
4	0/-0.025	2.00	0/-0.020	6	3.2	16	3.85	60	2	17.04	17.56	18.11	18.69	19.94	UHLNB204016	●
4	0/-0.025	2.00	0/-0.020	6	3.2	20	3.85	60	2	21.18	21.84	22.54	23.28	-	UHLNB204020	●
4	0/-0.025	2.00	0/-0.020	6	3.2	25	3.85	75	2	26.35	27.19	28.08	29.02	-	UHLNB204025	●
4	0/-0.025	2.00	0/-0.020	6	3.2	30	3.85	75	2	31.51	32.53	33.61	-	-	UHLNB204030	●
4	0/-0.025	2.00	0/-0.020	6	3.2	35	3.85	75	2	36.68	37.88	39.15	-	-	UHLNB204035	●
4	0/-0.025	2.00	0/-0.020	6	3.2	40	3.85	100	2	41.85	43.23	-	-	-	UHLNB204040	●
4	0/-0.025	2.00	0/-0.020	6	3.2	45	3.85	100	2	47.02	48.57	-	-	-	UHLNB204045	●
4	0/-0.025	2.00	0/-0.020	6	3.2	50	3.85	100	2	52.19	53.92	-	-	-	UHLNB204050	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHLNB2

	Material Group ISO 513				P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm				< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae				ap x 0.2D			ap x 0.2D			ap x 0.2D			ap x 0.2D		
	Vc (m/min)				140-160			110-130			80-100			50-70		
	D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
ROUND RIB	0.2	≤ 6D	0.01	0.09	40000	0.008	640	40000	0.007	580	40000	0.006	510	40000	0.006	450
		≤ 8D	0.01	0.08	40000	0.007	580	40000	0.006	470	40000	0.005	415	40000	0.005	365
		≤ 10D	0.01	0.07	40000	0.006	510	40000	0.005	370	40000	0.004	330	40000	0.004	285
	0.3	≤ 6D	0.02	0.13	40000	0.010	800	40000	0.009	720	40000	0.008	640	40000	0.007	560
		≤ 8D	0.01	0.12	40000	0.009	720	40000	0.007	580	40000	0.006	520	40000	0.006	455
		≤ 10D	0.01	0.11	40000	0.008	640	40000	0.006	460	40000	0.005	410	40000	0.004	360
	0.4	≤ 6D	0.02	0.17	40000	0.013	1040	40000	0.012	940	40000	0.010	830	40000	0.009	730
		≤ 8D	0.02	0.16	40000	0.012	940	40000	0.009	760	40000	0.008	675	40000	0.007	590
		≤ 10D	0.01	0.15	40000	0.010	830	40000	0.007	600	40000	0.007	530	38220	0.006	445
	0.5	≤ 6D	0.03	0.22	40000	0.017	1360	40000	0.015	1220	40000	0.014	1090	38220	0.012	910
		≤ 8D	0.02	0.20	40000	0.015	1220	40000	0.012	990	40000	0.011	880	34390	0.010	665
		≤ 10D	0.02	0.18	40000	0.014	1090	40000	0.010	780	40000	0.009	695	30570	0.008	465
	0.6	≤ 6D	0.03	0.26	40000	0.021	1680	40000	0.019	1510	40000	0.017	1345	31850	0.015	935
		≤ 8D	0.03	0.24	40000	0.019	1510	40000	0.015	1220	40000	0.014	1090	28660	0.012	685
		≤ 10D	0.02	0.22	40000	0.017	1340	40000	0.012	970	38220	0.011	820	25480	0.009	480
	0.8	≤ 6D	0.04	0.35	40000	0.025	2000	40000	0.023	1800	35830	0.020	1435	23890	0.018	835
		≤ 8D	0.03	0.32	40000	0.023	1800	40000	0.018	1460	32250	0.016	1045	21500	0.014	610
		≤ 10D	0.03	0.29	40000	0.020	1600	38220	0.014	1100	28660	0.013	735	19110	0.011	430
	1	≤ 6D	0.05	0.44	40000	0.030	2400	38220	0.027	2060	28660	0.024	1375	19110	0.021	805
		≤ 8D	0.04	0.40	40000	0.027	2160	34390	0.022	1500	25800	0.019	1005	17200	0.017	585
		≤ 10D	0.04	0.37	38220	0.024	1830	30570	0.017	1060	22930	0.015	705	15290	0.013	410
		≤ 12D	0.03	0.33	33440	0.021	1400	26750	0.013	710	20060	0.012	470	13380	0.010	275
		> 12D	0.02	0.30	28660	0.018	1030	22930	0.010	450	17200	0.009	295	11460	0.008	175
	1.2	≤ 6D	0.06	0.52	39810	0.035	2790	31850	0.032	2010	23890	0.028	1340	15920	0.025	780
		≤ 8D	0.05	0.48	35830	0.032	2260	28660	0.026	1460	21500	0.023	975	14330	0.020	570
		≤ 10D	0.04	0.44	31850	0.028	1780	25480	0.020	1030	19110	0.018	685	12740	0.016	400
		≤ 12D	0.03	0.39	27870	0.025	1370	22290	0.015	690	16720	0.014	460	11150	0.012	270
		> 12D	0.03	0.36	23890	0.021	1000	19110	0.011	430	14330	0.010	290	9550	0.009	170
	1.5	≤ 6D	0.08	0.65	31850	0.045	2870	25480	0.041	2060	19110	0.036	1375	12740	0.032	805
		≤ 8D	0.06	0.61	28660	0.041	2320	22930	0.033	1500	17200	0.029	1005	11460	0.026	585
		≤ 10D	0.05	0.55	25480	0.036	1830	20380	0.026	1060	15290	0.023	705	10190	0.020	410
		≤ 12D	0.04	0.49	22290	0.032	1400	17830	0.020	710	13380	0.018	470	8920	0.015	275
		> 12D	0.03	0.44	19110	0.027	1030	15290	0.015	450	11460	0.013	295	7640	0.011	175
	2	≤ 6D	0.10	0.87	23890	0.060	2870	19110	0.054	2060	14330	0.048	1375	9550	0.042	800
		≤ 8D	0.09	0.81	21500	0.054	2320	17200	0.044	1500	12900	0.039	1005	8600	0.034	585
		≤ 10D	0.07	0.74	19110	0.048	1830	15290	0.035	1060	11460	0.031	705	7640	0.027	410
		≤ 12D	0.06	0.65	16720	0.042	1400	13380	0.026	710	10030	0.024	470	6690	0.021	275
		> 12D	0.05	0.59	14330	0.036	1030	11460	0.019	450	8600	0.017	295	5730	0.015	175
	2.5	≤ 6D	0.13	1.09	19110	0.060	2290	15290	0.054	1650	11460	0.048	1100	7640	0.042	640
		≤ 8D	0.11	1.01	17200	0.054	1860	13760	0.044	1200	10320	0.039	800	6880	0.034	470
		≤ 10D	0.09	0.92	15290	0.048	1470	12230	0.035	850	9170	0.031	565	6110	0.027	330
		≤ 12D	0.07	0.82	13380	0.042	1120	10700	0.026	570	8030	0.024	380	5350	0.021	220
		> 12D	0.06	0.74	11460	0.036	830	9170	0.019	360	6880	0.017	240	4590	0.015	140
	3	≤ 6D	0.15	1.31	15920	0.075	2390	12740	0.068	1720	9550	0.060	1145	6370	0.053	670
		≤ 8D	0.13	1.21	14330	0.068	1930	11460	0.055	1250	8600	0.049	835	5730	0.043	485
		≤ 10D	0.11	1.10	12740	0.060	1530	10190	0.043	880	7640	0.038	585	5100	0.034	345
		≤ 12D	0.08	0.98	11150	0.053	1170	8920	0.033	590	6690	0.029	395	4460	0.026	230
		> 12D	0.07	0.89	9550	0.045	860	7640	0.024	370	5730	0.022	250	3820	0.019	145

α	n (rpm)	Vf (mm/min)
45°	x 1.65	x 1.65
30°	x 1.30	x 1.30
15°	x 1.15	x 1.15

CUTTING PARAMETERS

UHLNB2

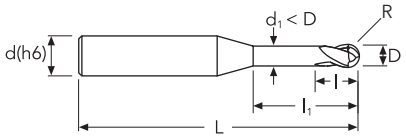
Material Group ISO 513				P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm				< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae				**ap x 0.2D**			**ap x 0.2D**			**ap x 0.2D**			**ap x 0.2D**		
Vc				**140-160**			**110-130**			**80-100**			**50-70**		
D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
4	**≤ 6D**	**0.20**	**1.74**	11940	0.095	2270	9550	0.086	1630	7170	0.076	1090	4780	0.067	635
	≤ 8D	**0.17**	**1.61**	10750	0.086	1840	8600	0.069	1190	6450	0.062	795	4300	0.054	465
	≤ 10D	**0.14**	**1.47**	9550	0.076	1450	7640	0.055	840	5730	0.049	555	3820	0.043	325
	≤ 12D	**0.11**	**1.31**	8360	0.067	1110	6690	0.042	560	5020	0.037	375	3340	0.033	220
	> 12D	**0.09**	**1.19**	7170	0.057	820	5730	0.031	350	4300	0.027	235	2870	0.024	135

α	n (rpm)	Vf (mm/min)
45°	x 1.65	x 1.65
30°	x 1.30	x 1.30
15°	x 1.15	x 1.15

UHCRB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature, 6 mm. shank

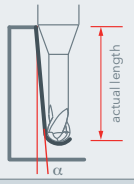
OSAWA NORM | UH | NMG UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.5	0/-0.012	0.25	+/-0.005	6	0.5	2	0.45	50	2	2.15	2.22	2.29	2.36	2.52	UHCRB20050156	●
0.5	0/-0.012	0.25	+/-0.005	6	0.5	4	0.45	50	2	4.22	4.35	4.50	4.65	4.98	UHCRB20050336	●
0.6	0/-0.012	0.30	+/-0.005	6	0.5	2	0.55	50	2	2.15	2.21	2.28	2.35	2.50	UHCRB20060206	●
0.6	0/-0.012	0.30	+/-0.005	6	0.5	4	0.55	50	2	4.22	4.35	4.49	4.65	4.97	UHCRB20060406	●
0.6	0/-0.012	0.30	+/-0.005	6	0.5	6	0.55	50	2	6.28	6.49	6.71	6.94	7.44	UHCRB20060606	●
0.8	0/-0.012	0.40	+/-0.005	6	0.8	2	0.75	50	2	2.15	2.21	2.27	2.34	2.48	UHCRB20080256	●
0.8	0/-0.012	0.40	+/-0.005	6	0.8	4	0.75	50	2	4.21	4.34	4.48	4.63	4.95	UHCRB20080406	●
0.8	0/-0.012	0.40	+/-0.005	6	0.8	6	0.75	50	2	6.28	6.48	6.70	6.93	7.42	UHCRB20080556	●
1	0/-0.012	0.50	+/-0.005	6	1	3	0.90	50	2	3.27	3.37	3.47	3.57	3.80	UHCRB20100336	●
1	0/-0.012	0.50	+/-0.005	6	1	6	0.90	50	2	6.37	6.58	6.79	7.02	7.50	UHCRB20100676	●
1	0/-0.012	0.50	+/-0.005	6	1	8	0.90	50	2	8.44	8.71	9.00	9.31	9.97	UHCRB20100806	●
1	0/-0.012	0.50	+/-0.005	6	1	10	0.90	50	2	10.51	10.85	11.22	11.61	12.44	UHCRB20101206	●
1.2	0/-0.012	0.60	+/-0.005	6	1.2	6	1.10	50	2	6.37	6.57	6.78	7.00	7.48	UHCRB20120606	●
1.2	0/-0.012	0.60	+/-0.005	6	1.2	8	1.10	50	2	8.44	8.71	8.99	9.30	9.95	UHCRB2012086	●
1.2	0/-0.012	0.60	+/-0.005	6	1.2	10	1.10	50	2	10.50	10.85	11.21	11.59	12.42	UHCRB20121006	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	4	1.40	50	2	4.30	4.42	4.55	4.68	4.98	UHCRB2015056	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	8	1.40	50	2	8.43	8.70	8.98	9.27	9.91	UHCRB20150806	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	10	1.40	50	2	10.50	10.84	11.19	11.57	12.38	UHCRB20150976	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	12	1.40	50	2	12.57	12.97	13.41	13.86	14.85	UHCRB2015156	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	16	1.40	50	2	16.70	17.25	17.84	18.45	19.78	UHCRB20151606	●
2	0/-0.012	1.00	+/-0.005	6	3	6	1.90	50	2	6.36	6.54	6.74	6.94	7.39	UHCRB2020066	●
2	0/-0.012	1.00	+/-0.005	6	3	8	1.90	50	2	8.42	8.68	8.95	9.24	9.86	UHCRB20200806	●
2	0/-0.012	1.00	+/-0.005	6	3	10	1.90	50	2	10.49	10.82	11.17	11.53	12.32	UHCRB20201006	●
2	0/-0.012	1.00	+/-0.005	6	3	12	1.90	50	2	12.56	12.96	13.38	13.83	14.79	UHCRB2020136	●
2	0/-0.012	1.00	+/-0.005	6	3	16	1.90	50	2	16.69	17.23	17.81	18.42	19.73	UHCRB20201606	●
2	0/-0.012	1.00	+/-0.005	6	3	20	1.90	50	2	20.83	21.51	22.24	23.00	24.66	UHCRB2020206	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHCRB2

Material Group ISO 513				P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm				< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae				ap x 0.2D			ap x 0.2D			ap x 0.2D			ap x 0.2D		
Vc (m/min)				140-160			110-130			80-100			50-70		
D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
0.5	≤ 6D	0.03	0.22	40000	0.020	1600	40000	0.018	1440	40000	0.016	1280	38220	0.014	1070
	≤ 8D	0.02	0.20	40000	0.018	1440	40000	0.015	1170	40000	0.013	1035	34390	0.011	780
	≤ 10D	0.02	0.18	40000	0.016	1280	40000	0.012	920	40000	0.010	820	30570	0.009	550
0.6	≤ 6D	0.03	0.26	40000	0.022	1760	40000	0.020	1580	40000	0.018	1410	31850	0.015	980
	≤ 8D	0.03	0.24	40000	0.020	1580	40000	0.016	1280	40000	0.014	1140	28660	0.012	715
	≤ 10D	0.02	0.22	40000	0.018	1410	40000	0.013	1010	38220	0.011	860	25480	0.010	500
0.8	≤ 6D	0.04	0.35	40000	0.025	2000	40000	0.023	1800	35830	0.020	1435	23890	0.018	835
	≤ 8D	0.03	0.32	40000	0.023	1800	40000	0.018	1460	32250	0.016	1045	21500	0.014	610
	≤ 10D	0.03	0.29	40000	0.020	1600	38220	0.014	1100	28660	0.013	735	19110	0.011	430
1	≤ 6D	0.05	0.44	40000	0.030	2400	38220	0.027	2060	28660	0.024	1375	19110	0.021	805
	≤ 8D	0.04	0.40	40000	0.027	2160	34390	0.022	1500	25800	0.019	1005	17200	0.017	585
	≤ 10D	0.04	0.37	38220	0.024	1830	30570	0.017	1060	19110	0.015	585	15290	0.013	410
	≤ 12D	0.03	0.33	33440	0.021	1400	26750	0.013	710	16720	0.012	395	13380	0.010	275
	> 12D	0.02	0.30	28660	0.018	1030	22930	0.010	450	14330	0.009	250	11460	0.008	175
1.2	≤ 6D	0.06	0.52	39810	0.035	2790	31850	0.032	2010	23890	0.028	1340	15920	0.025	780
	≤ 8D	0.05	0.48	35830	0.032	2260	28660	0.026	1460	21500	0.023	975	14330	0.020	570
	≤ 10D	0.04	0.44	31850	0.028	1780	25480	0.020	1030	19110	0.018	685	12740	0.016	400
	≤ 12D	0.03	0.39	27870	0.025	1370	22290	0.015	690	16720	0.014	460	11150	0.012	270
	> 12D	0.03	0.36	23890	0.021	1000	19110	0.011	430	14330	0.010	290	9550	0.009	170
1.5	≤ 6D	0.08	0.65	31850	0.045	2870	25480	0.041	2060	19110	0.036	1375	12740	0.032	805
	≤ 8D	0.06	0.61	28660	0.041	2320	22930	0.033	1500	17200	0.029	1005	11460	0.026	585
	≤ 10D	0.05	0.55	25480	0.036	1830	20380	0.026	1060	15290	0.023	705	10190	0.020	410
	≤ 12D	0.04	0.49	22290	0.032	1400	17830	0.020	710	13380	0.018	470	8920	0.015	275
	> 12D	0.03	0.44	19110	0.027	1030	15290	0.015	450	11460	0.013	295	7640	0.011	175
2	≤ 6D	0.10	0.87	23890	0.060	2870	19110	0.054	2060	14330	0.048	1375	9550	0.042	800
	≤ 8D	0.09	0.81	21500	0.054	2320	17200	0.044	1500	12900	0.039	1005	8600	0.034	585
	≤ 10D	0.07	0.74	19110	0.048	1830	15290	0.035	1060	11460	0.031	705	7640	0.027	410
	≤ 12D	0.06	0.65	16720	0.042	1400	13380	0.026	710	10030	0.024	470	6690	0.021	275
	> 12D	0.05	0.59	14330	0.036	1030	11460	0.019	450	8600	0.017	295	5730	0.015	175

α	n (rpm)	Vf (mm/min)
45°	x 1.65	x 1.65
30°	x 1.30	x 1.30
15°	x 1.15	x 1.15

UHCSB2

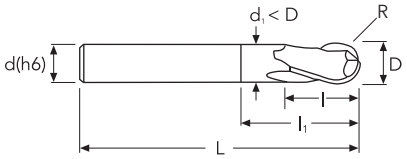
cylindrical shank, 2 flutes ball nose

OSAWA NORM | UH | NMG UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.012	0.50	+/-0.005	6	1.5		40	2	UHCSB2010	●
1.5	0/-0.012	0.75	+/-0.005	6	2.5		40	2	UHCSB2015	●
2	0/-0.012	1.00	+/-0.005	6	3		40	2	UHCSB2020	●
2.5	0/-0.012	1.25	+/-0.005	6	3		50	2	UHCSB2025	●
3	0/-0.012	1.50	+/-0.005	6	4.5		50	2	UHCSB2030	●
4	0/-0.012	2.00	+/-0.005	6	6		50	2	UHCSB2040	●
5	0/-0.012	2.50	+/-0.005	6	7.5		50	2	UHCSB2050	●
6	0/-0.012	3.00	+/-0.010	6	9		50	2	UHCSB2060	●
8	0/-0.015	4.00	+/-0.010	8	12		50	2	UHCSB2080	●
10	0/-0.015	5.00	+/-0.010	10	15		60	2	UHCSB2100	●
12	0/-0.015	6.00	+/-0.010	12	18		60	2	UHCSB2120	●
14	0/-0.030	7.00	+/-0.020	14	32		90	2	UHCSB2140	●
16	0/-0.030	8.00	+/-0.020	16	32		90	2	UHCSB2160	●
18	0/-0.030	9.00	+/-0.020	18	38		100	2	UHCSB2180	●
20	0/-0.030	10.00	+/-0.020	20	38		100	2	UHCSB2200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UHCSB2

	Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae		0.05D x 0.2D			0.05D x 0.2D			0.05D x 0.2D			0.05D x 0.2D		
	Vc (m/min)		140-180			100-140			80-100			60-80		
	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
COPYING	**1**	**0.44**	40000	0.009	720	38220	0.008	620	28660	0.007	410	22290	0.006	280
	1.5	**0.65**	33970	0.012	820	25480	0.011	550	19110	0.010	370	14860	0.008	250
	2	**0.87**	25480	0.012	610	19110	0.011	410	14330	0.010	280	11150	0.008	190
	2.5	**1.09**	20380	0.015	610	15290	0.014	410	11460	0.012	280	8920	0.011	190
	3	**1.31**	16990	0.018	610	12740	0.016	410	9550	0.014	280	7430	0.013	190
	4	**1.74**	12740	0.025	640	9550	0.023	430	7170	0.020	290	5570	0.018	190
	5	**2.18**	10190	0.032	650	7640	0.029	440	5730	0.026	290	4460	0.022	200
	6	**2.62**	8490	0.038	650	6370	0.034	440	4780	0.030	290	3720	0.027	200
	8	**3.49**	6370	0.048	610	4780	0.043	410	3580	0.038	270	2790	0.034	190
	10	**4.36**	5100	0.057	580	3820	0.051	390	2870	0.046	260	2230	0.040	180
	12	**5.23**	4250	0.067	570	3180	0.060	380	2390	0.054	260	1860	0.047	170
	14	**6.10**	3640	0.08	580	2730	0.072	390	2050	0.064	260	1590	0.056	180
	16	**6.97**	3180	0.095	600	2390	0.086	410	1790	0.076	270	1390	0.067	180
	18	**7.85**	2830	0.108	610	2120	0.097	410	1590	0.086	270	1240	0.076	190
	20	**8.72**	2550	0.108	550	1910	0.097	370	1430	0.086	250	1110	0.076	170

