OSW24 CATALOGUE



OSAWA

SORMA CUTTING SOLUTIONS

	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	1200-1480 N/mm²
P7	Ferritic - Martensitic stainless steel	
P8	PH stainless steel	
M1	Austenitic stainless steel (good machinability)	
M2	Austenitic stainless steel (medium machinability) and Duplex	
M3	Super austenitic stainless steel and super Duplex	
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 alloy > 12% Si and Aluminium-Magnesium	
N3	Copper alloy	
N4	Brass alloy and Bronze alloy	
N5	Plastic material	
N6	Carbon fiber and composite	
S1	Heat resistant super alloys (HRSA) Ni base (good machinability)	< 25 HRC
S2	Heat resistant super alloys (HRSA) Ni base (medium machinability)	25-35 HRC
S3	Heat resistant super alloys (HRSA) Ni base (low machinability)	35-45 HRC
S4	Low Titanium base alloy (good machinability)	
S5	High Titanium base alloy (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 15-29 FOR THE COMPLETE LIST OF WORKPIECE MATERIALS.
CONSULTARE PAGG. 15-29 PER LA LISTA COMPLETA DEI MATERIALI
AUF DEN SEITEN 15 BIS 29 FÜR DIE VOLLSTÄNDIGE LISTE VON WERKSTOFFMATERIALIEN
CONSULTER DE LA PAGE 15 À LA PAGE 29 POUR LA LISTE COMPLÈTE DES MATÉRIAUX
CONSULTAR DESDE PÁG. 15 A PÁG. 29 PARA LA LISTA COMPLETA DE LOS MATERIALES
ПОЛНЫЙ СПИСОК ОБРАБАТЫВАЕМЫХ МАТЕРИАЛОВ СМОТРИ НА СТР. 15-29.

OSW24 CATALOGUE

Osawa is the range of solid tools for milling and drilling by Sorma s.p.a. addressed to the mechanical industry. Based on the well-established know how of Sorma, coming from Japanese and European best technologies, the brand Osawa was launched in 2001 and groups different tools manifacturers which are strictly selected on the strength of their tools' performances and they are all certified ISO 9001.
The company's organization enables Sorma to cope with a broad framework of customer requests, even in the most critical applications.
Manufacturing flexibility and in-depth knowledge of customers' needs gained in more than 70 years of business enable the company to offer the market high-profile tools in every component of the range.

Arturo Sorgato
President - Sorma S.p.A.

Osawa è la linea di utensili integrali per foratura e fresatura di Sorma s.p.a. destinata all'industria meccanica. 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 selezionati severamente sulla base delle prestazioni dei loro utensili, tutti certificati ISO 9001.
L'organizzazione interna dell'azienda permette a Sorma di far fronte ad un ampio quadro di richieste da parte dei clienti, anche nelle applicazioni più critiche.
La flessibilità produttiva e la profonda conoscenza delle esigenze dei clienti maturate in oltre 70 anni di attività, permettono all'azienda di offrire al mercato utensili di alto profilo in ogni componente della gamma.

Arturo Sorgato
Presidente - Sorma S.p.A.

Osawa ist eine umfangreiche Produktlinie von Bohr- und Fräswerkzeugen der Firma Sorma s.p.a., die für den Maschinenbau entwickelt wurde. Basierend auf den Erfahrungen, die Sorma mit den besten japanischen und europäischen Technologien gesammelt hat, wurde 2001 die Marke Osawa eingeführt, die mehrere Hersteller vereint, die streng nach der Leistung ihrer Werkzeuge ausgewählt wurden und alle nach ISO 9001 zertifiziert sind.
Die interne Organisation des Unternehmens ermöglicht es Sorma, ein breites Spektrum an Kundenwünschen zu bewältigen, selbst bei den kritischsten Anwendungen.
Die Produktionsflexibilität und die umfassende Kenntnis der Kundenbedürfnisse, die in über 70 Jahren Tätigkeit erworben wurden, ermöglichen es dem Unternehmen, dem Markt hochkarätige Werkzeuge in allen Segmenten des Sortiments anzubieten.

Arturo Sorgato
Präsident - Sorma S.p.A.

Osawa est la gamme d'outils monobloc pour perçage et fraisage de Sorma s.p.a., pensée pour l'industrie mécanique. Basée sur l'expérience de Sorma avec les meilleures technologies japonaises et européennes, la marque Osawa a été lancée en 2001 et elle regroupe de différents fabricants qui ont été sélectionnés sur la base des performances de leurs outils, tous certifié ISO 9001.
L'organisation interne de l'entreprise permet à Sorma de faire face à une large gamme de demandes de la part des clients, ainsi que dans les applications les plus problématiques.
La flexibilité productive et la profonde connaissance des exigences des clients, développées depuis plus de 70 années d'activité, permettent à l'entreprise d'offrir au marché des outils de haute qualité dans chaque composant de la gamme.

Arturo Sorgato
Président - Sorma S.p.A.

Osawa es la línea de herramientas integrales para taladrado y fresado de Sorma s.p.a. destinados a la industria mecánica. Basada en la experiencia adquirida por Sorma con las mejores tecnologías japonesas y europeas, la marca Osawa nació en 2001 y reúne a varios fabricantes rigurosamente seleccionados en función de las prestaciones de sus herramientas, certificadas ISO 9001.
La organización interna de la empresa permite a Sorma hacer frente a una amplia gama de solicitudes por parte de los clientes, también en las aplicaciones más problemáticas.
La flexibilidad de la producción y el profundo conocimiento de las necesidades de los clientes adquirido a lo largo de más de 70 años de actividad permiten a la empresa ofrecer al mercado herramientas de alto perfil en todos los componentes de la gama.

Arturo Sorgato
Presidente - Sorma S.p.A.

Osawa – это линия цельно-осевого инструмента компании Sorma s.p.a. для фрезерования и сверления предназначенного для металлообрабатывающей промышленности. Основываясь на хорошо зарекомендовавших себя ноу-хау компании Sorma, основанных на лучших японских и европейских технологиях, бренд Osawa был основан в 2001 году, который объединяет нескольких производителей инструмента сертифицированных по стандарту ISO 9001, которые проходят строгий отбор на основании характеристик производимого ими инструмента.
Внутренняя организация компании позволяет Sorma справляться с широким спектром запросов клиентов, даже в случае наиболее сложных задач.
Производственная гибкость и глубокое понимание потребностей клиентов, приобретенное за более чем 70 лет работы, позволяют компании предложить на рынок высококлассный инструмент по всей гамме ассортимента.

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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65 ..... TYPHOON 4HTA general purpose 4-margins - 8xD
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91 ..... TYPHOON CV general purpose - 3xD
97 ..... TYPHOON HVA stainless steel - 3xD, 5xD
109 ..... TYPHOON ALH non-ferrous materials - 3xD, 5xD
119 ..... TYPHOON HRC hardened steel 45÷62 HRC - 3xD
125 ..... TYPHOON SUH MINI short, long and extra long - 5xD÷30xD
157 ..... TYPHOON HL long and extra-long - 12xD÷30xD
191 ..... TYPHOON HSD step drill for 90° chamfering
197 ..... C-SD-TA NC spotting

201. HSS DRILLS 

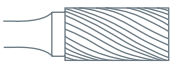
211 ..... LFTA high performance
221 ..... SUTA high performance
231 ..... HSS - HSS/Co general purpose

297. CARBIDE END MILLS 

315 ..... G2 general purpose
365 ..... HF VH/UP universal and multi-purpose
463 ..... MEF stainless steel and super alloys
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565 ..... UH (< 70 HRC), MH (30÷70 HRC) steel and hardened steel

629. HSS END MILLS 

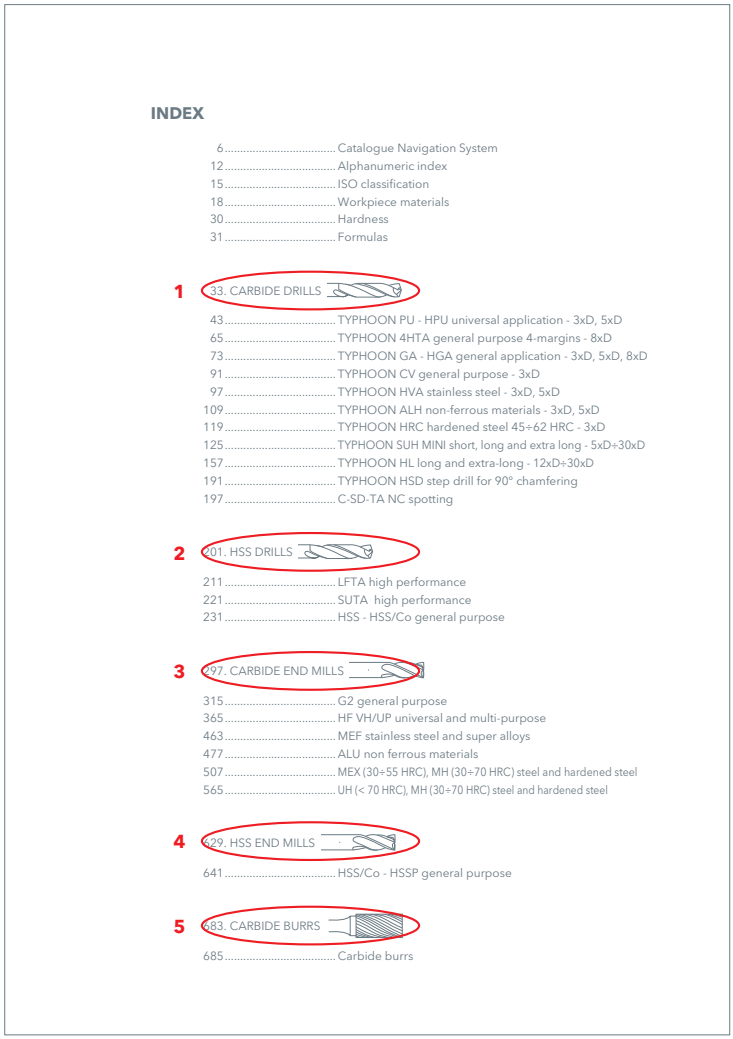
641 ..... HSS/Co - HSSP general purpose

683. CARBIDE BURRS 

685 ..... Carbide burrs

CATALOGUE STRUCTURE

SUDDIVISIONE DEL CATALOGO
AUFTEILUNG DES KATALOGS
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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-Rotierfräser

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	232	G2211
134NB (234NVA)	270	G2212
1385NTI (1386STI)	241	G2250
1386STI	241	G2251
1386STI SET	244	G2310
138HB	252	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.

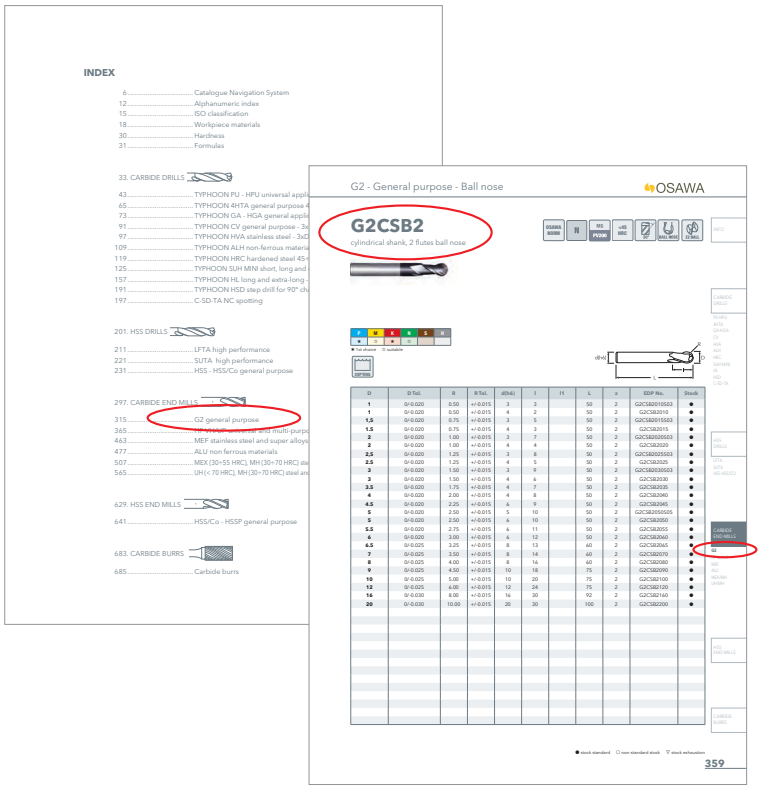
ALPHANUMERISCHER INDEX
Wenn Sie die Art.Nr kennen (z.B. ART.Nr 118N), können Sie die entsprechende Seite durch den Alphanumerischen Index – Seite 12 - finden.

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. Carbide End-Mills G2) is known, check general index at page 5 or follow the thumb index.

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

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

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

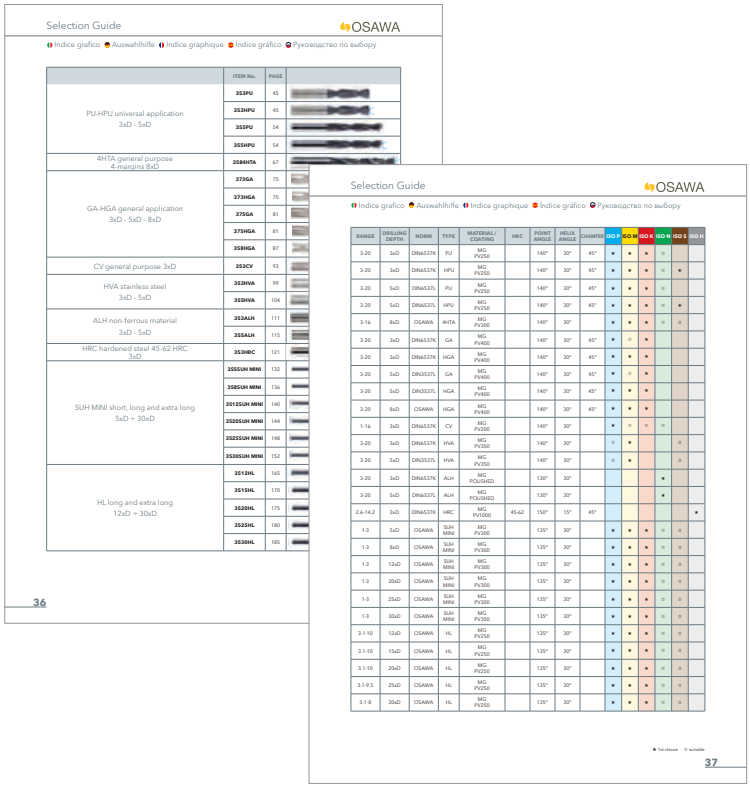
ÍNDICE Y DIRECTORIO
Conociendo la serie de producto (ej. Carbide End-Mills G2), consultar el índice general en pág. 5 o seguir el directorio.

ОГЛАВЛЕНИЕ И РУБРИКАТОР
Если известна серия продукции (т.е. Carbide End-Mills 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.

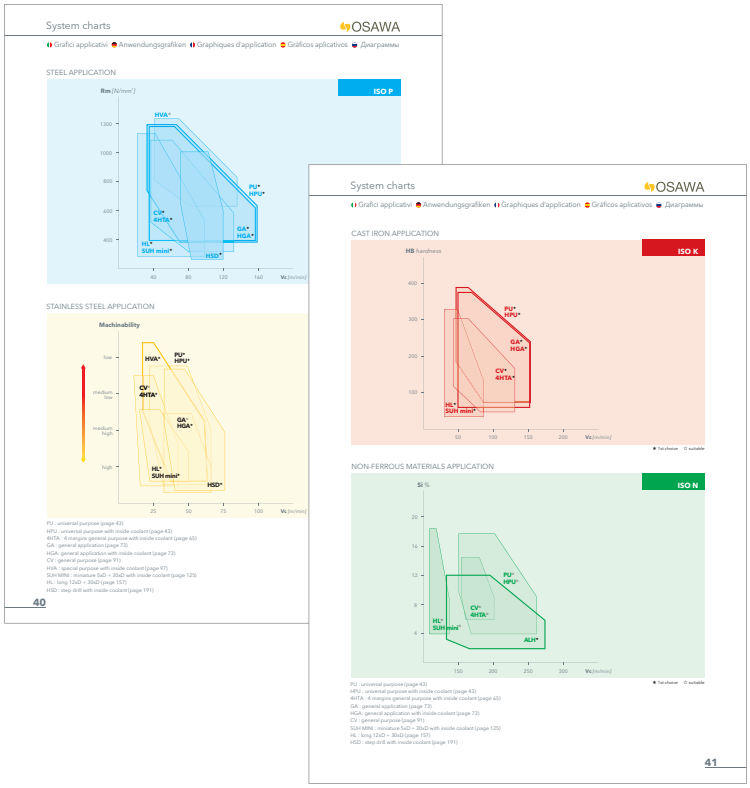
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CARBIDE END MILLS page 302
HSS END MILLS page 634
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PRODUCT SEARCH

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.

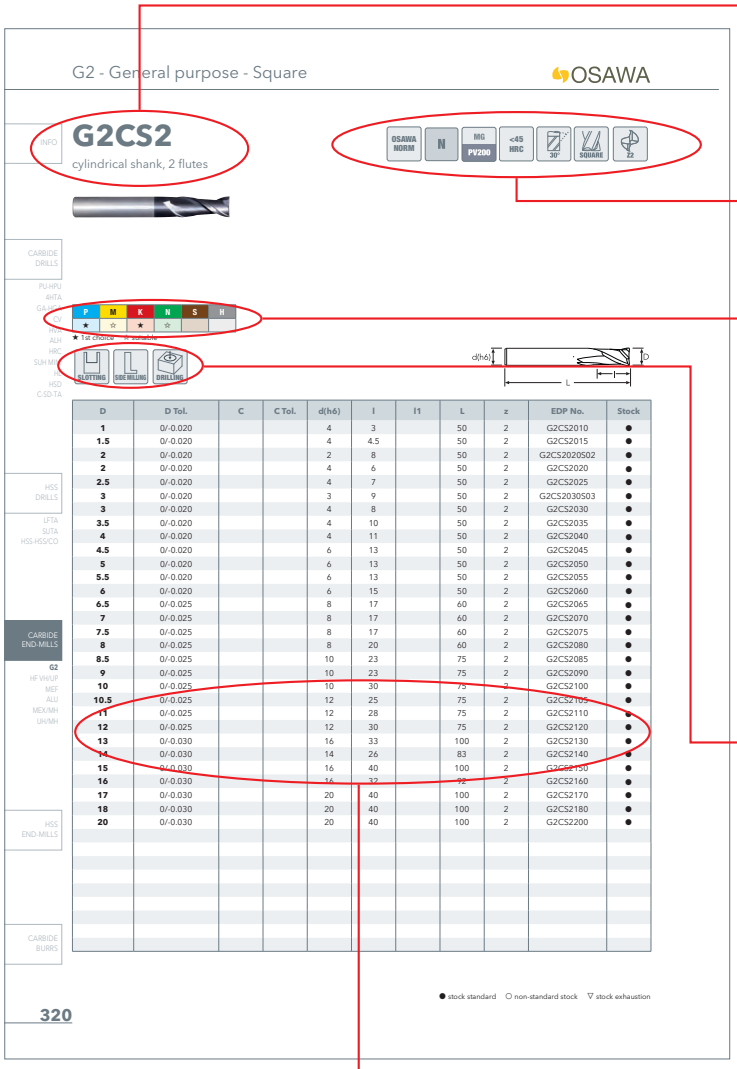
SYSTEM CHART
В начале каждого подраздела, для каждой группы инструмента находиться система графических диаграмм соответствующих типу обрабатываемого материала.

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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

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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 ÷ 1480 N/mm² 38 ÷ 45 HRC
P7	Ferritic - Martensitic stainless steel Acciai inossidabili ferritici e martensitici Ferritische-Martensitische Stähle	Aciers inoxydables ferritiques-martensitiques Aceros inoxidables ferríticos-martensíticos Ферритно-мартенситная нержавеющая сталь	
P8	PH stainless steel Acciai inossidabili PH - indurenti per precipitazione Ausscheidungshartbare Edelstahle	Aciers inoxydables à durcissement par précipitation Aceros inoxidables PH Дисперсионно-твердеющая нержавеющая сталь	
M1	Austenitic stainless steel (good machinability) Acciai inossidabili austenitici (buona lavorabilità) Austenitische Edelstähle (niedriglegiert)	Aciers inoxydables austénitiques (faiblement allié) Aceros inoxidables Austeníticos (fácil mecanizado) Аустенитная нержавеющая сталь	
M2	Austenitic stainless steel (medium machinability) and Duplex Acciai inossidabili austenitici (buona lavorabilità) Austenitische Edelstähle (niedriglegiert)	Aciers inoxydables austénitiques (faiblement allié) Aceros inoxidables Austeníticos (fácil mecanizado) Аустенитная нержавеющая сталь	
M3	Super austenitic stainless steel and super Duplex Acciai inossidabili austenitici (media lavorabilità) e Duplex Austenitische Edelstähle (mittel-legiert) und Duplex	Aciers inoxydables austénitiques (moyennement allié) et Duplex Aceros inoxidables Austeníticos (medio mecanizado) y Duplex Аустенитная и дуплексная нержавеющая сталь	

	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 alloy > 12% Si and Aluminium-Magnesium Leghe di alluminio > 12% Si e alluminio-magnesio Aluminiumlegierungen > 12% Si und Aluminium-Magnesium	Alliages d'aluminium > 12 % Si et Aluminium-Magnesium Aleación de aluminio > 12% Si y Aluminio-Magnesio Алюминиевые сплавы с содержанием Si<12% и алюмо-магниевые сплавы	
N3	Copper alloy Leghe di rame Kupferlegierungen	Alliages de cuivre Aleación de cobre Медные сплавы	
N4	Brass alloy and Bronze alloy Leghe di ottone e leghe di bronzo Bronze- und Messinglegierungen	Alliages de bronze et de laiton Aleación de Latón y Aleación de Bronce Латуни и бронзы	
N5	Plastic material Polimeri Polymere	Polymères Material plástico Пластики	
N6	Carbon fiber and composite Fibra di carbonio e compositi Faserwerkstoffe und Verbundwerkstoffe	Fibres et composites Fibra de carbonio y compositos Углеволокно и композиты	

	MATERIALS		HARDNESS/Rm
S1	Heat resistant super alloys (HRSA) Ni base (good machinability) Leghe a base di nichel resistenti al calore (buona lavorabilità) Warmfeste Superlegierungen (HRSA) Nickel-Legierungen (einfach zu bearbeiten)	Base Ni de superalliages résistants à la chaleur (HRSA) (bonne usinabilité) Super aleaciones resistentes al calor (HRSA) base Nickel (fácil mecanizado) Жаропрочные сплавы (HRSA) Ni(легкообрабатываемые)	< 25 HRC
S2	Heat resistant super alloys (HRSA) Ni base (medium machinability) Leghe a base di nichel resistenti al calore (media lavorabilità) Warmfeste Superlegierungen (HRSA) Nickel-Legierungen (mittlere Bearbeitbarkeit)	Superalliages résistants à la chaleur (HRSA) Ni base (usinabilité moyenne) Super aleaciones resistentes al calor (HRSA) base Nickel (medio mecanizado) Жаропрочные сплавы (HRSA) Ni(среднеобрабатываемые)	25 ÷ 35 HRC
S3	Heat resistant super alloys (HRSA) Ni base (low machinability) Leghe a base di nichel resistenti al calore (difficile lavorabilità) Warmfeste Superlegierungen (HRSA) Nickel-Legierungen (schwierig zu bearbeiten)	Superalliages résistants à la chaleur (HRSA) Ni base (faible usinabilité) Super aleaciones resistentes al calor (HRSA) base Nickel (difícil mecanizado) Жаропрочные сплавы (HRSA) Ni(труднообрабатываемые)	35 ÷ 45 HRC
S4	Low Titanium base alloy (good machinability) Leghe di titanio basso legate (buona lavorabilità) Titanlegierung (gut Bearbeitbarkeit)	Alliages de base à faible teneur en titane (bonne usinabilité) Aleaciones a bajo contenido Titanio (fácil mecanizado) Сплавы с низким содержанием Ti(легкообрабатываемые)	
S5	High Titanium base alloy (medium machinability) Leghe di titanio alto legate (media lavorabilità) Hochfeste Titanlegierung (mittlere Bearbeitbarkeit)	Alliages à base de titane élevé (usinabilité moyenne) Aleaciones a alto contenido Titanio (medio mecanizado) Сплавы с высоким содержанием Ti (среднеобрабатываемые)	

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

Gr.	Materials	W.-Nr	DIN	EN-Nr.	EN	UNI	BS	JIS	AFNOR
P1	Free cutting steel and structural steel Rm < 500 N/mm²	1.0037	St 37-2	1.0037	S235JR	Fe 360 B		STKM 12 C	E 24-2
		1.0116	St 37-3	1.0038	S235JRG2	Fe 360 D FF	4360-40 C		E 24-3, E 24-4
		1.0144	St 44-3 N	1.0144	S275J2G3	Fe 430 D FF	4360-43 C	SM 41 C	E 28-3, E 28-4
		1.0301	C 10	1.0301	C 10	C 10	045 M 10	S 10 C	34 C 10, XC 10
		1.0401	C 15			C 15, C 16	080 M 15		37 C 12, XC 18
		1.0402	C 22	1.0402	C 22	C 20, C 21	050 A 20		C 20
		1.0570	St 52-3	1.0570	S355JR	Fe 510 B	4360-50 C	SM 50 YA	E 36-3, E 36-4
		1.0715	9 SMn 28	1.0715	11 SMn 30	CF 9 SMn 28	230 M 07	SUM 22	S 250
		1.0718	9 SMnPb 28	1.0718	11 SMnPb 30	CF 9 SMnPb 28		SUM 22 L	S 250 Pb
		1.0721	10 S 20	1.0721	10 S 20	CF 10 S 20	210 M 15		10 F 1
		1.0722	10 SPb 20			CF 10 SPb 20			10 PbF 2
		1.0723	15 S 20	1.0725	15 SMn 13		210 A 15	SUM 32	
		1.0726	35 S 20	1.0726	35 S20		212 M 36		35 MF 4
		1.0727	46 S 20	1.0727	46 S20		212 M 44		45 MF 4
		1.0736	9 SMn 36	1.0736	11 SMn 37	CF 9 SMn 36	240 M 07		S 300
		1.0765	36 SMnPb 14		36 SMnPb 14	CF 35 SMnPb 10	216 M 36		35 MF 6 Pb
		1.1141	Ck 15	1.1141	C 15R	C 15, C 16	080 M 15	S 15 C, S 15 CK	XC 15, XC 18
			Ck 25			C 25	060 A 25	S 25 C	XC 25
P2	Carbon steel and low alloy steel Rm 500÷700 N/mm²	1.0501	C 35		C 35	C 35	060 A 35		55 C 35
		1.0503	C 45	1.0503	E 335	C 45	80 M 46	S 45 C	65 C 45
		1.0511	C 40		C 40	C 40	080 M 40	S 40 C	60 C 40
		1.0535	St 70-2	1.0070	E 360	Fe 690			A 70-2
		1.0601	C 60	1.0601	C60	C 60	080 A 62		CC 55
		1.1157	40 Mn 4				150 M 36		35 M 5
		1.1165	30 Mn 5	1.1165	G 28 Mn6		120 M 36	SMn 1 H, SCMn 2	
		1.1181	Ck 35	1.1181	C 35E	C 35	080 M 36	S 35 C	XC 38 H1
		1.1191	Ck 45	1.1191	C 45E	C 45	080 M 46	S 45 C	XC 42
		1.1221	Ck 60	1.1221	C 60E	C 60	080 A 62	S 58 C	XC 60
		1.1740	C 60 W					SK 7	Y3 55
		1.2162	21 MnCr 5					SCR 420 H	20 NC 5
		1.5415	15 Mo 3	1.5415	16 Mo 3	16 Mo 3	1501-240		15 D 3
		1.5423	16 Mo 5			16 Mo 5	1503-245-420	SB 450 M	
		1.5752	14 NiCr 14	1.5752	14 NiCr 14		655 M 13	SNC 815 (H)	12 NC 15
		1.5919	15 CrNi 6			16 CrNi 4	S 107		16 NC 6
		1.6587	18 CrNiMo 7 6	1.6587	18 NiCrMo 7 6	18 NiCrMo 7	820 A 16		18 NCD 6
		1.7131	16 MnCr 5	1.7131	16 MnCr 5	16 MnCr 5	527 M 17	SCR 415	16 MC 5
		1.7139	16 MnCrS 5	1.7139	16 MnCrS 5				
		1.7147	20 MnCr 5	1.7147	20 MnCr 5	20 MnCr 5		SMnC 420 (H)	20 MC 5
		1.7149	20 MnCrS 5	1.7149	20 MnCrS 5			SMnC 21 H	20 MnCrS 5
		1.7335	13 CrMo 4 4	1.7335	13 CrMo 4 5	14 CrMo 4 5	1501-620 Gr. 27		15 CD 3.5
		1.7337	16 CrMo 4 4			14 CrMo 4 5	1501-620 Gr. 27		15 CD 4.5
		1.7380	10 CrMo 9 10	1.7380	10 CrMo 9 10	12 CrMo 9 10	1501-622 Gr. 31		10 CD 9.10
P3	Medium alloy steel Rm 600÷800 N/mm²	1.0904	55 Si 7	1.7100	55 SiCr7	55 Si 8	250 A 53		55 S 7
		1.2330	35 CrMo 4			35 CrMo 4	708 A 37		34 CD 4
		1.2542	45 WCrV 7			45 WCrV 8 KU	BS 1		
		1.2714	56 NiCrMoV 7	1.2714		56 NiCrMoV7-KU	BH 224-5	SKT 4	
		1.5121	46 MnSi 4						
		1.5710	36 NiCr 6				640 A 35	SNC 236	35 NC 6
		1.5736	36 NiCr 10			35 NiCr 9		SNC 631 (H)	35 NC 11
		1.6511	36 CrNiMo 4		36 CrNiMo 4	38 NiCrMo 4 (KB)	816 M 40		40 NCD 3
		1.6582	34 CrNiMo 6	1.6582	34 CrNiMo 6	35 NiCrMo 6 (KW)	817 M 40	SNCM 447	35 NCD 6
		1.7033	34 Cr 4	1.7033	34 Cr 4	34 Cr 4 (KB)	530 A 32	SCR 430 (H)	32 C 4
		1.7035	41 Cr 4	1.7035	41 Cr 4	41 Cr 4	530 M 40	SCR 440 (H)	42 C 4
		1.7218	25 CrMo 4	1.7218	25 CrMo 4	25 CrMo 4 (KB)	708 M 25	SCM 425	25 CD 4 S
		1.7225	42 CrMo 4	1.7225	42 CrMo 4	42 CrMo 4	708 M 40	SCM 440 (H)	42 CD 4
		1.7361	32 CrMo 12			32 CrMo 12	722 M 24		30 CD 12
		1.8159	50 CrV 4	1.8159	50 CrV 4	51 CrV 4	735 A 50	SUP 10	50 CV 4
		1.8509	41 CrAlMo 7	1.8509	41 CrAlMo 7 10	41 CrAlMo 7	905 M 39	SACM 645	40 CAD 6.12

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

SS	UNS	U.N.E. / I.H.A.	AISI-ASTM	GOST	ČSN	Trade Mark	Structure
1311				16D			
1312, 1313			A573 Grade 58	18kp	11 378		
1412, 1414			A573 Grade 70	St14kP	11 448		
	G10100		1010	10			
1350	G10170	F.1110	1015	15			
1450	G10200		1020, 1023	20	12 024		
2172, 2132				17G1S	11 523		
1912	G12130		1213			AVP	
1914	G12134		12 L 13				
			1108				
			11 L 08				
1922							
1957	G11400		1140	40			
1973	G11460		1146				
	G12150		12 L14			AVZ	
			11 L 37	AS35G2		PR80	
1370	G10170	F.1511	1015	15			
	G10250	F.1120	1025	25			
1550	G10350	F.1130	1035	35	12 040		
1650	G10430	F.5110	1045	45	12 050		
			1040	40	12 041		
1655		F.1150	1055	55			
	G10600		1060	60	12 061		
	G10390		1039	40G			
	G13300		1330	30G2			
1572	G10340	F.1135	1035	35			
1672	G10420	F.1140	1045	45	12 050		
1665, 1678	G10640	F.1150	1064	60			
			1060	60			
2912			A204 Grade A		15 020		
	G45200		4520				
	G33106		3310, 9314	20X2H4A	16 420		
			4320		16 220		
2511	G51170	F.1516	5115	12KHN2	14 220		
				18HG			
	G51200		5120	20KH	14 221		
			5120 H	20KH			
2216			A182-F11, A182-F12	12KHM	15 121		
2216			A387 Grade 12 Cl. 2				
2218	J21890	F.155	A182-F22	12KH8	15 313		
2085, 2090		F.144	9255	55S2			
2234	T51620	F.1250	4135	35KHM			
2710	T41901	F.5241	S1	5KHV2S			
	T61206		L6	5KHNV			
			5045				
			3135				
			3435				
	G98400		9840				
2541	G43400	F.1280	4340	38H2N2MA	16 343		
	G51320		5132	35KH			
	G51400		5140	40H	14 140		
2225	G41300	F.1251	4130	20KHM	15 130		
2244	G41400	F.1252	4142, 4140	38HM	15 142		
2240							
2230	H61500	F.143	6150	50KHFA	15 260		
2940	K24065	F.1740	A355 Cl. A				

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

Gr.	Materials	W.-Nr	DIN	EN-Nr.	EN	UNI	BS	JIS	AFNOR
P4	High alloy steel Rm 800÷1000 N/mm²	1.1231	Ck 67	1.1231	C 67S	C 70	060 A 67		XC 68
		1.1274	Ck 101	1.1274	C 100S		060 A 96	SUP 4	
		1.1545	C 105 W1	1.1545	C 105U	C 100 KU			Y1 105
		1.1645	C 105 W2			C 100 KU		SK 3	Y1 105
		1.1663	C 125 W			C 120 KU		SK 2	Y2 120
		1.2210	115 CrV 3	1.2210	107 CrV 3	107 CrV 3 KU			100 C 3
		1.2510	100 MnCrW 4			95 MnWCr 5 KU	BO 1	SKS 3	90 MWCV 5
		1.2842	90 MnCrV 8	1.2842	90 MnCrV 8	90 MnVCr 8 KU	BO 2		90 MV 8
		1.3505	100 Cr 6	1.3505	100 Cr 6	100 Cr 6	534 A 99	SUJ 2	100 C 6
P5	Tool steel Rm 900÷1200 N/mm²	1.2080	X 210 Cr 12	1.2080	X 210 Cr 12	X 210 Cr 13 KU	BD 3	SKD 1	Z 200 C 12
		1.2311	40 CrMnMo 7						
		1.2312	40 CrMnMoS 86						
		1.2343	X 38 CrMoV 5 1			X 37 CrMoV 5 1 KU	BH 11	SKD 6	Z 38 CDV 5
		1.2344	X 40 CrMoV 5 1	1.2344	X 40 CrMoV 5 1	X 40 CrMo 5 1 1 KU	BH 13	SKD 61	Z 40 CDV 5
		1.2363	X 100 CrMoV 5	1.2363	X 100 CrMoV 5 1	X 100 CrMoV 5 1 KU	BA 2	SKD 12	Z 100 CDV 5
		1.2365	X 32 CrMoV 3 3			30 CrMoV 12 27 KU	BH 10	SKD 7	32 DCV 28
		1.2379	X 155 CrVMo 12 1			X 155 CrMo 12 KU			
		1.2436	X 210 CrW 12			X 215 CrW 12 1 KU		SKD 2	
		1.2601	X 165 CrMoV 12			X 165 CrMoW 12 KU			
		1.2713	55 NiCrMoV 6					SKT 4	55 NCDV 7
		1.2714	56 NiCrMoV 7			56 NiCrMoV 7 KU			
		1.3243	S 6-5-2-5	1.3243	HS 6-5-2-5	HS 6-5-2-5		SKH 55	Z 85 WDKCV 06-05-05-04-02
		1.3247	S 2-10-1-8	1.3247	HS 2-10-1-8	HS 2-9-1-8	BM 42	SKH 51	Z 110 DKCWV 09-08-04
		1.3255	S 18-1-2-5	1.3255	HS 18-1-2-5	HS 18-1-1-5	BT 4	SKH 3	Z 80 WKCV 18-05-04-01
		1.3343	S 6-5-2	1.3343	HS 6-5-2	HS 6-5-2	BM 2	SKH 9, SKH 51	Z 85 WDCV 06-05-04-02
		1.3348	S 2-9-2	1.3348	HS 2-9-2	HS 2-9-2		SKH 58	Z 100 DCWV 09-04-02-02
		1.3355	S 18-0-1	1.3355	HS 18-0-1	HS 18-0-1	BT 1	SKH 2	Z 80 WCV 18-04-01
P6	High tensile strength steel Rm 1200÷1480 N/mm² HRC 38÷45	1.6546	40 NiCrMo 2 2	1.6546	40 NiCrMo 2 KD	40NiCrMo2	311 - Type 7	SNCM 240	40 NCD 2
		1.7045	42 Cr 4	1.7045		41Cr4	530 A 40	SCR 440	42 C 4 TS
P7	Ferritic - Martensitic stainless steel	1.4000	X 6 Cr 13	1.4000	X 6 Cr 13	X 6 Cr 13	403 S 17	SUS 403	Z 6 C 12
		1.4006	X 10 Cr 13	1.4006	X 12 Cr 13	X 12 Cr 13	410 S 21	SUS 410	Z 10 C 13
		1.4016	X 6 Cr 17	1.4016	X 6 Cr 17	X 8 Cr 17	430 S 15	SUS 430	Z 8 C 17
		1.4021	X 20 Cr 13	1.4021	X 20 Cr 13	X 20 Cr 13	420 S 37	SUS 420 J 1	Z 20 C 13
		1.4031	X 40 Cr 13	1.4031	X 39 Cr 13	X 40 Cr 14	420 S 45	SUS 420	Z 40 C 14
		1.4109	X 65 CrMo 14	1.4109	X 70 CrMo 15			SUS 440 A	Z 70 D 14
		1.4112	X 90 CrMoV 18	1.4112	X 90 CrMoV 18	X CrTi 12	409 S 19	SUS 440 B	Z 2 CND 18 05
		1.4125	X 105 CrMo 17	1.4125	X 105 CrMo 17	X 105 CrMo 17		SUS 440 C	Z 100 CD 17
		1.4313	X 5 CrNi 13 4	1.4313	X 5 CrNiMo 13 3	X 6 CrNi 13 04	425 C 11	SCS 5	Z 5 CN 13.4
		1.4749	X 18 CrN 28	1.4749	X 18 CrN 28				Z 18 C 25
P8	PH stainless steel	1.4534	X 3 CrNiMoAl 13 8 2	1.4534	X 6 NiCrTiMoV 25 15				
		1.4540	X 4 CrNiCuNb 16 4	1.4540	X 4 CrNiCuNb 16 4	Z 4 CNUNb 16.4 M			Z 4 CNUNb 16.4 M
		1.4548	X 5 CrNiCuNb 17 4	1.4548	X 5 CrNiCuNb 17 4	Z 6 CNU 17.4		SCS 24, SUS 630	
		1.4568	X 7 CrNiAl 17 7	1.4564	X 3 CrNiMoAl 13 8 2	X 7 CrNiAl 17 7	301 S 81	SUS 631	Z 9 CAN 17.7
		1.6356	X 2 NiCoMoTi 18 12 4	1.6356	X 2 NiCoMoTi 18 12 4				

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

SS	UNS	U.N.E. / I.H.A.	AISI-ASTM	GOST	ČSN	Trade Mark	Structure
1770	G10700	F.5103	1070	70			
1870	G10950	F.5117	1095				
1880		F.5118	W1	U10A			
				U10			
			W1	U13			
	T61202	F.520L	L2	11KHF			
2140	T31501	F.5220	O1	9KHVG			
	T31502		O2	9G2F		K720	
2258	G51986	F.5230	52100	SHKH15	14 109		
						TOOLOX 33	
	T30403	F.5212	D3	KH12		K100	
						M201	
						M200 - HOLDAX	
	T20811		H11	4KH5MFS		VIDAR - W300	
2242	T20813	F.5318	H13	4KH5MF1S		ORVAR - W302	
2260	T30102	F.5227	A2	9KH5VF			
	T20810		H10	3KH3M3F		W320	
						K110	
2312		F.5213		KH12			
2310				KH12MF			
	T61206	F.520.S	L6	5KHNM			
			L6			W500	
2723		F.5613	M35	R6M5K5			
	T11342		M42	R2AM9K5			
	T12004		T4	R18K5F2			
2722	T11302	F.5603	M2	R6M5		S600	
2782	T11307		M7				
	T12001		T1	R18			
	G86400		8640			Monix	
2245			5140				
						HARDOX 400®	
						HARDOX 450®	
						TOOLOX 40®	
						TOOLOX 44®	
2301	S41008		403	08KH13			Ferritic
2302	S41000	F.3401	410, CA-15	12KH13			Martensitic
2320	S43000	F.3113	430	12KH17			Ferritic
2303	S42000	F.5261	420	20KH13	17 022		Martensitic
2304	S40280	F.3404	420 C	40KH13			Martensitic
	S44002		440 A				Martensitic
2327	S44003		440 B	95KH18			Martensitic
	S44004		440 C	95KH18			Martensitic
2385	S41500		A182 F6NM				Martensitic
2322	S44600		446	15KH28			Ferritic
	S13800		XM-13			PH13-8 Mo	Austenitic
	S15500		XM-12			15-5-PH	Martensitic
	S17400		630			17-4-PH	Martensitic
2388	S17700		631	09KH17N7YU1		17-7-PH	Austenitic/Ferritic
	K93160		AMS 6515				Martensitic

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

Gr.	Materials	W.-Nr	DIN	EN-Nr.	EN	UNI	BS	JIS	AFNOR
M1	Austenitic stainless steel (good machinability)	1.4300	X 12 CrNi 18 8	1.4300	X 12 CrNi 18 8		302 S 25	SUS 302	Z 12 CN 18
		1.4301	X 5 CrNi 18 10	1.4301	X 5 CrNi 18 10	X 5 CrNi 18 11	304 S 31	SUS 304	Z 6 CN 18.09
		1.4305	X 10 CrNiS 18 9	1.4305	X 10 CrNiS 18 9	X 10 CrNi 18 09	303 S 31	SUS 303	Z 10 CNF 18.09
		1.4306	X 2 CrNi 19 11	1.4306	X 2 CrNi 19 11	X 3 Cr Ni 18 11	304 S 12	SUS 304 L	Z 2 CN 18.10
		1.4310	X 12 CrNi 17 7	1.4310	X 9 CrNi 18 8	X 12 CrNi 17 07	301 S 21	SUS 301	Z 12 CN 17.07
		1.4550	X 6 CrNiNb 18 10	1.4550	X 6 CrNiNb 18 10	X 6 CrNiNb 18 11	347 S 31	SUS 347	Z 6 CNNb 18.10
M2	Austenitic stainless steel (medium machinability) and Duplex	1.4311	X 2 CrNiN 19 11	1.4311	X 2 CrNiN 18 10	X 2 CrNiN 18 11	304 S 62	SUS 304 LN	Z 2 CN 18 .10 Az
		1.4335	X 12 CrNi 25 21	1.4335	X 12 CrNi 25 21	X 6 CrNi 26 20	310 S 24	SUH 310, SUS 310 S	Z 12 CN 25.20
		1.4401	X 5 CrNiMo 17 12 2	1.4401	X 5 CrNiMo 17 12 2	X 5 CrNiMo 17 12	316 S 31	SUS 316	Z 3 CND 17.11.1
		1.4417	X 2 CrNiMoSi 19 5	1.4424	X 2 CrNiMoSi 19 5				Z 2 CND 18.05.03
		1.4429	X 2 CrNiMoN 17 13 3	1.4429	X 2 CrNiMoN 17 13 3	X 2 CrNiMoN 17 13 3	316 S 62	SUS 316 LN	Z 2 CND 17.13 Az
		1.4435	X 2 CrNiMo 18 14 3	1.4435	X 2 CrNiMo 18 14 3	X 2 CrNiMo 17 13 2	316 S 12	SCS 16, SUS 316 L	Z 2 CND 17.13
		1.4438	X2 CrNiMo 18 16			X2CrNiMo18 16	317 S 12	SUS 317 L	Z 2 CND 19.15
		1.4460	X 4 CrNiMo 27 5 2	1.4460	X 3 CrNiMo 27 5 2	X 3 CrNiMo 27 5 2		SUS 329 J 1	Z 3 CND 25.7 Az
		1.4462	X 2 CrNiMoN 22 5	1.4462	X 2 CrNiMoN 22 5 3	X 2 CrNiMoN 22 5	332 S 15		Z 2 CND 22.05 Az
		1.4466	X 5 CrNi 18 15	1.4466	X 3 CrNiMo 18 12 3	X 5 CrNi 18 15	317 S 16	SUS 317	
		1.4541	X10 CrNiTi 18 9	1.4541		X6CrNiTi18 11	321 S 12	SUS 321	Z 6 CND 18.10
		1.4550	X 6 CrNiNb 18 10	1.4550	X 6 CrNiNb 18 10	X 6 CrNiNb 18 11	347 S 31	SUS 347	Z 6 CNNb 18.10
		1.4571	X10 CrNiMoTi 18 10			X6CrNiMoTi 17 12	320 S 17	-	Z 6 CNDT 17.12
		1.4893	X 9 CrNiSiNCe 21 11 2	1.4835	X 9 CrNiSiNCe 21 11 2		310 S 31		
M3	Super austenitic stainless steel and super Duplex	1.4410	X 2 CrNiMoN 25 7 4	1.4410	X 2 CrNiMoN 25 7 4	X 2 CrNiMoN 25 7 4			Z 3 CND 25.07 Az
		1.4501	X 2 CrNiMoCuWN 15 7 4			X 2 CrNiMoCuWN 15 7 4			
		1.4529	X 1 CrNiMoN 20 18 7	1.4547	X 1 CrNiMoN 20 18 7	X 1 CrNiMoN 20 18 7			Z 1 CNDU 20.18.05 Az
		1.4539	X 2 NiCrMoCu 25 20 5	1.4539	X 2 NiCrMoCu 25 20 5		904 S 13		Z 2 NCDU 25 20
		1.4652	X 2 CrNiMoN 25 22 7	1.4652	X 1 CrNiMoN 25 22 8				
		1.4876	X 10 NiCrAlTi 32 20	1.4876	X 10 NiCrAlTi 32 20			NCF 800	Z 10 NC 32.21
		1.4943	X 4 NiCrTi 25 15	1.4980	X 5 CrNiCuNb 16 4		HR 51	SUH 660	Z 6 NCTDV 25.15
K1	Grey cast iron 150 ÷ 250 HB	0.6015	GG-15	5.1200	EN-GJL-150	G15	Grade 150	FC 150	Ft 15 D
		0.6020	GG-20	5.1300	EN-GJL-200	G20	Grade 220	FC 200	Ft 20 D
		0.6025	GG-25	5.1301	EN-GJL-250	G25	Grade 260	FC 250	Ft 25 D
		0.6027	GG-220 HB		EN-GJL-215				
		0.6035	GG-35	5.1303	EN-GJL-350	G35	Grade 350	FC 350	Ft 35 D
K2	Nodular cast iron 150 ÷ 350 HB	0.7033	GGG 35.3	5.3100	EN-GJS-350-22		Grade 350/22	FCD 350-22L	FGS 370-17
		0.7040	GGG 40	5.3106	EN-GJS-400-15	GS400-12	Grade 420/12		FGS 400-12
		0.7043	GGG 40.3	5.3105	EN-GJS-400-18	GSO 42/17	Grade 370/17	FCD 400-18L	FGS 370-17
		0.7050	GGG 50	5.3200	EN-GJS-500-7	GS500-7	Grade 500/7	FCD 500-7	FGS 500-7
		0.7060	GGG 60	5.3201	EN-GJS-600-3	GS600-3	Grade 600/3	FCD 600-3	FGS 600-3
		0.7070	GGG 70	5.3300	EN-GJS-700-2	GS700-2	Grade 700/2	FCD 700-2	FGS 700-2
		0.8155	GTS-55-04		EN-GJMB-550-4	P 55-04	P 540/5	PCMP55-04	P 540/5
		0.9990	GGV-40	5.2201	EN-GJV-400				
			GGV-45	5.2300	EN-GJV-450				
			GGV-50	5.2301	EN-GJV-500				
K3	Austenitic cast iron 120 ÷ 260 HB	0.6655	GGL-NiCuCr 15 6 2		EN-GJLA-XNiCuCr 15-6-2		Grade F1		FGL Ni15 Cu6 Cr2
		0.6660	GGL-NiCr 20 2		EN-GJLA-XNiCr 20-2		Grade F2		FGL Ni20 Cr2
		0.6676	GGL-NiCr 30 3		EN-GJLA-XNiCr 30-3		Grade F3		FGL Ni30 Cr3
		0.7652	GGG-NiMn 13 7		EN-GJSA-XNiMn 13-7		Grade S6		FGS Ni13 Mn7
		0.7660	GGG-NiCr 20 2	5.3500	EN-GJSA-XNiCr 20-2		Grade S2		FGS Ni20 Cr2
		0.7673	GGG-NiMn 23 4		EN-GJSA-XNiMn 23-4		Grade S2M		FGS Ni23 Mn4
		0.7676	GGG-NiCr 30 3	5.3507	EN-GJSA-XNiCr 30-3		Grade S3		FGS Ni30 Cr3
		0.7683	GGG-Ni 35	5.3504	EN-GJSA-XNi 35				FGS Ni35
K4	ADI cast iron 250 ÷ 500 HB		GJS-800-8	5.3301	EN-GJS-800-8				
			GJS-1000-5		EN-GJS-1000-5				
			GJS-1200-2		EN-GJS-1200-2				
			GJS-1400-1	5.3405	EN-GJS-1400-1				

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

SS	UNS	U.N.E. / I.H.A.	AISI-ASTM	GOST	ČSN	Trade Mark	Structure
2331	S30200		302	12KH18N9			Austenitic
2333	S30400	F.3504	304	08KH18N10	17 240		Austenitic
2346	S30300	F.3508	303	12KH19N9			Austenitic
2352	S30403	F.3504	304 L	03KH18N11			Austenitic
	S30100	F.3517	301	07KH16N6			Austenitic
2338	S34700		347	08KH18N12B			Austenitic
2371	S30453	F.3541	304 LN	03KH18N11			Austenitic
2361	S31008		310 S	12KH25N20			Austenitic
2347	S31600	F.3534	316	08KH17H13M2T	17 346		Austenitic
2376	S31500						Duplex
2375	S31653		316 LN	03KH16N15M3			Austenitic
2353	S31603	F.3533	316 L	03KH17N14M3	17 349		Austenitic
2367			317 L				Austenitic
2324	S32900		329				Duplex
2377	S31803		329 LN				Duplex
2366	S31700		317	08KH17H15M3T			Austenitic
2337			321				Austenitic
2338	S34700	F.3524	347	08KH18N12B			Austenitic
2350			316 Ti				Austenitic
2368	S30815						Austenitic
2328	S32750		F 53				Super duplex
	S32760		F 55-329 S				Super duplex
2778	S31254						Super Austenitic
2562	N08904		904L				Super Austenitic
	S32654						Super Austenitic
	N08800					Alloy 800	Austenitic
2570	S66286		660			A286	Austenitic
01 15-00	F11601		A48 25 B	Sc 15	422 415		Lamellar
01 20-00	F12101		A48 30 B	Sc 20	422 420		Lamellar
01 25-00	F12401		A48 35 B	Sc 25	422 425		Lamellar
02 19							Lamellar
01 35-00	F13502		A48 50 B	Sc 35			Lamellar
07 17-15					422 303		Nodular
07 17-02		FGE 38-17		Vc 42-12	422 304		Nodular
07 17-12	F32800		60-40-18	Vc 42-12	422 314		Nodular
07 27-02	F33800	FGE 50-7	A536, 80-55-06	Vc 50-2	422 305		Nodular
07 32-03	F34100	FGE 60-2	A476, 80-60-03	Vc 60-2	422 306		Nodular
07 37-01	F34800	FGE 70-2	A536, 100-70-03	Vc 70-2	422 307		Nodular
08 54-00	F24130		A220 60004				Malleable
			Grade 400-15				Vermicular
			Grade 450				Vermicular
			Grade 500				Vermicular
	F41000		A436 Type 1			Ni-Resist 1	Lamellar
05 23-00	F41002		A436 Type 2			Ni-Resist 2	Lamellar
	F41004		A436 Type 3			Ni-Resist 3	Lamellar
07 72-00						Nodumag	Nodular
	F43000		A436 Type D-2			Ni-Resist D-2	Nodular
	F43010		A439 Type D-2M			Ni-Resist D-2M	Nodular
	F43003		A436 Type D-3			Ni-Resist D-3	Nodular
	F43006		A439 Type D-5			Ni-Resist D-5	Nodular
	ADI grade 1		850/550/10			ADI 800	Ductile austempered
	ADI grade 2		1050/700/7			ADI 1000	Ductile austempered
	ADI grade 3		1200/850/4			ADI 1200	Ductile austempered
	ADI grade 4		1400/1100/1			ADI 1400	Ductile austempered

Materiali Werkstoffmaterialien Matériaux Materiales Материалы

Gr.	Materials	W.-Nr	DIN	EN-Nr.	EN	UNI	BS	JIS	AFNOR
N1	Aluminium alloy < 12% Si	3.0205	Al 99			9001/1	1C	A1x3	A4
		3.0255	Al99.5	Al99.5	AW-1050A	9001/2	1B	(A1050)	A-5/1050A
		3.0505	AlMn0,5Mg0,5				N31		
		3.0517	AlMn1Cu	AlMn1Cu	AW-3003			A3003	A-M1/3003
		3.0615	AlMgSiPb						ASGPB
		3.1255	AlCuSiMn	AlCuSiMn	AW-2014		H15		A-U4SG
		3.1305	AlCuMg0,5			9002/1	L86		AU2G
		3.1325	AlCuMg 1			9002/2	(H14)	A3x2	AU4G
		3.1355	AlCuMg 2			9002/4	DTD5090	A3x4	AU4G1
		3.1645	AlCuMgPb			9002/8	-	-	AU4Pb
		3.1655	AlCuBiPb	AlCuBiPb	AW-2011		FC1	A2011	A-U5PbBi
		3.2161	G-AlSi8Cu3	AlSi8Cu3(Si)	AC-46200				
		3.2315	AlSi1MgMn	AlMgSi1	AW-6082	90006/4	H30		A-SGM0.7
		3.2341	G-AlSi5Mg		AC-42000	3599	LM25	AC 4C	A-S7G
		3.2381	G-AlSi10Mg	AlSi10Mg(Fe)	AC-43400		LM9		A-S10G
		3.2383	G-AlSi10Mg (Cu)		43200		(LM9)		A-S10UG
		33.206	AlMgSi0.5	AlMgSi0.5	AW-6060		(H9)		A-GS/6060
		3.3210	AlMgSi0.7	AlMgSi0.7	AW-6063		(H10)	(A6063)	A-GSUC/6061
		3.3211	AlMg1SiCu			9006/2	H20	A2x4	AGSUC
		3.3315	AlMg1	AlMg1	AW-5005		N41		A-G0.6
		3.3316	AlMg1,5			9005/7			
		3.3523	AlMg2,5			9005/2		A2x1	AG2,5C
		3.3535	AlMg3			9005/8	N5/N56		AG3
		3.3547	AlMg4.5Mn0.7			9005/5	N8	A2x7	AG4,5MC
		3.3555	AlMg5				N6		A-G5
		3.4335	AlZn4.5Mg1	AlZn4.5Mg1	AW-7020		H17		A-Z5G
		34.365	AlZn5.5MgCu		AW-7075	9007/2	2L95	A7075	A-Z5GU
		3.5612	G-MgAl6Zn	MgAl6Zn	MG-P-63		MAG-E-121		G-A6-Z1
		3.5812	G-MgAl8Zn	MgAl8Zn	MG-P-61				(G-A7-Z1)
N2	Aluminium alloy > 12% Si and Aluminium-Magnesium	32.382	G-AlSi12	AlSi12	AC-44200	4514	LM6	AC3A	AS 13
		3.2583	G-AlSi12 (Cu)	AlSi12 (Cu)	AC-47000		LM20	Al-Si12Cu	
		3.5101	G-MgZn4SE1Zr1				MAG5		G-Z4TR
		3.5102	G-MgZn5Th2Zr1						
		35.103	G-MgSe3Zn2Zr1	MgSe3Zn2Zr1	MN65120		MAG6-TE		ZRE1
		3.5106	G-MgAg3SE2Zr1				MAG 12		G-Ag22,5
		3.5312	G-MgAl3Zn				MAG-E-111		
		3.5912	G-MgAl9Zn1				MAG7		G-A9Z1
N3	Copper alloy	2.0040	OF Cu		CW008A		C103	C1020	Cu/c1
		2.0060	E-Cu57		CW004A	E-Cu57	C101	C1100	Cu/a1
		2.0070	SE Cu		CW021A				
		2.0090	SF Cu		CW024A		C106	C1220	Cu/b
		2.0240	CuZn15	CuZn15	CW502L		CZ102	C2300	CuZn15
		2.0321	CuZn37		CW508L		CZ108		CuZn37
		2.0401	CuZn39Pb3	CuZn39Pb3	CW614N		CZ121		CuZn39Pb3
		2.0402	CuZn40Pb2	CuZn40Pb2	CW612N		CZ120		CuZn39Pb2
		20.530	CuZn38Sn1	CuZn38Sn1	CW717R				
		2.0790	CuNi18Zn19Pb	CW408J					CuNi18Zn19Pb1
		2.0872	CuNi10Fe1Mn	CuNi10Fe1Mn			CN102		CuNi10Fe1Mn
		2.0940	CuAl10Fe		CC331G		AB1		CuAl10Fe
		2.0975	CuAl10Ni		CC333G		AB2		CuAl10Ni5Fe5
		2.1050	CuSn10		CC480K		CT1		CuSn10
		2.1087	CuSn10Zn						
		2.1176	CuPb10Sn		CW352H		LB2		CuSn10Pb10
		2.1202	SB Cu				C107		

SS	UNS	U.N.E. / I.H.A.	AISI-ASTM	GOST	ČSN	Trade Mark	Structure
4010			A1200				
4007	AA1050A		A1050/1050A				
			3105				
	AA3003					Aluman 100	
			6012				
4338	AA2014		2014			Avional 660	
			2117			Avional 050	
			2017			Avional 100	
			2024			Avional 150	
4335			2030				
4355	AA2011		2011			Recidal 11	
4251	A13800		A380				
4212	A96082		6082			Anticorodal 100	
4244			B26				
4253	A13600		B85				
4103	AA6060					Anticorodal 063	
4104, 4107	AA6005						
			6061			Anticorodal 061	
4106	AA5005					Peraluman 080	
			5050			Peraluman 150	
4120			5052			Peraluman 250	
			5154			Peraluman 350	
4140	A95083		5083			Peraluman 440	
			5056			Peraluman 500	
4425	AA7020		7020				
	A97075		7075	B95		Ergal	
	M11600		AZ61A				
			AZ80A				
			A413.2				
	M12330		AMS 4442				
			AZ31B				
	C10200						
	C11000						
	C10300						
	C12200						
5112	C23000			L90			
5150	C27200						
5170	C38500						
5168	C37800						
	C46400			LO60-1			
	C76300						
5667	C70600						
5710	C95200		CA952	BrA9ZH3L			
5716	C95500		CA955	BrA10ZH4N4L			
5443	C90700						
5458	C90500						
5640	C93700		CA937				
	C14200						