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

UH250

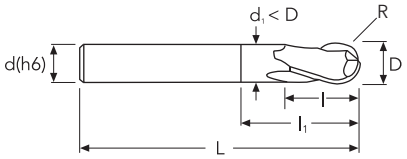
cylindrical shank, 2 flutes ball nose, long reach and reduced neck

OSAWA NORM | UH | NMG UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
1	0/-0.012	0.50	+/-0.005	4	1	2.2	0.95	50	2	UH250010	●
1.5	0/-0.012	0.75	+/-0.005	4	1.5	3	1.45	50	2	UH250015	●
2	0/-0.012	1.00	+/-0.005	6	2	4	1.95	50	2	UH250020	●
2.5	0/-0.012	1.25	+/-0.005	6	4	10	2.40	50	2	UH250025	●
3	0/-0.012	1.50	+/-0.005	6	3	6	2.85	60	2	UH250030	●
4	0/-0.012	2.00	+/-0.005	6	4	8	3.85	70	2	UH250040	●
5	0/-0.012	2.50	+/-0.005	6	5	10	4.85	80	2	UH250050	●
6	0/-0.012	3.00	+/-0.010	6	6	12	5.85	90	2	UH250060	●
8	0/-0.015	4.00	+/-0.010	8	8	16	7.70	100	2	UH250080	●
10	0/-0.015	5.00	+/-0.010	10	10	20	9.70	100	2	UH250100	●
12	0/-0.015	6.00	+/-0.010	12	12	24	11.70	110	2	UH250120	●
14	0/-0.030	7.00	0/-0.020	14	32	80	13.00	125	2	UH250140	●
16	0/-0.030	8.00	0/-0.020	16	32	80	15.00	125	2	UH250160	●
18	0/-0.030	9.00	0/-0.020	18	38	80	17.00	125	2	UH250180	●
20	0/-0.030	10.00	0/-0.020	20	38	80	19.00	125	2	UH250200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH250

Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae		**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**		
Vc (m/min)		**120-160**			**90-130**			**70-90**			**50-70**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	**0.44**	30000	0.015	900	30000	0.014	810	25480	0.012	610	19110	0.011	400
2	**0.87**	22290	0.021	950	17520	0.019	670	12740	0.017	430	9550	0.015	280
3	**1.31**	14860	0.027	810	11680	0.024	570	8490	0.022	370	6370	0.019	240
4	**1.74**	11150	0.037	820	8760	0.033	580	6370	0.029	370	4780	0.026	240
5	**2.18**	8920	0.045	800	7010	0.041	570	5100	0.036	370	3820	0.032	240
6	**2.62**	7430	0.051	760	5840	0.046	540	4250	0.041	350	3180	0.036	230
8	**3.49**	5570	0.060	660	4380	0.054	470	3180	0.048	300	2390	0.042	200
10	**4.36**	4460	0.068	610	3500	0.061	430	2550	0.054	280	1910	0.048	180
12	**5.23**	3720	0.077	570	2920	0.069	400	2120	0.061	260	1590	0.054	170
14	**6.10**	3180	0.089	570	2500	0.080	400	1820	0.071	260	1360	0.062	170
16	**6.97**	2790	0.102	570	2190	0.092	400	1590	0.082	260	1190	0.071	170
18	**7.85**	2480	0.115	570	1950	0.103	400	1420	0.092	260	1060	0.080	170
20	**8.72**	2230	0.132	590	1750	0.119	420	1270	0.106	270	960	0.092	180

α	n (rpm)	Vf (mm/min)
30°	x 0.8	x 0.8
15°	x 0.7	x 0.7
0°	x 0.6	x 0.6

UH253

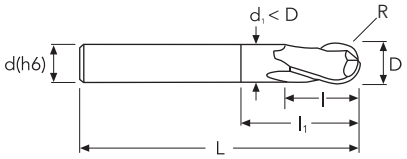
cylindrical shank, 2 flutes ball nose, extra-long reach and reduced neck

OSAWA NORM | UH | NMG UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL

P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
1	0/-0.020	0.50	0/-0.020	6	3	7	0.90	75	2	UH25301075	●
1	0/-0.020	0.50	0/-0.020	6	3	10	0.90	100	2	UH253010100	●
1.5	0/-0.020	0.75	0/-0.020	6	3	10	1.40	75	2	UH25301575	●
1.5	0/-0.020	0.75	0/-0.020	6	3	15	1.40	100	2	UH253015100	●
2	0/-0.020	1.00	0/-0.020	6	4	14	1.90	75	2	UH25302075	●
2	0/-0.020	1.00	0/-0.020	6	4	20	1.90	100	2	UH253020100	●
2.5	0/-0.020	1.25	0/-0.020	6	4	18	2.40	75	2	UH25302575	●
3	0/-0.025	1.50	0/-0.020	6	5	21	2.80	75	2	UH25303075	●
3	0/-0.025	1.50	0/-0.020	6	5	30	2.80	100	2	UH253030100	●
4	0/-0.025	2.00	0/-0.020	6	8	28	3.70	75	2	UH25304075	●
4	0/-0.025	2.00	0/-0.020	6	8	40	3.70	100	2	UH253040100	●
5	0/-0.025	2.50	0/-0.020	6	9	50	4.60	100	2	UH253050100	●
6	0/-0.025	3.00	0/-0.020	6	10	60	5.50	100	2	UH253060100	●
6	0/-0.025	3.00	0/-0.020	6	10	60	5.50	150	2	UH253060150	●
8	0/-0.030	4.00	0/-0.020	8	12	60	7.40	100	2	UH253080100	●
8	0/-0.030	4.00	0/-0.020	8	12	80	7.40	150	2	UH253080150	●
10	0/-0.030	5.00	0/-0.020	10	14	85	9.20	125	2	UH253100125	●
10	0/-0.030	5.00	0/-0.020	10	14	100	9.20	150	2	UH253100150	●
12	0/-0.030	6.00	0/-0.020	12	16	85	11.00	125	2	UH253120125	●
12	0/-0.030	6.00	0/-0.020	12	16	110	11.00	150	2	UH253120150	●
14	0/-0.030	7.00	0/-0.020	14	32	110	13.00	150	2	UH253140150	●
14	0/-0.030	7.00	0/-0.020	14	32	150	13.00	200	2	UH253140200	●
16	0/-0.030	8.00	0/-0.020	16	32	110	15.00	150	2	UH253160150	●
16	0/-0.030	8.00	0/-0.020	16	32	150	15.00	200	2	UH253160200	●
20	0/-0.030	10.00	0/-0.020	20	38	110	19.00	150	2	UH253200150	●
20	0/-0.030	10.00	0/-0.020	20	38	150	19.00	200	2	UH253200200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH253

Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
ap x ae		**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**		
Vc (m/min)		**110-150**			**80-120**			**60-80**			**40-60**		
D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
1	**0.44**	30000	0.021	1280	30000	0.019	1150	22290	0.017	760	15920	0.015	470
2	**0.87**	20700	0.021	880	15920	0.019	610	11150	0.017	380	7960	0.015	240
3	**1.31**	13800	0.027	750	10620	0.024	520	7430	0.022	320	5310	0.019	200
4	**1.74**	10350	0.037	760	7960	0.033	520	5570	0.029	330	3980	0.026	200
5	**2.18**	8280	0.045	750	6370	0.041	520	4460	0.036	320	3180	0.032	200
6	**2.62**	6900	0.051	700	5310	0.046	490	3720	0.041	300	2650	0.036	190
8	**3.49**	5180	0.060	620	3980	0.054	430	2790	0.048	270	1990	0.042	170
10	**4.36**	4140	0.068	560	3180	0.061	390	2230	0.054	240	1590	0.048	150
12	**5.23**	3450	0.077	530	2650	0.069	360	1860	0.061	230	1330	0.054	140
14	**6.10**	2960	0.089	530	2270	0.080	360	1590	0.071	230	1140	0.062	140
16	**6.97**	2590	0.102	530	1990	0.092	370	1390	0.082	230	1000	0.071	140
18	**7.85**	2300	0.115	530	1770	0.103	370	1240	0.092	230	880	0.080	140
20	**8.72**	2070	0.132	550	1590	0.119	380	1110	0.106	230	800	0.092	150

α	n (rpm)	Vf (mm/min)
30°	x 0.8	x 0.8
15°	x 0.7	x 0.7
0°	x 0.6	x 0.6

HSS END MILLS

CAPTION . 646
SELECTION GUIDE . 650
SYSTEM CHARTS . 654
2 FLUTES . 658
2 FLUTE ALU . 663
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3 FLUTES 50° HELIX . 669
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2 FLUTES BALL NOSE . 681
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CORNER ROUNDING . 689
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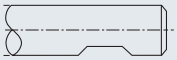
T-SLOT . 695
WOODRUFF . 697

Legenda Verzeichnis Légende Leyenda Условные обозначения

STOCK		
●	stock standard stock standard Standard Lager	stock standard stock estándar складская позиция
○	non-standard stock stock non standard nicht Standard Lager	stock non standard stock no estándar не складская позиция
▽	stock exhaustion esaurimento stock Vorraterschöpfung	épuisement du stock agotamiento de stock складские остатки

APPLICATION GUIDELINES INDICAZIONI PER L'APPLICAZIONE LEITFADEN ZUR ANWENDUNG INDICATIONS POUR L'APPLICATION INDICACIONES PARA SU APLICACIÓN УКАЗАНИЯ ПО ПРИМЕНЕНИЮ		
★	1st choice 1° scelta 1. Wahl	1er choix 1ª elección 1-й выбор
☆	suitable adatto geeignet	adapté adecuado пригоден

SHANK ATTACCO SCHAFT QUEUE MANGO ХВОСТОВИК		
	cylindrical shank attacco cilindrico zylindrischer Schaft	queue cylindrique mango cilíndrico цилиндрическое крепление
	Weldon	

MILLING STRATEGY STRATEGIA DI FRESATURA FRÄSSTRATEGIE STRATÉGIES DE FRAISAGE ESTRATEGIA DE FRESADO СТРАТЕГИЯ ФРЕЗЕРОВАНИЯ		
	slotting fresatura di cave Nutfräsen	fraisage de pièce taillée dans la masse fresado de una sola pieza фрезерование пазов
	side milling contornatura Konturfräsen	contournage perfiladura фрезерование по контуру
	copying copiatura Kopieren	copiage copia копирование
	drilling foratura Bohren	perçage perforación сверление

Legenda Verzeichnis Légende Leyenda Условные обозначения

MILLING STRATEGY STRATEGIA DI FRESATURA FRÄSSTRATEGIE STRATÉGIES DE FRAISAGE ESTRATEGIA DE FRESADO СТРАТЕГИЯ ФРЕЗЕРОВАНИЯ		
	rounding raggiatura concava Konkavradius	rayon concave redondeo cóncavo кругление
	dovetail A	
	dovetail B	
	T slot cave a T T Nut	rainure en T ranurado en T обработка Т-образного паза
	Woodruff	

APPLICATION RANGE GAMMA DI APPLICAZIONE ANWENDUNGSBEREICH GAMME D'APPLICATION RANGO DE APLICACIÓN ОБЛАСТЬ ПРИМЕНЕНИЯ		
	general purpose uso generico allgemeine Anwendung	applications génériques uso genérico общего назначения
	HSSP high performance HSSP alto rendimento HSSP hochleistung	HSSP haute performance HSSP alto rendimiento Высокопроизводительная быстрорежущая сталь
	for aluminium per alluminio für Aluminium	pour aluminium para aluminio для алюминия

TYPE TIPO TYP TYPE TIPO ТИП		
	sharp corner spigolo vivo scharfe Kante	arête vive arista viva острая кромка
	ball nose raggiata runder Stirn	bout hémisphérique fresa de bola сферическая

Legenda Verzeichnis Légende Leyenda Условные обозначения

NR. OF FLUTES · N. DI TAGLIENTI · ANZAHL DER SCHNEIDEN · NOMBRE DE DENTS · N. DE LABIOS · КОЛИЧЕСТВО РЕЖУЩИХ КРОМОК		
	2 flutes 2 taglienti 2 Schneiden	2 arêtes de coupe 2 filos 2 зуба
	3 flutes 3 taglienti 3 Schneiden	3 arêtes de coupe 3 filos 3 зуба
	4 flutes 4 taglienti 4 Schneiden	4 arêtes de coupe 4 filos 4 зуба
	6 flutes 6 taglienti 6 Schneiden	6 arêtes de coupe 6 filos 6 зубьев
	>6 flutes >6 taglienti >6 Schneiden	>6 arêtes de coupe >6 filos >6 зубьев

CHIPBREAKER STYLE · TIPO DI ROMPITRUCIOLO · SPÄNEBRECHER TYP · TYPE DE BRISE-COPEAUX · TIPO DE ROMPEVIRUTAS · ТИП СТРУЖКОЛОМА		
	roughing coarse pitch sgrossare passo grosso Schruppfräser Regelgewinde	ébauche pas gros desbaste paso grueso черновая с крупным шагом
	roughing fine pitch sgrossare passo fine Schruppfräser Feingewinde	ébauche pas fin desbaste paso fino черновая с мелким шагом

MATERIAL · MATERIALE · WERKSTOFF · MATIÈRE · MATERIAL · МАТЕРИАЛ		
	high speed steel 5%÷8% Co acciaio super rapido 5%÷8% Co Hochleistungsschnellschnittstahl 5%÷8% Co	acier rapide 5%÷8% Co acero súper rápido 5%÷8% Co быстрорежущая сталь с кобальтом 5÷8%
	powder steel acciaio sinterizzato Sinterstahl	acier fritté acero sinterizado порошковая сталь

SURFACE TREATMENT · TRATTAMENTO SUPERFICIALE · OBERFLÄCHENBEHANDLUNG · TRAITMENT DE SURFACE · TRATAMIENTO SUPERFICIAL · ОБРАБОТКА ПОВЕРХНОСТИ		
	uncoated non rivestito unbeschichtet	non revêtu no revestido без покрытия

Legenda Verzeichnis Légende Leyenda Условные обозначения

COATINGS RIVESTIMENTI BESCHICHTUNGEN REVÊTEMENTS RECUBRIMIENTOS ПОКРЫТИЕ		
		PV200
hardness (HV) durezza (HV) Härte (HV)	dureté (HV) dureza (HV) твёрдость (HV)	3300
friction coefficient coefficiente d'attrito Reibungskoeffizient	coefficent de frottement coeficiente de rozamiento коэффициент трения	0.3
thickness (µ) spessore (µ) dicke (µ)	epaisseur (µ) espesor (µ) толщина (мкм)	3
max working temperature (°C) temperatura max (°C) hochste Temperatur (°C)	température maximale (°C) temperatura máx (°C) макс. температура (°C)	950

	ITEM No.	PAGE	
HSS/Co - HSSP general purpose, square	**WS2**	658	
	TAWS2	658	
	UMWS2	658	
	WL2	661	
	TAWL2	661	
	WSA2	663	
	WS3	665	
	TAWS3	665	
	WL3	667	
	TAWL3	667	
	TAWSH3	669	
	WS4(6)	671	
	TAWS4(6)	671	
	UMWS4	671	
	WL4(6)	673	
	TAWL4(6)	673	
HSS/Co - HSSP general purpose, roughing	**TAWSR**	675	
	WSFR	677	
	TAWSFR	677	
	UMWSFR	677	
	WLFR	679	
	TAWLFR	679	
HSS/Co general purpose, ball nose	**WSB2**	681	
	TAWSB2	681	
	WLB2	683	
	TAWLB2	683	

Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

RANGE	NORM	TYPE	MATERIAL / COATING	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
1-30	DIN 327	N	HSS/Co BR	30°	SQUARE	2	★	☆	★	☆		
1-25	DIN 327	N	HSS/Co PV200	30°	SQUARE	2	★	☆	★	☆		
2-20	DIN 327	UM	HSSP PV200	30°	SQUARE	2	★	★	★			
3-30	DIN 844	N	HSS/Co BR	30°	SQUARE	2	★	☆	★	☆		
3-20	DIN 844	N	HSS/Co PV200	30°	SQUARE	2	★	☆	★	☆		
2-20	DIN 844	ALU	HSS/Co BR	42°	SQUARE	2				★		
1-32	DIN 844	N	HSS/Co BR	30°	SQUARE	3	★	☆	★	☆		
1-25	DIN 844	N	HSS/Co PV200	30°	SQUARE	3	★	☆	★	☆		
3-25	DIN 844	N	HSS/Co BR	30°	SQUARE	3	★	☆	★	☆		
3-20	DIN 844	N	HSS/Co PV200	30°	SQUARE	3	★	☆	★	☆		
6-20	DIN 844	N	HSS/Co PV200	45°	SQUARE	3	★	☆	★	☆		
2-30	DIN 844	N	HSS/Co BR	30°	SQUARE	4-6	★	☆	★	☆		
2-40	DIN 844	N	HSS/Co PV200	30°	SQUARE	4-6	★	☆	★	☆		
3-20	DIN 844	UM	HSSP PV200	30°	SQUARE	4	★	★	★			
3-25	DIN 844	N	HSS/Co BR	30°	SQUARE	4-6	★	☆	★	☆		
3-40	DIN 844	N	HSS/Co PV200	30°	SQUARE	4-6	★	☆	★	☆		
6-20	DIN 844	N - NR	HSS/Co PV200	30°	SQUARE	3-4	★	☆	★	☆		
6-20	DIN 844	N - HR	HSS/Co BR	30°	SQUARE	3-4	★	☆	★	☆		
6-40	DIN 844	N - HR	HSS/Co PV200	30°	SQUARE	3-6	★	☆	★	☆		
6-20	DIN 844	UM - HR	HSSP PV200	30°	SQUARE	3-4	★	★	★			
6-20	DIN 844	N - HR	HSS/Co BR	30°	SQUARE	3-4	★	☆	★	☆		
6-40	DIN 844	N - HR	HSS/Co PV200	30°	SQUARE	3-6	★	☆	★	☆		
2-30	DIN 327	N	HSS/Co BR	30°	BALL NOSE	2	★	☆	★	☆		
2-20	DIN 327	N	HSS/Co PV200	30°	BALL NOSE	2	★	☆	★	☆		
3-20	DIN 1889	N	HSS/Co BR	30°	BALL NOSE	2	★	☆	★	☆		
3-20	DIN 1889	N	HSS/Co PV200	30°	BALL NOSE	2	★	☆	★	☆		

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
HSS/Co general purpose, shell	**FM**	685	
	TAFM	685	
	FFR	687	
HSS/Co general purpose, shell	**TAFFR**	687	
HSS/Co general purpose, corner rounding	**WCR**	689	
HSS/Co general purpose, dovetail	**WDC**	691	
	WDD	693	
HSS/Co general purpose, T-slot	**WTM**	695	
HSS/Co general purpose, woodruff	**WWK**	697	

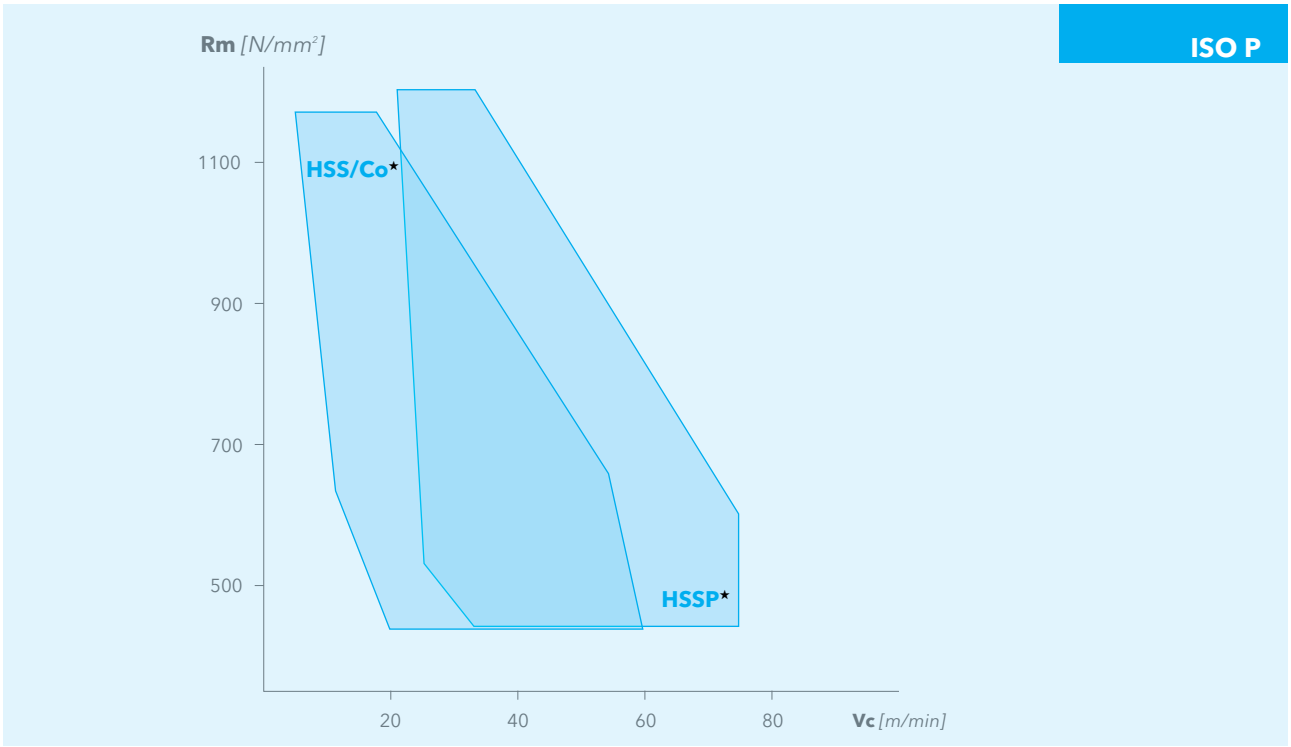
Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

RANGE	NORM	TYPE	MATERIAL / COATING	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
40-100	DIN 1880	N	HSS/Co BR	30°	SQUARE	8-10	★	☆	★	☆		
40-100	DIN 1880	N	HSS/Co PV200	30°	SQUARE	8-10	★	☆	★	☆		
40-100	DIN 1880	N - HR	HSS/Co BR	30°	SQUARE	6-10	★	☆	★	☆		
40-100	DIN 1880	N - HR	HSS/Co PV200	30°	SQUARE	6-10	★	☆	★	☆		
R1-R11	DIN 6518	N	HSS/Co BR	0°	RADIUS	4	★	☆	★	☆		
16-38	DIN 1833	N	HSS/Co BR	45°-60°	SQUARE	6-12	★	☆	★	☆		
16-38	DIN 1833	N	HSS/Co BR	45°-60°	SQUARE	6-12	★	☆	★	☆		
12.5-36	DIN 851	N	HSS/Co BR	15°	SQUARE	6-8	★	☆	★	☆		
10.5-32.5	DIN850	N	HSS/Co BR	10°	SQUARE	8-12	★	☆	★	☆		

★ 1st choice ☆ suitable

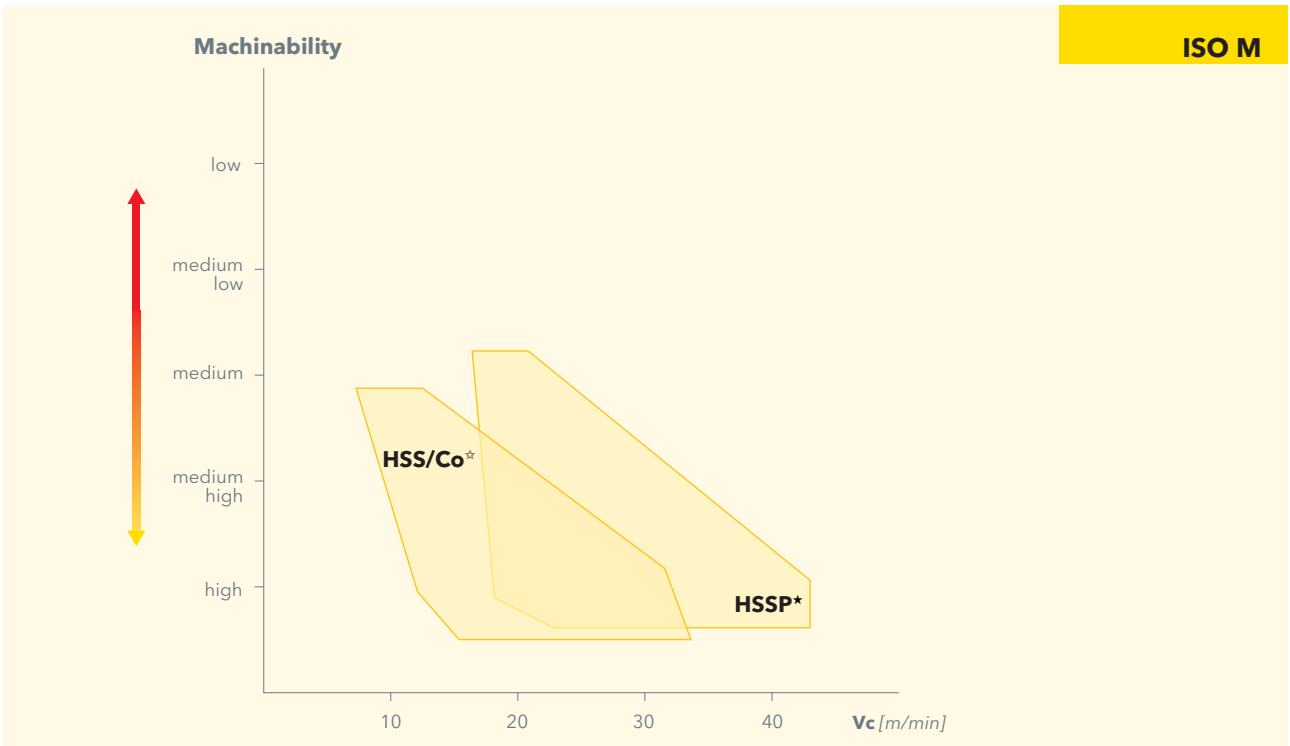
Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

STEEL APPLICATION



★ 1st choice ☆ suitable

STAINLESS STEEL APPLICATION

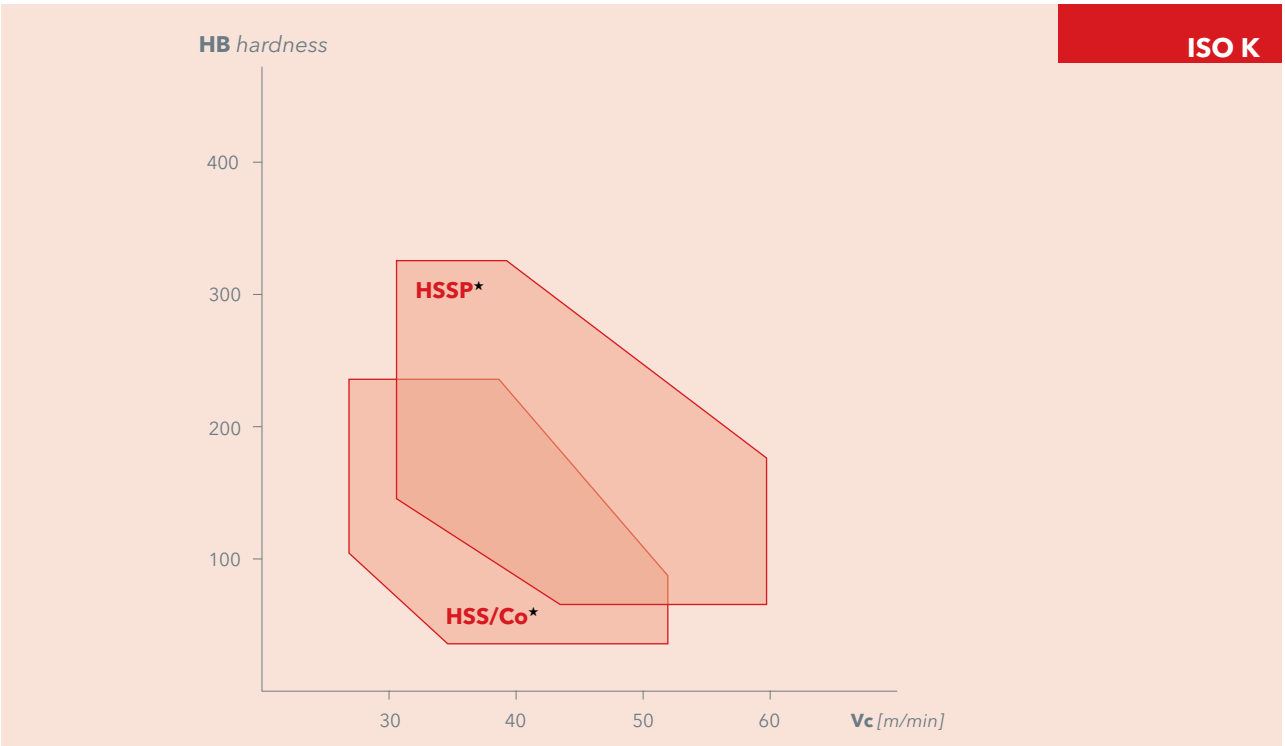


★ 1st choice ☆ suitable

HSS/Co : general purpose (page 658)
HSSP : high performance (page 658)

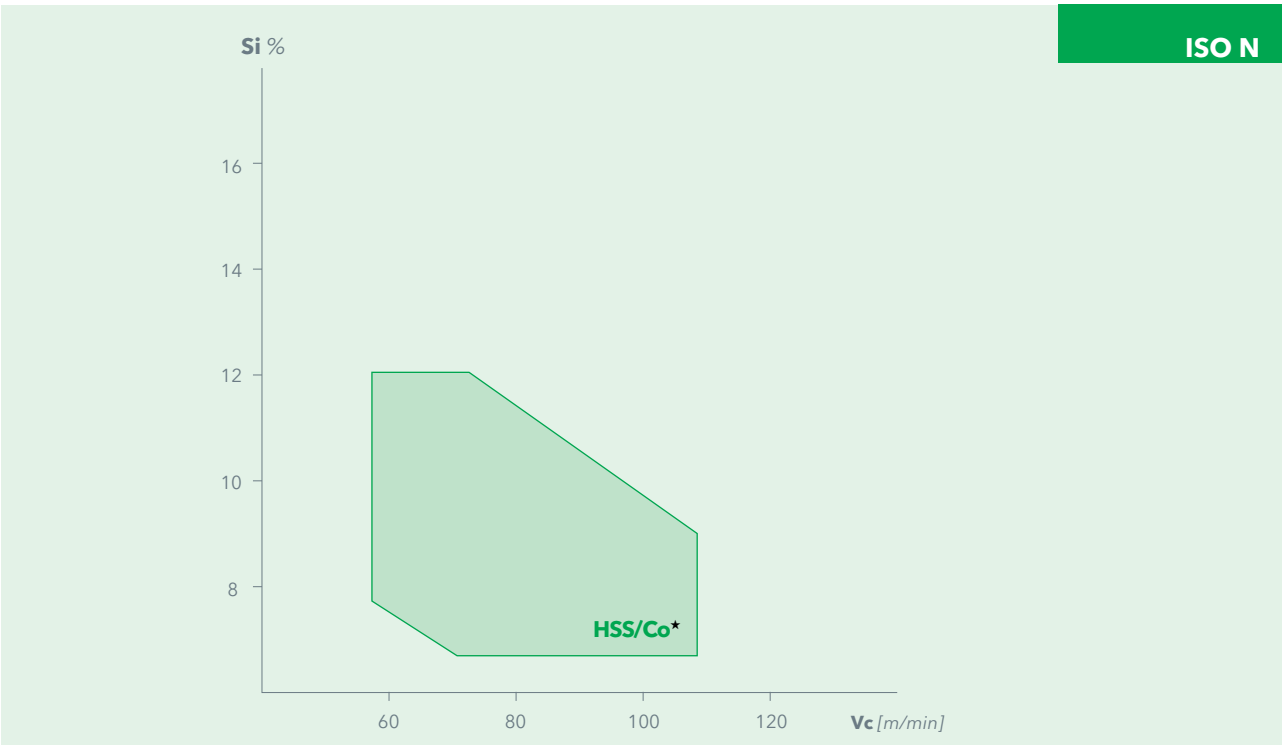
Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

CAST IRON APPLICATION



★ 1st choice ☆ suitable

NON-FERROUS MATERIALS APPLICATION



★ 1st choice ☆ suitable

HSS/Co : general purpose (page 658)
HSSP : high performance (page 658)

HSS/CO - HSSP
GENERAL PURPOSE

The Osawa catalogue includes a wide range of HSS/Co - HSSP end mills, both coated and uncoated.

Il catalogo Osawa include un'ampia scelta di frese in HSS/Co - HSSP nudo e rivestito.

Der Osawa Katalog umfasst eine große Auswahl an beschichteten und unbeschichteten Fräsern aus HSS/Co - HSSP.

Le catalogue Osawa inclut une large gamme de fraises en HSS/Co - HSSP, soit revêtues, soit non revêtues.

El catálogo Osawa incluye una amplia variedad de fresas de HSS/Co - HSSP con o sin recubrimiento.

В каталоге Osawa также представлена широкая гамма концевых фрез изготовленных из HSS/Co - HSSP с покрытием и без покрытия.

WS2-TAWS2-UMWS2

weldon shank, 2 flutes

DIN 327 | N | HSS/Co BR | HSS/Co PV200 | 30° | SQUARE | Z2

WS2/TAWS2 — WS2 — TAWS2

WS2

TAWS2

UM | HSS-P PV200

UMWS2

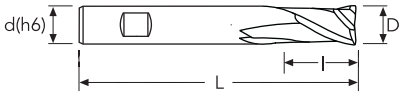
UMWS2

P	M	K	N	S	H
★	☆	★	☆		
★	★	★			

WS2-TAWS2
UMWS2

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



							WS2		TAWS2		UMWS2	
D(e8)	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
1	-0.014/-0.028	6	2.5		47	2	WS2010	●	TAWS2010	●		
1.5	-0.014/-0.028	6	3		47	2	WS2015	●	TAWS2015	●		
2	-0.014/-0.028	6	4		48	2	WS2020	●	TAWS2020	●	UMWS2020	●
2.5	-0.014/-0.028	6	5		49	2	WS2025	●	TAWS2025	●		
3	-0.014/-0.028	6	5		49	2	WS2030	●	TAWS2030	●	UMWS2030	●
3.5	-0.020/-0.038	6	6		50	2	WS2035	●	TAWS2035	●		
4	-0.020/-0.038	6	7		51	2	WS2040	●	TAWS2040	●	UMWS2040	●
4.5	-0.020/-0.038	6	7		51	2	WS2045	●	TAWS2045	●		
5	-0.020/-0.038	6	8		52	2	WS2050	●	TAWS2050	●	UMWS2050	●
5.5	-0.020/-0.038	6	8		52	2	WS2055	●	TAWS2055	●		
6	-0.020/-0.038	6	8		52	2	WS2060	●	TAWS2060	●	UMWS2060	●
6.5	-0.025/-0.047	10	10		60	2	WS2065	●	TAWS2065	●		
7	-0.025/-0.047	10	10		60	2	WS2070	●	TAWS2070	●		
7.5	-0.025/-0.047	10	10		60	2	WS2075	●	TAWS2075	●		
8	-0.025/-0.047	10	11		61	2	WS2080	●	TAWS2080	●	UMWS2080	●
8.5	-0.025/-0.047	10	11		61	2	WS2085	●	TAWS2085	●		
9	-0.025/-0.047	10	11		61	2	WS2090	●	TAWS2090	●		
9.5	-0.025/-0.047	10	11		61	2	WS2095	●	TAWS2095	●		
10	-0.025/-0.047	10	13		63	2	WS2100	●	TAWS2100	●	UMWS2100	●
10.5	-0.032/-0.059	12	13		70	2	WS2105	●	TAWS2105	●		
11	-0.032/-0.059	12	13		70	2	WS2110	●	TAWS2110	●		
11.5	-0.032/-0.059	12	13		70	2	WS2115	●	TAWS2115	●		
12	-0.032/-0.059	12	16		73	2	WS2120	●	TAWS2120	●	UMWS2120	●
12.5	-0.032/-0.059	12	16		73	2	WS2125	●	TAWS2125	●		
13	-0.032/-0.059	12	16		73	2	WS2130	●	TAWS2130	●		
13.5	-0.032/-0.059	12	16		73	2	WS2135	●	TAWS2135	●		
14	-0.032/-0.059	12	16		73	2	WS2140	●	TAWS2140	●	UMWS2140	●
15	-0.032/-0.059	12	16		73	2	WS2150	●	TAWS2150	●		
16	-0.032/-0.059	16	19		79	2	WS2160	●	TAWS2160	●	UMWS2160	●
17	-0.032/-0.059	16	19		79	2	WS2170	●	TAWS2170	●		
18	-0.032/-0.059	16	19		79	2	WS2180	●	TAWS2180	●	UMWS2180	●
19	-0.040/-0.073	16	19		79	2	WS2190	●	TAWS2190	●		
20	-0.040/-0.073	20	22		88	2	WS2200	●	TAWS2200	●	UMWS2200	●
22	-0.040/-0.073	20	22		88	2	WS2220	●	TAWS2220	●		
24	-0.040/-0.073	25	26		102	2	WS2240	●				
25	-0.040/-0.073	25	26		102	2	WS2250	●	TAWS2250	●		
26	-0.040/-0.073	25	26		102	2	WS2260	●				
28	-0.040/-0.073	25	26		102	2	WS2280	●				
30	-0.040/-0.073	25	26		102	2	WS2300	●				

● stock standard ○ non-standard stock ▽ stock exhaustion

TAWS2

UMWS2 (n and Vf = +20%) - WS2 (n and Vf = -20% ÷ -30%)

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**40-60**			**30-50**			**25-35**			**15-25**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	15920	0.003	90	12740	0.003	60	9550	0.002	40	6370	0.002	20
	2	7960	0.006	95	6370	0.005	70	4780	0.005	45	3180	0.004	25
	3	5310	0.009	95	4250	0.008	70	3180	0.007	45	2120	0.006	25
	4	3980	0.013	105	3180	0.012	75	2390	0.010	45	1590	0.009	30
	5	3180	0.017	110	2550	0.015	80	1910	0.013	50	1270	0.012	30
	6	2650	0.022	115	2120	0.020	85	1590	0.017	50	1060	0.015	35
	8	1990	0.032	125	1590	0.029	90	1190	0.024	55	800	0.022	35
	10	1590	0.040	125	1270	0.036	90	960	0.030	60	640	0.028	35
	12	1330	0.048	130	1060	0.043	90	800	0.036	60	530	0.034	35
	14	1140	0.057	130	910	0.051	95	680	0.043	60	450	0.040	35
	16	1000	0.067	135	800	0.060	95	600	0.050	60	400	0.047	40
	18	880	0.077	135	710	0.069	100	530	0.058	60	350	0.054	40
	20	800	0.088	140	640	0.079	100	480	0.066	65	320	0.062	40
	22	720	0.098	140	580	0.088	100	430	0.074	65	290	0.069	40
	24	660	0.105	140	530	0.095	100	400	0.079	65	270	0.074	40
	25	640	0.110	140	510	0.099	100	380	0.083	65	250	0.077	40
	26	610	0.116	140	490	0.104	100	370	0.087	65	240	0.081	40
	28	570	0.122	140	450	0.110	100	340	0.092	60	230	0.085	40
	30	530	0.128	135	420	0.115	95	320	0.096	60	210	0.090	40
	ap x ae	**≤ D3**	0.25D x D										