Gr.	Materials	W.-Nr	DIN	EN-Nr.	EN	UNI	BS	JIS	AFNOR
N4	Brass alloy and Bronze alloy	2.0220	CuZn5		CW500L		CZ125	C2100	
		2.0230	CuZn10		CW501L		CZ101	C2200	
		2.0250	CuZn20		CW503L		CZ103	C2400	
		2.0265	CuZn30		CW505L		CZ106	C2600	
		2.0331	CuZn36Pb1.5		CW600N		CZ119	C3501	
		2.0360	CuZn40		CW509L		CZ109	C2800	
		2.0372	CuZn39Pb0.5		CW610N		CZ123		
		2.0375	CuZn36Pb3		CW603N		CZ124	C3601	
		2.0380	CuZn39Pb2		CW612N		CZ 131	C3771	
		2.0401	CuZn39Pb3	12164	CW614N	5705	CZ121	C3603	
		2.0402	CuZn40Pb2		CW617N		CZ122		
		2.0410	CuZn44Pb2	CuZn44Pb2	CW622N		CZ104		
		2.0460	CuZn20Al2				CZ110		
		2.0470	CuZn28Sn1	CuZn28Sn1	CW706R				CuZn29Sn1
		2.0932	CuAl8Fe3		CW303G				
		2.0966	CuAl10Ni5Fe4		CW307G		CA104		
		2.1010	CuSn2				-	-	
		2.1016	CuSn4				PB101	C5111	
		21.020	CuSn6	CuSn6	CW452K		PB103	C5191	CuSn6
		2.1030	CUSn8				PB104	C5212	
N5	Plastic material								
N6	Carbon fiber and composite								
S1	Heat resistant super alloy (HRSA) Ni base (good machinability) < 25 HRC	1.4980							Z3NCT25
		2.4617							NiMo28
			NiCr17Mo17Few						NC17DWY
		2.4816	NiCr15Fe						NC15Fe
		2.4851	NiCr23Fe						NC15FeA
		2.4856	NiCr22Mo9Nb						NC22DNb
		2.4669	NiCr 15 Fe 7 TiAl				HR505		NC19FeNB
S2	Heat resistant super alloy (HRSA) Ni base (medium machinability) 25 ÷ 35 HRC								
		1.4876	X10NiCrAlTi32-21				3075		
		2.4858	NiCr21Mo						NC21FeDU
		2.4665	NiCr22FeMo				HR6,204		NC22FeD
		2.4856	NiCr22Mo9Nb						NC22DNb
		2.4856	NiCr22Mo9Nb						NC22DNb
		2.4668	NiCr19Fe19NbMo				HR8		Nc19FeNb
		2.4668	NiCr19Fe19NbMo				HR8		Nc19FeNb
		2.4630	NiCr20Ti				HR5,203-4		NC20T
		2.4631	NiCr20TiAl				HR401,601		NC20TA
		2.4654	NiCr20Co14MoTi						NC20K14
S3	Heat resistant super alloy (HRSA) Ni base (low machinability) 35 ÷ 45 HRC								
		2.4654	NiCr20Co14MoTi						NC20K14
		2.4668	NiCr19Fe19NbMo				HR8		Nc19FeNb
		2.4669	NiCr 15 Fe 7 TiAl				HR505		NC19FeNB
			NiW13Co10Cr9AlTi						
			NiCo10W10Cr9AlTi						
			NiCr18cCoMoAlTi						NCK19DAT
			NiCo15Cr15MoAlTi						NCKD20AT

SS	UNS	U.N.E. / I.H.A.	AISI-ASTM	GOST	ČSN	Trade Mark	Structure
	C21000						
	C22000						
	C24000						
	C26000						
	C34000						
	C28000						
	C36500						
	C36000						
	C37700						
	C38500					OT-58	
	C38000						
5272	C68700			LAMsh77-2-0.05			
	C68700						
5220	C44300			LOMsh70-1-0.05			
	C61400						
	C63000						
	C50700						
	C51100						
5428	C51900			BrOF6.5-0.15			
	C52100						
							Polycarbonate
							E-glass
							Epoxy
							HTA
							HX
							Kevlar
							PEEK
							PPS
							T300
							T700
							T800
			5725			Discalloy	HRSA Iron-based
	N10665					Hastelloy B-2	HRSA Nickel-based
	N10002					Hastelloy C (casting)	HRSA Nickel-based
	N06600					Inconel 600	HRSA Nickel-based
	N06601					Inconel 601	HRSA Nickel-based
	N06625					Inconel 625 (casting)	HRSA Nickel-based
						Inconel 706	HRSA Nickel-based
	N07750					Inconel X750 (solubilized)	HRSA Nickel-based
						Stellite	HRSA Cobalt-based
	N08800					Incoloy 800	HRSA Iron-based
	N08825					Incoloy 825	HRSA Iron-based
	N06002					Hastelloy X	HRSA Nickel-based
	N06625					Inconel 625 (forged)	HRSA Nickel-based
	N06625					Inconel 625 (pipe)	HRSA Nickel-based
	N07718					Inconel 718 (casting)	HRSA Nickel-based
	N07718					Inconel 718 (pipe)	HRSA Nickel-based
	N06075					Nimonic 80	HRSA Nickel-based
	N07080					Nimonic 81	HRSA Nickel-based
	N07001					Waspalloy (casting)	HRSA Nickel-based
						Haynes	HRSA Cobalt-based
	N07001					Waspalloy (forged)	HRSA Nickel-based
	N07718					Inconel 718 (forged)	HRSA Nickel-based
	N07750					Inconel X750 (precipitation)	HRSA Nickel-based
						Mar-M 200	HRSA Nickel-based
						Mar-M 247	HRSA Nickel-based
						Rene 95	HRSA Nickel-based
						Udimet 500	HRSA Nickel-based
						Udimet 700	HRSA Nickel-based

Gr.	Materials	W.-Nr	DIN	EN-Nr.	EN	UNI	BS	JIS	AFNOR
S4	Titanium alloy good machinability		TiAl2Sn4Zr2MoSi						
			TiAl2Sn4Zr6Mo						
		3.7055	Ti 99,6						
		3.7195	Ti3Al2.5V						
		3.7115	TiAl5Sn2.5				TA14/17		
		3.7124	TiCu2,5						
		3.7155	TiAl6Zr5Mo0,5						
		3.7165	TiAl6V4 ELI				TA11		
		3.7175	TiAl6V6Sn2						
		3.7185	TiAl4Mo4Sn2						
		3.7025	Ti 99,8				TA 1		
		3.7035	Ti 99,7a				TA 2-5		
S5	Titanium alloy medium machinability								
		3.7164	TiAl6V4						
			Ti5Al2.5SN						
			TiAl2Sn4Zr2MoSi						
			TiAl2Sn4Zr6Mo						
H1	Hardened steel 50 ÷ 56 HRC	1.1231	Ck 67	1.1231	C 67S	C 70	060 A 67		XC 68
		1.1248	Ck 75	1.1248	C 75S	C 75	060 A 78		XC 75
		1.1274	Ck 101	1.1274	C 100S		060 A 96	SUP 4	
		1.1545	C 105 W1	1.1545	C 105U	C 100 KU			Y1 105
		1.2550	60 WCrV 7			55 WCrV 8 KU			55 WC 20
		1.7131	16 MnCr 5	1.7131	16 MnCr 5	16 MnCr 5	527 M 17	SCR 415	16 MC 5
		1.7176	55 Cr 3	1.7176	55 Cr 3	55 Cr 3	527 A 60	SUP 9 (A)	55 C 3
		2.4669	NiCr 15 Fe 7 TiAl				HR505		NC19FeNB
H2	Hardened bearing steel 54 ÷ 62 HRC	1.2210	115 CrV 3	1.2210	107 CrV 3	107 CrV 3 KU			100 C 3
		1.2510	100 MnCrW 4			95 MnWCr 5 KU	BO 1	SKS 3	90 MWCV 5
		1.2842	90 MnCrV 8	1.2842	90 MnCrV 8	90 MnVCr 8 KU	BO 2		90 MV 8
		1.3505	100 Cr 6	1.3505	100 Cr 6	100 Cr 6	534 A 99	SUJ 2	100 C 6
H3	Hardened tool steel 60 ÷ 65 HRC	1.2344	X 40 CrMoV 5 1	1.2344	X 40 CrMoV 5 1	X 40 CrMo 5 1 1 KU	BH 13	SKD 61	Z 40 CDV 5
		1.2363	X 100 CrMoV 5 1	1.2363	X 100 CrMoV 5	X 100 CrMoV 5 1 KU	BA 2	SKD 12	Z 100 CDV 5
		1.2379	X 155 CrVMo 12 1		X 155 CrVMo 12 1	X 155 CrVMo 12 1 KU	BD 2	SKD 11	Z 160 CDV 12
		1.2436	X 210 CrW 12			X 215 CrW 12 1 KU		SKD 2	
		1.2601	X 165 CrMoV 12			X 165 CrMoW 12 KU			
		1.2713	55 NiCrMoV 6					SKT 4	55 NCDV 7
		1.3243	S 6-5-2-5	1.3243	HS 6-5-2-5	HS 6-5-2-5		SKH 55	Z 85 WDKCV 06-05-05-04-02
		1.3247	S 2-10-1-8	1.3247	HS 2-10-1-8	HS 2-9-1-8	BM 42	SKH 51	Z 110 DKCWV 09-08-
		1.3355	S 18-0-1	1.3355	HS 18-0-1	HS 18-0-1	BT 1	SKH 2	Z 80 WCV 18-04-01
H4	Hardened martensitic stainless steel 50 ÷ 56 HRC	1.4021	X 20 Cr 13	1.4021	X 20 Cr 13	X 20 Cr 13	420 S 37	SUS 420 J 1	Z 20 C 13
		1.4109	X 65 CrMo 14	1.4109	X 70 CrMo 15			SUS 440 A	Z 70 D 14
		1.4112	X 90 CrMoV 18	1.4112	X 90 CrMoV 18	X CrTi 12	409 S 19	SUS 440 B	Z 2 CND 18 05
		1.4125	X 105 CrMo 17	1.4125	X 105 CrMo 17	X 105 CrMo 17		SUS 440 C	Z 100 CD 17
		1.4542	X 5 CrNiCuNb 16 4	1.4542	X 5 CrNiCuNb 16 4			SUS 630	
		1.4568	X 7 CrNiAl 17 7	1.4568	X 7 CrNiAl 17 7	X 7 CrNiAl 17 7	301 S 81	SUS 631	Z 9 CAN 17.7
		1.4943	X 4 NiCrTi 25 15	1.4980	X 6 NiCrTiMoV 25 15		HR 51	SUH 660	Z 6 NCTDV 25.15
H5	Hardened white cast iron 48 ÷ 55 HRC	0.9620	G-X330 NiCr 4 2	0.9620	EN-GJN-HV520		Grade 2 A		FB Ni4 Cr2 BC
		0.9625	G-X260 NiCr 4 2	0.9625	EN-GJN-HV550		Grade 2 B		FB Ni4 Cr2 HC
		0.9630	G-X300 CrNiSi 9 5 2	0.9630	EN-GJN-HV600		Grade 2 C, D, E		FB Cr9 Ni5

SS	UNS	U.N.E. / I.H.A.	AISI-ASTM	GOST	ČSN	Trade Mark	Structure
	R50250		265-G1			Grade 1	
	R50400		265-G2			Grade 2	
	R50550		265-G3			Grade 3	
	R56320					Grade 9	
	R50700		265-G4			Grade 4	
	R56400					Grade 5	
						Grade 6	
			4975			6242	
	R56260					6246	
1770	G10700	F.5103	1070	70			
1774, 1778	G10780	F.5107	1078, 1080	75			
1870	G10950	F.5117	1095				
1880		F.5118	W1	U10A			
			S1	5KHV2SF			
2511	G51170	F.1516	5115	12KHN2	14 220		
2253	G51550		5155				
	N07750					Inconel X750 (solubilized)	HRSA Nickel-based
	T61202	F.520L	L2	11KHF			
2140	T31501	F.5220	O1	9KHVG			
	T31502		O2	9G2F			
2258	G51986	F.5230	52100	SHKH15	14 109		
2242	T20813	F.5318	H13	4KH5MF1S			
2260	T30102	F.5227	A2	9KH5VF			
	T30402	F.5211	D2	KH12MF			
2312		F.5213		KH12			
2310				KH12MF			
	T61206	F.520.S	L6	5KHNM			
2723		F.5613	M35	R6M5K5			
	T11342		M42	R2AM9K5			
	T12001		T1	R18			
2303	S42000	F.5261	420	20KH13	17 022		
	S44002		440 A				
2327	S44003		440 B	95KH18			
	S44004		440 C	95KH18			
	S17400		SAE 630			17-4 PH	H900
2388	S17700		AMS 5528	09KH17N7YU1		17-7 PH	TH1050
2570	S66286		660			A286	
05 12-00	F45001		A532 IB			Ni-Hard 2	
05 13-00	F45000		A532 IA			Ni-Hard 1	
04 57-00	F45003		A532 ID			Ni-Hard 4	

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

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

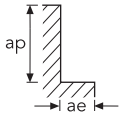
METAL (CHIP) REMOVAL RATE VOLUME TRUCIOLO ASPORTATO VOLUMEN ABGETRAGENER SPÄNE VOLUME DE COPEAU VOLUMEN VIRUTA EXTRAÍDA ОБЪЕМ УДАЛЕННОЙ СТРУЖКИ

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

D DIAMETER DIAMETRO DURCHMESSER DIAMÈTRE DIÁMETRO ДИАМЕТР

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

ap
ae



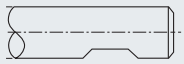
CARBIDE DRILLS 

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TYPHOON PU - HPU universal application . 43
TYPHOON 4HTA general purpose 4-margins - 8xD . 65
TYPHOON GA - HGA general application - 3xD, 5xD, 8xD . 73
TYPHOON CV general purpose - 3xD . 91
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TYPHOON HSD step drill for 90° chamfering . 191
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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	

GEOMETRY · GEOMETRIA · GEOMETRIE · GÉOMÉTRIE · GEOMETRÍA · ГЕОМЕТРИЯ		
	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 IK	application universelle avec lubrification interne aplicación universal con refrigeración interna универсальное применение с внутренним охлаждением
	4 guides chamfer with inside coolant 4 fasi con refrigerazione interna 4 Führungsfasen mit IK	4 listels avec lubrification interne 4 fases con refrigeración interna 4 направляющих с внутренней подачей СОЖ
	general application applicazione universale allgemeine Anwendung	application universelle aplicación universal универсальное применение
	general application with inside coolant applicazione universale con refrigerazione interna universelle Anwendung mit IK	application universelle avec lubrification interne aplicación universal con refrigeración interna универсальное применение с внутренним охлаждением
	general purpose uso generico allgemeine Anwendung	usage général uso genérico Общее назначение
	stainless steel with inside coolant acciaio inossidabile con refrigerazione interna edelstahl mit IK	acier inoxydable avec lubrification interne acero inoxidable con refrigeración interna нержавеющая сталь с внутренним охлаждением

* The stock category of items in this catalogue may change without prior notice
La categoria di stock dei prodotti a catalogo può variare senza preavviso
Die Einstufung der Produkte kann sich jederzeit ändern
La catégorie de stock des articles dans ce catalogue peut être modifiée sans préavis.
La categoría de Stock de los artículos de este catálogo puede cambiar sin previo aviso
Классификация склада продукции в этом каталоге может быть изменена без предварительного уведомления.

Legenda Verzeichnis Légende Leyenda Условные обозначения

GEOMETRY GEOMETRIA GEOMETRIE GÉOMÉTRIE GEOMETRÍA ГЕОМЕТРИЯ

	aluminium with inside coolant alluminio con refrigerazione interna Aluminium mit IK	aluminium avec lubrification interne aluminio con refrigeración interna алюминий с внутренней подачей подачей СОЖ
	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 IK, 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 IK, lang	large gamme de matériaux, avec lubrification interne, longue amplia gama de materiales, con refrigeración interna, larga широкий выбор материалов, с внутренним охлаждением, длинная
	universal application with inside coolant applicazione universale con refrigerazione interna Universelle Anwendung mit IK	application universelle avec lubrification interne aplicación universal con refrigeración interna универсальное применение с внутренним охлаждением
	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	PV350	PV400	PV1000
hardness (HV) durezza (HV) Härte (HV)	dureté (HV) dureza (HV) твёрдость (HV)	3300	3300	3300	3350	3400	3600
friction coefficient coefficiente d'attrito Reibungskoeffizient	coefficent de frottement coeficiente de rozamiento коэффициент трения	0.3	0.3	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	2.5÷3.5	2÷4	2÷3
max working temperature (°C) temperatura max (°C) hochste Temperatur (°C)	température maximale (°C) temperatura máx (°C) макс. температура (°C)	950°	900°	1100°	1100°	1150°	1200°

Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

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PU-HPU universal application 3xD - 5xD	**353PU**	45	
	353HPU	45	
	355PU	54	
	355HPU	54	
4HTA general purpose 4-margins 8xD	**3584HTA**	67	
GA-HGA general application 3xD - 5xD - 8xD	**373GA**	75	
	373HGA	75	
	375GA	81	
	375HGA	81	
	358HGA	87	
CV general purpose 3xD	**353CV**	93	
HVA stainless steel 3xD - 5xD	**353HVA**	99	
	355HVA	104	
ALH non-ferrous material 3xD - 5xD	**353ALH**	111	
	355ALH	115	
HRC hardened steel 45-62 HRC 3xD	**353HRC**	121	
SUH MINI short, long and extra long 5xD ÷ 30xD	**355SUH MINI**	132	
	358SUH MINI	136	
	3512SUH MINI	140	
	3520SUH MINI	144	
	3525SUH MINI	148	
	3530SUH MINI	152	
HL long and extra long 12xD ÷ 30xD	**3512HL**	165	
	3515HL	170	
	3520HL	175	
	3525HL	180	
	3530HL	185	

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
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°	★	★	★	☆	★	
3-16	8xD	OSAWA	4HTA	MG PV300		140°	30°		★	★	★	☆	☆	
3-20	3xD	DIN6537K	GA	MG PV400		140°	30°	45°	★	☆	★			
3-20	3xD	DIN6537K	HGA	MG PV400		140°	30°	45°	★	★	★			
3-20	5xD	DIN3537L	GA	MG PV400		140°	30°	45°	★	☆	★			
3-20	5xD	DIN3537L	HGA	MG PV400		140°	30°	45°	★	★	★			
3-20	8xD	OSAWA	HGA	MG PV400		140°	30°	45°	★	★	★			
1-16	3xD	DIN6537K	CV	MG PV200		140°	30°		★	☆	☆	☆		
3-20	3xD	DIN6537K	HVA	MG PV350		140°	30°		☆	★			☆	
3-20	5xD	DIN3537L	HVA	MG PV350		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°		★	★	★	☆	☆	

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
HSD step drill for 90° chamfering	**372HSD**	193	
NC spotting 90° - 120°	**CS-D-TA 90**	198	
	CS-D-TA 120	198	

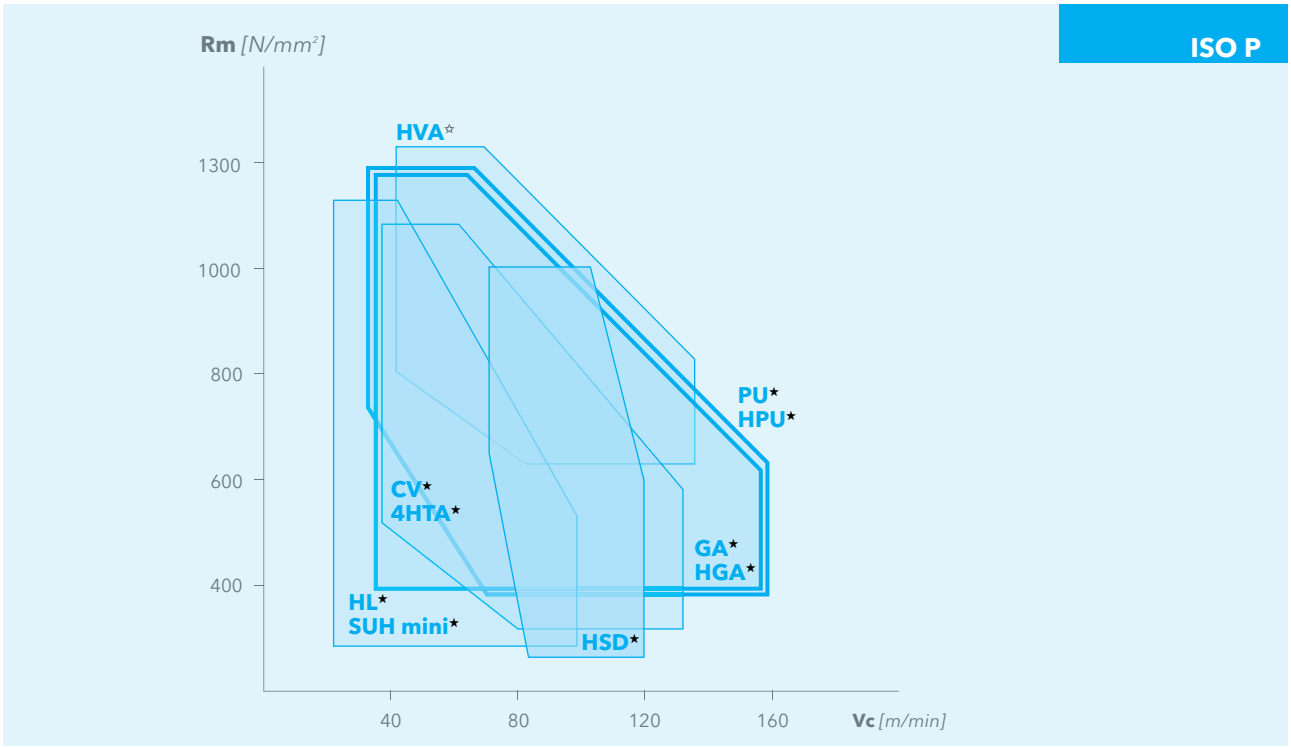
Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

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
2.5-11.22	3xD	OSAWA	HSD	MG/PV300		140°	30°		★	★			★	
6-16		OSAWA	SD	MG PV200		90°	30°		★	★	★	★	☆	
6-16		OSAWA	SD	MG PV200		120°	30°		★	★	★	★	☆	

★ 1st choice ☆ suitable

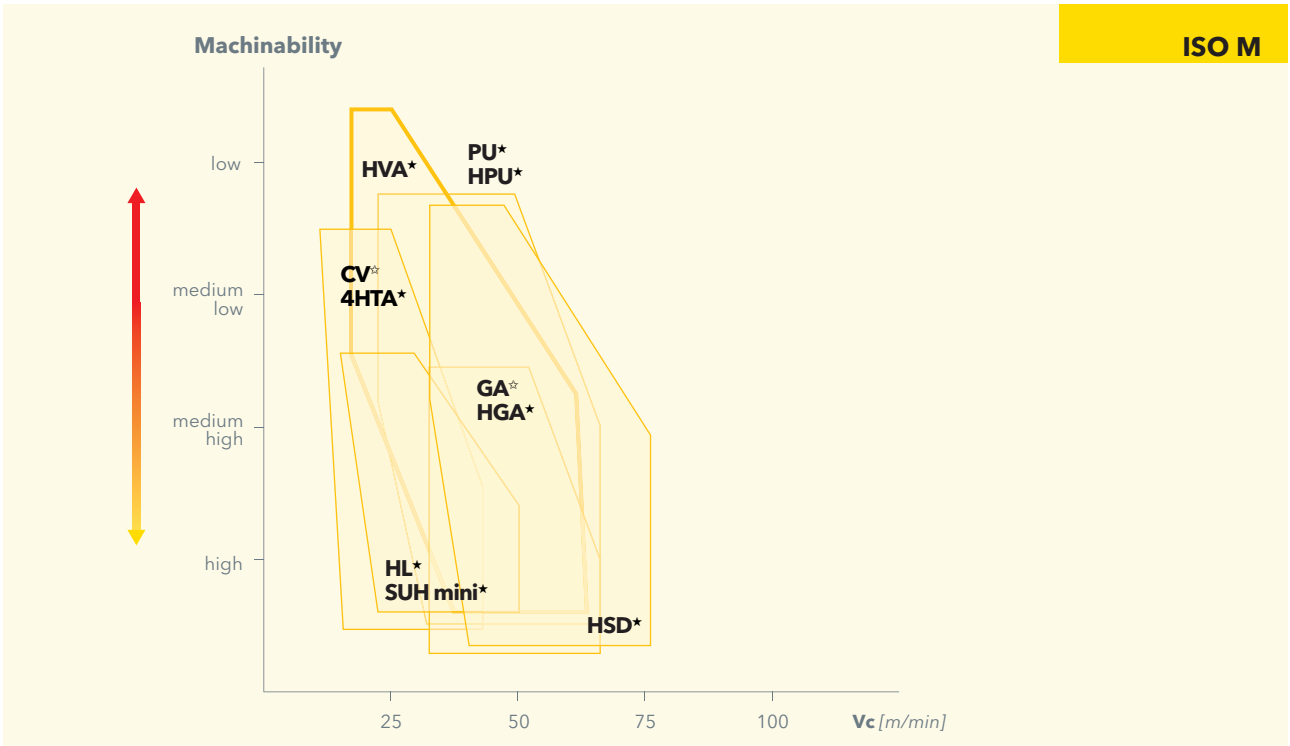
Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

STEEL APPLICATION



★ 1st choice ☆ suitable

STAINLESS STEEL APPLICATION



★ 1st choice ☆ suitable

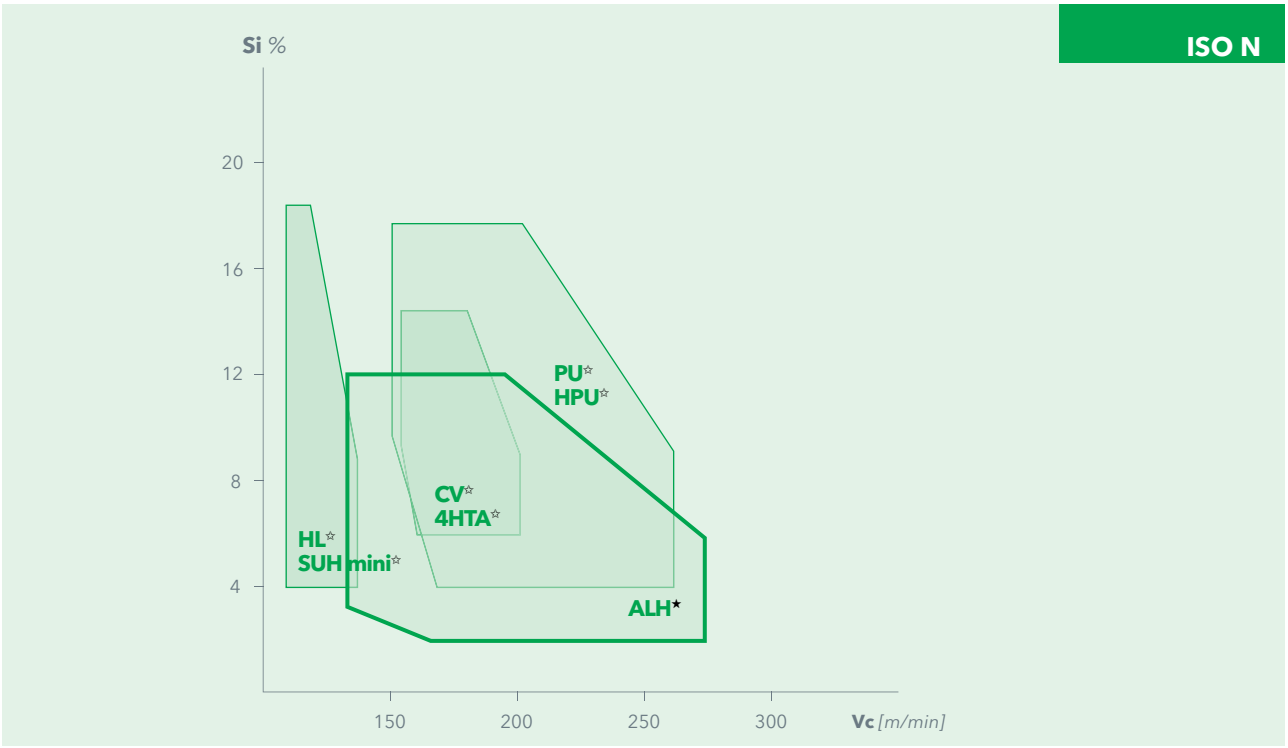
PU : universal purpose (page 43)
HPU : universal purpose with inside coolant (page 43)
4HTA : 4 margins general purpose with inside coolant (page 65)
GA : general application (page 73)
HGA: general application with inside coolant (page 73)
CV : general purpose (page 91)
HVA : special purpose with inside coolant (page 97)
SUH MINI : miniature 5xD ÷ 30xD with inside coolant (page 125)
HL : long 12xD ÷ 30xD (page 157)
HSD : step drill with inside coolant (page 191)