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
	Vc (m/min)	**50-70**			**40-60**			**25-35**			**20-30**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	19110	0.003	130	15920	0.003	100	11150	0.003	60	7960	0.004	60
	2	9550	0.007	140	7960	0.006	100	5570	0.006	60	3980	0.008	60
	3	6370	0.007	90	5310	0.006	70	3720	0.006	45	2650	0.005	25
	4	4780	0.011	105	3980	0.010	75	2790	0.009	50	1990	0.008	30
	5	3820	0.016	120	3180	0.014	90	2230	0.012	55	1590	0.011	35
	6	3180	0.020	130	2650	0.018	95	1860	0.016	60	1330	0.014	40
	8	2390	0.026	125	1990	0.024	95	1390	0.021	60	1000	0.018	35
	10	1910	0.038	145	1590	0.035	110	1110	0.031	70	800	0.027	45
	12	1590	0.048	155	1330	0.043	115	930	0.038	70	660	0.034	45
	14	1360	0.058	155	1140	0.052	120	800	0.046	75	570	0.040	45
	16	1190	0.068	165	1000	0.062	125	700	0.055	75	500	0.048	50
	18	1060	0.080	170	880	0.072	125	620	0.064	80	440	0.056	50
	20	960	0.092	175	800	0.083	135	560	0.074	85	400	0.065	50
	22	870	0.106	185	720	0.095	135	510	0.084	85	360	0.074	55
	24	800	0.118	190	660	0.106	140	460	0.094	85	330	0.082	55
	25	760	0.126	190	640	0.113	145	450	0.101	90	320	0.088	55
	26	730	0.132	195	610	0.119	145	430	0.106	90	310	0.092	55
	28	680	0.139	190	570	0.125	145	400	0.111	90	280	0.097	55
	30	640	0.146	185	530	0.132	140	370	0.117	85	270	0.102	55
	ap x ae	**≤ D3**	1.5D x 0.25D		1.5D x 0.25D			1.2D x 0.1D			1.2D x 0.1D		

CUTTING PARAMETERS

TAWS2

UMWS2 (n and Vf = +20%) - WS2 (n and Vf = -20% ÷ -30%)

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**0.5D x D**			**0.5D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**30-50**			**25-35**			**20-30**			**12-18**		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	4250	0.005	40	3180	0.003	15	2650	0.002	10	1590	0.002	5
	4	3180	0.007	40	2390	0.004	20	1990	0.003	15	1190	0.003	5
	5	2550	0.009	45	1910	0.006	20	1590	0.005	15	960	0.005	10
	6	2120	0.011	45	1590	0.008	25	1330	0.006	15	800	0.006	10
	8	1590	0.016	50	1190	0.010	25	1000	0.008	15	600	0.008	10
	10	1270	0.020	50	960	0.014	30	800	0.012	20	480	0.011	10
	12	1060	0.024	50	800	0.018	30	660	0.015	20	400	0.014	10
	14	910	0.029	50	680	0.022	30	570	0.018	20	340	0.017	10
	16	800	0.034	55	600	0.026	30	500	0.021	20	300	0.020	10
	18	710	0.039	55	530	0.030	30	440	0.025	20	270	0.023	15
	20	640	0.044	55	480	0.035	35	400	0.029	25	240	0.027	15
	22	580	0.049	55	430	0.040	35	360	0.033	25	220	0.031	15
	24	530	0.053	55	400	0.044	35	330	0.037	25	200	0.034	15
	25	510	0.055	55	380	0.047	35	320	0.039	25	190	0.037	15
	26	490	0.058	55	370	0.050	35	310	0.041	25	180	0.039	15
	28	450	0.061	55	340	0.052	35	280	0.044	25	170	0.041	15
	30	420	0.064	55	320	0.055	35	270	0.046	25	160	0.043	15

WL2-TAWL2

weldon shank, 2 flutes, long

DIN 844 | N | HSS/Co BR WL2 | HSS/Co PV200 TAWL2 | 30° | SQUARE | Z2

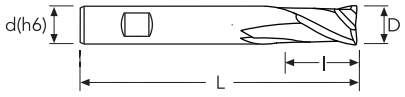
WL2

TAWL2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



							WL2		TAWL2	
D(e8)	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock
3	-0.014/-0.028	6	8		56	2	WL2030	●	TAWL2030	●
4	-0.020/-0.038	6	11		63	2	WL2040	●	TAWL2040	●
5	-0.020/-0.038	6	13		68	2	WL2050	●	TAWL2050	●
6	-0.020/-0.038	6	13		68	2	WL2060	●	TAWL2060	●
7	-0.025/-0.047	10	16		80	2	WL2070	●		
8	-0.025/-0.047	10	19		88	2	WL2080	●	TAWL2080	●
9	-0.025/-0.047	10	19		88	2	WL2090	●		
10	-0.025/-0.047	10	22		95	2	WL2100	●	TAWL2100	●
11	-0.032/-0.059	12	22		102	2	WL2110	●		
12	-0.032/-0.059	12	26		110	2	WL2120	●	TAWL2120	●
13	-0.032/-0.059	12	26		110	2	WL2130	●		
14	-0.032/-0.059	12	26		110	2	WL2140	●	TAWL2140	●
15	-0.032/-0.059	12	26		110	2	WL2150	●		
16	-0.032/-0.059	16	32		123	2	WL2160	●	TAWL2160	●
18	-0.032/-0.059	16	32		123	2	WL2180	●	TAWL2180	●
20	-0.040/-0.073	20	38		141	2	WL2200	●	TAWL2200	●
22	-0.040/-0.073	20	38		141	2	WL2220	●		
24	-0.040/-0.073	25	45		166	2	WL2240	○		
25	-0.040/-0.073	25	45		166	2	WL2250	●		
28	-0.040/-0.073	25	45		166	2	WL2280	●		
30	-0.040/-0.073	25	45		166	2	WL2300	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

TAWL2

WL2 (n and Vf = -20% ÷ -30%)

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**0.3D x D**			**0.3D x D**			**0.3D x D**			**0.2D x D**		
	Vc (m/min)	**30-50**			**25-35**			**20-30**			**12-18**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	4250	0.006	50	3180	0.005	30	2650	0.005	25	1590	0.004	15
	4	3180	0.008	50	2390	0.007	35	1990	0.007	25	1190	0.006	15
	5	2550	0.011	55	1910	0.010	35	1590	0.009	25	960	0.008	15
	6	2120	0.014	60	1590	0.012	40	1330	0.011	30	800	0.010	15
	8	1590	0.020	65	1190	0.018	45	1000	0.016	30	600	0.015	20
	10	1270	0.025	65	960	0.023	45	800	0.020	30	480	0.019	20
	12	1060	0.030	65	800	0.027	45	660	0.024	30	400	0.023	20
	14	910	0.036	65	680	0.032	45	570	0.029	35	340	0.027	20
	16	800	0.042	70	600	0.038	45	500	0.034	35	300	0.032	20
	18	710	0.048	70	530	0.043	45	440	0.038	35	270	0.036	20
	20	640	0.053	70	480	0.048	45	400	0.043	35	240	0.040	20
	22	580	0.060	70	430	0.054	45	360	0.048	35	220	0.045	20
	25	510	0.070	70	380	0.063	50	320	0.056	35	190	0.053	20
	28	450	0.077	70	340	0.069	45	280	0.062	35	170	0.058	20
	30	420	0.084	70	320	0.076	50	270	0.067	35	160	0.063	20

ap x ae	**≤ D5**	0.25D x D

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**2D x 0.1D**			**2D x 0.1D**			**2D x 0.1D**			**2D x 0.1D**		
	Vc (m/min)	**40-50**			**30-40**			**25-35**			**10-20**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	4780	0.006	60	3720	0.006	40	3180	0.005	30	1590	0.005	10
	4	3580	0.009	65	2790	0.008	50	2390	0.007	30	1190	0.007	20
	5	2870	0.012	70	2230	0.011	50	1910	0.009	40	960	0.009	20
	6	2390	0.015	75	1860	0.014	50	1590	0.012	40	800	0.011	20
	8	1790	0.022	80	1390	0.020	60	1190	0.018	40	600	0.017	20
	10	1430	0.028	80	1110	0.025	60	960	0.022	40	480	0.021	20
	12	1190	0.033	80	930	0.030	60	800	0.027	40	400	0.025	20
	14	1020	0.040	80	800	0.036	60	680	0.032	40	340	0.030	20
	16	900	0.046	85	700	0.042	60	600	0.037	40	300	0.035	20
	18	800	0.052	85	620	0.047	60	530	0.042	40	270	0.039	20
	20	720	0.059	85	560	0.053	60	480	0.047	40	240	0.044	20
	22	650	0.065	85	510	0.059	60	430	0.052	50	220	0.049	20
	25	570	0.077	90	450	0.069	60	380	0.062	50	190	0.058	20
	28	510	0.085	85	400	0.076	60	340	0.068	50	170	0.064	20
	30	480	0.092	90	370	0.083	60	320	0.074	50	160	0.069	20

ap x ae	**≤ D5**	1.5D x 0.05D

WSA2

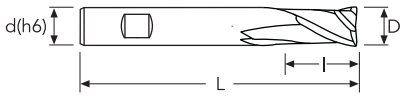
weldon shank, 2 flutes for aluminium

DIN 844 | ALU | HSS/Co BR | 42° | SQUARE | Z2

P	M	K	N	S	H
			★		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING | DRILLING



D(e8)	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
2	-0.014/-0.028	6	7		51	2	WSA2020	●
2.5	-0.014/-0.028	6	8		52	2	WSA2025	●
3	-0.014/-0.028	6	8		52	2	WSA2030	●
4	-0.020/-0.038	6	11		55	2	WSA2040	●
5	-0.020/-0.038	6	13		57	2	WSA2050	●
6	-0.020/-0.038	6	13		57	2	WSA2060	●
8	-0.025/-0.047	10	19		69	2	WSA2080	●
10	-0.025/-0.047	10	22		72	2	WSA2100	●
12	-0.032/-0.059	12	26		83	2	WSA2120	●
14	-0.032/-0.059	12	26		83	2	WSA2140	●
16	-0.032/-0.059	16	32		92	2	WSA2160	●
18	-0.032/-0.059	16	32		92	2	WSA2180	●
20	-0.040/-0.073	20	38		104	2	WSA2200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

WSA2

	Material Group ISO 513	N1			N2			N3 N4			N5		
	Material	≤ 12% Si			> 12% Si			Non ferrous materials			Plastics		
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	90-110			70-90			60-80			100-140		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	15920	0.015	480	12740	0.014	345	11150	0.012	270	19110	0.018	690
	3	10620	0.020	425	8490	0.018	305	7430	0.016	240	12740	0.024	610
	4	7960	0.030	480	6370	0.027	345	5570	0.024	265	9550	0.036	690
	5	6370	0.035	445	5100	0.032	320	4460	0.028	250	7640	0.042	640
	6	5310	0.042	445	4250	0.038	320	3720	0.034	250	6370	0.050	640
	8	3980	0.056	445	3180	0.050	320	2790	0.045	250	4780	0.067	640
	10	3180	0.073	465	2550	0.066	335	2230	0.058	260	3820	0.088	670
	12	2650	0.090	475	2120	0.081	345	1860	0.072	270	3180	0.108	685
	14	2270	0.106	480	1820	0.095	345	1590	0.085	270	2730	0.127	695
	16	1990	0.120	480	1590	0.108	345	1390	0.096	265	2390	0.144	690
	18	1770	0.135	480	1420	0.122	345	1240	0.108	270	2120	0.162	685
	20	1590	0.150	475	1270	0.135	345	1110	0.120	265	1910	0.180	690
ap x ae	≤ D3	0.2D x D											

	Material Group ISO 513	N1			N2			N3 N4			N5		
	Material	≤ 12% Si			> 12% Si			Non ferrous materials			Plastics		
	ap x ae	1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.5D		
	Vc (m/min)	100-140			90-110			70-90			130-150		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	19110	0.018	690	15920	0.016	520	12740	0.014	370	22290	0.020	880
	3	12740	0.018	460	10620	0.016	345	8490	0.014	245	14860	0.013	375
	4	9550	0.024	460	7960	0.022	345	6370	0.019	245	11150	0.017	375
	5	7640	0.036	550	6370	0.032	415	5100	0.029	295	8920	0.025	450
	6	6370	0.042	535	5310	0.038	400	4250	0.034	285	7430	0.029	435
	8	4780	0.050	480	3980	0.045	360	3180	0.040	255	5570	0.035	395
	10	3820	0.067	515	3180	0.060	385	2550	0.054	275	4460	0.047	420
	12	3180	0.088	555	2650	0.079	420	2120	0.070	295	3720	0.061	455
	14	2730	0.108	590	2270	0.097	440	1820	0.086	315	3180	0.076	480
	16	2390	0.127	610	1990	0.114	455	1590	0.102	325	2790	0.089	495
	18	2120	0.144	610	1770	0.130	460	1420	0.115	325	2480	0.101	500
	20	1910	0.162	620	1590	0.146	465	1270	0.130	330	2230	0.113	505
ap x ae	≤ D3	1.2D x 0.1D											

	Material Group ISO 513	N1			N2			N3 N4			N5		
	Material	≤ 12% Si			> 12% Si			Non ferrous materials			Plastics		
	ap x ae	0.5D x D			0.5D x D			0.5D x D			0.5D x D		
	Vc (m/min)	70-90			55-75			50-60			90-110		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	8490	0.010	170	6900	0.007	95	5840	0.006	70	10620	0.009	192
	4	6370	0.015	190	5180	0.009	95	4380	0.008	70	7960	0.012	192
	5	5100	0.018	180	4140	0.014	110	3500	0.012	85	6370	0.018	230
	6	4250	0.021	180	3450	0.016	110	2920	0.014	80	5310	0.021	224
	8	3180	0.028	180	2590	0.019	100	2190	0.017	75	3980	0.025	200
	10	2550	0.037	185	2070	0.025	105	1750	0.022	80	3180	0.034	214
	12	2120	0.045	190	1730	0.033	115	1460	0.029	85	2650	0.044	232
	14	1820	0.053	195	1480	0.041	120	1250	0.036	90	2270	0.054	246
	16	1590	0.060	190	1290	0.048	125	1090	0.042	90	1990	0.064	254
	18	1420	0.068	190	1150	0.054	125	970	0.048	95	1770	0.072	254
	20	1270	0.075	190	1040	0.061	125	880	0.054	95	1590	0.081	258

WS3-TAWS3

weldon shank, 3 flutes

DIN 844 | N | HSS/Co BR WS3 | HSS/Co PV200 TAWS3 | 30° | SQUARE | Z3

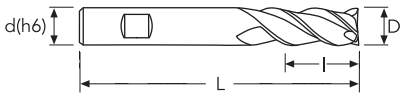
WS3

TAWS3

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



							WS3		TAWS3	
D(e8)	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock
1	-0.014/-0.028	6	3		47	3	WS3010	●	TAWS3010	○
1.5	-0.014/-0.028	6	7		51	3	WS3015	●	TAWS3015	○
2	-0.014/-0.028	6	7		51	3	WS3020	●	TAWS3020	●
2.5	-0.014/-0.028	6	8		52	3	WS3025	●	TAWS3025	●
3	-0.014/-0.028	6	8		52	3	WS3030	●	TAWS3030	●
3.5	-0.020/-0.038	6	10		54	3	WS3035	●	TAWS3035	●
4	-0.020/-0.038	6	11		55	3	WS3040	●	TAWS3040	●
4.5	-0.020/-0.038	6	11		55	3	WS3045	●	TAWS3045	●
5	-0.020/-0.038	6	13		57	3	WS3050	●	TAWS3050	●
5.5	-0.020/-0.038	6	13		57	3	WS3055	●	TAWS3055	●
6	-0.020/-0.038	6	13		57	3	WS3060	●	TAWS3060	●
6.5	-0.025/-0.047	10	16		66	3	WS3065	●	TAWS3065	●
7	-0.025/-0.047	10	16		66	3	WS3070	●	TAWS3070	●
8	-0.025/-0.047	10	19		69	3	WS3080	●	TAWS3080	●
8.5	-0.025/-0.047	10	19		69	3	WS3085	●	TAWS3085	●
9	-0.025/-0.047	10	19		69	3	WS3090	●	TAWS3090	●
10	-0.025/-0.047	10	22		72	3	WS3100	●	TAWS3100	●
11	-0.032/-0.059	12	22		79	3	WS3110	●	TAWS3110	●
12	-0.032/-0.059	12	26		83	3	WS3120	●	TAWS3120	●
13	-0.032/-0.059	12	26		83	3	WS3130	●	TAWS3130	●
14	-0.032/-0.059	12	26		83	3	WS3140	●	TAWS3140	●
15	-0.032/-0.059	12	26		83	3	WS3150	●	TAWS3150	●
16	-0.032/-0.059	16	32		92	3	WS3160	●	TAWS3160	●
18	-0.032/-0.059	16	32		92	3	WS3180	●	TAWS3180	●
20	-0.040/-0.073	20	38		104	3	WS3200	●	TAWS3200	●
22	-0.040/-0.073	20	38		104	3	WS3220	●	TAWS3220	●
25	-0.040/-0.073	25	45		121	3	WS3250	●	TAWS3250	●
30	-0.040/-0.073	25	45		121	3	WS3300	●		
32	-0.050/-0.089	32	53		133	3	WS3320	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWS3

WS3 (n and Vf = -20% ÷ -30%)

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**0.3D x D**			**0.3D x D**			**0.3D x D**			**0.3D x D**		
	Vc (m/min)	**40-60**			**30-50**			**25-35**			**15-25**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	15920	0.003	120	12740	0.002	90	9550	0.002	50	6370	0.002	30
	2	7960	0.005	130	6370	0.005	95	4780	0.004	60	3180	0.004	35
	3	5310	0.008	130	4250	0.007	95	3180	0.006	60	2120	0.006	35
	4	3980	0.012	140	3180	0.011	100	2390	0.009	65	1590	0.008	40
	5	3180	0.015	145	2550	0.014	105	1910	0.011	65	1270	0.011	40
	6	2650	0.020	155	2120	0.018	115	1590	0.015	70	1060	0.014	45
	8	1990	0.029	170	1590	0.026	125	1190	0.022	75	800	0.020	50
	10	1590	0.036	170	1270	0.032	125	960	0.027	80	640	0.025	50
	12	1330	0.043	170	1060	0.039	125	800	0.032	80	530	0.030	50
	14	1140	0.051	175	910	0.046	125	680	0.038	80	450	0.036	50
	16	1000	0.060	180	800	0.054	130	600	0.045	80	400	0.042	50
	18	880	0.069	185	710	0.062	135	530	0.052	85	350	0.049	50
	20	800	0.079	190	640	0.071	135	480	0.059	85	320	0.055	55
	22	720	0.088	190	580	0.079	140	430	0.066	85	290	0.062	55
	25	640	0.099	190	510	0.089	135	380	0.074	85	250	0.069	50
	28	570	0.122	210	450	0.110	150	340	0.092	95	230	0.085	60
	30	530	0.128	205	420	0.115	145	320	0.096	90	210	0.090	55
	32	500	0.136	200	400	0.116	140	300	0.095	90	200	0.095	60
	ap x ae	**≤ D3**	0.2D x D										

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
	Vc (m/min)	**50-70**			**40-60**			**25-35**			**20-30**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	19110	0.003	170	15920	0.003	130	11150	0.002	80	7960	0.003	80
	2	9550	0.006	190	7960	0.006	140	5570	0.005	90	3980	0.007	90
	3	6370	0.006	125	5310	0.006	95	3720	0.005	60	2650	0.005	35
	4	4780	0.010	140	3980	0.009	105	2790	0.008	65	1990	0.007	40
	5	3820	0.014	160	3180	0.013	120	2230	0.011	75	1590	0.010	45
	6	3180	0.018	175	2650	0.017	130	1860	0.015	80	1330	0.013	50
	8	2390	0.024	170	1990	0.021	130	1390	0.019	80	1000	0.017	50
	10	1910	0.035	200	1590	0.031	150	1110	0.028	90	800	0.024	60
	12	1590	0.043	205	1330	0.039	155	930	0.035	95	660	0.030	60
	14	1360	0.052	210	1140	0.047	160	800	0.041	100	570	0.036	60
	16	1190	0.062	220	1000	0.055	165	700	0.049	105	500	0.043	65
	18	1060	0.072	230	880	0.065	170	620	0.058	110	440	0.051	65
	20	960	0.083	240	800	0.075	180	560	0.067	110	400	0.058	70
	22	870	0.095	250	720	0.086	185	510	0.076	115	360	0.067	70
	25	760	0.113	260	640	0.102	195	450	0.091	120	320	0.079	75
	28	680	0.139	285	570	0.125	215	400	0.111	135	280	0.097	80
	32	600	0.146	265	500	0.132	200	350	0.117	125	250	0.102	75
	ap x ae	**≤ D3**	1.5D x 0.25D		1.5D x 0.25D			1.2D x 0.1D			1.2D x 0.1D		