CAST IRON APPLICATION



★ 1st choice ☆ suitable

NON-FERROUS MATERIALS APPLICATION



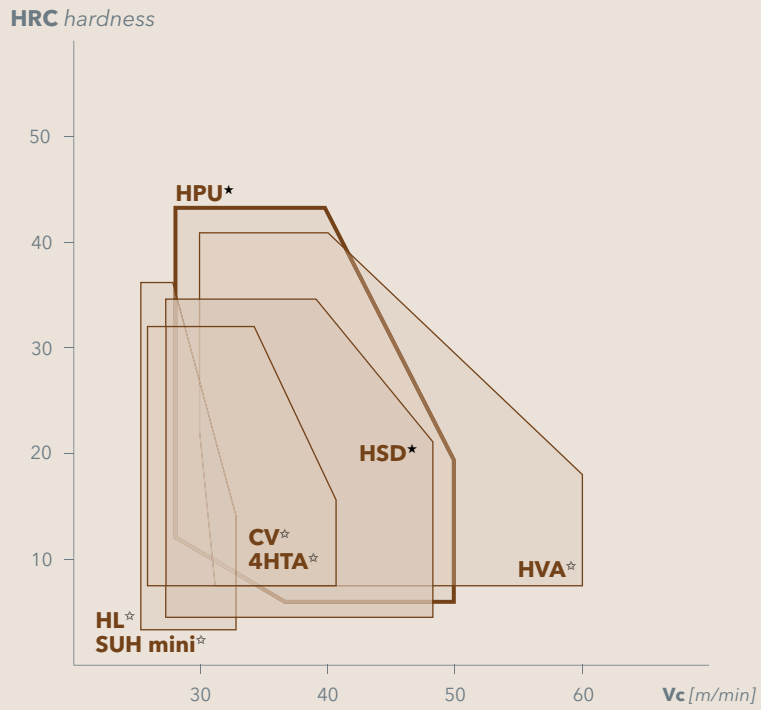
★ 1st choice ☆ suitable

PU : universal purpose (page 43)
HPU : universal purpose with inside coolant (page 43)
4HTA : 4 margins general purpose with inside coolant (page 65)
GA : general application (page 73)
HGA: general application with inside coolant (page 73)
CV : general purpose (page 91)
SUH MINI : miniature 5xD ÷ 30xD with inside coolant (page 125)
HL : long 12xD ÷ 30xD (page 157)
HSD : step drill with inside coolant (page 191)
ALH : high performance - non-ferrous materials (page 109)

Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

SUPER ALLOYS APPLICATION

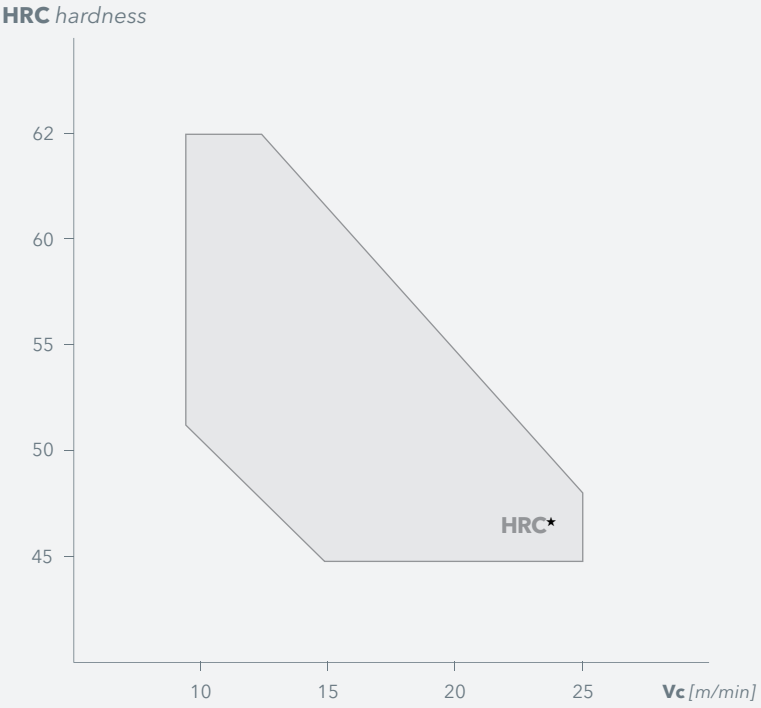
ISO S



★ 1st choice ☆ suitable

HARDENED STEEL APPLICATION

ISO H



★ 1st choice ☆ suitable

HPU : universal purpose with inside coolant (page 43)
4HTA : 4 margins general purpose with inside coolant (page 65)
CV : general purpose (page 91)
HVA : special purpose with inside coolant (page 97)
HRC : hardened steel 45÷62 HRC (page 119)
SUH MINI : miniature 5xD ÷ 30xD with inside coolant (page 125)
HL : long 12xD ÷ 30xD (page 157)
HSD : step drill with inside coolant (page 191)



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

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

353PU 353HPU



353PU



353HPU

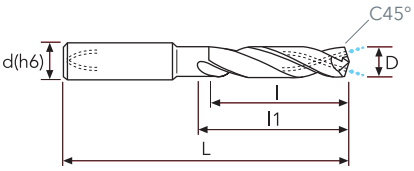
P	M	K	N	S	H	
★	★	★	☆			353PU
★	★	★	☆	★		353HPU

★ 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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

353PU-353HPU

universal application, high productivity

3XD | DIN 6537K | PU 353PU | HPU 353HPU | MG PV250 | 140°+C45° | 30°



353PU



353HPU

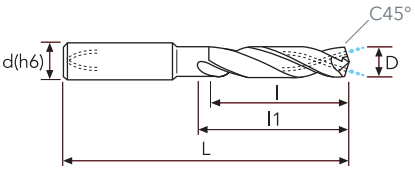
	P	M	K	N	S	H
353PU	★	★	★	☆		
353HPU	★	★	★	☆	★	

★ 1st choice ☆ suitable

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

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

353PU 353HPU



353PU



353HPU

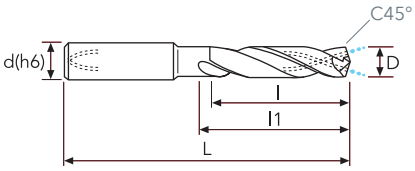
P	M	K	N	S	H	
★	★	★	☆			353PU
★	★	★	☆	★		353HPU

★ 1st choice ☆ suitable

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

353PU-353HPU

universal application, high productivity

3XD | DIN 6537K | PU 353PU | HPU 353HPU | MG PV250 | 140°+C45° | 30°



353PU



353HPU

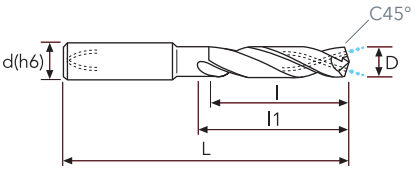
	P	M	K	N	S	H
353PU	★	★	★	☆		
353HPU	★	★	★	☆	★	

★ 1st choice ☆ suitable

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	45	65	115	353PU1500	●	353HPU1500	●
15.10	+0.025/+0.007	16	45	65	115	353PU1510	●	353HPU1510	●
15.20	+0.025/+0.007	16	45	65	115	353PU1520	●	353HPU1520	●
15.30	+0.025/+0.007	16	45	65	115	353PU1530	●	353HPU1530	●
15.50	+0.025/+0.007	16	45	65	115	353PU1550	●	353HPU1550	●
15.60	+0.025/+0.007	16	45	65	115	353PU1560	●	353HPU1560	●
15.70	+0.025/+0.007	16	45	65	115	353PU1570	●	353HPU1570	●
15.80	+0.025/+0.007	16	45	65	115	353PU1580	●	353HPU1580	●
16.00	+0.025/+0.007	16	45	65	115	353PU1600	●	353HPU1600	●
16.10	+0.025/+0.007	18	52	73	123			353HPU1610	●
16.20	+0.025/+0.007	18	52	73	123			353HPU1620	●
16.30	+0.025/+0.007	18	52	73	123			353HPU1630	●
16.50	+0.025/+0.007	18	52	73	123	353PU1650	●	353HPU1650	●
16.70	+0.025/+0.007	18	52	73	123			353HPU1670	●
16.80	+0.025/+0.007	18	52	73	123			353HPU1680	●
17.00	+0.025/+0.007	18	52	73	123	353PU1700	●	353HPU1700	●
17.10	+0.025/+0.007	18	52	73	123			353HPU1710	●
17.20	+0.025/+0.007	18	52	73	123			353HPU1720	●
17.50	+0.025/+0.007	18	52	73	123	353PU1750	●	353HPU1750	●
17.60	+0.025/+0.007	18	52	73	123			353HPU1760	●
17.70	+0.025/+0.007	18	52	73	123			353HPU1770	●
17.80	+0.025/+0.007	18	52	73	123			353HPU1780	●
18.00	+0.025/+0.007	18	52	73	123	353PU1800	●	353HPU1800	●
18.10	+0.029/+0.008	20	55	79	131			353HPU1810	●
18.20	+0.029/+0.008	20	55	79	131			353HPU1820	●
18.30	+0.029/+0.008	20	55	79	131			353HPU1830	●
18.50	+0.029/+0.008	20	55	79	131	353PU1850	●	353HPU1850	●
18.60	+0.029/+0.008	20	55	79	131			353HPU1860	●
18.70	+0.029/+0.008	20	55	79	131			353HPU1870	●
18.80	+0.029/+0.008	20	55	79	131			353HPU1880	●
19.00	+0.029/+0.008	20	55	79	131	353PU1900	●	353HPU1900	●
19.20	+0.029/+0.008	20	55	79	131			353HPU1920	●
19.30	+0.029/+0.008	20	55	79	131			353HPU1930	●
19.50	+0.029/+0.008	20	55	79	131	353PU1950	●	353HPU1950	●
19.60	+0.029/+0.008	20	55	79	131			353HPU1960	●
19.80	+0.029/+0.008	20	55	79	131			353HPU1980	●
20.00	+0.029/+0.008	20	55	79	131	353PU2000	●	353HPU2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353PU

Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
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**	**60÷85**	**50÷65**	**35÷50**	**20÷30**
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
3	0.120	0.108	0.096	0.084	0.074	0.044
4	0.142	0.128	0.114	0.099	0.087	0.052
5	0.164	0.147	0.131	0.115	0.101	0.061
6	0.186	0.167	0.149	0.130	0.120	0.072
7	0.208	0.187	0.166	0.145	0.134	0.081
8	0.229	0.206	0.184	0.161	0.148	0.089
9	0.251	0.226	0.201	0.176	0.162	0.097
10	0.273	0.246	0.219	0.191	0.177	0.106
11	0.284	0.256	0.227	0.199	0.184	0.110
12	0.306	0.275	0.245	0.214	0.198	0.119
13	0.328	0.295	0.262	0.229	0.212	0.127
14	0.350	0.315	0.280	0.245	0.226	0.136
15	0.371	0.334	0.297	0.260	0.240	0.144
16	0.393	0.354	0.315	0.275	0.246	0.147
17	0.404	0.364	0.323	0.283	0.249	0.149
18	0.415	0.374	0.332	0.291	0.256	0.153
19	0.426	0.383	0.341	0.298	0.262	0.157
20	0.437	0.393	0.350	0.306	0.269	0.161

Ø RUN OUT <0.02mm

353HPU

Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
Vc (m/min)	**120÷160**	**100÷140**	**70÷100**	**60÷80**	**50÷70**	**25÷40**
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
3	0.127	0.114	0.101	0.089	0.082	0.049
4	0.150	0.135	0.120	0.105	0.097	0.058
5	0.173	0.155	0.138	0.121	0.112	0.067
6	0.196	0.176	0.156	0.137	0.133	0.080
7	0.219	0.197	0.175	0.153	0.149	0.089
8	0.242	0.217	0.193	0.169	0.165	0.099
9	0.265	0.238	0.212	0.185	0.181	0.108
10	0.288	0.259	0.230	0.201	0.196	0.118
11	0.299	0.269	0.239	0.209	0.204	0.122
12	0.322	0.290	0.258	0.225	0.220	0.132
13	0.345	0.311	0.276	0.242	0.235	0.141
14	0.368	0.331	0.294	0.258	0.251	0.151
15	0.391	0.352	0.313	0.274	0.267	0.160
16	0.414	0.373	0.331	0.290	0.273	0.163
17	0.426	0.383	0.340	0.298	0.277	0.166
18	0.437	0.393	0.350	0.306	0.284	0.170
19	0.449	0.404	0.359	0.314	0.292	0.175
20	0.460	0.414	0.368	0.322	0.299	0.179

Ø RUN OUT <0.02mm

CUTTING PARAMETERS

353PU



Material Group ISO 513	M1	M2	M3			
Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
Vc (m/min)	**35÷50**	**30÷45**	**20÷35**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3	0.067	0.053	0.047			
4	0.079	0.063	0.055			
5	0.101	0.081	0.064			
6	0.114	0.091	0.072			
7	0.128	0.102	0.081			
8	0.141	0.113	0.089			
9	0.155	0.124	0.097			
10	0.168	0.135	0.106			
11	0.175	0.140	0.110			
12	0.188	0.151	0.119			
13	0.202	0.161	0.127			
14	0.215	0.172	0.136			
15	0.229	0.183	0.144			
16	0.242	0.194	0.153			
17	0.249	0.199	0.157			
18	0.256	0.205	0.161			
19	0.262	0.210	0.165			
20	0.269	0.215	0.170			

353HPU



Material Group ISO 513	M1	M2	M3			
Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
Vc (m/min)	**50÷70**	**40÷60**	**30÷45**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3	0.074	0.059	0.052			
4	0.087	0.070	0.061			
5	0.112	0.090	0.071			
6	0.127	0.102	0.080			
7	0.142	0.114	0.089			
8	0.157	0.126	0.099			
9	0.172	0.138	0.108			
10	0.187	0.150	0.118			
11	0.194	0.155	0.122			
12	0.209	0.167	0.132			
13	0.224	0.179	0.141			
14	0.239	0.191	0.151			
15	0.254	0.203	0.160			
16	0.269	0.215	0.170			
17	0.277	0.221	0.174			
18	0.284	0.227	0.179			
19	0.292	0.233	0.184			
20	0.299	0.239	0.188			

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÷150**	**90÷120**	**60÷80**	**40÷60**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**3**	0.120	0.108	0.096	0.084		
	4	0.142	0.128	0.114	0.099		
	5	0.164	0.147	0.131	0.115		
	6	0.186	0.167	0.149	0.130		
	7	0.208	0.187	0.166	0.145		
	8	0.229	0.206	0.184	0.161		
	9	0.251	0.226	0.201	0.176		
	10	0.273	0.246	0.219	0.191		
	11	0.284	0.256	0.227	0.199		
	12	0.306	0.275	0.245	0.214		
	13	0.328	0.295	0.262	0.229		
	14	0.350	0.315	0.280	0.245		
	15	0.371	0.334	0.297	0.260		
	16	0.393	0.354	0.315	0.275		
	17	0.404	0.364	0.323	0.283		
	18	0.415	0.374	0.332	0.291		
	19	0.426	0.383	0.341	0.298		
	20	0.437	0.393	0.350	0.306		

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÷160**	**100÷140**	**80÷100**	**60÷80**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**3**	0.127	0.114	0.101	0.089		
	4	0.150	0.135	0.120	0.105		
	5	0.173	0.155	0.138	0.121		
	6	0.196	0.176	0.156	0.137		
	7	0.219	0.197	0.175	0.153		
	8	0.242	0.217	0.193	0.169		
	9	0.265	0.238	0.212	0.185		
	10	0.288	0.259	0.230	0.201		
	11	0.299	0.269	0.239	0.209		
	12	0.322	0.290	0.258	0.225		
	13	0.345	0.311	0.276	0.242		
	14	0.368	0.331	0.294	0.258		
	15	0.391	0.352	0.313	0.274		
	16	0.414	0.373	0.331	0.290		
	17	0.426	0.383	0.340	0.298		
	18	0.437	0.393	0.350	0.306		
	19	0.449	0.404	0.359	0.314		
	20	0.460	0.414	0.368	0.322		

CUTTING PARAMETERS

353PU



Material Group ISO 513	N1	N2	N3	N4		
Hardness/Rm	> 5%Si					
Vc (m/min)	220÷260	200÷240	160÷200	160÷200		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.144	0.132	0.120	0.120		
4	0.170	0.156	0.142	0.142		
5	0.197	0.180	0.164	0.164		
6	0.223	0.204	0.186	0.186		
7	0.249	0.228	0.208	0.208		
8	0.275	0.252	0.229	0.229		
9	0.302	0.276	0.251	0.251		
10	0.328	0.300	0.273	0.273		
11	0.341	0.312	0.284	0.284		
12	0.367	0.336	0.306	0.306		
13	0.393	0.361	0.328	0.328		
14	0.420	0.385	0.350	0.350		
15	0.446	0.409	0.371	0.371		
16	0.472	0.433	0.393	0.393		
17	0.485	0.445	0.404	0.404		
18	0.498	0.457	0.415	0.415		
19	0.511	0.469	0.426	0.426		
20	0.524	0.481	0.437	0.437		

353HPU



Material Group ISO 513	N1	N2	N3	N4		
Hardness/Rm	> 5%Si					
Vc (m/min)	260÷300	220÷260	180÷220	180÷220		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.152	0.139	0.127	0.127		
4	0.179	0.164	0.150	0.150		
5	0.207	0.190	0.173	0.173		
6	0.235	0.215	0.196	0.196		
7	0.262	0.240	0.219	0.219		
8	0.290	0.266	0.242	0.242		
9	0.317	0.291	0.265	0.265		
10	0.345	0.316	0.288	0.288		
11	0.359	0.329	0.299	0.299		
12	0.386	0.354	0.322	0.322		
13	0.414	0.380	0.345	0.345		
14	0.442	0.405	0.368	0.368		
15	0.469	0.430	0.391	0.391		
16	0.497	0.455	0.414	0.414		
17	0.511	0.468	0.426	0.426		
18	0.524	0.481	0.437	0.437		
19	0.538	0.493	0.449	0.449		
20	0.552	0.506	0.460	0.460		

353PU

Material Group ISO 513	S1 S2	S3	S4	S5		
Hardness/Rm	<35 HRC	35÷45 HRC				
Vc (m/min)	**15÷25**	**10÷20**	**20÷30**	**15÷25**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.054	0.049	0.037	0.031		
4	0.064	0.058	0.043	0.037		
5	0.074	0.066	0.050	0.042		
6	0.084	0.075	0.057	0.048		
7	0.093	0.084	0.064	0.053		
8	0.103	0.093	0.070	0.059		
9	0.113	0.102	0.077	0.065		
10	0.123	0.111	0.084	0.070		
11	0.128	0.115	0.087	0.073		
12	0.138	0.124	0.094	0.079		
13	0.147	0.133	0.100	0.084		
14	0.157	0.142	0.107	0.090		
15	0.167	0.150	0.114	0.096		
16	0.177	0.159	0.120	0.101		
17	0.182	0.164	0.124	0.104		
18	0.187	0.168	0.127	0.107		
19	0.192	0.173	0.130	0.110		
20	0.197	0.177	0.134	0.113		

Ø RUN OUT <0.02mm

353HPU

Material Group ISO 513	S1 S2	S3	S4	S5		
Hardness/Rm	<35 HRC	35÷45 HRC				
Vc (m/min)	**30÷40**	**25÷35**	**40÷50**	**30÷40**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.057	0.054	0.046	0.039		
4	0.067	0.064	0.054	0.046		
5	0.078	0.074	0.063	0.053		
6	0.088	0.084	0.071	0.060		
7	0.098	0.093	0.079	0.067		
8	0.109	0.103	0.088	0.074		
9	0.119	0.113	0.096	0.081		
10	0.129	0.123	0.104	0.088		
11	0.135	0.128	0.109	0.091		
12	0.145	0.138	0.117	0.099		
13	0.155	0.147	0.125	0.106		
14	0.166	0.157	0.134	0.113		
15	0.176	0.167	0.142	0.120		
16	0.186	0.177	0.150	0.127		
17	0.191	0.182	0.155	0.130		
18	0.197	0.187	0.159	0.134		
19	0.202	0.192	0.163	0.137		
20	0.207	0.197	0.167	0.141		

Ø RUN OUT <0.02mm

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

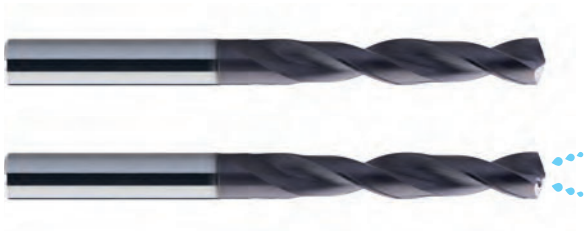
HSS END-MILLS

CARBIDE BURRS

355PU-355HPU

universal application, high productivity

5XD | DIN 6537L | PU 355PU | HPU 355HPU | MG PV250 | 140°+C45° | 30°



355PU

355HPU

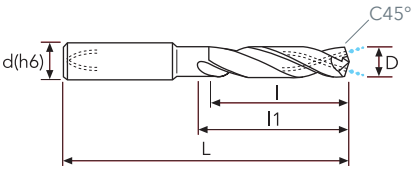
P	M	K	N	S	H	
★	★	★	☆			355PU
★	★	★	☆	★		355HPU

★ 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	●

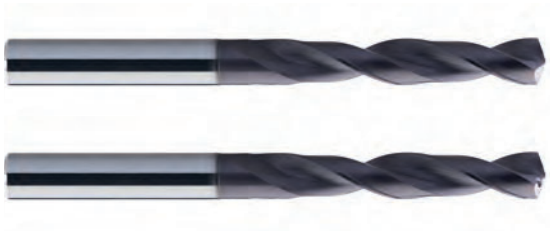
● stock standard ○ non-standard stock ▽ stock exhaustion

355PU-355HPU

universal application, high productivity

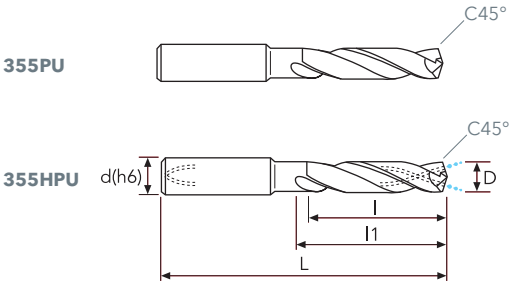
5XD | DIN 6537L | PU | HPU | MG PV250 | 140° +C45° | 30°

355PU 355HPU



355PU

355HPU



P	M	K	N	S	H
★	★	★	☆		
★	★	★	☆	★	

355PU
355HPU

★ 1st choice ☆ suitable

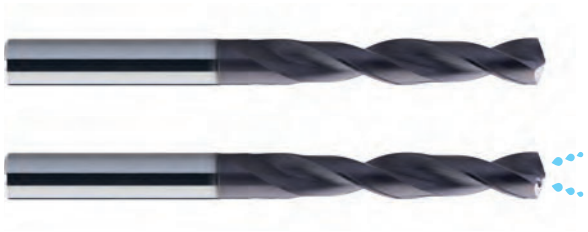
						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
6.60	+0.021/+0.006	8	43	53	91	355PU0660	●	355HPU0660	●
6.70	+0.021/+0.006	8	43	53	91	355PU0670	●	355HPU0670	●
6.80	+0.021/+0.006	8	43	53	91	355PU0680	●	355HPU0680	●
6.90	+0.021/+0.006	8	43	53	91	355PU0690	●	355HPU0690	●
7.00	+0.021/+0.006	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	●
9.35	+0.021/+0.006	10	49	61	103			355HPU0935	●
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	49	61	103	355PU0950	●	355HPU0950	●
9.60	+0.021/+0.006	10	49	61	103	355PU0960	●	355HPU0960	●
9.70	+0.021/+0.006	10	49	61	103	355PU0970	●	355HPU0970	●
9.80	+0.021/+0.006	10	49	61	103	355PU0980	●	355HPU0980	●
9.90	+0.021/+0.006	10	49	61	103	355PU0990	●	355HPU0990	●
10.00	+0.021/+0.006	10	49	61	103	355PU1000	●	355HPU1000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355PU-355HPU

universal application, high productivity

5XD | DIN 6537L | PU 355PU | HPU 355HPU | MG PV250 | 140°+C45° | 30°



355PU

355HPU

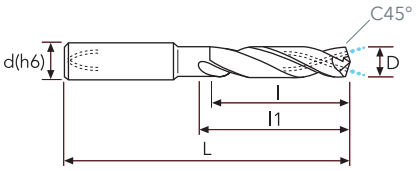
	P	M	K	N	S	H
355PU	★	★	★	☆		
355HPU	★	★	★	☆	★	

★ 1st choice ☆ suitable

355PU



355HPU



						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
10.10	+0.025/+0.007	12	57	71	118	355PU1010	●	355HPU1010	●
10.20	+0.025/+0.007	12	57	71	118	355PU1020	●	355HPU1020	●
10.30	+0.025/+0.007	12	57	71	118	355PU1030	●	355HPU1030	●
10.40	+0.025/+0.007	12	57	71	118	355PU1040	●	355HPU1040	●
10.50	+0.025/+0.007	12	57	71	118	355PU1050	●	355HPU1050	●
10.60	+0.025/+0.007	12	57	71	118	355PU1060	●	355HPU1060	●
10.70	+0.025/+0.007	12	57	71	118	355PU1070	●	355HPU1070	●
10.80	+0.025/+0.007	12	57	71	118	355PU1080	●	355HPU1080	●
10.90	+0.025/+0.007	12	57	71	118	355PU1090	●	355HPU1090	●
11.00	+0.025/+0.007	12	57	71	118	355PU1100	●	355HPU1100	●
11.10	+0.025/+0.007	12	57	71	118	355PU1110	●	355HPU1110	●
11.20	+0.025/+0.007	12	57	71	118	355PU1120	●	355HPU1120	●
11.25	+0.025/+0.007	12	57	71	118			355HPU1125	●
11.30	+0.025/+0.007	12	57	71	118	355PU1130	●	355HPU1130	●
11.40	+0.025/+0.007	12	57	71	118	355PU1140	●	355HPU1140	●
11.50	+0.025/+0.007	12	57	71	118	355PU1150	●	355HPU1150	●
11.60	+0.025/+0.007	12	57	71	118	355PU1160	●	355HPU1160	●
11.70	+0.025/+0.007	12	57	71	118	355PU1170	●	355HPU1170	●
11.80	+0.025/+0.007	12	57	71	118	355PU1180	●	355HPU1180	●
11.90	+0.025/+0.007	12	57	71	118	355PU1190	●	355HPU1190	●
12.00	+0.025/+0.007	12	57	71	118	355PU1200	●	355HPU1200	●
12.10	+0.025/+0.007	14	63	77	124	355PU1210	●	355HPU1210	●
12.20	+0.025/+0.007	14	63	77	124	355PU1220	●	355HPU1220	●
12.30	+0.025/+0.007	14	63	77	124			355HPU1230	●
12.40	+0.025/+0.007	14	63	77	124			355HPU1240	●
12.50	+0.025/+0.007	14	63	77	124	355PU1250	●	355HPU1250	●
12.60	+0.025/+0.007	14	63	77	124			355HPU1260	●
12.70	+0.025/+0.007	14	63	77	124	355PU1270	●	355HPU1270	●
12.80	+0.025/+0.007	14	63	77	124	355PU1280	●	355HPU1280	●
12.90	+0.025/+0.007	14	63	77	124			355HPU1290	●
13.00	+0.025/+0.007	14	63	77	124	355PU1300	●	355HPU1300	●
13.10	+0.025/+0.007	14	63	77	124	355PU1310	●	355HPU1310	●
13.20	+0.025/+0.007	14	63	77	124	355PU1320	●	355HPU1320	●
13.30	+0.025/+0.007	14	63	77	124	355PU1330	●	355HPU1330	●
13.40	+0.025/+0.007	14	63	77	124			355HPU1340	●
13.50	+0.025/+0.007	14	63	77	124	355PU1350	●	355HPU1350	●
13.60	+0.025/+0.007	14	63	77	124			355HPU1360	●
13.70	+0.025/+0.007	14	63	77	124	355PU1370	●	355HPU1370	●
13.80	+0.025/+0.007	14	63	77	124	355PU1380	●	355HPU1380	●

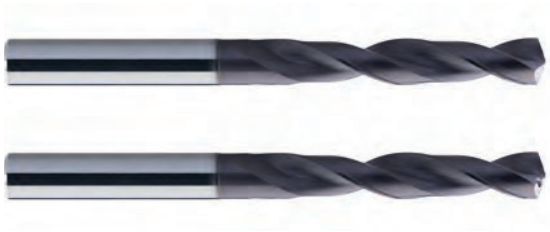
● stock standard ○ non-standard stock ▽ stock exhaustion

355PU-355HPU

universal application, high productivity

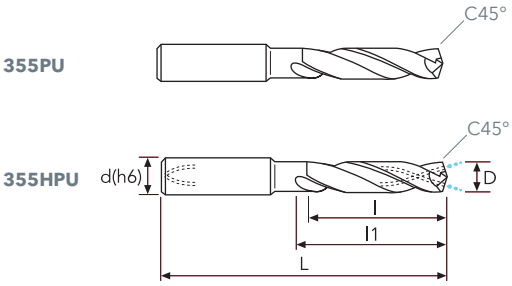
5XD | DIN 6537L | PU | HPU | MG PV250 | 140° +C45° | 30°