WL3-TAWL3

weldon shank, 3 flutes, long

DIN 844 | N | HSS/Co BR | HSS/Co PV200 | 30° | SQUARE | Z3

WL3 TAWL3

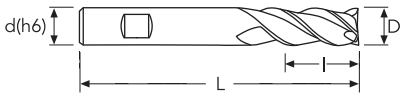
WL3

TAWL3

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



							WL3		TAWL3	
D(e8)	D(e8) Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock
3	-0.014/-0.028	6	12		56	3	WL3030	●	TAWL3030	●
4	-0.020/-0.038	6	19		63	3	WL3040	●	TAWL3040	●
5	-0.020/-0.038	6	24		68	3	WL3050	●	TAWL3050	●
6	-0.020/-0.038	6	24		68	3	WL3060	●	TAWL3060	●
8	-0.025/-0.047	10	38		88	3	WL3080	●	TAWL3080	●
10	-0.025/-0.047	10	45		95	3	WL3100	●	TAWL3100	●
12	-0.032/-0.059	12	53		110	3	WL3120	●	TAWL3120	●
14	-0.032/-0.059	12	53		110	3	WL3140	●	TAWL3140	●
16	-0.032/-0.059	16	63		123	3	WL3160	●	TAWL3160	●
18	-0.032/-0.059	16	63		123	3	WL3180	●	TAWL3180	●
20	-0.040/-0.073	20	75		141	3	WL3200	●	TAWL3200	●
22	-0.040/-0.073	20	75		141	3	WL3220	●		
25	-0.040/-0.073	25	90		166	3	WL3250	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWL3

WL3 (n and Vf = -20% ÷ -30%)

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**0.3D x D**			**0.3D x D**			**0.3D x D**			**0.2D x D**		
	Vc (m/min)	**30-50**			**25-35**			**20-30**			**12-18**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	4250	0.006	70	3180	0.005	50	2650	0.005	35	1590	0.004	20
	4	3180	0.008	80	2390	0.007	55	1990	0.007	40	1190	0.006	20
	5	2550	0.011	80	1910	0.010	55	1590	0.009	40	960	0.008	25
	6	2120	0.014	90	1590	0.012	60	1330	0.011	45	800	0.010	25
	8	1590	0.020	95	1190	0.018	65	1000	0.016	50	600	0.015	25
	10	1270	0.025	95	960	0.023	65	800	0.020	50	480	0.019	25
	12	1060	0.030	95	800	0.027	65	660	0.024	50	400	0.023	25
	14	910	0.036	100	680	0.032	65	570	0.029	50	340	0.027	25
	16	800	0.042	100	600	0.038	70	500	0.034	50	300	0.032	30
	18	710	0.048	100	530	0.043	70	440	0.038	50	270	0.036	30
	20	640	0.053	100	480	0.048	70	400	0.043	50	240	0.040	30
	22	580	0.060	105	430	0.054	70	360	0.048	50	220	0.045	30
	25	510	0.070	105	380	0.063	70	320	0.056	55	190	0.053	30

ap x ae	**≤ D5**	0.25D x D

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**2D x 0.1D**			**2D x 0.1D**			**2D x 0.1D**			**2D x 0.1D**		
	Vc (m/min)	**40-50**			**30-40**			**25-35**			**10-20**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	3	4780	0.006	90	3720	0.006	60	3180	0.005	50	1590	0.005	20
	4	3580	0.009	95	2790	0.008	70	2390	0.007	50	1190	0.007	20
	5	2870	0.012	100	2230	0.011	70	1910	0.009	50	960	0.009	30
	6	2390	0.015	110	1860	0.014	80	1590	0.012	60	800	0.011	30
	8	1790	0.022	120	1390	0.020	80	1190	0.018	60	600	0.017	30
	10	1430	0.028	120	1110	0.025	80	960	0.022	60	480	0.021	30
	12	1190	0.033	120	930	0.030	80	800	0.027	60	400	0.025	30
	14	1020	0.040	120	800	0.036	90	680	0.032	60	340	0.030	30
	16	900	0.046	125	700	0.042	90	600	0.037	70	300	0.035	30
	18	800	0.052	125	620	0.047	90	530	0.042	70	270	0.039	30
	20	720	0.059	125	560	0.053	90	480	0.047	70	240	0.044	30
	22	650	0.065	130	510	0.059	90	430	0.052	70	220	0.049	30
	25	570	0.077	130	450	0.069	90	380	0.062	70	190	0.058	30

ap x ae	**≤ D5**	1.5D x 0.05D

TAWSH3

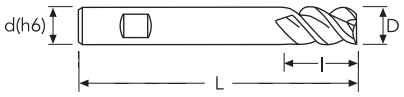
weldon shank 3 flutes

DIN 844 | N | HSS/Co PV200 | 50° | SQUARE | Z3

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	0/+0.048	6	13		57	3	TAWSH3060	●
8	0/+0.058	10	19		69	3	TAWSH3080	●
10	0/+0.058	10	22		72	3	TAWSH3100	●
12	0/+0.070	12	26		83	3	TAWSH3120	●
14	0/+0.070	12	26		83	3	TAWSH3140	●
16	0/+0.070	16	32		92	3	TAWSH3160	●
18	0/+0.070	16	32		92	3	TAWSH3180	●
20	0/+0.084	20	38		104	3	TAWSH3200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

TAWSH3

SLOTTING

Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
ap x ae	**0.3D x D**			**0.3D x D**			**0.3D x D**			**0.3D x D**		
Vc (m/min)	**40-60**			**30-50**			**25-35**			**15-25**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	2650	0.020	155	2120	0.018	115	1590	0.015	70	1060	0.014	45
8	1990	0.029	170	1590	0.026	125	1190	0.022	75	800	0.020	50
10	1590	0.036	170	1270	0.032	125	960	0.027	80	640	0.025	50
12	1330	0.043	170	1060	0.039	125	800	0.032	80	530	0.030	50
14	1140	0.051	175	910	0.046	125	680	0.038	80	450	0.036	50
16	1000	0.060	180	800	0.054	130	600	0.045	80	400	0.042	50
18	880	0.069	185	710	0.062	135	530	0.052	85	350	0.049	50
20	800	0.079	190	640	0.071	135	480	0.059	85	320	0.055	55

SIDE MILLING

Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
Vc (m/min)	**50-70**			**40-60**			**25-35**			**20-30**		
D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	3180	0.018	175	2650	0.017	130	1860	0.015	80	1330	0.013	50
8	2390	0.024	170	1990	0.021	130	1390	0.019	80	1000	0.017	50
10	1910	0.035	200	1590	0.031	150	1110	0.028	90	800	0.024	60
12	1590	0.043	205	1330	0.039	155	930	0.035	95	660	0.030	60
14	1360	0.052	210	1140	0.047	160	800	0.041	100	570	0.036	60
16	1190	0.062	220	1000	0.055	165	700	0.049	105	500	0.043	65
18	1060	0.072	230	880	0.065	170	620	0.058	110	440	0.051	65
20	960	0.083	240	800	0.075	180	560	0.067	110	400	0.058	70

WS4(6)-TAWS4(6)-UMWS4

weldon shank, 4 flutes-6 flutes

DIN 844 | N | HSS/Co BR | HSS/Co PV200 | 30° | SQUARE | Z4~Z6

WS4(6) TAWS4(6) — WS4(6) — TAWS4(6)

WS4(6)

TAWS4(6)

UM | HSS-P PV200

UMWS4

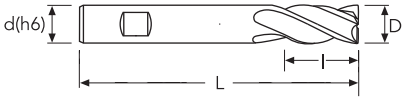
UMWS4

P	M	K	N	S	H
★	☆	★	☆		
★	★	★			

WS4(6)-TAWS4(6)

UMWS4

★ 1st choice ☆ suitable



SIDE MILLING

							WS4(6)		TAWS4(6)		UMWS4	
D	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
2	0/+0.040	6	7		51	4	WS4020	●	TAWS4020	●		
3	0/+0.040	6	8		52	4	WS4030	●	TAWS4030	●	UMWS4030	●
4	0/+0.040	6	11		55	4	WS4040	●	TAWS4040	●	UMWS4040	●
5	0/+0.040	6	13		57	4	WS4050	●	TAWS4050	●	UMWS4050	●
6	0/+0.040	6	13		57	4	WS4060	●	TAWS4060	●	UMWS4060	●
7	0/+0.040	10	16		66	4	WS4070	●	TAWS4070	●		
8	0/+0.040	10	19		69	4	WS4080	●	TAWS4080	●	UMWS4080	●
9	0/+0.040	10	19		69	4	WS4090	●	TAWS4090	●		
10	0/+0.040	10	22		72	4	WS4100	●	TAWS4100	●	UMWS4100	●
11	0/+0.040	12	22		79	4	WS4110	●	TAWS4110	●		
12	0/+0.040	12	26		83	4	WS4120	●	TAWS4120	●	UMWS4120	●
13	0/+0.040	12	26		83	4	WS4130	●	TAWS4130	●		
14	0/+0.040	12	26		83	4	WS4140	●	TAWS4140	●	UMWS4140	●
15	0/+0.040	12	26		83	4	WS4150	●	TAWS4150	●		
16	0/+0.040	16	32		92	4	WS4160	●	TAWS4160	●	UMWS4160	●
17	0/+0.040	16	32		92	4			TAWS4170	●		
18	0/+0.040	16	32		92	4	WS4180	●	TAWS4180	●	UMWS4180	●
19	0/+0.040	16	32		92	4			TAWS4190	●		
20	0/+0.040	20	38		104	4	WS4200	●	TAWS4200	●	UMWS4200	●
22	0/+0.040	20	38		104	4	WS4220	●	TAWS4220	●		
24	0/+0.040	25	45		121	6	WS6240	●				
25	0/+0.040	25	45		121	4	WS4250	●	TAWS4250	●		
28	0/+0.040	25	45		121	6	WS6280	●	TAWS6280	●		
30	0/+0.040	25	45		121	6	WS6300	●	TAWS6300	●		
32	0/+0.040	32	53		133	6			TAWS6320	●		
36	0/+0.040	32	53		133	6			TAWS6360	●		
40	0/+0.040	32	63		143	6			TAWS6400	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWS4

UMWS4 (n and Vf = +20%) - WS4 (n and Vf = -20% ÷ -30%)

	Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae		1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.3D			1.5D x 0.3D		
	Vc (m/min)		50-70			40-60			25-35			20-30		
	D (mm)	Z (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
SIDE MILLING	**2**	**4**	9550	0.006	220	7960	0.005	170	5570	0.005	100	3980	0.004	70
	3	**4**	6370	0.006	145	5310	0.005	110	3720	0.005	70	2650	0.004	45
	4	**4**	4780	0.009	165	3980	0.008	125	2790	0.007	75	1990	0.006	50
	5	**4**	3820	0.012	190	3180	0.011	145	2230	0.010	90	1590	0.009	60
	6	**4**	3180	0.016	210	2650	0.015	155	1860	0.013	95	1330	0.012	65
	8	**4**	2390	0.021	200	1990	0.019	150	1390	0.017	95	1000	0.016	65
	10	**4**	1910	0.031	235	1590	0.028	175	1110	0.025	110	800	0.023	75
	12	**4**	1590	0.038	245	1330	0.035	185	930	0.031	115	660	0.029	75
	14	**4**	1360	0.046	250	1140	0.041	190	800	0.037	120	570	0.035	80
	16	**4**	1190	0.055	260	1000	0.049	195	700	0.044	125	500	0.041	80
	18	**4**	1060	0.064	275	880	0.058	205	620	0.051	130	440	0.048	85
	20	**4**	960	0.074	285	800	0.067	215	560	0.059	130	400	0.055	90
	22	**4**	870	0.084	295	720	0.076	220	510	0.068	140	360	0.063	90
	24	**6**	800	0.088	425	660	0.079	315	460	0.071	195	330	0.066	130
	25	**4**	760	0.106	320	640	0.095	245	450	0.084	150	320	0.079	100
	28	**6**	680	0.102	420	570	0.092	315	400	0.082	195	280	0.077	130
	30	**6**	640	0.108	415	530	0.097	310	370	0.086	190	270	0.081	130
	32	**6**	600	0.113	410	500	0.102	305	350	0.091	190	250	0.085	130
	36	**6**	530	0.127	405	440	0.114	300	310	0.101	190	220	0.095	125
	40	**6**	480	0.139	400	400	0.125	300	280	0.111	185	200	0.104	125

ap x ae	≤ D3	1.5D x 0.25D	1.5D x 0.25D	1.2D x 0.1D	1.2D x 0.1D

WL4(6)-TAWL4(6)

weldon shank, 4 flutes-6 flutes, long

DIN 844 | N | HSS/Co BR | HSS/Co PV200 | 30° | SQUARE | Z4~Z6

WL4(6) TAWL4(6)

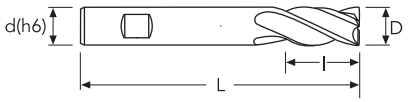
WL4(6)

TAWL4(6)

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



							WL4(6)		TAWL4(6)	
D	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock
3	0/+0.040	6	12		56	4	WL4030	●	TAWL4030	●
4	0/+0.040	6	19		63	4	WL4040	●	TAWL4040	●
5	0/+0.040	6	24		68	4	WL4050	●	TAWL4050	●
6	0/+0.040	6	24		68	4	WL4060	●	TAWL4060	●
7	0/+0.050	10	30		80	4	WL4070	●	TAWL4070	●
8	0/+0.050	10	38		88	4	WL4080	●	TAWL4080	●
9	0/+0.050	10	38		88	4	WL4090	●	TAWL4090	●
10	0/+0.050	10	45		95	4	WL4100	●	TAWL4100	●
11	0/+0.050	12	45		102	4	WL4110	●	TAWL4110	●
12	0/+0.050	12	53		110	4	WL4120	●	TAWL4120	●
13	0/+0.050	12	53		110	4	WL4130	●	TAWL4130	●
14	0/+0.050	12	53		110	4	WL4140	●	TAWL4140	●
15	0/+0.050	12	53		110	4	WL4150	●	TAWL4150	●
16	0/+0.050	16	63		123	4	WL4160	●	TAWL4160	●
17	0/+0.050	16	63		123	4	WL4170	●	TAWL4170	●
18	0/+0.050	16	63		123	4	WL4180	●	TAWL4180	●
19	0/+0.050	16	63		123	4	WL4190	●	TAWL4190	●
20	0/+0.050	20	75		141	4	WL4200	●	TAWL4200	●
22	0/+0.050	20	75		141	6	WL6220	●	TAWL6220	●
25	0/+0.050	25	90		166	6	WL6250	●	TAWL6250	●
30	0/+0.050	25	90		166	6			TAWL6300	●
32	0/+0.050	32	106		186	6			TAWL6320	●
36	0/+0.050	32	106		186	6			TAWL6360	●
40	0/+0.050	40	125		217	6			TAWL6400	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWL4

WL4 (n and Vf = -20% ÷ -30%)

	Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae		2D x 0.1D			2D x 0.1D			2D x 0.1D			2D x 0.1D		
	Vc (m/min)		40-50			30-40			25-35			10-20		
	D (mm)	Z (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
SIDE MILLING	**3**	**4**	4780	0.004	75	3720	0.004	50	3180	0.003	40	1590	0.003	20
	4	**4**	3580	0.006	85	2790	0.005	60	2390	0.005	50	1190	0.004	20
	5	**4**	2870	0.009	100	2230	0.008	70	1910	0.007	50	960	0.006	20
	6	**4**	2390	0.012	115	1860	0.011	80	1590	0.010	60	800	0.009	30
	8	**4**	1790	0.015	105	1390	0.013	70	1190	0.012	60	600	0.011	30
	10	**4**	1430	0.021	120	1110	0.019	90	960	0.017	70	480	0.016	30
	12	**4**	1190	0.027	125	930	0.024	90	800	0.021	70	400	0.020	30
	14	**4**	1020	0.032	130	800	0.029	90	680	0.026	70	340	0.024	30
	16	**4**	900	0.038	135	700	0.034	100	600	0.030	70	300	0.028	30
	18	**4**	800	0.045	145	620	0.040	100	530	0.036	80	270	0.033	40
	20	**4**	720	0.050	145	560	0.045	100	480	0.040	80	240	0.038	40
	22	**6**	650	0.056	220	510	0.051	155	430	0.045	115	220	0.042	55
	25	**6**	570	0.068	230	450	0.061	165	380	0.054	125	190	0.051	60
	32	**6**	450	0.077	210	350	0.069	145	300	0.062	110	150	0.054	50
	36	**6**	400	0.085	205	310	0.077	140	270	0.068	110	130	0.060	45
	40	**6**	360	0.095	205	280	0.086	145	240	0.076	110	120	0.067	50

ap x ae	**≤ D5**	1.5D x 0.05D	1.5D x 0.05D	1.2D x 0.05D	1.2D x 0.05D

TAWSR

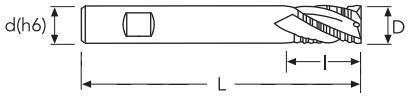
weldon shank, roughing NR

DIN 844 | N | HSS/Co PV200 | 30° | SQUARE | NR COARSE | Z3~Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



D(js12)	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
6	+/-0.060	6	13		57	3	TAWSR060	●
7	+/-0.075	10	16		66	3	TAWSR070	●
8	+/-0.075	10	19		69	3	TAWSR080	●
9	+/-0.075	10	19		69	3	TAWSR090	●
10	+/-0.075	10	22		72	4	TAWSR100	●
11	+/-0.090	12	22		79	4	TAWSR110	●
12	+/-0.090	12	26		83	4	TAWSR120	●
13	+/-0.090	12	26		83	4	TAWSR130	●
14	+/-0.090	12	26		83	4	TAWSR140	●
15	+/-0.090	12	26		83	4	TAWSR150	●
16	+/-0.090	16	32		92	4	TAWSR160	●
17	+/-0.090	16	32		92	4	TAWSR170	●
18	+/-0.090	16	32		92	4	TAWSR180	●
20	+/-0.105	20	38		104	4	TAWSR200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWSR

SLOTTING

Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
ap x ae		**D x D**			**D x D**			**D x D**			**0.5D x D**		
Vc (m/min)		**40-60**			**30-50**			**25-35**			**15-25**		
D (mm)	**Z (mm)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**
6	**3**	2650	0.022	175	2120	0.020	125	1590	0.018	85	1060	0.017	50
8	**3**	1990	0.028	165	1590	0.025	120	1190	0.022	80	800	0.019	45
10	**4**	1590	0.035	225	1270	0.032	160	960	0.028	110	640	0.025	65
12	**4**	1330	0.045	240	1060	0.041	170	800	0.036	115	530	0.032	65
14	**4**	1140	0.055	250	910	0.050	180	680	0.044	120	450	0.039	70
16	**4**	1000	0.065	260	800	0.059	185	600	0.052	125	400	0.046	75
18	**4**	880	0.075	265	710	0.068	190	530	0.060	125	350	0.053	75
20	**4**	800	0.085	270	640	0.077	195	480	0.068	130	320	0.060	75

SIDE MILLING

Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
ap x ae		**1.5D x 0.5D**			**1.5D x 0.5D**			**1.5D x 0.3D**			**1.5D x 0.3D**		
Vc (m/min)		**50-70**			**40-60**			**30-40**			**20-30**		
D (mm)	**Z (mm)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**	**n (rpm)**	**fz (mm/z)**	**Vf (mm/min)**
6	**3**	3180	0.026	250	2650	0.024	190	1860	0.021	120	1330	0.018	75
8	**3**	2390	0.033	235	1990	0.030	175	1390	0.026	110	1000	0.023	70
10	**4**	1910	0.042	320	1590	0.038	180	1110	0.034	110	800	0.029	70
12	**4**	1590	0.054	345	1330	0.049	195	930	0.043	120	660	0.038	75
14	**4**	1360	0.066	360	1140	0.059	205	800	0.053	125	570	0.046	80
16	**4**	1190	0.078	370	1000	0.070	210	700	0.062	130	500	0.055	80
18	**4**	1060	0.090	380	880	0.081	215	620	0.072	135	440	0.063	85
20	**4**	960	0.102	390	800	0.092	220	560	0.082	135	400	0.071	85