355PU 355HPU



355PU

355HPU



P	M	K	N	S	H	
★	★	★	☆			355PU
★	★	★	☆	★		355HPU

★ 1st choice ☆ suitable

						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
13.90	+0.025/+0.007	14	63	77	124			355HPU1390	●
14.00	+0.025/+0.007	14	63	77	124	355PU1400	●	355HPU1400	●
14.10	+0.025/+0.007	16	67	83	133			355HPU1410	●
14.20	+0.025/+0.007	16	67	83	133			355HPU1420	●
14.30	+0.025/+0.007	16	67	83	133			355HPU1430	●
14.40	+0.025/+0.007	16	67	83	133			355HPU1440	●
14.50	+0.025/+0.007	16	67	83	133	355PU1450	●	355HPU1450	●
14.60	+0.025/+0.007	16	67	83	133			355HPU1460	●
14.70	+0.025/+0.007	16	67	83	133			355HPU1470	●
14.80	+0.025/+0.007	16	67	83	133			355HPU1480	●
14.90	+0.025/+0.007	16	67	83	133			355HPU1490	●
15.00	+0.025/+0.007	16	67	83	133	355PU1500	●	355HPU1500	●
15.10	+0.025/+0.007	16	67	83	133			355HPU1510	●
15.20	+0.025/+0.007	16	67	83	133			355HPU1520	●
15.30	+0.025/+0.007	16	67	83	133	355PU1530	●	355HPU1530	●
15.40	+0.025/+0.007	16	67	83	133			355HPU1540	●
15.50	+0.025/+0.007	16	67	83	133	355PU1550	●	355HPU1550	●
15.60	+0.025/+0.007	16	67	83	133			355HPU1560	●
15.70	+0.025/+0.007	16	67	83	133			355HPU1570	●
15.80	+0.025/+0.007	16	67	83	133	355PU1580	●	355HPU1580	●
15.90	+0.025/+0.007	16	67	83	133			355HPU1590	●
16.00	+0.025/+0.007	16	67	83	133	355PU1600	●	355HPU1600	●
16.10	+0.025/+0.007	18	75	93	143			355HPU1610	●
16.20	+0.025/+0.007	18	75	93	143			355HPU1620	●
16.30	+0.025/+0.007	18	75	93	143			355HPU1630	●
16.40	+0.025/+0.007	18	75	93	143			355HPU1640	●
16.50	+0.025/+0.007	18	75	93	143	355PU1650	●	355HPU1650	●
16.60	+0.025/+0.007	18	75	93	143			355HPU1660	●
16.70	+0.025/+0.007	18	75	93	143			355HPU1670	●
16.80	+0.025/+0.007	18	75	93	143			355HPU1680	●
16.90	+0.025/+0.007	18	75	93	143			355HPU1690	●
17.00	+0.025/+0.007	18	75	93	143	355PU1700	●	355HPU1700	●
17.10	+0.025/+0.007	18	75	93	143			355HPU1710	●
17.20	+0.025/+0.007	18	75	93	143			355HPU1720	●
17.30	+0.025/+0.007	18	75	93	143			355HPU1730	●
17.40	+0.025/+0.007	18	75	93	143			355HPU1740	●
17.50	+0.025/+0.007	18	75	93	143	355PU1750	●	355HPU1750	●
17.60	+0.025/+0.007	18	75	93	143			355HPU1760	●
17.70	+0.025/+0.007	18	75	93	143			355HPU1770	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

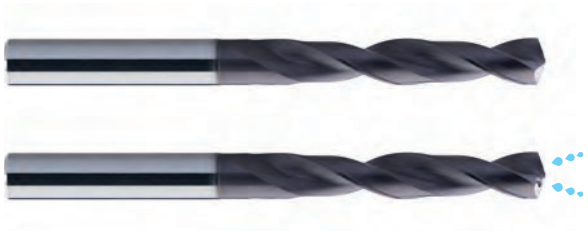
HSS END-MILLS

CARBIDE BURRS

355PU-355HPU

universal application, high productivity

5XD | DIN 6537L | PU 355PU | HPU 355HPU | MG PV250 | 140°+C45° | 30°



355PU

355HPU

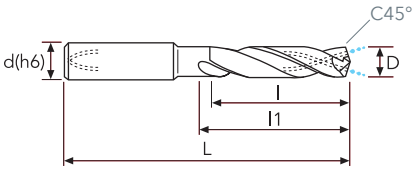
P	M	K	N	S	H	
★	★	★	☆			355PU
★	★	★	☆	★		355HPU

★ 1st choice ☆ suitable

355PU



355HPU



						355PU		355HPU	
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock	EDP No.	Stock
17.80	+0.025/+0.007	18	75	93	143			355HPU1780	●
17.90	+0.025/+0.007	18	75	93	143			355HPU1790	●
18.00	+0.025/+0.007	18	75	93	143	355PU1800	●	355HPU1800	●
18.10	+0.029/+0.008	20	81	101	153			355HPU1810	●
18.20	+0.029/+0.008	20	81	101	153			355HPU1820	●
18.30	+0.029/+0.008	20	81	101	153			355HPU1830	●
18.40	+0.029/+0.008	20	81	101	153			355HPU1840	●
18.50	+0.029/+0.008	20	81	101	153	355PU1850	●	355HPU1850	●
18.60	+0.029/+0.008	20	81	101	153			355HPU1860	●
18.70	+0.029/+0.008	20	81	101	153			355HPU1870	●
18.80	+0.029/+0.008	20	81	101	153			355HPU1880	●
18.90	+0.029/+0.008	20	81	101	153			355HPU1890	●
19.00	+0.029/+0.008	20	81	101	153	355PU1900	●	355HPU1900	●
19.10	+0.029/+0.008	20	81	101	153			355HPU1910	●
19.20	+0.029/+0.008	20	81	101	153			355HPU1920	●
19.30	+0.029/+0.008	20	81	101	153			355HPU1930	●
19.40	+0.029/+0.008	20	81	101	153			355HPU1940	●
19.50	+0.029/+0.008	20	81	101	153	355PU1950	●	355HPU1950	●
19.60	+0.029/+0.008	20	81	101	153			355HPU1960	●
19.70	+0.029/+0.008	20	81	101	153			355HPU1970	●
19.80	+0.029/+0.008	20	81	101	153			355HPU1980	●
19.90	+0.029/+0.008	20	81	101	153			355HPU1990	●
20.00	+0.029/+0.008	20	81	101	153	355PU2000	●	355HPU2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355PU

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	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**	**60÷85**	**50÷65**	**35÷50**	**20÷30**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
Ø RUN OUT <0.02mm	**3**	0.114	0.103	0.091	0.080	0.070	0.042
	4	0.135	0.121	0.108	0.094	0.083	0.050
	5	0.156	0.140	0.125	0.109	0.096	0.058
	6	0.176	0.159	0.141	0.124	0.114	0.068
	7	0.197	0.177	0.158	0.138	0.128	0.077
	8	0.218	0.196	0.174	0.153	0.141	0.085
	9	0.239	0.215	0.191	0.167	0.154	0.093
	10	0.259	0.234	0.208	0.182	0.168	0.101
	11	0.270	0.243	0.216	0.189	0.174	0.105
	12	0.291	0.262	0.232	0.203	0.188	0.113
	13	0.311	0.280	0.249	0.218	0.201	0.121
	14	0.332	0.299	0.266	0.232	0.215	0.129
	15	0.353	0.318	0.282	0.247	0.228	0.137
	16	0.374	0.338	0.299	0.262	0.233	0.139
	17	0.384	0.346	0.307	0.269	0.236	0.142
	18	0.394	0.355	0.316	0.276	0.243	0.146
	19	0.405	0.364	0.324	0.283	0.249	0.150
	20	0.415	0.374	0.332	0.291	0.256	0.153

355HPU

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
	Vc (m/min)	**120÷160**	**100÷140**	**70÷100**	**60÷80**	**50÷70**	**25÷40**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
Ø RUN OUT <0.02mm	**3**	0.120	0.108	0.096	0.084	0.078	0.047
	4	0.142	0.128	0.114	0.099	0.092	0.055
	5	0.164	0.147	0.131	0.115	0.107	0.064
	6	0.186	0.167	0.149	0.130	0.127	0.076
	7	0.208	0.187	0.166	0.145	0.142	0.085
	8	0.229	0.206	0.184	0.161	0.157	0.094
	9	0.251	0.226	0.201	0.176	0.171	0.103
	10	0.273	0.246	0.219	0.191	0.186	0.112
	11	0.284	0.256	0.227	0.199	0.194	0.116
	12	0.306	0.275	0.245	0.214	0.209	0.125
	13	0.328	0.295	0.262	0.229	0.224	0.134
	14	0.350	0.315	0.280	0.245	0.239	0.143
	15	0.371	0.334	0.297	0.260	0.254	0.152
	16	0.393	0.356	0.315	0.275	0.259	0.155
	17	0.404	0.364	0.323	0.283	0.263	0.158
	18	0.415	0.374	0.332	0.291	0.270	0.162
	19	0.426	0.383	0.341	0.298	0.277	0.166
	20	0.437	0.393	0.350	0.306	0.284	0.170

CUTTING PARAMETERS

355PU



Material Group ISO 513	M1	M2	M3			
Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
Vc (m/min)	**35÷50**	**30÷45**	**20÷35**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3	0.063	0.051	0.044			
4	0.075	0.060	0.052			
5	0.096	0.077	0.060			
6	0.109	0.087	0.068			
7	0.121	0.097	0.077			
8	0.134	0.107	0.085			
9	0.147	0.118	0.093			
10	0.160	0.128	0.101			
11	0.166	0.133	0.105			
12	0.179	0.143	0.113			
13	0.192	0.153	0.121			
14	0.205	0.164	0.129			
15	0.217	0.174	0.137			
16	0.230	0.184	0.145			
17	0.236	0.189	0.149			
18	0.243	0.194	0.153			
19	0.249	0.199	0.157			
20	0.256	0.205	0.161			

355HPU



Material Group ISO 513	M1	M2	M3			
Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
Vc (m/min)	**50÷70**	**40÷60**	**30÷45**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3	0.070	0.056	0.049			
4	0.083	0.066	0.058			
5	0.107	0.085	0.067			
6	0.121	0.097	0.076			
7	0.135	0.108	0.085			
8	0.149	0.119	0.094			
9	0.163	0.131	0.103			
10	0.178	0.142	0.112			
11	0.185	0.148	0.116			
12	0.199	0.159	0.125			
13	0.213	0.170	0.134			
14	0.227	0.182	0.143			
15	0.241	0.193	0.152			
16	0.256	0.205	0.161			
17	0.263	0.210	0.166			
18	0.270	0.216	0.170			
19	0.277	0.222	0.174			
20	0.284	0.227	0.179			

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)	**110÷150**	**90÷120**	**60÷80**	**40÷60**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**3**	0.114	0.103	0.091	0.080		
	4	0.135	0.121	0.108	0.094		
	5	0.156	0.140	0.125	0.109		
	6	0.176	0.159	0.141	0.124		
	7	0.197	0.177	0.158	0.138		
	8	0.218	0.196	0.174	0.153		
	9	0.239	0.215	0.191	0.167		
	10	0.259	0.234	0.208	0.182		
	11	0.270	0.243	0.216	0.189		
	12	0.291	0.262	0.232	0.203		
	13	0.311	0.280	0.249	0.218		
	14	0.332	0.299	0.266	0.232		
	15	0.353	0.318	0.282	0.247		
	16	0.374	0.338	0.299	0.262		
	17	0.384	0.346	0.307	0.269		
	18	0.394	0.355	0.316	0.276		
	19	0.405	0.364	0.324	0.283		
	20	0.415	0.374	0.332	0.291		

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)	**120÷160**	**100÷140**	**80÷100**	**60÷80**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**3**	0.120	0.108	0.096	0.084		
	4	0.142	0.128	0.114	0.099		
	5	0.164	0.147	0.131	0.115		
	6	0.186	0.167	0.149	0.130		
	7	0.208	0.187	0.166	0.145		
	8	0.229	0.206	0.184	0.161		
	9	0.251	0.226	0.201	0.176		
	10	0.273	0.246	0.219	0.191		
	11	0.284	0.256	0.227	0.199		
	12	0.306	0.275	0.245	0.214		
	13	0.328	0.295	0.262	0.229		
	14	0.350	0.315	0.280	0.245		
	15	0.371	0.334	0.297	0.260		
	16	0.393	0.356	0.315	0.275		
	17	0.404	0.364	0.323	0.283		
	18	0.415	0.374	0.332	0.291		
	19	0.426	0.383	0.341	0.298		
	20	0.437	0.393	0.350	0.306		

355PU

	Material Group ISO 513	N1	N2	N3	N4		
	Hardness/Rm	> 5%Si					
	Vc (m/min)	220÷260	200÷240	160÷200	160÷200		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	3	0.137	0.126	0.114	0.114		
	4	0.162	0.148	0.135	0.135		
	5	0.187	0.171	0.156	0.156		
	6	0.212	0.194	0.176	0.176		
	7	0.237	0.217	0.197	0.197		
	8	0.262	0.240	0.218	0.218		
	9	0.286	0.263	0.239	0.239		
	10	0.311	0.285	0.259	0.259		
	11	0.324	0.297	0.270	0.270		
	12	0.349	0.320	0.291	0.291		
	13	0.374	0.342	0.311	0.311		
	14	0.399	0.365	0.332	0.332		
	15	0.423	0.388	0.353	0.353		
	16	0.448	0.411	0.374	0.374		
	17	0.461	0.422	0.384	0.384		
	18	0.473	0.434	0.394	0.394		
	19	0.486	0.445	0.405	0.405		
	20	0.498	0.457	0.415	0.415		

355HPU

	Material Group ISO 513	N1	N2	N3	N4		
	Hardness/Rm	> 5%Si					
	Vc (m/min)	260÷300	220÷260	180÷220	180÷220		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	3	0.144	0.132	0.120	0.120		
	4	0.170	0.156	0.142	0.142		
	5	0.197	0.180	0.164	0.164		
	6	0.223	0.204	0.186	0.186		
	7	0.249	0.228	0.208	0.208		
	8	0.275	0.252	0.229	0.229		
	9	0.302	0.276	0.251	0.251		
	10	0.328	0.300	0.273	0.273		
	11	0.341	0.312	0.284	0.284		
	12	0.367	0.336	0.306	0.306		
	13	0.393	0.361	0.328	0.328		
	14	0.420	0.385	0.350	0.350		
	15	0.446	0.409	0.371	0.371		
	16	0.472	0.433	0.393	0.393		
	17	0.485	0.445	0.404	0.404		
	18	0.498	0.457	0.415	0.415		
	19	0.511	0.469	0.426	0.426		
	20	0.524	0.481	0.437	0.437		

355PU

Material Group ISO 513	S1 S2	S3	S4	S5		
Hardness/Rm	<35 HRC	35÷45 HRC				
Vc (m/min)	**15÷25**	**10÷20**	**20÷30**	**15÷25**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.051	0.044	0.035	0.029		
4	0.061	0.052	0.041	0.035		
5	0.070	0.060	0.048	0.040		
6	0.079	0.068	0.054	0.045		
7	0.089	0.076	0.060	0.051		
8	0.098	0.084	0.067	0.056		
9	0.107	0.092	0.073	0.062		
10	0.117	0.100	0.079	0.067		
11	0.121	0.104	0.083	0.070		
12	0.131	0.112	0.089	0.075		
13	0.140	0.120	0.095	0.080		
14	0.149	0.128	0.102	0.086		
15	0.159	0.136	0.108	0.091		
16	0.168	0.144	0.114	0.096		
17	0.173	0.148	0.118	0.099		
18	0.177	0.152	0.121	0.102		
19	0.182	0.156	0.124	0.104		
20	0.187	0.160	0.127	0.107		

Ø RUN OUT <0.02mm

355HPU

Material Group ISO 513	S1 S2	S3	S4	S5		
Hardness/Rm	<35 HRC	35÷45 HRC				
Vc (m/min)	**30÷40**	**25÷35**	**40÷50**	**30÷40**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.054	0.049	0.044	0.037		
4	0.064	0.058	0.052	0.043		
5	0.074	0.067	0.060	0.050		
6	0.084	0.075	0.067	0.057		
7	0.093	0.084	0.075	0.064		
8	0.103	0.093	0.083	0.070		
9	0.113	0.102	0.091	0.077		
10	0.123	0.111	0.099	0.084		
11	0.128	0.115	0.103	0.087		
12	0.138	0.124	0.111	0.094		
13	0.147	0.133	0.119	0.100		
14	0.157	0.142	0.127	0.107		
15	0.167	0.151	0.135	0.114		
16	0.177	0.160	0.143	0.120		
17	0.182	0.164	0.147	0.124		
18	0.187	0.169	0.151	0.127		
19	0.192	0.173	0.155	0.130		
20	0.197	0.177	0.159	0.134		

Ø RUN OUT <0.02mm



TYPHOON 4HTA

HIGH PERFORMANCE - GENERAL PURPOSE

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

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

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

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

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

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

TYPHOON 4HTA

HIGH PERFORMANCE - GENERAL PURPOSE



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

3584HTA

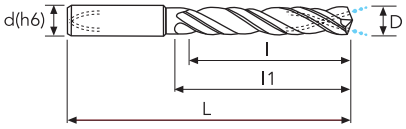
4-margin lands, long (8xD)

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

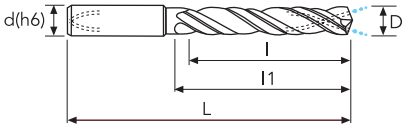
4-margin lands, long (8xD)

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

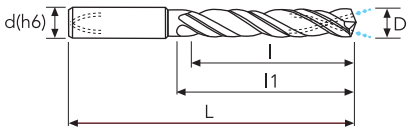
4-margin lands, long (8xD)

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

CUTTING PARAMETERS

3584HTA

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	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**	**40÷50**	**15÷25**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3	0.072	0.065	0.058	0.050	0.070	0.042
	4	0.089	0.080	0.071	0.062	0.090	0.054
	5	0.106	0.095	0.085	0.074	0.100	0.060
	6	0.122	0.110	0.098	0.085	0.110	0.066
	7	0.139	0.125	0.111	0.097	0.130	0.078
	8	0.155	0.140	0.124	0.109	0.150	0.090
	9	0.172	0.155	0.138	0.120	0.160	0.096
	10	0.188	0.169	0.150	0.132	0.175	0.105
	11	0.205	0.185	0.164	0.144	0.180	0.108
	12	0.221	0.199	0.177	0.155	0.200	0.120
	13	0.238	0.214	0.190	0.167	0.215	0.129
	14	0.254	0.229	0.203	0.178	0.230	0.138
	15	0.270	0.243	0.216	0.189	0.245	0.147
	16	0.286	0.257	0.229	0.200	0.260	0.156

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm						
	Vc (m/min)	**40÷50**	**30÷40**	**20÷30**			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.070	0.056	0.049			
	4	0.090	0.072	0.063			
	5	0.100	0.080	0.070			
	6	0.110	0.088	0.077			
	7	0.130	0.104	0.091			
	8	0.150	0.120	0.105			
	9	0.160	0.128	0.112			
	10	0.175	0.140	0.123			
	11	0.180	0.144	0.126			
	12	0.200	0.160	0.140			
	13	0.215	0.172	0.151			
	14	0.230	0.184	0.161			
	15	0.245	0.196	0.172			
	16	0.260	0.208	0.182			

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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
	3	0.072	0.065	0.058	0.050		
	4	0.089	0.080	0.071	0.062		
	5	0.106	0.095	0.085	0.074		
	6	0.122	0.110	0.098	0.085		
	7	0.139	0.125	0.111	0.097		
	8	0.155	0.140	0.124	0.109		
	9	0.172	0.155	0.138	0.120		
	10	0.188	0.169	0.150	0.132		
	11	0.205	0.185	0.164	0.144		
	12	0.221	0.199	0.177	0.155		
	13	0.238	0.214	0.190	0.167		
	14	0.254	0.229	0.203	0.178		
	15	0.270	0.243	0.216	0.189		
	16	0.286	0.257	0.229	0.200		

	Material Group ISO 513	N1 N2	N3	N4			
	Hardness/Rm	>5% Si					
	Vc (m/min)	**160÷200**	**140÷180**	**130÷170**			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.086	0.078	0.078			
	4	0.107	0.096	0.096			
	5	0.127	0.114	0.114			
	6	0.146	0.132	0.132			
	7	0.167	0.150	0.150			
	8	0.186	0.167	0.167			
	9	0.206	0.186	0.186			
	10	0.226	0.203	0.203			
	11	0.246	0.221	0.221			
	12	0.265	0.239	0.239			
	13	0.286	0.257	0.257			
	14	0.305	0.274	0.274			
	15	0.324	0.292	0.292			
	16	0.343	0.309	0.309			

CUTTING PARAMETERS

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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
	3	0.046	0.032	0.044	0.037		
	4	0.055	0.039	0.052	0.044		
	5	0.063	0.044	0.060	0.050		
	6	0.073	0.051	0.069	0.058		
	7	0.080	0.056	0.076	0.064		
	8	0.090	0.063	0.086	0.072		
	9	0.100	0.070	0.095	0.080		
	10	0.110	0.077	0.105	0.088		
	11	0.120	0.084	0.114	0.096		
	12	0.130	0.091	0.124	0.104		
	13	0.137	0.096	0.130	0.110		
	14	0.145	0.102	0.138	0.116		
	15	0.153	0.107	0.145	0.122		
	16	0.160	0.112	0.152	0.128		



TYPHOON GA-HGA

HIGH PERFORMANCE - GENERAL APPLICATION

3xD, 5xD and 8xD with Weldon shank for general application on ISO P, M, K

3xD, 5xD e 8xD con gambo weldon per applicazioni generali su ISO P, M, K.

3xD, 5xD und 8xD mit Weldon Schaft für allgemeine Anwendung auf ISO P, M, K

3xD, 5xD et 8xD avec tige Weldon pour application générale sur ISO P, M, K

3XD, 5xD y 8xD con mango Weldon para aplicación general en ISO P, M, K

3xD, 5xD и 8xD с хвостовиком Weldon для общего применения по ISO P, M, K.

TYPHOON GA-HGA

HIGH PERFORMANCE - GENERAL APPLICATION





- Self-centering geometry: accurate holes
- Made of sub-micron grain carbide and new PV400 coating for better wear resistance (lower cost per hole).
- Straight cutting edge design and unique edge treatment technology allow higher reliability.
- Optimized core diameter guarantees the straightness of the hole and wide flutes design allows smooth chip ejection

- Géométrie auto-centrée pour trous précis
- Fabriqué en carbure à grains submicroniques et nouveau revêtement PV400 pour une meilleure résistance à l'usure (coût inférieur par trou).
- La conception du bord droit et la technologie unique de traitement des bords permettent une plus grande fiabilité.
- Le diamètre optimisé du noyau garantit la rectitude du trou et la conception de cannelures larges permet une éjection en douceur des copeaux.

- Affilatura autocentrante per fori precisi
- In metallo duro con grano sub-micron e nuovo rivestimento PV400 per migliore resistenza all'usura (inferiore costo per foro)
- Tagliente diritto e esclusivo processo di onatura del bordo per elevata affidabilità
- Il diametro del nocciolo ottimizzato assicura la realizzazione di fori diritti; le scanalature ampie, garantiscono migliore evacuazione dei trucioli

- Afilado autocentrante para agujeros precisos
- Hecho de carburo de grano submicrónico y nuevo recubrimiento PV400 para una mayor resistencia al desgaste (menor costo por agujero).
- El diseño de filo de corte recto y la tecnología única de tratamiento de filo dan una mayor estabilidad.
- El diámetro del núcleo optimizado garantiza la rectitud del agujero y el diseño de ranuras anchas permiten una expulsión suave de la viruta.

- Selbstzentrierender Schliff für präzise Bohrungen
- Aus VHM Mikrokörnung und neue PV400 Beschichtung um bessere Verschleissbeständigkeit zu ermöglichen.
- Gerades Schnittkantendesign und optimaler Schliff für eine hohe Zuverlässigkeit des Werkzeugs.
- Optimierter Kerndurchmesser für gerade Bohrungen, breite Spannuten zur Verbesserung der Spanabfuhr.

- Самоцентрирующаяся заточка для получения точных отверстий
- Изготовлены из твёрдого сплава с субмикронным зерном и новым покрытием PV400 для лучшей износостойкости (более низкая стоимость отверстия).
- Прямая режущая кромка и уникальная технология обработки кромок обеспечивают более высокую надежность.
- Оптимизированный диаметр сердцевины гарантирует прямолинейность отверстия, а конструкция с широкими канавками обеспечивает беспрепятственный выброс стружки.

373GA-HGA

General application, Weldon shank

3XD | DIN 6537K | GA 373GA | HGA 373HGA | MG PV400 | 140° | 30°

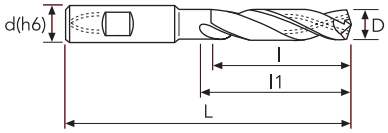


373GA

373HGA

P	M	K	N	S	H	
★	☆	★				373GA
★	★	★				373HGA

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	373GA EDP No.	Stock	373HGA EDP No.	Stock
3.0	+0.004/+0.016	6	14	20	62	373GA0300	●	373HGA0300	●
3.1	+0.004/+0.016	6	14	20	62	373GA0310	●	373HGA0310	●
3.2	+0.004/+0.016	6	14	20	62	373GA0320	●	373HGA0320	●
3.3	+0.004/+0.016	6	14	20	62	373GA0330	●	373HGA0330	●
3.4	+0.004/+0.016	6	14	20	62	373GA0340	●	373HGA0340	●
3.5	+0.004/+0.016	6	14	20	62	373GA0350	●	373HGA0350	●
3.6	+0.004/+0.016	6	14	20	62	373GA0360	●	373HGA0360	●
3.7	+0.004/+0.016	6	14	20	62	373GA0370	●	373HGA0370	●
3.8	+0.004/+0.016	6	17	24	66	373GA0380	●	373HGA0380	●
3.9	+0.004/+0.016	6	17	24	66	373GA0390	●	373HGA0390	●
4.0	+0.004/+0.016	6	17	24	66	373GA0400	●	373HGA0400	●
4.1	+0.004/+0.016	6	17	24	66	373GA0410	●	373HGA0410	●
4.2	+0.004/+0.016	6	17	24	66	373GA0420	●	373HGA0420	●
4.3	+0.004/+0.016	6	17	24	66	373GA0430	●	373HGA0430	●
4.4	+0.004/+0.016	6	17	24	66	373GA0440	●	373HGA0440	●
4.5	+0.004/+0.016	6	17	24	66	373GA0450	●	373HGA0450	●
4.6	+0.004/+0.016	6	17	24	66	373GA0460	●	373HGA0460	●
4.7	+0.004/+0.016	6	17	24	66	373GA0470	●	373HGA0470	●
4.8	+0.004/+0.016	6	20	28	66	373GA0480	●	373HGA0480	●
4.9	+0.004/+0.016	6	20	28	66	373GA0490	●	373HGA0490	●
5.0	+0.004/+0.016	6	20	28	66	373GA0500	●	373HGA0500	●
5.1	+0.004/+0.016	6	20	28	66	373GA0510	●	373HGA0510	●
5.2	+0.004/+0.016	6	20	28	66	373GA0520	●	373HGA0520	●
5.3	+0.004/+0.016	6	20	28	66	373GA0530	●	373HGA0530	●
5.4	+0.004/+0.016	6	20	28	66	373GA0540	●	373HGA0540	●
5.5	+0.004/+0.016	6	20	28	66	373GA0550	●	373HGA0550	●
5.6	+0.004/+0.016	6	20	28	66	373GA0560	●	373HGA0560	●
5.7	+0.004/+0.016	6	20	28	66	373GA0570	●	373HGA0570	●
5.8	+0.004/+0.016	6	20	28	66	373GA0580	●	373HGA0580	●
5.9	+0.004/+0.016	6	20	28	66	373GA0590	●	373HGA0590	●
6.0	+0.004/+0.016	6	20	28	66	373GA0600	●	373HGA0600	●
6.1	+0.006/+0.021	8	24	34	79	373GA0610	●	373HGA0610	●
6.2	+0.006/+0.021	8	24	34	79	373GA0620	●	373HGA0620	●
6.3	+0.006/+0.021	8	24	34	79	373GA0630	●	373HGA0630	●
6.4	+0.006/+0.021	8	24	34	79	373GA0640	●	373HGA0640	●
6.5	+0.006/+0.021	8	24	34	79	373GA0650	●	373HGA0650	●
6.6	+0.006/+0.021	8	24	34	79	373GA0660	●	373HGA0660	●
6.7	+0.006/+0.021	8	24	34	79	373GA0670	●	373HGA0670	●
6.8	+0.006/+0.021	8	24	34	79	373GA0680	●	373HGA0680	●