WSFR-TAWSFR-UMWSFR

weldon shank, roughing HR

DIN 844 | N | HSS/Co BR | HSS/Co PV200 | HR FINE | Z3~Z6

WSFR TAWSFR | WSFR | TAWSFR

UM | HSS-P PV200

UMWSFR

WSFR

TAWSFR

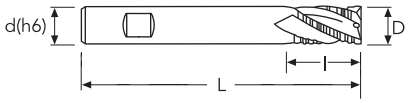
UMWSFR

P	M	K	N	S	H
★	☆	★	☆		
★	★	★			

WSFR-TAWSFR
UMWSFR

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



							WSFR		TAWSFR		UMWSFR	
D(js12)	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
6	+/-0.060	6	13		57	3	WSFR060	●	TAWSFR060	●	UMWSFR060	●
7	+/-0.075	10	16		66	3			TAWSFR070	●	UMWSFR070	●
8	+/-0.075	10	19		69	3	WSFR080	●	TAWSFR080	●	UMWSFR080	●
9	+/-0.075	10	19		69	3			TAWSFR090	●	UMWSFR090	●
10	+/-0.075	10	22		72	4	WSFR100	●	TAWSFR100	●	UMWSFR100	●
11	+/-0.090	12	22		79	4			TAWSFR110	●		
12	+/-0.090	12	26		83	4	WSFR120	●	TAWSFR120	●	UMWSFR120	●
13	+/-0.090	12	26		83	4			TAWSFR130	●		
14	+/-0.090	12	26		83	4	WSFR140	●	TAWSFR140	●	UMWSFR140	●
15	+/-0.090	12	26		83	4			TAWSFR150	●		
16	+/-0.090	16	32		92	4	WSFR160	●	TAWSFR160	●	UMWSFR160	●
17	+/-0.090	16	32		92	4			TAWSFR170	●		
18	+/-0.090	16	32		92	4	WSFR180	●	TAWSFR180	●	UMWSFR180	●
20	+/-0.105	20	38		104	4	WSFR200	●	TAWSFR200	●	UMWSFR200	●
22	+/-0.105	20	38		104	5			TAWSFR220	●		
25	+/-0.105	25	45		121	5			TAWSFR250	●		
28	+/-0.105	25	45		121	6 CH			TAWSFR280	●		
30	+/-0.105	25	45		121	6			TAWSFR300	●		
32	+/-0.125	32	53		133	6			TAWSFR320	●		
36	+/-0.125	32	53		133	6			TAWSFR360	●		
40	+/-0.125	32	63		155	6			TAWSFR400	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

TAWSFR

UMWSFR (n and Vf = +20%) - WSFR (n and Vf = -20% ÷ -30%)

SLOTTING

Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
ap x ae		D x D			D x D			D x D			0.5D x D		
Vc (m/min)		40-60			30-50			25-35			15-25		
D (mm)	Z (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	**3**	2650	0.022	175	2120	0.020	125	1590	0.018	85	1060	0.017	50
8	**3**	1990	0.028	165	1590	0.025	120	1190	0.022	80	800	0.019	45
10	**4**	1590	0.035	225	1270	0.032	160	960	0.028	110	640	0.025	65
12	**4**	1330	0.045	240	1060	0.041	170	800	0.036	115	530	0.032	65
14	**4**	1140	0.055	250	910	0.050	180	680	0.044	120	450	0.039	70
16	**4**	1000	0.065	260	800	0.059	185	600	0.052	125	400	0.046	75
18	**4**	880	0.075	265	710	0.068	190	530	0.060	125	350	0.053	75
20	**4**	800	0.085	270	640	0.077	195	480	0.068	130	320	0.060	75
22	**5**	720	0.086	310	580	0.077	225	430	0.068	145	290	0.060	85
25	**5**	640	0.099	315	510	0.089	225	380	0.079	150	250	0.069	85
28	**6**	570	0.100	340	450	0.090	245	340	0.080	165	230	0.070	95
30	**6**	530	0.108	345	420	0.097	245	320	0.086	165	210	0.076	95
32	**6**	500	0.116	350	400	0.104	250	300	0.093	165	200	0.081	95
36	**6**	440	0.130	345	350	0.111	230	270	0.104	170	180	0.091	100
40	**6**	400	0.145	350	320	0.123	235	240	0.116	165	160	0.102	95

SIDE MILLING

Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
ap x ae		1.5D x 0.5D			1.5D x 0.5D			1.5D x 0.3D			1.5D x 0.3D		
Vc (m/min)		50-70			40-60			30-40			20-30		
D (mm)	Z (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	**3**	3180	0.026	250	2650	0.024	190	1860	0.021	120	1330	0.018	75
8	**3**	2390	0.033	235	1990	0.030	175	1390	0.026	110	1000	0.023	70
10	**4**	1910	0.042	320	1590	0.038	180	1110	0.034	110	800	0.029	70
12	**4**	1590	0.054	345	1330	0.049	195	930	0.043	120	660	0.038	75
14	**4**	1360	0.066	360	1140	0.059	205	800	0.053	125	570	0.046	80
16	**4**	1190	0.078	370	1000	0.070	210	700	0.062	130	500	0.055	80
18	**4**	1060	0.090	380	880	0.081	215	620	0.072	135	440	0.063	85
20	**4**	960	0.102	390	800	0.092	220	560	0.082	135	400	0.071	85
22	**5**	870	0.103	445	720	0.092	200	510	0.082	125	360	0.072	80
25	**5**	760	0.119	450	640	0.107	205	450	0.095	130	320	0.083	80
28	**6**	680	0.120	490	570	0.108	245	400	0.096	155	280	0.084	95
30	**6**	640	0.130	500	530	0.117	245	370	0.104	155	270	0.091	100
32	**6**	600	0.139	500	500	0.125	250	350	0.111	155	250	0.097	95
36	**6**	530	0.156	495	440	0.140	245	310	0.125	155	220	0.109	95
40	**6**	480	0.174	500	400	0.157	250	280	0.139	155	200	0.122	95

WLFR-TAWLFR

weldon shank, roughing HR, long

DIN 844 | N | HSS/Co BR | HSS/Co PV200 | 30° | HR FINE | Z3~Z6

WLFR TAWLFR

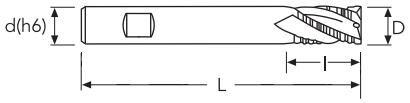
WLFR

TAWLFR

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SLOTTING | SIDE MILLING



							WLFR		TAWLFR	
D(js12)	D Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock
6	+/-0.060	6	24		68	3	WLFR060	●	TAWLFR060	●
8	+/-0.075	10	38		88	3	WLFR080	●	TAWLFR080	●
10	+/-0.075	10	45		95	4	WLFR100	●	TAWLFR100	●
12	+/-0.090	12	53		110	4	WLFR120	●	TAWLFR120	●
14	+/-0.090	12	53		110	4	WLFR140	●	TAWLFR140	●
16	+/-0.090	16	63		123	4	WLFR160	●	TAWLFR160	●
18	+/-0.090	16	63		123	4	WLFR180	●	TAWLFR180	●
20	+/-0.105	20	75		141	4	WLFR200	●	TAWLFR200	●
22	+/-0.105	20	75		141	5			TAWLFR220	●
25	+/-0.105	25	90		166	5			TAWLFR250	●
30	+/-0.105	25	90		166	6			TAWLFR300	●
32	+/-0.105	32	106		186	6			TAWLFR320	●
36	+/-0.125	32	106		186	6			TAWLFR360	●
40	+/-0.125	32	125		217	6			TAWLFR400	●

● stock standard ○ non-standard stock ▽ stock exhaustion

TAWLFR

WLFR (n and Vf = -20% ÷ -30%)

SLOTTING

Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
ap x ae		0.5D x D			0.5D x D			0.5D x D			0.3D x D		
Vc (m/min)		35-45			25-35			20-30			10-20		
D (mm)	Z (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	**3**	2120	0.014	90	1590	0.013	60	1330	0.011	45	800	0.011	25
8	**3**	1590	0.020	95	1190	0.018	65	1000	0.016	50	600	0.014	25
10	**4**	1270	0.025	125	960	0.022	85	800	0.020	65	480	0.017	35
12	**4**	1060	0.032	135	800	0.028	90	660	0.025	65	400	0.022	35
14	**4**	910	0.039	140	680	0.035	95	570	0.031	70	340	0.027	35
16	**4**	800	0.046	145	600	0.041	100	500	0.036	75	300	0.032	40
18	**4**	710	0.053	150	530	0.047	100	440	0.042	75	270	0.037	40
20	**4**	640	0.060	150	480	0.054	105	400	0.048	75	240	0.042	40
22	**5**	580	0.060	175	430	0.054	115	360	0.048	85	220	0.042	45
25	**5**	510	0.069	175	380	0.062	120	320	0.055	90	190	0.049	45
28	**6**	450	0.070	190	340	0.063	130	280	0.056	95	170	0.049	50
30	**6**	420	0.076	190	320	0.068	130	270	0.060	100	160	0.053	50
32	**6**	400	0.081	195	300	0.073	130	250	0.065	95	150	0.057	50
36	**6**	350	0.091	190	270	0.077	125	220	0.073	95	130	0.064	50
40	**6**	320	0.102	195	240	0.086	125	200	0.081	95	120	0.071	50

SIDE MILLING

Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
ap x ae		1.5D x 0.3D			1.5D x 0.3D			1.5D x 0.3D			1.5D x 0.2D		
Vc (m/min)		40-50			30-40			25-35			10-20		
D (mm)	Z (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
6	**3**	2390	0.017	120	1860	0.015	85	1590	0.013	65	800	0.012	30
8	**3**	1790	0.024	130	1390	0.022	90	1190	0.019	70	600	0.017	30
10	**4**	1430	0.029	170	1110	0.026	90	960	0.024	70	480	0.021	30
12	**4**	1190	0.038	180	930	0.034	95	800	0.030	75	400	0.026	30
14	**4**	1020	0.046	190	800	0.042	100	680	0.037	75	340	0.032	35
16	**4**	900	0.055	195	700	0.049	105	600	0.044	80	300	0.038	35
18	**4**	800	0.063	200	620	0.057	105	530	0.050	80	270	0.044	35
20	**4**	720	0.071	205	560	0.064	110	480	0.057	80	240	0.050	35
22	**5**	650	0.072	235	510	0.065	100	430	0.057	75	220	0.050	35
25	**5**	570	0.083	235	450	0.075	100	380	0.067	75	190	0.058	35
28	**6**	510	0.084	255	400	0.076	120	340	0.067	90	170	0.059	40
30	**6**	480	0.091	260	370	0.082	120	320	0.073	95	160	0.064	40
32	**6**	450	0.097	265	350	0.088	125	300	0.078	95	150	0.068	40
36	**6**	400	0.109	260	310	0.098	120	270	0.087	95	130	0.076	40
40	**6**	360	0.122	265	280	0.110	125	240	0.097	95	120	0.085	40

WSB2-TAWSB2

weldon shank, 2 flutes ball nose

DIN 327 | N | HSS/Co BR | HSS/Co PV200 | 30° | BALL NOSE | Z2 BALL

WSB2 TAWSB2

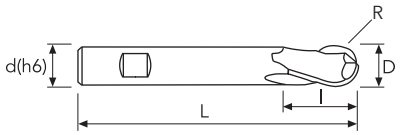
WSB2

TAWSB2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



									WSB2		TAWSB2	
D(e8)	D(e8) Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock
2	-0.014/-0.028	1.00	+0.020/-0.020	6	4		48	2	WSB2020	●	TAWSB2020	○
3	-0.014/-0.028	1.50	+0.020/-0.020	6	5		49	2	WSB2030	●	TAWSB2030	●
4	-0.020/-0.038	2.00	+0.020/-0.020	6	7		51	2	WSB2040	●	TAWSB2040	●
5	-0.020/-0.038	2.50	+0.020/-0.020	6	8		52	2	WSB2050	●	TAWSB2050	●
6	-0.020/-0.038	3.00	+0.020/-0.020	6	8		52	2	WSB2060	●	TAWSB2060	●
8	-0.025/-0.047	4.00	+0.020/-0.020	10	11		61	2	WSB2080	●	TAWSB2080	●
10	-0.025/-0.047	5.00	+0.020/-0.020	10	13		63	2	WSB2100	●	TAWSB2100	●
12	-0.032/-0.059	6.00	+0.020/-0.020	12	16		73	2	WSB2120	●	TAWSB2120	●
14	-0.032/-0.059	7.00	+0.020/-0.020	12	16		73	2	WSB2140	●	TAWSB2140	●
16	-0.032/-0.059	8.00	+0.020/-0.020	16	19		79	2	WSB2160	●	TAWSB2160	●
18	-0.032/-0.059	9.00	+0.020/-0.020	16	19		79	2	WSB2180	●	TAWSB2180	●
20	-0.040/-0.073	10.00	+0.020/-0.020	20	22		88	2	WSB2200	●	TAWSB2200	●
25	-0.040/-0.073	12.50	+0.020/-0.020	25	26		102	2	WSB2250	●		
28	-0.040/-0.073	14.00	+0.020/-0.020	25	26		102	2	WSB2280	○		
30	-0.040/-0.073	15.00	+0.020/-0.020	25	26		102	2	WSB2300	○		

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWSB2

WSB2 (n and Vf = -20% ÷ -30%)

	Material Group ISO 513	P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm	≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae	**0.1 D x 0.2 D**			**0.1 D x 0.2 D**			**0.1 D x 0.2 D**			**0.1 D x 0.2 D**		
	Vc (m/min)	**40-60**			**30-50**			**25-35**			**15-25**		
	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	2	**1.20**	7960	0.020	320	6370	0.018	230	4780	0.016	150	3180	0.015	100
	3	**1.80**	5310	0.040	420	4250	0.036	310	3180	0.032	200	2120	0.030	130
	4	**2.40**	3980	0.060	480	3180	0.054	340	2390	0.048	230	1590	0.045	140
	5	**3.00**	3180	0.070	450	2550	0.063	320	1910	0.056	210	1270	0.053	130
	6	**3.60**	2650	0.082	430	2120	0.074	310	1590	0.066	210	1060	0.062	130
	8	**4.80**	1990	0.094	370	1590	0.085	270	1190	0.075	180	800	0.071	110
	10	**6.00**	1590	0.110	350	1270	0.099	250	960	0.088	170	640	0.083	110
	12	**7.20**	1330	0.130	350	1060	0.117	250	800	0.104	170	530	0.098	100
	14	**8.40**	1140	0.150	340	910	0.135	250	680	0.120	160	450	0.113	100
	16	**9.60**	1000	0.170	340	800	0.153	240	600	0.136	160	400	0.128	100
	18	**10.80**	880	0.190	330	710	0.171	240	530	0.152	160	350	0.143	100
	20	**12.00**	800	0.210	340	640	0.189	240	480	0.168	160	320	0.158	100
	22	**13.20**	720	0.232	330	580	0.209	240	430	0.186	160	290	0.174	100
	25	**15.00**	640	0.262	340	510	0.236	240	380	0.210	160	250	0.197	100
	28	**16.80**	570	0.285	320	450	0.257	230	340	0.228	160	230	0.214	100
	30	**18.00**	530	0.292	310	420	0.263	220	320	0.233	150	210	0.219	90

	α	n (rpm)	Vf (mm/min)
	15°	x 1.1	x 1.1

WLB2-TAWLB2

weldon shank, 2 flutes ball nose, long

DIN 1889 | N | HSS/Co BR WLB2 | HSS/Co PV200 TAWLB2 | 30° | BALL NOSE | Z2 BALL

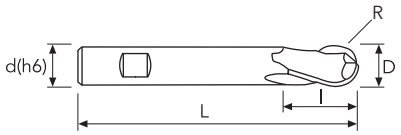
WLB2

TAWLB2

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



									WLB2		TAWLB2	
D(e8)	D(e8) Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock	EDP No.	Stock
3	-0.014/-0.028	1.50	+0.020/-0.020	6	8		56	2	WLB2030	●	TAWLB2030	○
4	-0.020/-0.038	2.00	+0.020/-0.020	6	11		63	2	WLB2040	●	TAWLB2040	○
5	-0.020/-0.038	2.50	+0.020/-0.020	6	13		68	2	WLB2050	●	TAWLB2050	○
6	-0.020/-0.038	3.00	+0.020/-0.020	6	13		68	2	WLB2060	●	TAWLB2060	○
8	-0.025/-0.047	4.00	+0.020/-0.020	10	19		88	2	WLB2080	●	TAWLB2080	○
10	-0.025/-0.047	5.00	+0.020/-0.020	10	22		95	2	WLB2100	●	TAWLB2100	○
12	-0.032/-0.059	6.00	+0.020/-0.020	12	26		110	2	WLB2120	●	TAWLB2120	○
14	-0.032/-0.059	7.00	+0.020/-0.020	12	26		110	2	WLB2140	●	TAWLB2140	○
16	-0.032/-0.059	8.00	+0.020/-0.020	16	32		123	2	WLB2160	●	TAWLB2160	○
18	-0.032/-0.059	9.00	+0.020/-0.020	16	32		123	2	WLB2180	●	TAWLB2180	○
20	-0.040/-0.073	10.00	+0.020/-0.020	20	38		141	2	WLB2200	●	TAWLB2200	○

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWLB2

WLB2 (n and Vf = -20% ÷ -30%)

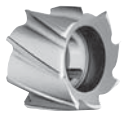
	Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae		**0.1 D x 0.2 D**			**0.1 D x 0.2 D**			**0.1 D x 0.2 D**			**0.1 D x 0.2 D**		
	Vc (m/min)		**30-50**			**25-35**			**20-30**			**12-18**		
	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
ap ae COPYING	**3**	**1.80**	4250	0.034	290	3180	0.031	190	2650	0.027	140	1590	0.026	80
	4	**2.40**	3180	0.051	320	2390	0.046	220	1990	0.041	160	1190	0.038	90
	5	**3.00**	2550	0.060	300	1910	0.054	200	1590	0.048	150	960	0.045	90
	6	**3.60**	2120	0.070	300	1590	0.063	200	1330	0.056	150	800	0.052	80
	8	**4.80**	1590	0.080	250	1190	0.072	170	1000	0.064	130	600	0.060	70
	10	**6.00**	1270	0.094	240	960	0.084	160	800	0.075	120	480	0.070	70
	12	**7.20**	1060	0.111	230	800	0.099	160	660	0.088	120	400	0.083	70
	14	**8.40**	910	0.128	230	680	0.115	160	570	0.102	120	340	0.096	70
	16	**9.60**	800	0.145	230	600	0.130	160	500	0.116	120	300	0.108	70
	18	**10.80**	710	0.162	230	530	0.145	150	440	0.129	110	270	0.121	70
	20	**12.00**	640	0.179	230	480	0.161	150	400	0.143	110	240	0.134	60

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

FM-TAFM

shell mill, multi flute

DIN 1880 | N | HSS/Co BR FM | HSS/Co PV200 TAFM | 30° | SQUARE | Z8~Z14



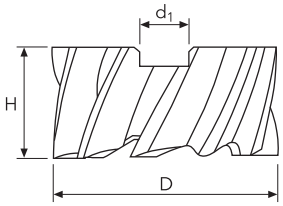
FM

TAFM

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



							FM		TAFM	
D	D Tol.	d1	d1 Tol.	H	H Tol.	z	EDP No.	Stock	EDP No.	Stock
40	+0.250/-0.150	16	+0.020/0	32	+0.50/0	8	FM40	●	TAFM40	●
50	+0.250/-0.150	22	+0.020/0	36	+0.50/0	8	FM50	●	TAFM50	●
63	+0.250/-0.150	27	+0.020/0	40	+0.50/0	8	FM63	●	TAFM63	●
80	+0.250/-0.150	27	+0.020/0	45	+0.50/0	10	FM80	○	TAFM80	○
100	+0.250/-0.150	32	+0.020/0	50	+0.50/0	10	FM100	○	TAFM100	○

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAFM

FM (n and Vf = -20% ÷ -30%)

SIDE MILLING	Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae		**0.25D x 0.75D**			**0.25D x 0.75D**			**0.25D x 0.75D**			**0.25D x 0.75D**		
	Vc (m/min)		**40-60**			**30-50**			**25-35**			**15-25**		
	D (mm)	Z (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	40	**8**	400	0.060	190	320	0.054	140	240	0.048	90	160	0.045	60
	50	**8**	320	0.070	180	250	0.063	125	190	0.056	85	130	0.053	55
	63	**8**	250	0.080	200	200	0.072	145	150	0.064	95	100	0.060	60
	80	**10**	200	0.100	200	160	0.090	145	120	0.080	95	80	0.075	60
	100	**10**	160	0.120	190	130	0.108	140	100	0.096	95	60	0.090	55

FFR-TAFFR

shell mill, multi flute, roughing HR

DIN 1880 | N | HSS/Co BR (FFR) | HSS/Co PV200 (TAFFR) | 30° | SQUARE | HR FINE | Z6~Z10

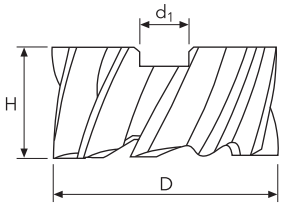
FFR

TAFFR

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

SIDE MILLING



							FFR		TAFFR	
D	D Tol.	d1	d1 Tol.	H	H Tol.	z	EDP No.	Stock	EDP No.	Stock
40	+0.250/-0.150	16	+0.020/0	32	+0.50/0	6	FFR40	●	TAFFR40	●
50	+0.250/-0.150	22	+0.020/0	36	+0.50/0	8	FFR50	●	TAFFR50	●
63	+0.250/-0.150	27	+0.020/0	40	+0.50/0	8	FFR63	●	TAFFR50	●
80	+0.250/-0.150	27	+0.020/0	45	+0.50/0	10	FFR80	○	TAFFR63	○
100	+0.250/-0.150	32	+0.020/0	50	+0.50/0	10	FFR100	○	TAFFR100	○