● stock standard ○ non-standard stock

373GA-HGA

General application, Weldon shank

3XD | DIN 6537K | GA 373GA | HGA 373HGA | MG PV400 | 140° | 30°



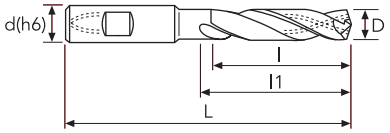
373GA



373HGA

	P	M	K	N	S	H
373GA	★	☆	★			
373HGA	★	★	★			

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	373GA EDP No.	Stock	373HGA EDP No.	Stock
6.9	+0.006/+0.021	8	24	34	79	373GA0690	●	373HGA0690	●
7.0	+0.006/+0.021	8	24	34	79	373GA0700	●	373HGA0700	●
7.1	+0.006/+0.021	8	29	41	79	373GA0710	●	373HGA0710	●
7.2	+0.006/+0.021	8	29	41	79	373GA0720	●	373HGA0720	●
7.3	+0.006/+0.021	8	29	41	79	373GA0730	●	373HGA0730	●
7.4	+0.006/+0.021	8	29	41	79	373GA0740	●	373HGA0740	●
7.5	+0.006/+0.021	8	29	41	79	373GA0750	●	373HGA0750	●
7.6	+0.006/+0.021	8	29	41	79	373GA0760	●	373HGA0760	●
7.7	+0.006/+0.021	8	29	41	79	373GA0770	●	373HGA0770	●
7.8	+0.006/+0.021	8	29	41	79	373GA0780	●	373HGA0780	●
7.9	+0.006/+0.021	8	29	41	79	373GA0790	●	373HGA0790	●
8.0	+0.006/+0.021	8	29	41	79	373GA0800	●	373HGA0800	●
8.1	+0.006/+0.021	10	35	47	89	373GA0810	●	373HGA0810	●
8.2	+0.006/+0.021	10	35	47	89	373GA0820	●	373HGA0820	●
8.3	+0.006/+0.021	10	35	47	89	373GA0830	●	373HGA0830	●
8.4	+0.006/+0.021	10	35	47	89	373GA0840	●	373HGA0840	●
8.5	+0.006/+0.021	10	35	47	89	373GA0850	●	373HGA0850	●
8.6	+0.006/+0.021	10	35	47	89	373GA0860	●	373HGA0860	●
8.7	+0.006/+0.021	10	35	47	89	373GA0870	●	373HGA0870	●
8.8	+0.006/+0.021	10	35	47	89	373GA0880	●	373HGA0880	●
8.9	+0.006/+0.021	10	35	47	89	373GA0890	●	373HGA0890	●
9.0	+0.006/+0.021	10	35	47	89	373GA0900	●	373HGA0900	●
9.1	+0.006/+0.021	10	35	47	89	373GA0910	●	373HGA0910	●
9.2	+0.006/+0.021	10	35	47	89	373GA0920	●	373HGA0920	●
9.3	+0.006/+0.021	10	35	47	89	373GA0930	●	373HGA0930	●
9.4	+0.006/+0.021	10	35	47	89	373GA0940	●	373HGA0940	●
9.5	+0.006/+0.021	10	35	47	89	373GA0950	●	373HGA0950	●
9.6	+0.006/+0.021	10	35	47	89	373GA0960	●	373HGA0960	●
9.7	+0.006/+0.021	10	35	47	89	373GA0970	●	373HGA0970	●
9.8	+0.006/+0.021	10	35	47	89	373GA0980	●	373HGA0980	●
9.9	+0.006/+0.021	10	35	47	89	373GA0990	●	373HGA0990	●
10.0	+0.006/+0.021	10	35	47	89	373GA1000	●	373HGA1000	●
10.1	+0.007/+0.025	12	40	55	102	373GA1010	●	373HGA1010	●
10.2	+0.007/+0.025	12	40	55	102	373GA1020	●	373HGA1020	●
10.3	+0.007/+0.025	12	40	55	102	373GA1030	●	373HGA1030	●
10.4	+0.007/+0.025	12	40	55	102	373GA1040	●	373HGA1040	●
10.5	+0.007/+0.025	12	40	55	102	373GA1050	●	373HGA1050	●
10.6	+0.007/+0.025	12	40	55	102	373GA1060	●	373HGA1060	●
10.7	+0.007/+0.025	12	40	55	102	373GA1070	●	373HGA1070	●

● stock standard ○ non-standard stock

373GA-HGA

General application, Weldon shank

3XD | DIN 6537K | GA 373GA | HGA 373HGA | MG PV400 | 140° | 30°



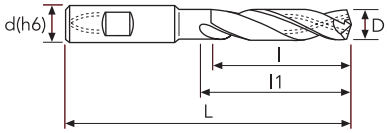
373GA



373HGA

P	M	K	N	S	H	
★	☆	★				373GA
★	★	★				373HGA

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	373GA EDP No.	Stock	373HGA EDP No.	Stock
10.8	+0.007/+0.025	12	40	55	102	373GA1080	●	373HGA1080	●
10.9	+0.007/+0.025	12	40	55	102	373GA1090	●	373HGA1090	●
11.0	+0.007/+0.025	12	40	55	102	373GA1100	●	373HGA1100	●
11.1	+0.007/+0.025	12	40	55	102	373GA1110	●	373HGA1110	●
11.2	+0.007/+0.025	12	40	55	102	373GA1120	●	373HGA1120	●
11.3	+0.007/+0.025	12	40	55	102	373GA1130	●	373HGA1130	●
11.4	+0.007/+0.025	12	40	55	102	373GA1140	●	373HGA1140	●
11.5	+0.007/+0.025	12	40	55	102	373GA1150	●	373HGA1150	●
11.6	+0.007/+0.025	12	40	55	102	373GA1160	●	373HGA1160	●
11.7	+0.007/+0.025	12	40	55	102	373GA1170	●	373HGA1170	●
11.8	+0.007/+0.025	12	40	55	102	373GA1180	●	373HGA1180	●
11.9	+0.007/+0.025	12	40	55	102	373GA1190	●	373HGA1190	●
12.0	+0.007/+0.025	12	40	55	102	373GA1200	●	373HGA1200	●
12.1	+0.007/+0.025	14	43	60	107	373GA1210	○	373HGA1210	●
12.2	+0.007/+0.025	14	43	60	107	373GA1220	●	373HGA1220	●
12.3	+0.007/+0.025	14	43	60	107	373GA1230	○		
12.4	+0.007/+0.025	14	43	60	107	373GA1240	○		
12.5	+0.007/+0.025	14	43	60	107	373GA1250	●	373HGA1250	●
12.6	+0.007/+0.025	14	43	60	107	373GA1260	○		
12.7	+0.007/+0.025	14	43	60	107	373GA1270	●	373HGA1270	●
12.8	+0.007/+0.025	14	43	60	107	373GA1280	●	373HGA1280	●
12.9	+0.007/+0.025	14	43	60	107	373GA1290	○		
13.0	+0.007/+0.025	14	43	60	107	373GA1300	●	373HGA1300	●
13.5	+0.007/+0.025	14	43	60	107	373GA1350	●	373HGA1350	●
13.7	+0.007/+0.025	14	43	60	107	373GA1370	●	373HGA1370	○
13.8	+0.007/+0.025	14	43	60	107	373GA1380	●	373HGA1380	○
14.0	+0.007/+0.025	14	43	60	107	373GA1400	●	373HGA1400	●
14.2	+0.007/+0.025	16	45	65	115	373GA1420	●	373HGA1420	●
14.5	+0.007/+0.025	16	45	65	115	373GA1450	●	373HGA1450	●
14.7	+0.007/+0.025	16	45	65	115	373GA1470	●	373HGA1470	○
14.8	+0.007/+0.025	16	45	65	115	373GA1480	●	373HGA1480	●
15.0	+0.007/+0.025	16	49	65	115	373GA1500	●	373HGA1500	●
15.2	+0.007/+0.025	16	49	65	115	373GA1520	●	373HGA1520	●
15.3	+0.007/+0.025	16	49	65	115	373GA1530	●	373HGA1530	●
15.5	+0.007/+0.025	16	49	65	115	373GA1550	●	373HGA1550	●
15.7	+0.007/+0.025	16	49	65	115	373GA1570	●	373HGA1570	○
15.8	+0.007/+0.025	16	49	65	115	373GA1580	●	373HGA1580	●
16.0	+0.007/+0.025	16	49	65	115	373GA1600	●	373HGA1600	●
16.5	+0.007/+0.025	18	52	73	123	373GA1650	●	373HGA1650	●

● stock standard ○ non-standard stock

373GA-HGA

General application, Weldon shank

3XD | DIN 6537K | GA 373GA | HGA 373HGA | MG PV400 | 140° | 30°



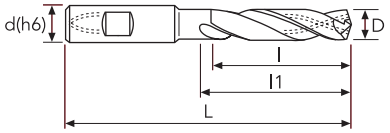
373GA



373HGA

P	M	K	N	S	H	
★	☆	★				373GA
★	★	★				373HGA

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	373GA EDP No.	Stock	373HGA EDP No.	Stock
16.8	+0.007/+0.025	18	52	73	123	373GA1680	○	373HGA1680	○
17.0	+0.007/+0.025	18	52	73	123	373GA1700	●	373HGA1700	●
17.5	+0.007/+0.025	18	52	73	123	373GA1750	●	373HGA1750	●
17.7	+0.007/+0.025	18	52	73	123	373GA1770	○	373HGA1770	○
17.8	+0.007/+0.025	18	52	73	123	373GA1780	○	373HGA1780	○
18.0	+0.007/+0.025	18	52	73	123	373GA1800	●	373HGA1800	●
18.5	+0.008/+0.029	20	55	79	131	373GA1850	●	373HGA1850	●
18.8	+0.008/+0.029	20	55	79	131	373GA1880	○	373HGA1880	○
19.0	+0.008/+0.029	20	55	79	131	373GA1900	●	373HGA1900	●
19.5	+0.008/+0.029	20	55	79	131	373GA1950	●	373HGA1950	●
19.8	+0.008/+0.029	20	55	79	131	373GA1980	○	373HGA1980	○
20.0	+0.008/+0.029	20	55	79	131	373GA2000	●	373HGA2000	●

● stock standard ○ non-standard stock

CUTTING PARAMETERS

373GA

	Material Group ISO 513	P1	P2	P3 P4	P5 P6	P7	P8
	Hardness/Rm	<500 N/mm²	500÷700 N/mm²	600÷1000 N/mm²	900÷1480 N/mm²	<750 N/mm²	850÷1200 N/mm²
	Vc (m/min)	**70÷90**	**60÷80**	**60÷80**	**50÷70**	**40÷60**	**35÷55**
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3	0.143	0.143	0.124	0.105	0.076	0.057
	4	0.143	0.143	0.124	0.105	0.076	0.057
	6	0.181	0.181	0.162	0.133	0.114	0.095
	8	0.209	0.209	0.190	0.152	0.133	0.124
	10	0.209	0.209	0.190	0.152	0.133	0.124
	12	0.266	0.266	0.219	0.181	0.171	0.171
	14	0.304	0.304	0.238	0.209	0.190	0.190
	16	0.304	0.304	0.238	0.209	0.190	0.190
	18	0.361	0.361	0.285	0.228	0.228	0.228
	20	0.361	0.361	0.285	0.228	0.228	0.228

373HGA

	Material Group ISO 513	P1	P2	P3 P4	P5 P6	P7	P8
	Hardness/Rm	<500 N/mm²	500÷700 N/mm²	600÷1000 N/mm²	900÷1480 N/mm²	<750 N/mm²	850÷1200 N/mm²
	Vc (m/min)	**90÷110**	**70÷90**	**70÷90**	**50÷70**	**50÷70**	**40÷60**
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3	0.150	0.150	0.130	0.110	0.080	0.060
	4	0.150	0.150	0.130	0.110	0.080	0.060
	6	0.190	0.190	0.170	0.140	0.120	0.100
	8	0.220	0.220	0.200	0.160	0.140	0.130
	10	0.220	0.220	0.200	0.160	0.140	0.130
	12	0.280	0.280	0.230	0.190	0.180	0.180
	14	0.320	0.320	0.250	0.220	0.200	0.200
	16	0.320	0.320	0.250	0.220	0.200	0.200
	18	0.380	0.380	0.300	0.240	0.240	0.240
	20	0.380	0.380	0.300	0.240	0.240	0.240

373GA

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
	Vc (m/min)	**40÷60**	**35÷55**	**25÷45**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.072	0.054	0.054			
	4	0.090	0.072	0.072			
	6	0.108	0.072	0.072			
	8	0.117	0.090	0.090			
	10	0.135	0.099	0.099			
	12	0.153	0.117	0.117			
	14	0.162	0.117	0.117			
	16	0.180	0.126	0.126			
	18	0.198	0.126	0.126			
	20	0.216	0.144	0.144			

CUTTING PARAMETERS

373HGA

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
	Vc (m/min)	**50÷70**	**50÷70**	**35÷55**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.080	0.060	0.060			
	4	0.100	0.080	0.080			
	6	0.120	0.080	0.080			
	8	0.130	0.100	0.100			
	10	0.150	0.110	0.110			
	12	0.170	0.130	0.130			
	14	0.180	0.130	0.130			
	16	0.200	0.140	0.140			
	18	0.220	0.140	0.140			
	20	0.240	0.160	0.160			

373GA

	Material Group ISO 513	K1	K2	K3			
	Hardness/Rm	150÷250 HB	150÷350 HB	120÷260 HB			
	Vc (m/min)	**90÷110**	**70÷90**	**60÷80**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.162	0.143	0.086			
	4	0.190	0.162	0.095			
	6	0.238	0.190	0.124			
	8	0.257	0.238	0.152			
	10	0.285	0.266	0.190			
	12	0.314	0.285	0.209			
	14	0.342	0.314	0.228			
	16	0.380	0.333	0.247			
	18	0.399	0.361	0.266			
	20	0.428	0.380	0.266			

373HGA

	Material Group ISO 513	K1	K2	K3			
	Hardness/Rm	150÷250 HB	150÷350 HB	120÷260 HB			
	Vc (m/min)	**110÷130**	**90÷110**	**70÷90**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.170	0.150	0.090			
	4	0.200	0.170	0.100			
	6	0.250	0.200	0.130			
	8	0.270	0.250	0.160			
	10	0.300	0.280	0.200			
	12	0.330	0.300	0.220			
	14	0.360	0.330	0.240			
	16	0.400	0.350	0.260			
	18	0.420	0.380	0.280			
	20	0.450	0.400	0.280			

375GA-HGA

General application, Weldon shank

5XD | DIN 6537L | GA 375GA | HGA 375HGA | MG PV400 | 140° | 30°

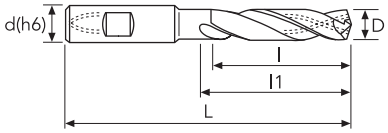


375GA

375HGA

P	M	K	N	S	H	
★	☆	★				375GA
★	★	★				375HGA

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	375GA EDP No.	Stock	375HGA EDP No.	Stock
3.0	+0.004/+0.016	6	23,5	28	66	375GA0300	●	375HGA0300	●
3.1	+0.004/+0.016	6	23,4	28	66	375GA0310	●	375HGA0310	●
3.2	+0.004/+0.016	6	23,2	28	66	375GA0320	●	375HGA0320	●
3.3	+0.004/+0.016	6	23,1	28	66	375GA0330	●	375HGA0330	●
3.4	+0.004/+0.016	6	22,9	28	66	375GA0340	●	375HGA0340	●
3.5	+0.004/+0.016	6	22,8	28	66	375GA0350	●	375HGA0350	●
3.6	+0.004/+0.016	6	22,6	28	66	375GA0360	●	375HGA0360	●
3.7	+0.004/+0.016	6	22,5	28	66	375GA0370	●	375HGA0370	●
3.8	+0.004/+0.016	6	30,3	36	74	375GA0380	●	375HGA0380	●
3.9	+0.004/+0.016	6	30,2	36	74	375GA0390	●	375HGA0390	●
4.0	+0.004/+0.016	6	30,0	36	74	375GA0400	●	375HGA0400	●
4.1	+0.004/+0.016	6	29,9	36	74	375GA0410	●	375HGA0410	●
4.2	+0.004/+0.016	6	29,7	36	74	375GA0420	●	375HGA0420	●
4.3	+0.004/+0.016	6	29,6	36	74	375GA0430	●	375HGA0430	●
4.4	+0.004/+0.016	6	29,4	36	74	375GA0440	●	375HGA0440	●
4.5	+0.004/+0.016	6	29,3	36	74	375GA0450	●	375HGA0450	●
4.6	+0.004/+0.016	6	29,1	36	74	375GA0460	●	375HGA0460	●
4.65	+0.004/+0.016	6	29,0	36	74			375HGA0465	●
4.7	+0.004/+0.016	6	29,0	36	74	375GA0470	●	375HGA0470	●
4.8	+0.004/+0.016	6	36,8	44	82	375GA0480	●	375HGA0480	●
4.9	+0.004/+0.016	6	36,7	44	82	375GA0490	●	375HGA0490	●
5.0	+0.004/+0.016	6	36,5	44	82	375GA0500	●	375HGA0500	●
5.1	+0.004/+0.016	6	36,4	44	82	375GA0510	●	375HGA0510	●
5.2	+0.004/+0.016	6	36,2	44	82	375GA0520	●	375HGA0520	●
5.3	+0.004/+0.016	6	36,1	44	82	375GA0530	●	375HGA0530	●
5.4	+0.004/+0.016	6	35,9	44	82	375GA0540	●	375HGA0540	●
5.5	+0.004/+0.016	6	35,8	44	82	375GA0550	●	375HGA0550	●
5.55	+0.004/+0.016	6	35,7	44	82			375HGA0555	●
5.6	+0.004/+0.016	6	35,6	44	82	375GA0560	●	375HGA0560	●
5.7	+0.004/+0.016	6	35,5	44	82	375GA0570	●	375HGA0570	●
5.8	+0.004/+0.016	6	35,3	44	82	375GA0580	●	375HGA0580	●
5.9	+0.004/+0.016	6	35,2	44	82	375GA0590	●	375HGA0590	●
6.0	+0.004/+0.016	6	35,0	44	82	375GA0600	●	375HGA0600	●
6.1	+0.006/+0.021	8	43,9	53	91	375GA0610	●	375HGA0610	●
6.2	+0.006/+0.021	8	43,7	53	91	375GA0620	●	375HGA0620	●
6.3	+0.006/+0.021	8	43,6	53	91	375GA0630	●	375HGA0630	●
6.4	+0.006/+0.021	8	43,4	53	91	375GA0640	●	375HGA0640	●
6.5	+0.006/+0.021	8	43,3	53	91	375GA0650	●	375HGA0650	●
6.6	+0.006/+0.021	8	43,1	53	91	375GA0660	●	375HGA0660	●

● stock standard ○ non-standard stock

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

375GA-HGA

General application, Weldon shank

5XD | DIN 6537L | GA 375GA | HGA 375HGA | MG PV400 | 140° | 30°



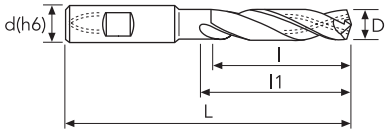
375GA



375HGA

P	M	K	N	S	H	
★	☆	★				375GA
★	★	★				375HGA

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	375GA EDP No.	Stock	375HGA EDP No.	Stock
6.7	+0.006/+0.021	8	43,0	53	91	375GA0670	●	375HGA0670	●
6.8	+0.006/+0.021	8	42,8	53	91	375GA0680	●	375HGA0680	●
6.9	+0.006/+0.021	8	42,7	53	91	375GA0690	●	375HGA0690	●
7.0	+0.006/+0.021	8	42,5	53	91	375GA0700	●	375HGA0700	●
7.1	+0.006/+0.021	8	42,4	53	91	375GA0710	●	375HGA0710	●
7.2	+0.006/+0.021	8	42,2	53	91	375GA0720	●	375HGA0720	●
7.3	+0.006/+0.021	8	42,1	53	91	375GA0730	●	375HGA0730	●
7.4	+0.006/+0.021	8	41,9	53	91	375GA0740	●	375HGA0740	●
7.45	+0.006/+0.021	8	41,8	53	91			375HGA0745	●
7.5	+0.006/+0.021	8	41,8	53	91	375GA0750	●	375HGA0750	●
7.6	+0.006/+0.021	8	41,6	53	91	375GA0760	●	375HGA0760	●
7.7	+0.006/+0.021	8	41,5	53	91	375GA0770	●	375HGA0770	●
7.8	+0.006/+0.021	8	41,3	53	91	375GA0780	●	375HGA0780	●
7.9	+0.006/+0.021	8	41,2	53	91	375GA0790	●	375HGA0790	●
8.0	+0.006/+0.021	8	41,0	53	91	375GA0800	●	375HGA0800	●
8.1	+0.006/+0.021	10	48,9	61	103	375GA0810	●	375HGA0810	●
8.2	+0.006/+0.021	10	48,7	61	103	375GA0820	●	375HGA0820	●
8.3	+0.006/+0.021	10	48,6	61	103	375GA0830	●	375HGA0830	●
8.4	+0.006/+0.021	10	48,4	61	103	375GA0840	●	375HGA0840	●
8.5	+0.006/+0.021	10	48,3	61	103	375GA0850	●	375HGA0850	●
8.6	+0.006/+0.021	10	48,1	61	103	375GA0860	●	375HGA0860	●
8.7	+0.006/+0.021	10	48,0	61	103	375GA0870	●	375HGA0870	●
8.8	+0.006/+0.021	10	47,8	61	103	375GA0880	●	375HGA0880	●
8.9	+0.006/+0.021	10	47,7	61	103	375GA0890	●	375HGA0890	●
9.0	+0.006/+0.021	10	47,5	61	103	375GA0900	●	375HGA0900	●
9.1	+0.006/+0.021	10	47,4	61	103	375GA0910	●	375HGA0910	●
9.2	+0.006/+0.021	10	47,2	61	103	375GA0920	●	375HGA0920	●
9.3	+0.006/+0.021	10	47,1	61	103	375GA0930	●	375HGA0930	●
9.35	+0.006/+0.021	10	47,0	61	103			375HGA0935	●
9.4	+0.006/+0.021	10	46,9	61	103	375GA0940	●	375HGA0940	●
9.5	+0.006/+0.021	10	46,8	61	103	375GA0950	●	375HGA0950	●
9.6	+0.006/+0.021	10	46,6	61	103	375GA0960	●	375HGA0960	●
9.7	+0.006/+0.021	10	46,5	61	103	375GA0970	●	375HGA0970	●
9.8	+0.006/+0.021	10	46,3	61	103	375GA0980	●	375HGA0980	●
9.9	+0.006/+0.021	10	46,2	61	103	375GA0990	●	375HGA0990	●
10.0	+0.006/+0.021	10	46,0	61	103	375GA1000	●	375HGA1000	●
10.1	+0.007/+0.025	12	55,9	71	118	375GA1010	●	375HGA1010	●
10.2	+0.007/+0.025	12	55,7	71	118	375GA1020	●	375HGA1020	●
10.3	+0.007/+0.025	12	55,6	71	118	375GA1030	●	375HGA1030	●

● stock standard ○ non-standard stock

375GA-HGA

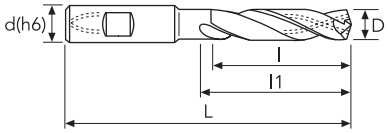
General application, Weldon shank

5XD | DIN 6537L | GA 375GA | HGA 375HGA | MG PV400 | 140° | 30°



P	M	K	N	S	H	
★	☆	★				375GA
★	★	★				375HGA

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	375GA EDP No.	Stock	375HGA EDP No.	Stock
10.4	+0.007/+0.025	12	55,4	71	118	375GA1040	●	375HGA1040	●
10.5	+0.007/+0.025	12	55,3	71	118	375GA1050	●	375HGA1050	●
10.6	+0.007/+0.025	12	55,1	71	118	375GA1060	●	375HGA1060	●
10.7	+0.007/+0.025	12	55,0	71	118	375GA1070	●	375HGA1070	●
10.8	+0.007/+0.025	12	54,8	71	118	375GA1080	●	375HGA1080	●
10.9	+0.007/+0.025	12	54,7	71	118	375GA1090	●	375HGA1090	●
11.0	+0.007/+0.025	12	54,5	71	118	375GA1100	●	375HGA1100	●
11.1	+0.007/+0.025	12	54,4	71	118	375GA1110	●	375HGA1110	●
11.2	+0.007/+0.025	12	54,2	71	118	375GA1120	●	375HGA1120	●
11.3	+0.007/+0.025	12	54,1	71	118	375GA1130	●	375HGA1130	●
11.4	+0.007/+0.025	12	53,9	71	118	375GA1140	●	375HGA1140	●
11.5	+0.007/+0.025	12	53,8	71	118	375GA1150	●	375HGA1150	●
11.6	+0.007/+0.025	12	53,6	71	118	375GA1160	●	375HGA1160	●
11.7	+0.007/+0.025	12	53,5	71	118	375GA1170	●	375HGA1170	●
11.8	+0.007/+0.025	12	53,3	71	118	375GA1180	●	375HGA1180	●
11.9	+0.007/+0.025	12	53,2	71	118	375GA1190	●	375HGA1190	●
12.0	+0.007/+0.025	12	53,0	71	118	375GA1200	●	375HGA1200	●
12.1	+0.007/+0.025	14	58,9	77	124			375HGA1210	●
12.2	+0.007/+0.025	14	58,7	77	124			375HGA1220	●
12.3	+0.007/+0.025	14	58,6	77	124			375HGA1230	●
12.4	+0.007/+0.025	14	58,4	77	124			375HGA1240	●
12.5	+0.007/+0.025	14	58,3	77	124	375GA1250	●	375HGA1250	●
12.6	+0.007/+0.025	14	58,1	77	124			375HGA1260	●
12.7	+0.007/+0.025	14	58,0	77	124			375HGA1270	●
12.8	+0.007/+0.025	14	57,8	77	124			375HGA1280	●
13.0	+0.007/+0.025	14	57,5	77	124	375GA1300	●	375HGA1300	●
13.5	+0.007/+0.025	14	56,8	77	124	375GA1350	●	375HGA1350	●
13.7	+0.007/+0.025	14	56,5	77	124			375HGA1370	●
13.8	+0.007/+0.025	14	56,3	77	124			375HGA1380	●
13.9	+0.007/+0.025	14	56,2	77	124			375HGA1390	●
14.0	+0.007/+0.025	14	56,0	77	124	375GA1400	●	375HGA1400	●
14.1	+0.007/+0.025	16	61,9	83	133			375HGA1410	●
14.2	+0.007/+0.025	16	61,7	83	133			375HGA1420	●
14.5	+0.007/+0.025	16	61,3	83	133	375GA1450	●	375HGA1450	●
14.7	+0.007/+0.025	16	61,0	83	133			375HGA1470	●
14.8	+0.007/+0.025	16	60,8	83	133			375HGA1480	●
15.0	+0.007/+0.025	16	60,5	83	133	375GA1500	●	375HGA1500	●
15.1	+0.007/+0.025	16	60,4	83	133			375HGA1510	●
15.2	+0.007/+0.025	16	60,2	83	133			375HGA1520	●

● stock standard ○ non-standard stock

375GA-HGA

General application, Weldon shank

5XD | DIN 6537L | GA 375GA | HGA 375HGA | MG PV400 | 140° | 30°



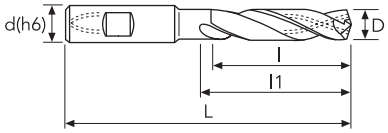
375GA



375HGA

P	M	K	N	S	H	
★	☆	★				375GA
★	★	★				375HGA

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	375GA EDP No.	Stock	375HGA EDP No.	Stock
15.3	+0.007/+0.025	16	60,1	83	133			375HGA1530	●
15.5	+0.007/+0.025	16	59,8	83	133	375GA1550	●	375HGA1550	●
15.7	+0.007/+0.025	16	59,5	83	133			375HGA1570	●
15.8	+0.007/+0.025	16	59,3	83	133			375HGA1580	●
16.0	+0.007/+0.025	16	59,0	83	133	375GA1600	●	375HGA1600	●
16.5	+0.007/+0.025	18	68,3	93	143	375GA1650	●	375HGA1650	●
16.8	+0.007/+0.025	18	67,8	93	143			375HGA1680	○
17.0	+0.007/+0.025	18	67,5	93	143	375GA1700	●	375HGA1700	●
17.5	+0.007/+0.025	18	66,8	93	143	375GA1750	●	375HGA1750	●
17.7	+0.007/+0.025	18	66,5	93	143			375HGA1770	○
17.8	+0.007/+0.025	18	66,3	93	143			375HGA1780	○
18.0	+0.007/+0.025	18	66,0	93	143	375GA1800	●	375HGA1800	●
18.5	+0.008/+0.029	20	73,3	101	153	375GA1850	●	375HGA1850	●
18.8	+0.008/+0.029	20	72,8	101	153			375HGA1880	○
19.0	+0.008/+0.029	20	72,5	101	153	375GA1900	●	375HGA1900	●
19.5	+0.008/+0.029	20	71,8	101	153	375GA1950	●	375HGA1950	●
19.8	+0.008/+0.029	20	71,3	101	153			375HGA1980	○
20.0	+0.008/+0.029	20	71,0	101	153	375GA2000	●	375HGA2000	●

● stock standard ○ non-standard stock

CUTTING PARAMETERS

375GA

	Material Group ISO 513	P1	P2	P3 P4	P5 P6	P7	P8
	Hardness/Rm	<500 N/mm²	500÷700 N/mm²	600÷1000 N/mm²	900÷1480 N/mm²	<750 N/mm²	850÷1200 N/mm²
	Vc (m/min)	**70÷90**	**60÷80**	**60÷80**	**50÷70**	**40÷60**	**35÷55**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3	0.143	0.143	0.124	0.105	0.076	0.057
	4	0.143	0.143	0.124	0.105	0.076	0.057
	6	0.181	0.181	0.162	0.133	0.114	0.095
	8	0.209	0.209	0.190	0.152	0.133	0.124
	10	0.209	0.209	0.190	0.152	0.133	0.124
	12	0.266	0.266	0.219	0.181	0.171	0.171
	14	0.304	0.304	0.238	0.209	0.190	0.190
	16	0.304	0.304	0.238	0.209	0.190	0.190
	18	0.361	0.361	0.285	0.228	0.228	0.228
	20	0.361	0.361	0.285	0.228	0.228	0.228

Ø RUN OUT <0.02mm

375HGA

	Material Group ISO 513	P1	P2	P3 P4	P5 P6	P7	P8
	Hardness/Rm	<500 N/mm²	500÷700 N/mm²	600÷1000 N/mm²	900÷1480 N/mm²	<750 N/mm²	850÷1200 N/mm²
	Vc (m/min)	**90÷110**	**70÷90**	**70÷90**	**50÷70**	**50÷70**	**40÷60**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3	0.150	0.150	0.130	0.110	0.080	0.060
	4	0.150	0.150	0.130	0.110	0.080	0.060
	6	0.190	0.190	0.170	0.140	0.120	0.100
	8	0.220	0.220	0.200	0.160	0.140	0.130
	10	0.220	0.220	0.200	0.160	0.140	0.130
	12	0.280	0.280	0.230	0.190	0.180	0.180
	14	0.320	0.320	0.250	0.220	0.200	0.200
	16	0.320	0.320	0.250	0.220	0.200	0.200
	18	0.380	0.380	0.300	0.240	0.240	0.240
	20	0.380	0.380	0.300	0.240	0.240	0.240

Ø RUN OUT <0.02mm

375GA

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
	Vc (m/min)	**40÷60**	**35÷55**	**25÷45**			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.072	0.054	0.054			
	4	0.090	0.072	0.072			
	6	0.108	0.072	0.072			
	8	0.117	0.090	0.090			
	10	0.135	0.099	0.099			
	12	0.153	0.117	0.117			
	14	0.162	0.117	0.117			
	16	0.180	0.126	0.126			
	18	0.198	0.126	0.126			
	20	0.216	0.144	0.144			

Ø RUN OUT <0.02mm

CUTTING PARAMETERS

375HGA

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
	Vc (m/min)	**50÷70**	**50÷70**	**35÷55**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.080	0.060	0.060			
	4	0.100	0.080	0.080			
	6	0.120	0.080	0.080			
	8	0.130	0.100	0.100			
	10	0.150	0.110	0.110			
	12	0.170	0.130	0.130			
	14	0.180	0.130	0.130			
	16	0.200	0.140	0.140			
	18	0.220	0.140	0.140			
	20	0.240	0.160	0.160			

375GA

	Material Group ISO 513	K1	K2	K3			
	Hardness/Rm	150÷250 HB	150÷350 HB	120÷260 HB			
	Vc (m/min)	**90÷110**	**70÷90**	**60÷80**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.162	0.143	0.086			
	4	0.190	0.162	0.095			
	6	0.238	0.190	0.124			
	8	0.257	0.238	0.152			
	10	0.285	0.266	0.190			
	12	0.314	0.285	0.209			
	14	0.342	0.314	0.228			
	16	0.380	0.333	0.247			
	18	0.399	0.361	0.266			
	20	0.428	0.380	0.266			

375HGA

	Material Group ISO 513	K1	K2	K3			
	Hardness/Rm	150÷250 HB	150÷350 HB	120÷260 HB			
	Vc (m/min)	**110÷130**	**90÷110**	**70÷90**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.170	0.150	0.090			
	4	0.200	0.170	0.100			
	6	0.250	0.200	0.130			
	8	0.270	0.250	0.160			
	10	0.300	0.280	0.200			
	12	0.330	0.300	0.220			
	14	0.360	0.330	0.240			
	16	0.400	0.350	0.260			
	18	0.420	0.380	0.280			
	20	0.450	0.400	0.280			

358HGA

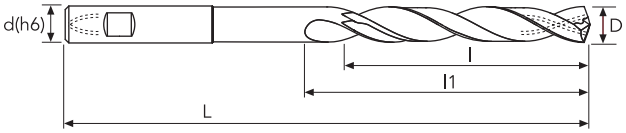
General application, Weldon shank

8XD | OSAWA NORM | HGA | MG PV400 | 140° | 30°



P	M	K	N	S	H
★	★	★			

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
3.0	+0.012/+0.002	6	29	34	72	358HGA0300	●
3.1	+0.016/+0.004	6	29	34	72	358HGA0310	●
3.2	+0.016/+0.004	6	29	34	72	358HGA0320	●
3.3	+0.016/+0.004	6	29	34	72	358HGA0330	●
3.4	+0.016/+0.004	6	29	34	72	358HGA0340	●
3.5	+0.016/+0.004	6	29	34	72	358HGA0350	●
3.6	+0.016/+0.004	6	29	34	72	358HGA0360	●
3.7	+0.016/+0.004	6	29	34	72	358HGA0370	●
3.8	+0.016/+0.004	6	36	43	81	358HGA0380	●
3.9	+0.016/+0.004	6	36	43	81	358HGA0390	●
4.0	+0.016/+0.004	6	36	43	81	358HGA0400	●
4.1	+0.016/+0.004	6	36	43	81	358HGA0410	●
4.2	+0.016/+0.004	6	36	43	81	358HGA0420	●
4.3	+0.016/+0.004	6	36	43	81	358HGA0430	●
4.4	+0.016/+0.004	6	36	43	81	358HGA0440	○
4.5	+0.016/+0.004	6	36	43	81	358HGA0450	●
4.6	+0.016/+0.004	6	36	43	81	358HGA0460	●
4.7	+0.016/+0.004	6	36	43	81	358HGA0470	●
4.8	+0.016/+0.004	6	48	57	95	358HGA0480	●
4.9	+0.016/+0.004	6	48	57	95	358HGA0490	●
5.0	+0.016/+0.004	6	48	57	95	358HGA0500	●
5.1	+0.016/+0.004	6	48	57	95	358HGA0510	●
5.2	+0.016/+0.004	6	48	57	95	358HGA0520	●
5.3	+0.016/+0.004	6	48	57	95	358HGA0530	●
5.4	+0.016/+0.004	6	48	57	95	358HGA0540	○
5.5	+0.016/+0.004	6	48	57	95	358HGA0550	●
5.6	+0.016/+0.004	6	48	57	95	358HGA0560	●
5.7	+0.016/+0.004	6	48	57	95	358HGA0570	●
5.8	+0.016/+0.004	6	48	57	95	358HGA0580	●
5.9	+0.016/+0.004	6	48	57	95	358HGA0590	●
6.0	+0.016/+0.004	6	48	57	95	358HGA0600	●
6.1	+0.021/+0.006	8	64	76	114	358HGA0610	●
6.2	+0.021/+0.006	8	64	76	114	358HGA0620	●
6.3	+0.021/+0.006	8	64	76	114	358HGA0630	●
6.4	+0.021/+0.006	8	64	76	114	358HGA0640	●
6.5	+0.021/+0.006	8	64	76	114	358HGA0650	●
6.6	+0.021/+0.006	8	64	76	114	358HGA0660	●
6.7	+0.021/+0.006	8	64	76	114	358HGA0670	●
6.8	+0.021/+0.006	8	64	76	114	358HGA0680	●

● stock standard ○ non-standard stock

358HGA

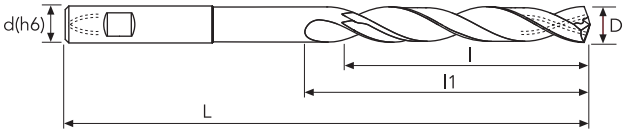
General application, Weldon shank

8XD | OSAWA NORM | HGA | MG PV400 | 140° | 30°



P	M	K	N	S	H
★	★	★			

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
6.9	+0.021/+0.006	8	64	76	114	358HGA0690	●
7.0	+0.021/+0.006	8	64	76	114	358HGA0700	●
7.1	+0.021/+0.006	8	64	76	114	358HGA0710	●
7.2	+0.021/+0.006	8	64	76	114	358HGA0720	●
7.3	+0.021/+0.006	8	64	76	114	358HGA0730	●
7.4	+0.021/+0.006	8	64	76	114	358HGA0740	●
7.5	+0.021/+0.006	8	64	76	114	358HGA0750	●
7.6	+0.021/+0.006	8	64	76	114	358HGA0760	●
7.7	+0.021/+0.006	8	64	76	114	358HGA0770	○
7.8	+0.021/+0.006	8	64	76	114	358HGA0780	●
7.9	+0.021/+0.006	8	64	76	114	358HGA0790	○
8.0	+0.021/+0.006	8	64	76	114	358HGA0800	●
8.1	+0.021/+0.006	10	80	95	142	358HGA0810	●
8.2	+0.021/+0.006	10	80	95	142	358HGA0820	●
8.3	+0.021/+0.006	10	80	95	142	358HGA0830	●
8.4	+0.021/+0.006	10	80	95	142	358HGA0840	○
8.5	+0.021/+0.006	10	80	95	142	358HGA0850	●
8.6	+0.021/+0.006	10	80	95	142	358HGA0860	●
8.7	+0.021/+0.006	10	80	95	142	358HGA0870	●
8.8	+0.021/+0.006	10	80	95	142	358HGA0880	●
8.9	+0.021/+0.006	10	80	95	142	358HGA0890	○
9.0	+0.021/+0.006	10	80	95	142	358HGA0900	●
9.1	+0.021/+0.006	10	80	95	142	358HGA0910	●
9.2	+0.021/+0.006	10	80	95	142	358HGA0920	●
9.3	+0.021/+0.006	10	80	95	142	358HGA0930	●
9.4	+0.021/+0.006	10	80	95	142	358HGA0940	○
9.5	+0.021/+0.006	10	80	95	142	358HGA0950	●
9.6	+0.021/+0.006	10	80	95	142	358HGA0960	○
9.7	+0.021/+0.006	10	80	95	142	358HGA0970	○
9.8	+0.021/+0.006	10	80	95	142	358HGA0980	●
9.9	+0.021/+0.006	10	80	95	142	358HGA0990	○
10.0	+0.021/+0.006	10	80	95	142	358HGA1000	●
10.1	+0.025/+0.007	12	96	114	162	358HGA1010	○
10.2	+0.025/+0.007	12	96	114	162	358HGA1020	●
10.3	+0.025/+0.007	12	96	114	162	358HGA1030	○
10.4	+0.025/+0.007	12	96	114	162	358HGA1040	○
10.5	+0.025/+0.007	12	96	114	162	358HGA1050	●
10.6	+0.025/+0.007	12	96	114	162	358HGA1060	○
10.7	+0.025/+0.007	12	96	114	162	358HGA1070	○

358HGA

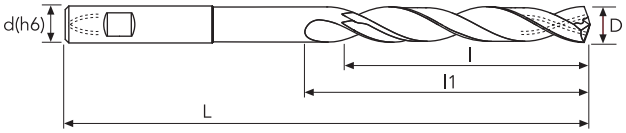
General application, Weldon shank

8XD | OSAWA NORM | HGA | MG PV400 | 140° | 30°



P	M	K	N	S	H
★	★	★			

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
10.8	+0.025/+0.007	12	96	114	162	358HGA1080	●
10.9	+0.025/+0.007	12	96	114	162	358HGA1090	○
11.0	+0.025/+0.007	12	96	114	162	358HGA1100	●
11.1	+0.025/+0.007	12	96	114	162	358HGA1110	○
11.2	+0.025/+0.007	12	96	114	162	358HGA1120	●
11.3	+0.025/+0.007	12	96	114	162	358HGA1130	○
11.4	+0.025/+0.007	12	96	114	162	358HGA1140	○
11.5	+0.025/+0.007	12	96	114	162	358HGA1150	●
11.6	+0.025/+0.007	12	96	114	162	358HGA1160	○
11.7	+0.025/+0.007	12	96	114	162	358HGA1170	○
11.8	+0.025/+0.007	12	96	114	162	358HGA1180	●
11.9	+0.025/+0.007	12	96	114	162	358HGA1190	○
12.0	+0.025/+0.007	12	96	114	162	358HGA1200	●
12.2	+0.025/+0.007	14	112	133	182	358HGA1220	●
12.5	+0.025/+0.007	14	112	133	182	358HGA1250	●
12.8	+0.025/+0.007	14	112	133	182	358HGA1280	●
13.0	+0.025/+0.007	14	112	133	182	358HGA1300	●
13.2	+0.025/+0.007	14	112	133	182	358HGA1320	●
13.5	+0.025/+0.007	14	112	133	182	358HGA1350	●
13.8	+0.025/+0.007	14	112	133	182	358HGA1380	○
14.0	+0.025/+0.007	14	112	133	182	358HGA1400	●
14.2	+0.025/+0.007	16	128	152	203	358HGA1420	●
14.5	+0.025/+0.007	16	128	152	203	358HGA1450	●
14.8	+0.025/+0.007	16	128	152	203	358HGA1480	○
15.0	+0.025/+0.007	16	128	152	203	358HGA1500	●
15.5	+0.025/+0.007	16	128	152	203	358HGA1550	●
15.8	+0.025/+0.007	16	128	152	203	358HGA1580	○
16.0	+0.025/+0.007	16	128	152	203	358HGA1600	●
16.5	+0.025/+0.007	18	144	171	222	358HGA1650	●
16.8	+0.025/+0.007	18	144	171	222	358HGA1680	○
17.0	+0.025/+0.007	18	144	171	222	358HGA1700	●
17.5	+0.025/+0.007	18	144	171	222	358HGA1750	●
17.8	+0.025/+0.007	18	144	171	222	358HGA1780	○
18.0	+0.025/+0.007	18	144	171	222	358HGA1800	●
18.5	+0.029/+0.008	20	160	190	243	358HGA1850	●
18.8	+0.029/+0.008	20	160	190	243	358HGA1880	○
19.0	+0.029/+0.008	20	160	190	243	358HGA1900	●
19.5	+0.029/+0.008	20	160	190	243	358HGA1950	●
19.8	+0.029/+0.008	20	160	190	243	358HGA1980	○
20.0	+0.029/+0.008	20	160	190	243	358HGA2000	●

● stock standard ○ non-standard stock

CUTTING PARAMETERS

358HGA

	Material Group ISO 513	P1	P2	P3 P4	P5 P6	P7	P8
	Hardness/Rm	<500 N/mm²	500÷700 N/mm²	600÷1000 N/mm²	900÷1480 N/mm²	<700 N/mm²	850÷1200 N/mm²
	Vc (m/min)	**80÷100**	**65÷85**	**65÷85**	**45÷65**	**45÷65**	**35÷55**
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3	0.150	0.150	0.130	0.105	0.057	0.057
	4	0.150	0.150	0.130	0.105	0.057	0.057
	6	0.190	0.190	0.170	0.133	0.095	0.095
	8	0.220	0.220	0.200	0.152	0.124	0.124
	10	0.220	0.220	0.200	0.152	0.124	0.124
	12	0.280	0.280	0.230	0.181	0.171	0.171
	14	0.320	0.320	0.250	0.209	0.190	0.190
	16	0.320	0.320	0.250	0.209	0.190	0.190
	18	0.380	0.380	0.300	0.228	0.228	0.228
	20	0.380	0.380	0.300	0.228	0.228	0.228

358HGA

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
	Vc (m/min)	**40÷60**	**40÷60**	**30÷50**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.800	0.060	0.060			
	4	0.800	0.060	0.060			
	6	0.100	0.080	0.080			
	8	0.100	0.080	0.080			
	10	0.120	0.100	0.100			
	12	0.120	0.100	0.100			
	14	0.140	0.120	0.120			
	16	0.140	0.120	0.120			
	18	0.160	0.140	0.140			
	20	0.160	0.140	0.140			

358HGA

	Material Group ISO 513	K1	K2	K3			
	Hardness/Rm	150÷250 HB	150÷350 HB	250÷500 HB			
	Vc (m/min)	**100÷120**	**80÷100**	**65÷85**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3	0.162	0.143	0.086			
	4	0.190	0.162	0.095			
	6	0.238	0.190	0.124			
	8	0.257	0.238	0.152			
	10	0.285	0.266	0.190			
	12	0.314	0.285	0.209			
	14	0.342	0.314	0.228			
	16	0.380	0.333	0.247			
	18	0.399	0.361	0.266			
	20	0.428	0.380	0.266			



TYPHOON CV

HIGH PERFORMANCE - GENERAL PURPOSE

The ideal solution for multi-purpose drilling on ISO P, M, K, N below 1100 N/mm².

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

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

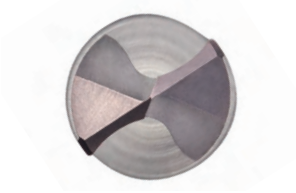
La solution idéale pour le perçage de matériaux ISO P, M, K, N jusqu'à 1100 N/mm².

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

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

TYPHOON CV

HIGH PERFORMANCE - GENERAL PURPOSE





- Unique split point: reduces thrust, provides better self centering
- Split gash design: low drilling resistance and short chips for easier ejection
- Optimized Chisel: long and stable tool life
- Wide flutes by new grinding technology: smooth chips ejection
- Special curved edge design: reduces cutting force
- Small chamfer: reduces corner chipping problem
- Special edge treatment: extends tool life

- Point de séparation unique: réduit la poussée, permet un meilleur auto-centrage.
- Grande goujure centrale: faible résistance au perçage et copeaux courts pour une éjection plus facile
- Arête de coupe transversale optimisée : durée de vie de l'outil longue et stable
- Des goujures larges grâce à une nouvelle technologie de meulage : éjection des copeaux optimale
- Conception spéciale de l'arête avec bord incurvé : réduit la force de coupe
- Petit chanfrein : réduit les problèmes d'écaillage dans les coins
- Traitement spécial des arêtes : prolonge la durée de vie de l'outil

- Affilatura a croce: riduce lo sforzo di taglio e migliora la capacità di centraggio
- Ampio scarico frontale: basso sforzo di taglio e trucioli corti per evacuazione più efficiente
- Tagliente trasversale ottimizzato: incremento durata e affidabilità
- Gole più ampie grazie alla nuova tecnologia di affilatura: ottima evacuazione dei trucioli
- Tagliente curvilineo: Riduce lo sforzo di taglio
- Smusso per protezione degli spigoli: riduzione dei problemi di scheggiatura
- Onatura precisa: maggiore durata dell'utensile

- Afilado a cruz: reduce el esfuerzo de corte y mejora el autocentrado
- Amplio descargue frontal: evacuación de viruta más eficiente gracias a bajos esfuerzos de corte y generación de viruta corta
- Filo de corte transversal mejorado Aumento de la vida útil y fiabilidad
- Ranuras más anchas gracias a la nueva tecnología de afilado: Excelente evacuación de viruta
- Filo de corte curvilíneo Reduce el esfuerzo de corte
- Chaflán para protección de los bordes: Reducción de problemas de astillado
- Tratamiento especial del filo: aumenta la vida útil de la herramienta

- Kreunzanschliff: reduziert die Schnittktraft und verbessert die Zentrierung
- Grosse Freifläche auf der Spitze: Geringer Bohrwiederstand und kurze Späne für eine effizientere Spanabfuhr
- Optimierte Querkante: Verbesserte Standzeit und Leistung
- Grössere Nuten, dank einer neuen Schleiftechnologie: optimale Spanabfuhr
- Gekurvte Schneide: Reduzierter Schneideaufwand
- Kantenschutz: vermindert Absplitterungen
- Spezieller Kantenschnitt: Verlängerte Standzeit

- Крестовая заточка: Снижает усилие резания и улучшает центрирование
- Дизайн режущей части: Низкое усилие резания и короткая стружка для более эффективного удаления
- Оптимизированная поперечная режущая кромка: Повышенная долговечность и надежность
- Более широкие канавки благодаря новой технологии заточки: Превосходное удаление стружки
- Криволинейная режущая кромка: Снижает усилие резания
- Фаска для защиты кромки: Уменьшает проблему сколов кромки
- Специальная обработка края: Более продолжительный срок службы инструмента

353CV

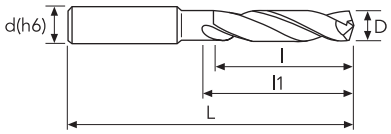
General purpose

3XD | DIN 6537K | CV | MG PV250 | 140° | 30°



P	M	K	N	S	H
★	☆	☆	☆		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
1.00	+0.012/+0.002	3	5	7	45	353CV0100	●
1.10	+0.012/+0.002	3	5	7	45	353CV0110	●
1.20	+0.012/+0.002	3	5	7	45	353CV0120	●
1.30	+0.012/+0.002	3	5	7	45	353CV0130	●
1.40	+0.012/+0.002	3	5	7	45	353CV0140	●
1.50	+0.012/+0.002	3	10	13	50	353CV0150	●
1.60	+0.012/+0.002	3	10	13	50	353CV0160	●
1.70	+0.012/+0.002	3	10	13	50	353CV0170	●
1.80	+0.012/+0.002	3	10	13	50	353CV0180	●
1.90	+0.012/+0.002	3	10	13	50	353CV0190	●
2.00	+0.012/+0.002	4	12	17	55	353CV0200	●
2.10	+0.012/+0.002	4	12	17	55	353CV0210	●
2.20	+0.012/+0.002	4	12	17	55	353CV0220	●
2.30	+0.012/+0.002	4	12	17	55	353CV0230	●
2.40	+0.012/+0.002	4	12	17	55	353CV0240	●
2.50	+0.012/+0.002	4	12	17	55	353CV0250	●
2.60	+0.012/+0.002	4	12	17	55	353CV0260	●
2.70	+0.012/+0.002	4	12	17	55	353CV0270	●
2.80	+0.012/+0.002	4	12	17	55	353CV0280	●
2.90	+0.012/+0.002	4	12	17	55	353CV0290	●
3.00	+0.012/+0.002	6	14	20	62	353CV0300	●
3.10	+0.016/+0.004	6	14	20	62	353CV0310	●
3.20	+0.016/+0.004	6	14	20	62	353CV0320	●
3.30	+0.016/+0.004	6	14	20	62	353CV0330	●
3.40	+0.016/+0.004	6	14	20	62	353CV0340	●
3.50	+0.016/+0.004	6	14	20	62	353CV0350	●
3.60	+0.016/+0.004	6	14	20	62	353CV0360	●
3.70	+0.016/+0.004	6	14	20	62	353CV0370	●
3.80	+0.016/+0.004	6	17	24	66	353CV0380	●
3.90	+0.016/+0.004	6	17	24	66	353CV0390	●
4.00	+0.016/+0.004	6	17	24	66	353CV0400	●
4.10	+0.016/+0.004	6	17	24	66	353CV0410	●
4.20	+0.016/+0.004	6	17	24	66	353CV0420	●
4.30	+0.016/+0.004	6	17	24	66	353CV0430	●
4.40	+0.016/+0.004	6	17	24	66	353CV0440	●
4.50	+0.016/+0.004	6	17	24	66	353CV0450	●
4.60	+0.016/+0.004	6	17	24	66	353CV0460	●
4.70	+0.016/+0.004	6	17	24	66	353CV0470	●
4.80	+0.016/+0.004	6	20	28	66	353CV0480	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353CV

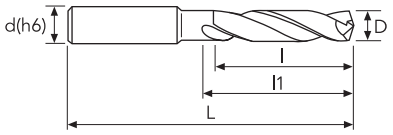
General purpose

3XD | DIN 6537K | CV | MG PV250 | 140° | 30°



P	M	K	N	S	H
★	☆	☆	☆		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
4.90	+0.016/+0.004	6	20	28	66	353CV0490	●
5.00	+0.016/+0.004	6	20	28	66	353CV0500	●
5.10	+0.016/+0.004	6	20	28	66	353CV0510	●
5.20	+0.016/+0.004	6	20	28	66	353CV0520	●
5.30	+0.016/+0.004	6	20	28	66	353CV0530	●
5.40	+0.016/+0.004	6	20	28	66	353CV0540	●
5.50	+0.016/+0.004	6	20	28	66	353CV0550	●
5.60	+0.016/+0.004	6	20	28	66	353CV0560	●
5.70	+0.016/+0.004	6	20	28	66	353CV0570	●
5.80	+0.016/+0.004	6	20	28	66	353CV0580	●
5.90	+0.016/+0.004	6	20	28	66	353CV0590	●
6.00	+0.016/+0.004	6	20	28	66	353CV0600	●
6.10	+0.021/+0.006	8	24	34	79	353CV0610	▽
6.20	+0.021/+0.006	8	24	34	79	353CV0620	▽
6.30	+0.021/+0.006	8	24	34	79	353CV0630	▽
6.40	+0.021/+0.006	8	24	34	79	353CV0640	▽
6.50	+0.021/+0.006	8	24	34	79	353CV0650	▽
6.60	+0.021/+0.006	8	24	34	79	353CV0660	▽
6.70	+0.021/+0.006	8	24	34	79	353CV0670	▽
6.80	+0.021/+0.006	8	24	34	79	353CV0680	▽
6.90	+0.021/+0.006	8	24	34	79	353CV0690	▽
7.00	+0.021/+0.006	8	24	34	79	353CV0700	▽
7.10	+0.021/+0.006	8	29	41	79	353CV0710	▽
7.20	+0.021/+0.006	8	29	41	79	353CV0720	▽
7.30	+0.021/+0.006	8	29	41	79	353CV0730	▽
7.40	+0.021/+0.006	8	29	41	79	353CV0740	▽
7.50	+0.021/+0.006	8	29	41	79	353CV0750	▽
7.60	+0.021/+0.006	8	29	41	79	353CV0760	▽
7.70	+0.021/+0.006	8	29	41	79	353CV0770	▽
7.80	+0.021/+0.006	8	29	41	79	353CV0780	▽
7.90	+0.021/+0.006	8	29	41	79	353CV0790	▽
8.00	+0.021/+0.006	8	29	41	79	353CV0800	▽
8.10	+0.021/+0.006	10	35	47	89	353CV0810	▽
8.20	+0.021/+0.006	10	35	47	89	353CV0820	▽
8.30	+0.021/+0.006	10	35	47	89	353CV0830	▽
8.40	+0.021/+0.006	10	35	47	89	353CV0840	▽
8.50	+0.021/+0.006	10	35	47	89	353CV0850	▽
8.60	+0.021/+0.006	10	35	47	89	353CV0860	▽
8.70	+0.021/+0.006	10	35	47	89	353CV0870	▽

● stock standard ○ non-standard stock ▽ stock exhaustion

353CV

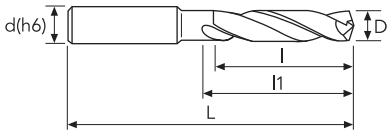
General purpose

3XD | DIN 6537K | CV | MG PV250 | 140° | 30°



P	M	K	N	S	H
★	☆	☆	☆		

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
8.80	+0.021/+0.006	10	35	47	89	353CV0880	▽
8.90	+0.021/+0.006	10	35	47	89	353CV0890	▽
9.00	+0.021/+0.006	10	35	47	89	353CV0900	▽
9.10	+0.021/+0.006	10	35	47	89	353CV0910	▽
9.20	+0.021/+0.006	10	35	47	89	353CV0920	▽
9.30	+0.021/+0.006	10	35	47	89	353CV0930	▽
9.40	+0.021/+0.006	10	35	47	89	353CV0940	▽
9.50	+0.021/+0.006	10	35	47	89	353CV0950	▽
9.60	+0.021/+0.006	10	35	47	89	353CV0960	▽
9.70	+0.021/+0.006	10	35	47	89	353CV0970	▽
9.80	+0.021/+0.006	10	35	47	89	353CV0980	▽
9.90	+0.021/+0.006	10	35	47	89	353CV0990	▽
10.00	+0.021/+0.006	10	35	47	89	353CV1000	▽
10.20	+0.025/+0.007	12	40	55	102	353CV1020	▽
10.50	+0.025/+0.007	12	40	55	102	353CV1050	▽
11.00	+0.025/+0.007	12	40	55	102	353CV1100	▽
11.50	+0.025/+0.007	12	40	55	102	353CV1150	▽
12.00	+0.025/+0.007	12	40	55	102	353CV1200	▽
12.50	+0.025/+0.007	14	43	60	107	353CV1250	▽
13.00	+0.025/+0.007	14	43	60	107	353CV1300	▽
13.50	+0.025/+0.007	14	43	60	107	353CV1350	▽
14.00	+0.025/+0.007	14	43	60	107	353CV1400	▽
14.50	+0.025/+0.007	16	49	65	115	353CV1450	▽
15.00	+0.025/+0.007	16	49	65	115	353CV1500	▽
15.50	+0.025/+0.007	16	49	65	115	353CV1550	▽
16.00	+0.025/+0.007	16	49	65	115	353CV1600	▽

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

353CV



Material Group ISO 513	P1 P2 P3	P7	M1	K1	N1 N2	
Hardness/Rm	<800 N/mm²	<700 N/mm²	<750 N/mm²	150÷200 HB		
Vc (m/min)	**80÷100**	**35÷45**	**35÷45**	**80÷100**	**140÷180**	
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
1	0.050	0.035	0.035	0.050	0.065	
2	0.070	0.049	0.049	0.070	0.091	
3	0.086	0.060	0.060	0.086	0.112	
4	0.126	0.088	0.088	0.126	0.164	
5	0.131	0.092	0.092	0.131	0.170	
6	0.145	0.102	0.102	0.145	0.189	
7	0.165	0.116	0.116	0.165	0.215	
8	0.185	0.130	0.130	0.185	0.241	
9	0.205	0.144	0.144	0.205	0.267	
10	0.224	0.157	0.157	0.224	0.291	
11	0.244	0.171	0.171	0.244	0.317	
12	0.263	0.184	0.184	0.263	0.342	
13	0.282	0.197	0.197	0.282	0.367	
14	0.302	0.211	0.211	0.302	0.393	
15	0.315	0.221	0.221	0.315	0.410	
16	0.336	0.235	0.235	0.336	0.437	



TYPHOON HVA

HIGH PERFORMANCE - STAINLESS STEEL

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

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

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

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

Brocas de alto rendimiento para el taladrado de acero inoxidable (ISO M), acero (ISO P) e y súper aleaciones (ISO S) hasta 45 HRC.