● stock standard ○ non-standard stock ▽ stock exhaustion

TAFFR

FFR (n and Vf = -20% ÷ -30%)

	Material Group ISO 513		P1 P2			P3 M1 K1			P4 M2 K2			P5 M3		
	Hardness/Rm		≤ 700 N/mm²			600-800 N/mm²			800-1000 N/mm²			900-1200 N/mm²		
	ap x ae		**0.25D x 0.75D**			**0.25D x 0.75D**			**0.25D x 0.75D**			**0.25D x 0.75D**		
SIDE MILLING	Vc (m/min)		**40-60**			**30-50**			**25-35**			**15-25**		
	D (mm)	Z (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	40	**8**	400	0.080	255	320	0.072	185	240	0.064	125	160	0.060	75
	50	**8**	320	0.100	255	250	0.090	180	190	0.080	120	130	0.075	80
	63	**8**	250	0.120	300	200	0.108	215	150	0.096	145	100	0.090	90
	80	**10**	200	0.120	240	160	0.108	175	120	0.096	115	80	0.090	70
	100	**10**	160	0.140	225	130	0.126	165	100	0.112	110	60	0.105	65

WCR

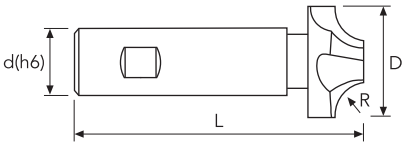
corner rounding

DIN 6518 | N | HSS/Co BR | 0° | Z4

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

ROUNDING



D	R	R(H11) Tol.	d(h6)	L	z	EDP No.	Stock
8	1.00	+0.060/0	10	60	4	WCR080	●
9	1.50	+0.060/0	10	60	4	WCR090	●
10	2.00	+0.060/0	10	60	4	WCR100	●
11	2.50	+0.060/0	10	60	4	WCR110	●
12	3.00	+0.060/0	12	60	4	WCR120	●
13	3.50	+0.075/0	12	60	4	WCR130	●
14	4.00	+0.075/0	12	60	4	WCR140	●
15	4.50	+0.075/0	12	60	4	WCR150	●
16	5.00	+0.075/0	12	60	4	WCR160	●
19	5.50	+0.075/0	16	67	4	WCR190	●
20	6.00	+0.075/0	16	67	4	WCR200	●
21	6.50	+0.090/0	16	71	4	WCR210	●
22	7.00	+0.090/0	16	71	4	WCR220	●
23	7.50	+0.090/0	16	71	4	WCR230	●
24	8.00	+0.090/0	16	71	4	WCR240	●
25	8.50	+0.090/0	25	85	4	WCR250	●
26	9.00	+0.090/0	25	85	4	WCR260	●
27	9.50	+0.090/0	25	85	4	WCR270	●
28	10.00	+0.090/0	25	85	4	WCR280	●
32	11.00	+0.110/0	25	90	4	WCR320	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

WCR

	Material Group ISO 513	P1 P2 P3 P4			M1 M2			K1 K2			N1 N2 N3 N4		
	Hardness/Rm	< 800 N/mm²			< 750 N/mm²			< 350 HB					
	ap x ae	**0.2D x 0.2D**			**0.2D x 0.2D**			**0.2D x 0.2D**			**0.2D x 0.2D**		
	Vc (m/min)	**30-50**			**15-25**			**30-40**			**60-80**		
ROUNDING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	8	1590	0.006	40	800	0.004	10	1390	0.005	30	2790	0.007	70
	9	1420	0.008	45	710	0.006	15	1240	0.007	35	2480	0.009	85
	10	1270	0.010	50	640	0.007	20	1110	0.009	40	2230	0.011	100
	11	1160	0.012	55	580	0.008	20	1010	0.010	40	2030	0.013	105
	12	1060	0.015	60	530	0.010	20	930	0.012	45	1860	0.016	120
	13	980	0.017	65	490	0.012	25	860	0.014	50	1710	0.019	130
	14	910	0.020	70	450	0.014	25	800	0.017	55	1590	0.021	135
	15	850	0.023	75	420	0.016	25	740	0.019	55	1490	0.025	150
	16	800	0.025	80	400	0.018	30	700	0.021	60	1390	0.028	155
	17	750	0.026	80	370	0.018	25	660	0.022	60	1310	0.029	150
	18	710	0.027	75	350	0.019	25	620	0.023	55	1240	0.030	145
	19	670	0.029	75	340	0.020	25	590	0.024	55	1170	0.031	145
	20	640	0.030	75	320	0.021	25	560	0.026	55	1110	0.033	145
	21	610	0.033	80	300	0.023	25	530	0.028	60	1060	0.036	150
	22	580	0.035	80	290	0.025	30	510	0.030	60	1010	0.039	155
	23	550	0.038	85	280	0.026	30	480	0.032	60	970	0.041	160
	24	530	0.040	85	270	0.028	30	460	0.034	65	930	0.044	165
	25	510	0.042	85	250	0.029	30	450	0.035	65	890	0.046	165
	26	490	0.043	85	240	0.030	30	430	0.037	65	860	0.047	165
	27	470	0.045	85	240	0.031	30	410	0.038	60	830	0.049	165
	28	450	0.046	85	230	0.032	30	400	0.039	65	800	0.051	160
	32	400	0.050	80	200	0.035	30	350	0.043	60	700	0.055	155

WDC

Dovetail cutter

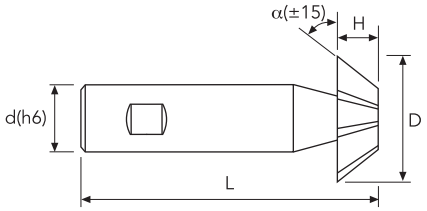
DIN 1833 | N | HSS/Co BR | α 45° | α 60° | Z6~Z12

WDC 45 WDC 60

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

DOVETAIL B 45°-60°



D	D Tol.	d(h6)	H	L	alfa	z	EDP No.	Stock
16	+/-0.065	12	4	60	45°	6	WDC45160	●
20	+/-0.065	12	5	63	45°	6	WDC45200	●
22	+/-0.065	12	6	67	45°	6	WDC45220	●
25	+/-0.065	16	6.3	67	45°	8	WDC45250	●
28	+/-0.065	16	7.5	67	45°	8	WDC45280	●
32	+/-0.080	16	8	71	45°	10	WDC45320	●
38	+/-0.080	16	10	80	45°	12	WDC45380	○
16	+/-0.065	12	6.3	60	60°	6	WDC60160	●
20	+/-0.065	12	8	63	60°	6	WDC60200	●
22	+/-0.065	12	9	67	60°	6	WDC60220	●
25	+/-0.065	16	10	67	60°	8	WDC60250	●
28	+/-0.065	16	11	67	60°	8	WDC60280	●
32	+/-0.080	16	12.5	71	60°	10	WDC60320	●
38	+/-0.080	16	16	80	60°	12	WDC60380	○

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

WDC 45° - 60°

Material Group ISO 513		P1 P2 P3 P4			M1 M2			K1 K2			N1 N2 N3 N4		
Hardness/Rm		< 800 N/mm²			< 750 N/mm²			< 350 HB					
ap x ae		0.2D x 0.15D			0.2D x 0.15D			0.2D x 0.15D			0.2D x 0.15D		
Vc (m/min)		30-50			15-25			30-40			50-70		
D (mm)	z	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
16	**6**	800	0.015	70	400	0.011	25	700	0.013	55	1190	0.017	120
20	**6**	640	0.017	65	320	0.012	20	560	0.014	45	960	0.018	105
22	**6**	580	0.018	65	290	0.013	20	510	0.015	45	870	0.020	105
25	**8**	510	0.020	80	250	0.014	20	450	0.017	45	760	0.022	100
28	**8**	450	0.023	80	230	0.016	20	400	0.019	45	680	0.025	100
32	**10**	400	0.025	100	200	0.018	20	350	0.021	45	600	0.028	100
38	**12**	340	0.028	115	170	0.020	20	290	0.024	40	500	0.031	90

WDD

Dovetail cutter

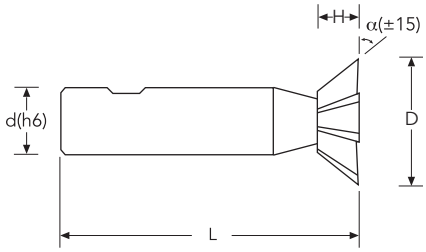
DIN 1833 | N | HSS/Co BR | α 45° | α 60° | Z6~Z12

WDD 45 WDD 60

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

DOVETAIL A 45°-60°



D	D Tol.	d(h6)	H	L	alfa	z	EDP No.	Stock
16	+/-0.065	12	4	60	45°	6	WDD45160	●
20	+/-0.065	12	5	63	45°	6	WDD45200	●
22	+/-0.065	12	6	67	45°	6	WDD45220	●
25	+/-0.065	16	6.3	67	45°	8	WDD45250	●
28	+/-0.065	16	7.5	67	45°	8	WDD45280	●
32	+/-0.080	16	8	71	45°	10	WDD45320	●
38	+/-0.080	16	10	80	45°	12	WDD45380	○
16	+/-0.065	12	6.3	60	60°	6	WDD60160	●
20	+/-0.065	12	8	63	60°	6	WDD60200	●
22	+/-0.065	12	9	67	60°	6	WDD60220	●
25	+/-0.065	16	10	67	60°	8	WDD60250	●
28	+/-0.065	16	11	67	60°	8	WDD60280	●
32	+/-0.080	16	12.5	71	60°	10	WDD60320	●
38	+/-0.080	16	16	80	60°	12	WDD60380	○

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

WDD 45° - 60°

Material Group ISO 513		P1 P2 P3 P4			M1 M2			K1 K2			N1 N2 N3 N4		
Hardness/Rm		< 800 N/mm²			< 750 N/mm²			< 350 HB					
ap x ae		**0.2D x 0.15D**			**0.2D x 0.15D**			**0.2D x 0.15D**			**0.2D x 0.15D**		
Vc (m/min)		**30-50**			**15-25**			**30-40**			**50-70**		
D (mm)	z	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
16	**6**	800	0.015	70	400	0.011	25	700	0.013	55	1190	0.017	120
20	**6**	640	0.017	65	320	0.012	20	560	0.014	45	960	0.018	105
22	**6**	580	0.018	65	290	0.013	20	510	0.015	45	870	0.020	105
25	**8**	510	0.020	80	250	0.014	20	450	0.017	45	760	0.022	100
28	**8**	450	0.023	80	230	0.016	20	400	0.019	45	680	0.025	100
32	**10**	400	0.025	100	200	0.018	20	350	0.021	45	600	0.028	100
38	**12**	340	0.028	115	170	0.020	20	290	0.024	40	500	0.031	90

WTM

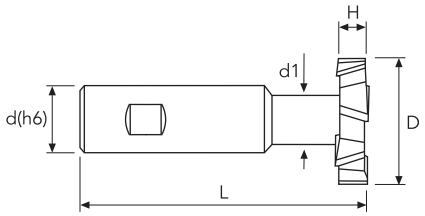
T-slot

DIN 851 | N | HSS/Co BR | 15° | SQUARE | Z6~Z8

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

T SLOT



D(d11)	D(d11) Tol.	d(h6)	d1(h12)	d1 Tol.	H(d11)	H Tol.	L	z	EDP No.	Stock
12.5	-0.050/-0.160	10	5	0/-0.012	6	-0-030/-0.105	57	6	WTM125	●
16	-0.050/-0.160	10	6.5	0/-0.015	8	-0-040/-0.130	62	6	WTM160	●
18	-0.050/-0.160	12	8	0/-0.015	8	-0-040/-0.130	70	6	WTM180	●
19	-0.065/-0.195	12	8	0/-0.015	9	-0-040/-0.130	71	6	WTM190	●
21	-0.065/-0.195	12	10	0/-0.015	9	-0-040/-0.130	74	6	WTM210	●
22	-0.065/-0.195	12	10	0/-0.015	10	-0-040/-0.130	75	6	WTM220	●
25	-0.065/-0.195	16	12	0/-0.018	11	-0-050/-0.160	82	6	WTM250	●
28	-0.065/-0.195	16	13	0/-0.018	12	-0-050/-0.160	83	6	WTM280	●
32	-0.080/-0.240	16	15	0/-0.018	14	-0-050/-0.160	90	8	WTM320	●
36	-0.080/-0.240	25	17	0/-0.018	16	-0-050/-0.160	103	8	WTM360	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

WTM

T SLOT

Material Group ISO 513		P1 P2 P3 P4			M1 M2			K1 K2			N1 N2 N3 N4		
Hardness/Rm		< 800 N/mm²			< 750 N/mm²			< 350 HB					
ap x ae		DIN Norm 650			DIN Norm 650			DIN Norm 650			DIN Norm 650		
Vc (m/min)		25-35			12-18			20-30			40-60		
D (mm)	z	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
12.5	**6**	760	0.010	45	380	0.007	15	640	0.009	35	1270	0.011	85
16	**6**	600	0.025	90	300	0.018	30	500	0.021	65	1000	0.028	165
18	**6**	530	0.030	95	270	0.021	35	440	0.026	65	880	0.033	175
19	**6**	500	0.035	105	250	0.025	35	420	0.030	75	840	0.039	195
21	**6**	450	0.040	110	230	0.028	40	380	0.034	80	760	0.044	200
22	**6**	430	0.043	110	220	0.030	40	360	0.036	80	720	0.047	200
25	**6**	380	0.045	105	190	0.032	35	320	0.038	75	640	0.050	190
28	**6**	340	0.050	100	170	0.035	35	280	0.043	70	570	0.055	190
32	**8**	300	0.057	135	150	0.040	50	250	0.048	95	500	0.063	250
36	**8**	270	0.065	140	130	0.046	45	220	0.055	95	440	0.072	250

WWK

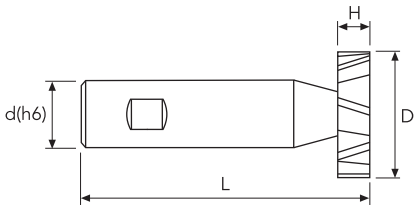
Woodruff

DIN 850 | N | HSS/Co BR | 10° | SQUARE | Z8~Z14

P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

WOODRUFF



D(h11)	D Tol.	d(h6)	H(e8)	H Tol.	L	z	EDP No.	Stock
10.5	0/-0.110	6	2	-0.032/-0.059	50	8	WWK105A	●
10.5	0/-0.110	6	2.5	-0.032/-0.059	50	8	WWK105B	●
10.5	0/-0.110	6	3	-0.032/-0.059	50	8	WWK105C	●
13.5	0/-0.110	10	2	-0.032/-0.059	56	8	WWK135A	●
13.5	0/-0.110	10	2.5	-0.032/-0.059	56	8	WWK135B	●
13.5	0/-0.110	10	3	-0.032/-0.059	56	8	WWK135C	●
13.5	0/-0.110	10	4	-0.032/-0.059	56	8	WWK135D	●
16.5	0/-0.110	10	2.5	-0.032/-0.059	56	8	WWK165B	●
16.5	0/-0.110	10	3	-0.032/-0.059	56	8	WWK165C	●
16.5	0/-0.110	10	4	-0.032/-0.059	56	8	WWK165D	●
16.5	0/-0.110	10	5	-0.032/-0.059	56	8	WWK165E	●
19.5	0/-0.130	10	3	-0.040/-0.073	63	8	WWK195C	●
19.5	0/-0.130	10	4	-0.040/-0.073	63	8	WWK195D	●
19.5	0/-0.130	10	5	-0.040/-0.073	63	8	WWK195E	●
19.5	0/-0.130	10	6	-0.040/-0.073	63	8	WWK195F	●
22.5	0/-0.130	10	4	-0.040/-0.073	63	10	WWK225D	●
22.5	0/-0.130	10	5	-0.040/-0.073	63	10	WWK225E	●
22.5	0/-0.130	10	6	-0.040/-0.073	63	10	WWK225F	●
22.5	0/-0.130	10	8	-0.040/-0.073	63	10	WWK225H	●
25.5	0/-0.130	10	5	-0.040/-0.073	63	10	WWK255E	●
25.5	0/-0.130	10	6	-0.040/-0.073	63	10	WWK255F	●
25.5	0/-0.130	10	7	-0.040/-0.073	63	10	WWK255G	●
25.5	0/-0.130	10	8	-0.040/-0.073	63	10	WWK255H	●
28.5	0/-0.130	10	5	-0.040/-0.073	63	10	WWK285E	●
28.5	0/-0.130	10	6	-0.040/-0.073	63	10	WWK285F	●
28.5	0/-0.130	10	7	-0.040/-0.073	63	10	WWK285G	●
28.5	0/-0.130	10	8	-0.040/-0.073	63	10	WWK285H	●
32.5	0/-0.160	12	5	-0.050/-0.089	71	12	WWK325E	●
32.5	0/-0.160	12	6	-0.050/-0.089	71	12	WWK325F	●
32.5	0/-0.160	12	7	-0.050/-0.089	71	12	WWK325G	●
32.5	0/-0.160	12	8	-0.050/-0.089	71	12	WWK325H	●
32.5	0/-0.160	12	10	-0.050/-0.089	71	12	WWK325L	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

WWK

WOODRUFF

Material Group ISO 513		P1 P2 P3 P4			M1 M2			K1 K2			N1 N2 N3 N4		
Hardness/Rm		< 800 N/mm²			< 750 N/mm²			< 350 HB					
ap x ae		DIN Norm 6888			DIN Norm 6888			DIN Norm 6888			DIN Norm 6888		
Vc (m/min)		25-35			12-18			20-30			40-60		
D (mm)	z	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
10.5	**8**	910	0.010	75	450	0.007	25	760	0.009	50	1520	0.011	135
13.5	**8**	710	0.018	100	350	0.012	35	590	0.015	70	1180	0.019	180
16.5	**8**	580	0.025	115	290	0.018	40	480	0.021	80	970	0.028	215
19.5	**8**	490	0.033	125	240	0.023	45	410	0.028	90	820	0.036	235
22.5	**10**	420	0.040	170	210	0.028	60	350	0.034	120	710	0.044	310
25.5	**10**	370	0.045	165	190	0.032	60	310	0.038	120	620	0.050	305
28.5	**10**	340	0.050	170	170	0.035	60	280	0.043	120	560	0.055	310
32.5	**12**	290	0.055	190	150	0.039	70	240	0.047	135	490	0.061	355

CARBIDE BURRS

Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

ITEM No.	PAGE	Ø3 mm	Ø6 mm
SA	703		
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SE	707		
SF	708		
SG	709		
SH	710		
SJ	711		
SK	712		
SL	713		
SM	714		
SN	715		

CARBIDE BURRS

Don’t miss the Osawa quality on carbide rotary burrs, available in a wide variety of shapes and geometries.

Ritrovate tutta la qualità Osawa anche nella gamma di lime rotative in metallo duro, disponibili in un’ampia scelta di forme e geometrie.

Die Osawa- Qualität steht auch für Hartmetall-Rotierfeilen. Diese sind in einer breiten Auswahl an Formen und Geometrien erhältlich.

Retrouvez toute la qualité Osawa dans la gamme de limes rotatives carbure, disponibles dans une grande variété de formes et géométries.

Toda la calidad Osawa también se propone en la gama de limas rotativas de metal duro, disponibles con una amplia variedad de formas y geometrías.

Широкий выбор форм и геометрии в сочетании с высочайшим качеством характеризует линию твёрдосплавных борфрез Osawa.

CARBIDE BURRS

M

MPC

MNF

M

Double cut
Doppio taglio
2 Schneiden

Coupe double
Doble corte
Двойная заточка

MPC

Plain cut
Taglio piano
Flachschneide

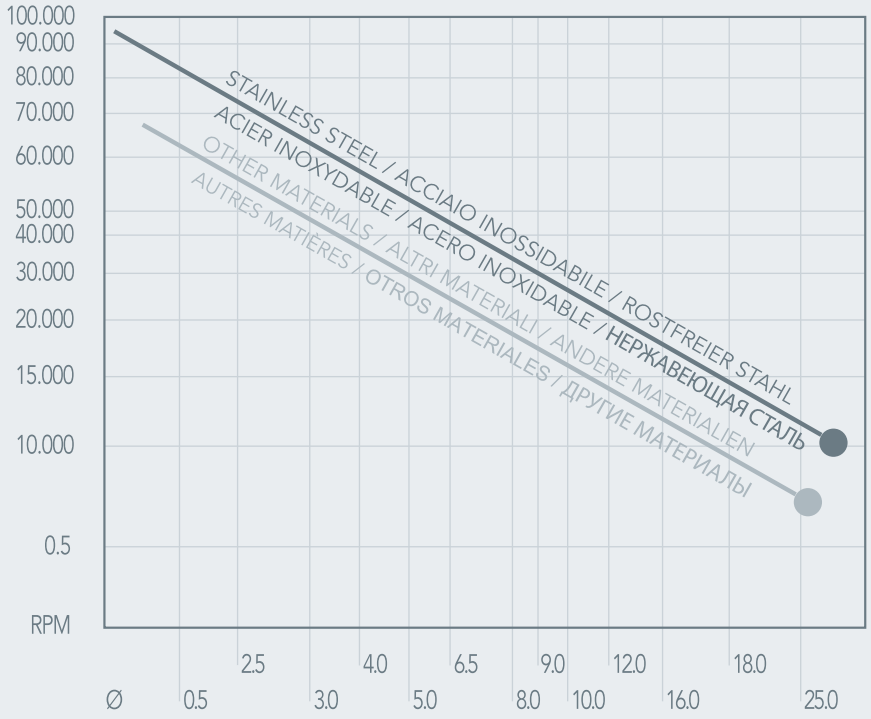
Coupe plane
Corte plano
Обычная заточка

MFN

Alucut

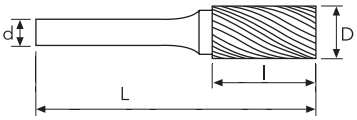
SPEED TABLE
TABELLA VELOCITÀ
GESCHWINDIGKEITSTABELLE

TABLEAU DE VITESSE
TABLA DE VELOCIDAD
ТАБЛИЦА СКОРОСТЕЙ

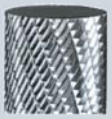


SA

OSAWA NORM



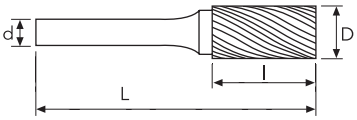
Always wear goggles when using the rotary burrs
Per l'uso delle lime rotative è obbligatorio indossare occhiali protettivi
Tragen Sie immer die Schutzbrille wenn Sie die Fräser benutzen
Toujours porter les lunettes de securité en utilisant les limes rotatives
Para usar las limas rotativas es obligatorio usar gafas de protección
При работе с борфрезами всегда используйте защитные очки

							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
1.5	3		6	38		5	SA41M	●	SA41MPC	●		
2.5	3		11	38		5	SA42M	●	SA42MPC	●		
3.0	3		14	38		5	SA43M	●	SA43MPC	●		
3.0		6	12	50		5	SA11M	●	SA11MPC	○		
4.0	3		12	38		5	SA52M	●	SA52MPC	●		
4.0		6	13	50		5	SA13M	●	SA13MPC	○		
5.0	3		12.7	38		5	SA53M	●	SA53MPC	●		
5.0		6	16	50		5	SA14M	●	SA14MPC	○		
6.0		6	18	50		5	SA1M	●	SA1MPC	○	SA1MNF	○
6.3	3		12.7	45		5	SA51M	●	SA51MPC	●		
8.0		6	19	64		5	SA2M	●	SA2MPC	○		
9.5		6	19	64		5	SA3M	●	SA3MPC	○	SA3MNF	○
11.0		6	25	70		5	SA4M	●	SA4MPC	○		
12.7		6	25	70		5	SA5M	●	SA5MPC	○	SA5MNF	○
16.0		6	25	70		5	SA6M	●	SA6MPC	○	SA6MNF	○
19.0		6	25	70		5	SA7M	●	SA7MPC	○	SA7MNF	○
25.0		6	25	70		5	SA9M	●	SA9MPC	○		

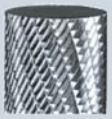
● stock standard ○ non-standard stock ▽ stock exhaustion

SB

OSAWA NORM



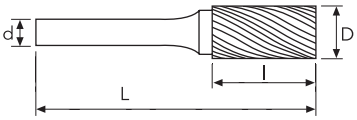
- Always wear goggles when using the rotary burrs
- Per l'uso delle lime rotative è obbligatorio indossare occhiali protettivi
- Tragen Sie immer die Schutzbrille wenn Sie die Fräser benutzen
- Toujours porter les lunettes de securité en utilisant les limes rotatives
- Para usar las limas rotativas es obligatorio usar gafas de protección
- При работе с борфрезами всегда используйте защитные очки

							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
1.5	3		6	38		5	SB41M	●	SB41MPC	●		
2.5	3		11	38		5	SB42M	●	SB42MPC	●		
3.0	3		14	38		5	SB43M	●	SB43MPC	●		
3.0		6	12	50		5	SB11M	●	SB11MPC	○		
4.0		6	13	50		5	SB13M	●	SB13MPC	○		
5.0		6	16	50		5	SB14M	●	SB14MPC	○		
6.0		6	18	50		5	SB1M	●	SB1MPC	○	SB1MNF	○
6.3	3		4.7	44		5	SB51M	●	SB51MPC	●		
8.0		6	19	64		5	SB2M	●	SB2MPC	○		
9.5		6	19	64		5	SB3M	●	SB3MPC	○	SB3MNF	○
11.0		6	25	70		5	SB4M	●	SB4MPC	○		
12.7		6	25	70		5	SB5M	●	SB5MPC	○	SB5MNF	○
16.0		6	25	70		5	SB6M	●	SB6MPC	○	SB6MNF	○
19.0		6	25	70		5	SB7M	○	SB7MPC	○	SB7MNF	○
25.0		6	25	70		5	SB9M	○	SB9MPC	○		

● stock standard ○ non-standard stock ∇ stock exhaustion

SC

OSAWA NORM



Always wear goggles when using the rotary burrs
Per l'uso delle lime rotative è obbligatorio indossare occhiali protettivi
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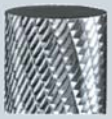
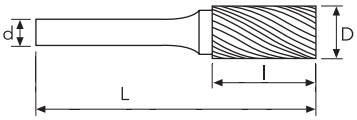
Para usar las limas rotativas es obligatorio usar gafas de protección
При работе с борфрезами всегда используйте защитные очки

							M		MPC		MNF	
												
D	**d (3)**	**d (6)**	**l**	**L**	**ANGLE**	**PACKAGING**	**EDP No.**	**Stock**	**EDP No.**	**Stock**	**EDP No.**	**Stock**
2.5	3		11	38		5	SC41M	●	SC41MPC	●		
3.0	3		14	38		5	SC42M	●	SC42MPC	●		
3.0		6	12	50		5	SC11M	●	SC11MPC	○		
4.0		6	13	50		5	SC13M	●	SC13MPC	○		
5.0	3		12.7	38		5	SC53M	●	SC53MPC	●		
5.0		6	16	50		5	SC14M	●	SC14MPC	○		
6.0		6	18	50		5	SC1M	●	SC1MPC	○	SC1MNF	○
6.3	3		12.7	45		5	SC51M	●	SC51MPC	●		
8.0		6	19	63		5	SC2M	●	SC2MPC	○		
9.5		6	19	63		5	SC3M	●	SC3MPC	○	SC3MNF	○
11.0		6	25	70		5	SC4M	●	SC4MPC	○		
12.7		6	25	70		5	SC5M	●	SC5MPC	○	SC5MNF	○
16.0		6	25	70		5	SC6M	●	SC6MPC	○	SC6MNF	○
19.0		6	25	70		5	SC7M	○	SC7MPC	○	SC7MNF	○
25.0		6	25	70		5	SC9M	○	SC9MPC	○		

● stock standard ○ non-standard stock ∇ stock exhaustion

SD

OSAWA NORM



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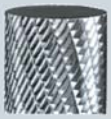
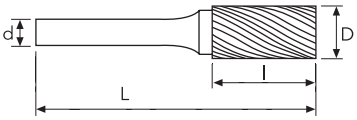
- Para usar las limas rotativas es obligatorio usar gafas de protección
- При работе с борфрезами всегда используйте защитные очки

							M		MPC		MNF	
												
D	**d (3)**	**d (6)**	**l**	**L**	**ANGLE**	**PACKAGING**	**EDP No.**	**Stock**	**EDP No.**	**Stock**	**EDP No.**	**Stock**
2.5	3		2.3	38		5	SD41M	●	SD41MPC	●		
3.0	3		2.5	38		5	SD42M	●	SD42MPC	●		
3.0		6	2.5	50		5	SD11M	●	SD11MPC	○		
5.0	3		4.7	38		5	SD53M	●	SD53MPC	●		
5.0		6	4	50		5	SD14M	●	SD14MPC	○		
6.0		6	4.7	50		5	SD1M	●	SD1MPC	○	SD1MNF	○
6.3	3		5	38		5	SD51M	●	SD51MPC	●		
8.0		6	6	52		5	SD2M	●	SD2MPC	○		
9.5		6	8	54		5	SD3M	●	SD3MPC	○	SD3MNF	○
11.0		6	9.5	55		5	SD4M	●	SD4MPC	○		
12.7		6	11	56		5	SD5M	●	SD5MPC	○	SD5MNF	○
16.0		6	14	60		5	SD6M	●	SD6MPC	○	SD6MNF	○
19.0		6	16.5	62		5	SD7M	●	SD7MPC	○	SD7MNF	○
25.0		6	22	68		5	SD9M	●	SD9MPC	○		

● stock standard ○ non-standard stock ▽ stock exhaustion

SE

OSAWA NORM



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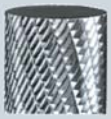
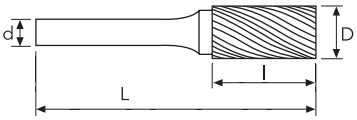
							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
3.0	3		5.5	38		5	SE41M	●	SE41MPC	●		
6.0		6	10	50		5	SE1M	●	SE1MPC	○		
5.0	3		7.1	38		5	SE53M	●	SE53MPC	●		
6.3	3		9.5	42		5	SE51M	●	SE51MPC	●		
9.5		6	16	60		5	SE3M	●	SE3MPC	○	SE3MNF	○
12.7		6	22	67		5	SE5M	●	SE5MPC	○	SE5MNF	○
16.0		6	25	70		5	SE6M	●	SE6MPC	○	SE6MNF	○
19.0		6	25	70		5	SE7M	○	SE7MPC	○	SE7MNF	○

● stock standard ○ non-standard stock ▽ stock exhaustion

SF

OSAWA NORM



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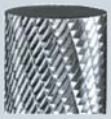
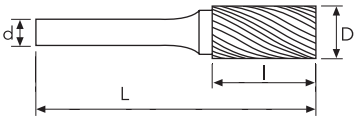
							M		MPC		MNF	
												
D	**d (3)**	**d (6)**	**l**	**L**	**ANGLE**	**PACKAGING**	**EDP No.**	**Stock**	**EDP No.**	**Stock**	**EDP No.**	**Stock**
3.0	3		6	38		5	SF41M	●	SF41MPC	●		
3.0	3		14	38		5	SF42M	●	SF42MPC	●		
3.0		6	12	50		5	SF11M	●	SF11MPC	○		
5.0	3		12.7	38		5	SF53M	●	SF53MPC	●		
6.0		6	18	50		5	SF1M	●	SF1MPC	○	SF1MNF	○
6.3	3		12.7	45		5	SF51M	●	SF51MPC	●		
9.6		6	19	64		5	SF3M	●	SF3MPC	○	SF3MNF	○
11.0		6	25	70		5	SF4M	●	SF4MPC	○		
12.7		6	19	65		5	SF13M	○	SF13MPC	○		
12.7		6	25	70		5	SF5M	●	SF5MPC	○	SF5MNF	○
16.0		6	25	70		5	SF6M	●	SF6MPC	○	SF6MNF	○
19.0		6	25	70		5	SF7M	○	SF7MPC	○		

● stock standard ○ non-standard stock ▽ stock exhaustion

SG

OSAWA NORM



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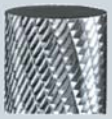
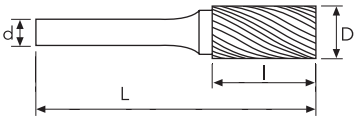
							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
3.0	3		6	38		5	SG41M	●	SG41MPC	●		
3.0	3		10	38		5	SG43M	●	SG43MPC	●		
3.0	3		14	38		5	SG44M	●	SG44MPC	●		
5.0	3		12.7	38		5	SG53M	●	SG53MPC	●		
6.0		6	18	50		5	SG1M	●	SG1MPC	○		
6.3	3		12.7	45		5	SG51M	●	SG51MPC	●		
8.0		6	19	64		5	SG2M	●	SG2MPC	○		
9.5		6	19	64		5	SG3M	●	SG3MPC	○		
12.7		6	19	64		5	SG13M	○	SG13MPC	○		
12.7		6	25	70		5	SG5M	●	SG5MPC	○		
16.0		6	25	70		5	SG6M	●	SG6MPC	○		
19.0		6	25	70		5	SG7M	●	SG7MPC	○		
19.0		6	38	83		5	SG15M	○	SG15MPC	○		

● stock standard ○ non-standard stock ▽ stock exhaustion

SH

OSAWA NORM



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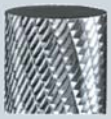
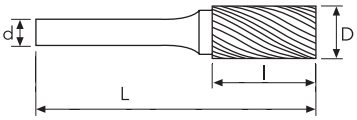
							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
3.0	3		6	38		5	SH41M	●	SH41MPC	●		
5.0	3		9.5	38		5	SH53M	●	SH53MPC	●		
8.0		6	19	64		5	SH2M	●	SH2MPC	○		
12.7		6	32	77		5	SH5M	●	SH5MPC	○		
16.0		6	36	80		5	SH6M	○	SH6MPC	○		

● stock standard ○ non-standard stock ▽ stock exhaustion

SJ

OSAWA NORM



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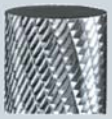
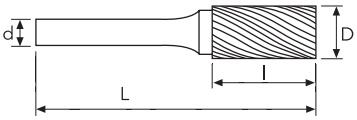
							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
3.0	3		2.5	38	60°	5	SJ42M	●	SJ42MPC	●		
6.0		6	4	50	60°	5	SJ1M	○	SJ1MPC	○		
9.5		6	8	56	60°	5	SJ3M	●	SJ3MPC	○		
12.7		6	11	59	60°	5	SJ5M	●	SJ5MPC	○		
16.0		6	14.5	63	60°	5	SJ6M	○	SJ6MPC	○		
19.0		6	17.5	65	60°	5	SJ7M	○	SJ7MPC	○		
25.0		6	24.5	70	60°	5	SJ9M	○	SJ9MPC	○		

● stock standard ○ non-standard stock ▽ stock exhaustion

SK

OSAWA NORM



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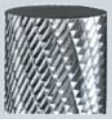
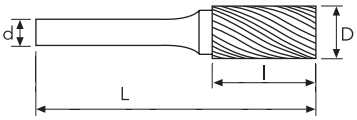
							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
3.0	3		1.5	38	90°	5	SK42M	●	SK42MPC	●		
6.0		6	3	50	90°	5	SK1M	●	SK1MPC	○		
9.5		6	4.7	53	90°	5	SK3M	●	SK3MPC	○		
12.7		6	6.3	55	90°	5	SK5M	●	SK5MPC	○		
16.0		6	8	57	90°	5	SK6M	●	SK6MPC	○		
19.0		6	9.5	59	90°	5	SK7M	○	SK7MPC	○		
25.0		6	12.7	60	90°	5	SK9M	○	SK9MPC	○		

● stock standard ○ non-standard stock ∇ stock exhaustion

SL

OSAWA NORM



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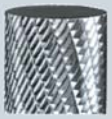
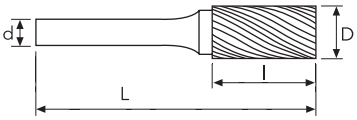
							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
3.0	3		10	38	10°	5	SL41M	●	SL41MPC	●		
3.0	3		14	38	8°	5	SL42M	●	SL42MPC	●		
5.0	3		12.7	38	14°	5	SL53M	●	SL53MPC	●		
6.0		6	18	50	14°	5	SL1M	●	SL1MPC	○		
8.0		6	25.4	70	14°	5	SL2M	●	SL2MPC	○		
9.6		6	30.2	76	14°	5	SL3M	●	SL3MPC	○	SL3MNF	○
12.7		6	32	77	14°	5	SL4M	●	SL4MPC	○	SL4MNF	○
16.0		6	33.3	78	14°	5	SL5M	●	SL5MPC	○	SL5MNF	○
19.0		6	41.3	86	14°	5	SL7M	○	SL7MPC	○		

● stock standard ○ non-standard stock ▽ stock exhaustion

SM

OSAWA NORM



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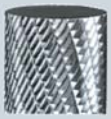
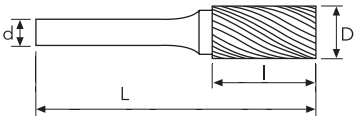
При работе с борфрезами всегда используйте защитные очки

							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
3.0	3		8	38	18°	5	SM41M	●	SM41MPC	●		
3.0	3		11	38	14°	5	SM42M	●	SM42MPC	●		
3.0	3		15	38	10°	5	SM43M	●	SM43MPC	●		
6.0		6	12.7	50	22°	5	SM1M	●	SM1MPC	○		
6.0		6	20	50	14°	5	SM2M	●	SM2MPC	○		
6.0		6	25	50	10°	5	SM3M	●	SM3MPC	○		
6.3	3		12.7	51	22°	5	SM51M	●	SM51MPC	●		
9.5		6	16	64	28°	5	SM4M	●	SM4MPC	○		
12.7		6	22	71	28°	5	SM5M	●	SM5MPC	○		
16.0		6	25	74	31°	5	SM6M	●	SM6MPC	○		

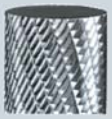
● stock standard ○ non-standard stock ∇ stock exhaustion

SN

OSAWA NORM



Always wear goggles when using the rotary burrs
Per l'uso delle lime rotative è obbligatorio indossare occhiali protettivi
Tragen Sie immer die Schutzbrille wenn Sie die Fräser benutzen
Toujours porter les lunettes de securité en utilisant les limes rotatives
Para usar las limas rotativas es obligatorio usar gafas de protección
При работе с борфрезами всегда используйте защитные очки

							M		MPC		MNF	
												
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	Stock	EDP No.	Stock	EDP No.	Stock
3.0	3		4	38	10°	5	SN42M	●	SN42MPC	●		
6.0		6	8	50	10°	5	SN1M	●	SN1MPC	○		
6.3	3		6	39	12°	5	SN51M	○	SN51MPC	○		
9.5		6	9.5	55	13°	5	SN2M	●	SN2MPC	○		
12.7		6	12.7	58	28°	5	SN4M	●	SN4MPC	○		
16.0		6	19	64	18°	5	SN6M	○	SN6MPC	○		
19.0		6	16	61	30°	5	SN7M	○	SN7MPC	○		

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO
TYPHOON TA-HTA-4HTA
TYPHOON PU-HPU
TYPHOON SUH
TYPHOON ALH
TYPHOON HRC
TYPHOON SUH MINI
TYPHOON HL
C-SD-TA
LFTA
SUTA
HSS-HSS/CO DRILLS
G2
MDTA
HF VH/UP
MEF
ALU
MEX
UH
HSS/CO-HSSP END MILLS
CARBIDE BURRS

M

BUR10 M TYPE

Set 10pcs. - shank Ø6 mm

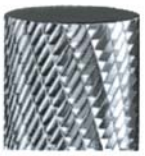
SA1 - SB1 - SC1 - SD1 - SE1 - SF1 - SG1 - SL1 - SM1 - SN1

MPC

A15FW MPC TYPE

Set 15pcs. - shank Ø3 mm

SA41 - SA42 - SA43 - SA52 - SB43 - SC42 - SD41 - SD42 - SD53 - SE41 - SG43 - SL42 - SM42 - SM43 - SN42



M

A16FW M TYPE

Set 15pcs. - shank Ø3 mm

SA41 - SA42 - SA43 - SA52 - SB43 - SC42 - SD41 SD42 - SD53 - SE41 - SG43 - SL42 - SM42 - SM43 - SN42

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