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

TYPHOON HVA

HIGH PERFORMANCE - STAINLESS STEEL





- Self-centering geometry: large chisel edge for highly accurate holes
- Straight cutting edge: short chips for easy evacuation and high reliability
- Large back taper geometry: reduces the torque and improves the cutting efficiency
- Chip pocket design: smooth surface to reduce welding and wide space to improve chip ejection
- Substrate: specifically selected nano grain for high wear resistance, long and reliable life
- Coating: improved new coating technology for high wear resistance

- Affûtage autocentré
large arête transversale pour des trous très précis
- Profil de l'arête droit et renforcé : il génère des copeaux courts et garantit une grande fiabilité
- Géométrie du corps avec conicité arrière pour faciliter l'action de coupe
- Géométrie des goujures: surface lisse pour réduire les problèmes de collage et faciliter l'évacuation des copeaux
- Substrat: des nanograins spécifiquement sélectionnés pour une haute résistance à l'usure, une durée de vie longue et fiable
- Revêtement:
nouvelle technologie de revêtement améliorée pour une haute résistance à l'usure

- Affilatura autocentrante: il particolare design del tagliente trasversale permette forature molto precise
- Profilo del tagliente diritto e rinforzato: genera trucioli corti e garantisce grande affidabilità
- Geometria del corpo con ampia conicità posteriore per agevolare l'azione di taglio
- Geometria delle gole: elevata finitura per ridurre il fenomeno dell'incollaggio e facilitare l'espulsione dei trucioli
- Substrato: nano grani selezionati per elevata resistenza all'usura, lunga durata e affidabilità
- Rivestimento: nuova tecnologia per elevata resistenza all'usura

- Afilado autocentrante amplio filo transversal para agujeros muy precisos
- Perfil del filo recto y reforzado: genera virutas cortas y garantiza una gran fiabilidad
- Geometría del cuerpo con conicidad posterior para facilitar la acción de corte
- Geometría de las ranuras:
Acabado superficial excelente para reducir el problema del encolado y facilitar la evacuación de las virutas
- Sustrato: nanograno específicamente seleccionado para una alta resistencia al desgaste y una vida útil larga y fiable
- Recubrimiento: nueva tecnología de alta resistencia al desgaste

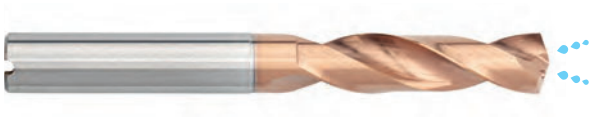
- Selbstzentrierender Schliff: das besondere Design der Querschneide ermöglicht ein sehr präzises Bohren
- Gerades und verstärktes Schneidkantenprofil: zur Erzeugung kurzer Späne und Gewährleistung hoher Zuverlässigkeit
- Geometrie der Schneidkante mit speziellem Schliff zum Schutz von Schneidkante und Kanten
- Nutengeoemtrie: Glattere Oberflächen zur Vermeidung des Klebephänomens und zur Verbesserung der Spanabfuhr
- Substrat: Spezielle Nanokörnung für eine hohe Verschleissbeständigkeit und Standzeit.
- Beschichtung: Verbesserte Beschichtung für eine höhere Verschleissbeständigkeit.

- Самоцентрирующаяся геометрия: особая конструкция режущей кромки обеспечивает очень точное сверление
- Прямые режущие кромки: формирование короткой стружки и высокая надежность
- Геометрия с обратным конусом: увеличивает эффективность обработки
- Геометрия канавки: гладкая поверхность для уменьшения наклепа и большое пространство для улучшения отвода стружки
- Субстрат: специальный нанозернистый твердый сплав для высокой износостойкости, долгого и надежного срока службы
- Покрытие: улучшенная новая технология покрытия для обеспечения высокой износостойкости

353HVA

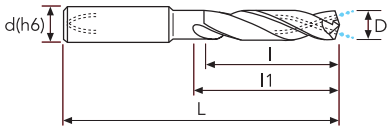
Stainless steel

3XD | DIN 6537K | HVA | MG PV350 | 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	353HVA0300	●
3.10	+0.016/+0.004	6	14	20	62	353HVA0310	●
3.20	+0.016/+0.004	6	14	20	62	353HVA0320	●
3.30	+0.016/+0.004	6	14	20	62	353HVA0330	●
3.40	+0.016/+0.004	6	14	20	62	353HVA0340	●
3.50	+0.016/+0.004	6	14	20	62	353HVA0350	●
3.60	+0.016/+0.004	6	14	20	62	353HVA0360	●
3.70	+0.016/+0.004	6	14	20	62	353HVA0370	●
3.80	+0.016/+0.004	6	17	24	66	353HVA0380	●
3.90	+0.016/+0.004	6	17	24	66	353HVA0390	●
4.00	+0.016/+0.004	6	17	24	66	353HVA0400	●
4.10	+0.016/+0.004	6	17	24	66	353HVA0410	●
4.20	+0.016/+0.004	6	17	24	66	353HVA0420	●
4.30	+0.016/+0.004	6	17	24	66	353HVA0430	●
4.40	+0.016/+0.004	6	17	24	66	353HVA0440	●
4.50	+0.016/+0.004	6	17	24	66	353HVA0450	●
4.60	+0.016/+0.004	6	17	24	66	353HVA0460	●
4.70	+0.016/+0.004	6	17	24	66	353HVA0470	●
4.80	+0.016/+0.004	6	20	28	66	353HVA0480	●
4.90	+0.016/+0.004	6	20	28	66	353HVA0490	●
5.00	+0.016/+0.004	6	20	28	66	353HVA0500	●
5.10	+0.016/+0.004	6	20	28	66	353HVA0510	●
5.20	+0.016/+0.004	6	20	28	66	353HVA0520	●
5.30	+0.016/+0.004	6	20	28	66	353HVA0530	●
5.40	+0.016/+0.004	6	20	28	66	353HVA0540	●
5.50	+0.016/+0.004	6	20	28	66	353HVA0550	●
5.60	+0.016/+0.004	6	20	28	66	353HVA0560	●
5.70	+0.016/+0.004	6	20	28	66	353HVA0570	●
5.80	+0.016/+0.004	6	20	28	66	353HVA0580	●
5.90	+0.016/+0.004	6	20	28	66	353HVA0590	●
6.00	+0.016/+0.004	6	20	28	66	353HVA0600	●
6.10	+0.021/+0.006	8	24	34	79	353HVA0610	●
6.20	+0.021/+0.006	8	24	34	79	353HVA0620	●
6.30	+0.021/+0.006	8	24	34	79	353HVA0630	●
6.40	+0.021/+0.006	8	24	34	79	353HVA0640	●
6.50	+0.021/+0.006	8	24	34	79	353HVA0650	●
6.60	+0.021/+0.006	8	24	34	79	353HVA0660	●
6.70	+0.021/+0.006	8	24	34	79	353HVA0670	●
6.80	+0.021/+0.006	8	24	34	79	353HVA0680	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

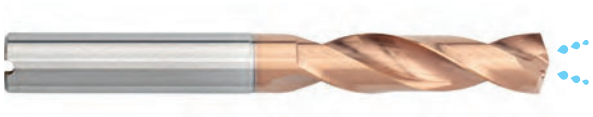
HSS END-MILLS

CARBIDE BURRS

353HVA

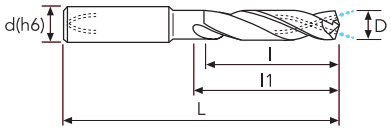
Stainless steel

3XD | DIN 6537K | HVA | MG PV350 | 140° | 30°



P	M	K	N	S	H
☆	★			☆	

★ 1st choice ☆ suitable



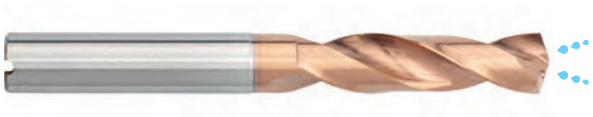
D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
6.90	+0.021/+0.006	8	24	34	79	353HVA0690	●
7.00	+0.021/+0.006	8	24	34	79	353HVA0700	●
7.10	+0.021/+0.006	8	29	41	79	353HVA0710	●
7.20	+0.021/+0.006	8	29	41	79	353HVA0720	●
7.30	+0.021/+0.006	8	29	41	79	353HVA0730	●
7.40	+0.021/+0.006	8	29	41	79	353HVA0740	●
7.50	+0.021/+0.006	8	29	41	79	353HVA0750	●
7.60	+0.021/+0.006	8	29	41	79	353HVA0760	●
7.70	+0.021/+0.006	8	29	41	79	353HVA0770	●
7.80	+0.021/+0.006	8	29	41	79	353HVA0780	●
7.90	+0.021/+0.006	8	29	41	79	353HVA0790	●
8.00	+0.021/+0.006	8	29	41	79	353HVA0800	●
8.10	+0.021/+0.006	10	35	47	89	353HVA0810	●
8.20	+0.021/+0.006	10	35	47	89	353HVA0820	●
8.30	+0.021/+0.006	10	35	47	89	353HVA0830	●
8.40	+0.021/+0.006	10	35	47	89	353HVA0840	●
8.50	+0.021/+0.006	10	35	47	89	353HVA0850	●
8.60	+0.021/+0.006	10	35	47	89	353HVA0860	●
8.70	+0.021/+0.006	10	35	47	89	353HVA0870	●
8.80	+0.021/+0.006	10	35	47	89	353HVA0880	●
8.90	+0.021/+0.006	10	35	47	89	353HVA0890	●
9.00	+0.021/+0.006	10	35	47	89	353HVA0900	●
9.10	+0.021/+0.006	10	35	47	89	353HVA0910	●
9.20	+0.021/+0.006	10	35	47	89	353HVA0920	●
9.30	+0.021/+0.006	10	35	47	89	353HVA0930	●
9.40	+0.021/+0.006	10	35	47	89	353HVA0940	●
9.50	+0.021/+0.006	10	35	47	89	353HVA0950	●
9.60	+0.021/+0.006	10	35	47	89	353HVA0960	●
9.70	+0.021/+0.006	10	35	47	89	353HVA0970	●
9.80	+0.021/+0.006	10	35	47	89	353HVA0980	●
9.90	+0.021/+0.006	10	35	47	89	353HVA0990	●
10.00	+0.021/+0.006	10	35	47	89	353HVA1000	●
10.10	+0.025/+0.007	12	40	55	102	353HVA1010	●
10.20	+0.025/+0.007	12	40	55	102	353HVA1020	●
10.30	+0.025/+0.007	12	40	55	102	353HVA1030	●
10.50	+0.025/+0.007	12	40	55	102	353HVA1050	●
10.60	+0.025/+0.007	12	40	55	102	353HVA1060	●
10.80	+0.025/+0.007	12	40	55	102	353HVA1080	●
11.00	+0.025/+0.007	12	40	55	102	353HVA1100	●

● stock standard ○ non-standard stock ▽ stock exhaustion

353HVA

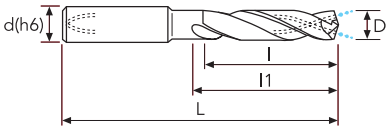
Stainless steel

3XD | DIN 6537K | HVA | MG PV350 | 140° | 30°



P	M	K	N	S	H
☆	★			☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
11.20	+0.025/+0.007	12	40	55	102	353HVA1120	●
11.50	+0.025/+0.007	12	40	55	102	353HVA1150	●
11.80	+0.025/+0.007	12	40	55	102	353HVA1180	●
12.00	+0.025/+0.007	12	40	55	102	353HVA1200	●
12.10	+0.025/+0.007	14	43	60	107	353HVA1210	●
12.20	+0.025/+0.007	14	43	60	107	353HVA1220	●
12.50	+0.025/+0.007	14	43	60	107	353HVA1250	●
12.80	+0.025/+0.007	14	43	60	107	353HVA1280	●
13.00	+0.025/+0.007	14	43	60	107	353HVA1300	●
13.30	+0.025/+0.007	14	43	60	107	353HVA1330	●
13.50	+0.025/+0.007	14	43	60	107	353HVA1350	●
13.80	+0.025/+0.007	14	43	60	107	353HVA1380	●
14.00	+0.025/+0.007	14	43	60	107	353HVA1400	●
14.10	+0.025/+0.007	16	45	65	115	353HVA1410	●
14.20	+0.025/+0.007	16	45	65	115	353HVA1420	●
14.50	+0.025/+0.007	16	45	65	115	353HVA1450	●
15.00	+0.025/+0.007	16	49	65	115	353HVA1500	●
15.30	+0.025/+0.007	16	49	65	115	353HVA1530	●
15.50	+0.025/+0.007	16	49	65	115	353HVA1550	●
15.80	+0.025/+0.007	16	49	65	115	353HVA1580	●
16.00	+0.025/+0.007	16	49	65	115	353HVA1600	●
16.50	+0.025/+0.007	18	52	73	123	353HVA1650	●
17.00	+0.025/+0.007	18	52	73	123	353HVA1700	●
17.50	+0.025/+0.007	18	52	73	123	353HVA1750	●
18.00	+0.025/+0.007	18	52	73	123	353HVA1800	●
18.50	+0.029/+0.008	20	55	79	131	353HVA1850	●
19.00	+0.029/+0.008	20	55	79	131	353HVA1900	●
19.50	+0.029/+0.008	20	55	79	131	353HVA1950	●
20.00	+0.029/+0.008	20	55	79	131	353HVA2000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

353HVA



Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²	<700 N/mm²	850÷1200 N/mm²
Vc (m/min)	**100÷140**	**80÷120**	**70÷90**	**50÷70**	**50÷70**	**20÷30**
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
3	0.118	0.106	0.095	0.083	0.077	0.046
4	0.140	0.126	0.112	0.098	0.091	0.055
5	0.161	0.145	0.129	0.113	0.105	0.063
6	0.183	0.164	0.146	0.128	0.119	0.071
7	0.204	0.184	0.163	0.143	0.133	0.080
8	0.226	0.203	0.181	0.158	0.147	0.088
9	0.247	0.223	0.198	0.173	0.161	0.096
10	0.269	0.242	0.215	0.188	0.175	0.105
11	0.280	0.252	0.224	0.196	0.182	0.109
12	0.301	0.271	0.241	0.211	0.196	0.117
13	0.323	0.290	0.258	0.226	0.210	0.126
14	0.344	0.310	0.275	0.241	0.224	0.134
15	0.366	0.329	0.292	0.256	0.238	0.143
16	0.387	0.348	0.310	0.271	0.252	0.151
17	0.398	0.358	0.318	0.278	0.259	0.155
18	0.409	0.368	0.327	0.286	0.266	0.159
19	0.419	0.377	0.335	0.293	0.273	0.164
20	0.430	0.387	0.344	0.301	0.280	0.168



Material Group ISO 513	M1	M2	M3			
Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
Vc (m/min)	**50÷70**	**45÷65**	**35÷50**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3	0.077	0.061	0.054			
4	0.091	0.073	0.064			
5	0.105	0.084	0.073			
6	0.119	0.095	0.083			
7	0.133	0.106	0.093			
8	0.147	0.117	0.103			
9	0.161	0.129	0.112			
10	0.175	0.140	0.122			
11	0.182	0.145	0.127			
12	0.196	0.157	0.137			
13	0.210	0.168	0.147			
14	0.224	0.179	0.157			
15	0.238	0.190	0.166			
16	0.252	0.201	0.176			
17	0.259	0.207	0.181			
18	0.266	0.212	0.186			
19	0.273	0.218	0.191			
20	0.280	0.224	0.196			

353HVA

	Material Group ISO 513	S1 S2	S3	S4	S5		
	Hardness/Rm	<35 N/mm²	35÷45 N/mm²				
	Vc (m/min)	**30÷50**	**25÷45**	**30÷45**	**25÷35**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**3**	0.053	0.037	0.051	0.043		
	4	0.063	0.044	0.060	0.050		
	5	0.073	0.051	0.069	0.058		
	6	0.082	0.058	0.078	0.066		
	7	0.092	0.064	0.087	0.074		
	8	0.102	0.071	0.097	0.081		
	9	0.111	0.078	0.106	0.089		
	10	0.121	0.085	0.115	0.097		
	11	0.126	0.088	0.119	0.101		
	12	0.135	0.095	0.129	0.108		
	13	0.145	0.102	0.138	0.116		
	14	0.155	0.108	0.147	0.124		
	15	0.164	0.115	0.156	0.132		
	16	0.174	0.122	0.165	0.139		
	17	0.179	0.125	0.170	0.143		
	18	0.184	0.129	0.175	0.147		
	19	0.189	0.132	0.179	0.151		
	20	0.194	0.135	0.185	0.155		

355HVA

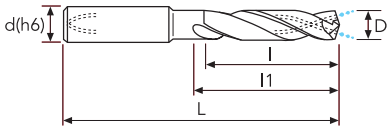
Stainless steel

5XD | DIN 6537L | HVA | MG PV350 | 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	23	28	66	355HVA0300	●
3.10	+0.016/+0.004	6	23	28	66	355HVA0310	●
3.20	+0.016/+0.004	6	23	28	66	355HVA0320	●
3.30	+0.016/+0.004	6	23	28	66	355HVA0330	●
3.40	+0.016/+0.004	6	23	28	66	355HVA0340	●
3.50	+0.016/+0.004	6	23	28	66	355HVA0350	●
3.60	+0.016/+0.004	6	23	28	66	355HVA0360	●
3.70	+0.016/+0.004	6	23	28	66	355HVA0370	●
3.80	+0.016/+0.004	6	29	36	74	355HVA0380	●
3.90	+0.016/+0.004	6	29	36	74	355HVA0390	●
4.00	+0.016/+0.004	6	29	36	74	355HVA0400	●
4.10	+0.016/+0.004	6	29	36	74	355HVA0410	●
4.20	+0.016/+0.004	6	29	36	74	355HVA0420	●
4.30	+0.016/+0.004	6	29	36	74	355HVA0430	●
4.40	+0.016/+0.004	6	29	36	74	355HVA0440	●
4.50	+0.016/+0.004	6	29	36	74	355HVA0450	●
4.60	+0.016/+0.004	6	29	36	74	355HVA0460	●
4.70	+0.016/+0.004	6	29	36	74	355HVA0470	●
4.80	+0.016/+0.004	6	35	44	82	355HVA0480	●
4.90	+0.016/+0.004	6	35	44	82	355HVA0490	●
5.00	+0.016/+0.004	6	35	44	82	355HVA0500	●
5.10	+0.016/+0.004	6	35	44	82	355HVA0510	●
5.20	+0.016/+0.004	6	35	44	82	355HVA0520	●
5.30	+0.016/+0.004	6	35	44	82	355HVA0530	●
5.40	+0.016/+0.004	6	35	44	82	355HVA0540	●
5.50	+0.016/+0.004	6	35	44	82	355HVA0550	●
5.60	+0.016/+0.004	6	35	44	82	355HVA0560	●
5.70	+0.016/+0.004	6	35	44	82	355HVA0570	●
5.80	+0.016/+0.004	6	35	44	82	355HVA0580	●
5.90	+0.016/+0.004	6	35	44	82	355HVA0590	●
6.00	+0.016/+0.004	6	35	44	82	355HVA0600	●
6.10	+0.021/+0.006	8	43	53	91	355HVA0610	●
6.20	+0.021/+0.006	8	43	53	91	355HVA0620	●
6.30	+0.021/+0.006	8	43	53	91	355HVA0630	●
6.40	+0.021/+0.006	8	43	53	91	355HVA0640	●
6.50	+0.021/+0.006	8	43	53	91	355HVA0650	●
6.60	+0.021/+0.006	8	43	53	91	355HVA0660	●
6.70	+0.021/+0.006	8	43	53	91	355HVA0670	●
6.80	+0.021/+0.006	8	43	53	91	355HVA0680	●

355HVA

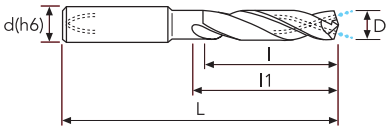
Stainless steel

5XD | DIN 6537L | HVA | MG PV350 | 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	355HVA0690	●
7.00	+0.021/+0.006	8	43	53	91	355HVA0700	●
7.10	+0.021/+0.006	8	43	53	91	355HVA0710	●
7.20	+0.021/+0.006	8	43	53	91	355HVA0720	●
7.30	+0.021/+0.006	8	43	53	91	355HVA0730	●
7.40	+0.021/+0.006	8	43	53	91	355HVA0740	●
7.50	+0.021/+0.006	8	43	53	91	355HVA0750	●
7.60	+0.021/+0.006	8	43	53	91	355HVA0760	●
7.70	+0.021/+0.006	8	43	53	91	355HVA0770	●
7.80	+0.021/+0.006	8	43	53	91	355HVA0780	●
7.90	+0.021/+0.006	8	43	53	91	355HVA0790	●
8.00	+0.021/+0.006	8	43	53	91	355HVA0800	●
8.10	+0.021/+0.006	10	49	61	103	355HVA0810	●
8.20	+0.021/+0.006	10	49	61	103	355HVA0820	●
8.30	+0.021/+0.006	10	49	61	103	355HVA0830	●
8.40	+0.021/+0.006	10	49	61	103	355HVA0840	●
8.50	+0.021/+0.006	10	49	61	103	355HVA0850	●
8.60	+0.021/+0.006	10	49	61	103	355HVA0860	●
8.70	+0.021/+0.006	10	49	61	103	355HVA0870	●
8.80	+0.021/+0.006	10	49	61	103	355HVA0880	●
8.90	+0.021/+0.006	10	49	61	103	355HVA0890	●
9.00	+0.021/+0.006	10	49	61	103	355HVA0900	●
9.10	+0.021/+0.006	10	49	61	103	355HVA0910	●
9.20	+0.021/+0.006	10	49	61	103	355HVA0920	●
9.30	+0.021/+0.006	10	49	61	103	355HVA0930	●
9.40	+0.021/+0.006	10	49	61	103	355HVA0940	●
9.50	+0.021/+0.006	10	49	61	103	355HVA0950	●
9.60	+0.021/+0.006	10	49	61	103	355HVA0960	●
9.70	+0.021/+0.006	10	49	61	103	355HVA0970	●
9.80	+0.021/+0.006	10	49	61	103	355HVA0980	●
9.90	+0.021/+0.006	10	49	61	103	355HVA0990	●
10.00	+0.021/+0.006	10	49	61	103	355HVA1000	●
10,10	+0.025/+0.007	12	52	71	118	355HVA1010	●
10.20	+0.025/+0.007	12	52	71	118	355HVA1020	●
10.30	+0.025/+0.007	12	52	71	118	355HVA1030	●
10.50	+0.025/+0.007	12	52	71	118	355HVA1050	●
10,60	+0.025/+0.007	12	52	71	118	355HVA1060	●
10.80	+0.025/+0.007	12	52	71	118	355HVA1080	●
11.00	+0.025/+0.007	12	52	71	118	355HVA1100	●

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

355HVA

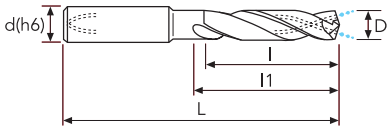
Stainless steel

5XD | DIN 6537L | HVA | MG PV350 | 140° | 30°



P	M	K	N	S	H
☆	★			☆	

★ 1st choice ☆ suitable



D(m7)	D Tol.	d(h6)	l	l1	L	EDP No.	Stock
11,10	+0.025/+0.007	12	52	71	118	355HVA1110	●
11.20	+0.025/+0.007	12	52	71	118	355HVA1120	●
11.30	+0.025/+0.007	12	52	71	118	355HVA1130	●
11.50	+0.025/+0.007	12	52	71	118	355HVA1150	●
11.80	+0.025/+0.007	12	52	71	118	355HVA1180	●
12.00	+0.025/+0.007	12	52	71	118	355HVA1200	●
12,10	+0.025/+0.007	14	63	77	124	355HVA1210	●
12.20	+0.025/+0.007	14	63	77	124	355HVA1220	●
12.50	+0.025/+0.007	14	63	77	124	355HVA1250	●
12.80	+0.025/+0.007	14	63	77	124	355HVA1280	●
13.00	+0.025/+0.007	14	63	77	124	355HVA1300	●
13.30	+0.025/+0.007	14	63	77	124	355HVA1330	●
13.50	+0.025/+0.007	14	63	77	124	355HVA1350	●
13.80	+0.025/+0.007	14	63	77	124	355HVA1380	●
14.00	+0.025/+0.007	14	63	77	124	355HVA1400	●
14.10	+0.025/+0.007	16	67	83	133	355HVA1410	●
14.20	+0.025/+0.007	16	67	83	133	355HVA1420	●
14.50	+0.025/+0.007	16	67	83	133	355HVA1450	●
15.00	+0.025/+0.007	16	67	83	133	355HVA1500	●
15.30	+0.025/+0.007	16	67	83	133	355HVA1530	●
15.50	+0.025/+0.007	16	67	83	133	355HVA1550	●
15.80	+0.025/+0.007	16	67	83	133	355HVA1580	●
16.00	+0.025/+0.007	16	67	83	133	355HVA1600	●
16.50	+0.025/+0.007	18	75	93	143	355HVA1650	●
17.00	+0.025/+0.007	18	75	93	143	355HVA1700	●
17.50	+0.025/+0.007	18	75	93	143	355HVA1750	●
18.00	+0.025/+0.007	18	75	93	143	355HVA1800	●
18.50	+0.029/+0.008	20	81	101	153	355HVA1850	●
19.00	+0.029/+0.008	20	81	101	153	355HVA1900	●
19.50	+0.029/+0.008	20	81	101	153	355HVA1950	●
20.00	+0.029/+0.008	20	81	101	153	355HVA2000	●

355HVA

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²	<700 N/mm²	850÷1200 N/mm²
	Vc (m/min)	**100÷140**	**80÷120**	**70÷90**	**50÷70**	**50÷70**	**20÷30**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
Ø RUN OUT <0.02mm	**3**	0.101	0.075	0.060	0.050	0.065	0.039
	4	0.119	0.089	0.071	0.059	0.077	0.046
	5	0.137	0.103	0.082	0.069	0.089	0.053
	6	0.155	0.117	0.093	0.078	0.101	0.061
	7	0.174	0.130	0.104	0.087	0.113	0.068
	8	0.192	0.144	0.115	0.096	0.125	0.075
	9	0.210	0.158	0.126	0.105	0.137	0.082
	10	0.228	0.171	0.137	0.114	0.148	0.089
	11	0.238	0.178	0.143	0.119	0.154	0.093
	12	0.256	0.192	0.154	0.128	0.166	0.100
	13	0.274	0.206	0.164	0.137	0.178	0.107
	14	0.292	0.219	0.175	0.146	0.190	0.114
	15	0.311	0.233	0.186	0.155	0.202	0.121
	16	0.329	0.247	0.197	0.164	0.214	0.128
	17	0.338	0.254	0.203	0.169	0.220	0.132
	18	0.347	0.260	0.208	0.174	0.226	0.135
	19	0.356	0.267	0.214	0.178	0.232	0.139
	20	0.366	0.274	0.219	0.183	0.238	0.143

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
	Vc (m/min)	**50÷70**	**45÷65**	**35÷50**			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
Ø RUN OUT <0.02mm	**3**	0.065	0.052	0.046			
	4	0.077	0.062	0.054			
	5	0.089	0.071	0.062			
	6	0.101	0.081	0.071			
	7	0.113	0.090	0.079			
	8	0.125	0.100	0.087			
	9	0.137	0.109	0.096			
	10	0.148	0.119	0.104			
	11	0.154	0.124	0.108			
	12	0.166	0.133	0.116			
	13	0.178	0.143	0.125			
	14	0.190	0.152	0.133			
	15	0.202	0.162	0.141			
	16	0.214	0.171	0.150			
	17	0.220	0.176	0.154			
	18	0.226	0.181	0.158			
	19	0.232	0.185	0.162			
	20	0.238	0.190	0.166			

CUTTING PARAMETERS

355HVA



Material Group ISO 513	S1 S2	S3	S4	S5		
Hardness/Rm	<35 N/mm²	35÷45 N/mm²				
Vc (m/min)	30÷50	25÷45	30÷45	25÷35		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.045	0.032	0.043	0.036		
4	0.053	0.037	0.051	0.043		
5	0.062	0.043	0.059	0.049		
6	0.070	0.049	0.066	0.056		
7	0.078	0.055	0.074	0.063		
8	0.086	0.060	0.082	0.069		
9	0.095	0.066	0.090	0.076		
10	0.103	0.072	0.098	0.082		
11	0.107	0.075	0.102	0.086		
12	0.115	0.081	0.109	0.092		
13	0.123	0.086	0.117	0.099		
14	0.132	0.092	0.125	0.105		
15	0.140	0.098	0.133	0.112		
16	0.148	0.104	0.141	0.118		
17	0.152	0.106	0.145	0.122		
18	0.156	0.109	0.148	0.125		
19	0.160	0.112	0.152	0.128		
20	0.164	0.115	0.156	0.132		



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

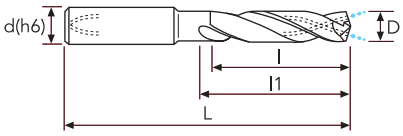
aluminium, polished flutes

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

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

353ALH

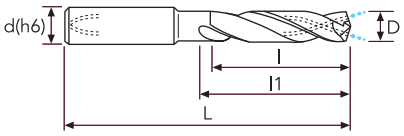
aluminium, polished flutes

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

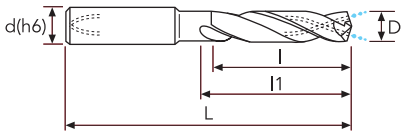
aluminium, polished flutes

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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.160	0.152	0.136	0.176		
4	0.190	0.181	0.162	0.209		
5	0.220	0.209	0.187	0.242		
6	0.250	0.238	0.213	0.275		
7	0.280	0.266	0.238	0.308		
8	0.310	0.295	0.264	0.341		
9	0.340	0.323	0.289	0.374		
10	0.370	0.352	0.315	0.407		
11	0.400	0.380	0.340	0.440		
12	0.430	0.409	0.366	0.473		
13	0.460	0.437	0.391	0.506		
14	0.490	0.466	0.417	0.539		
15	0.520	0.494	0.442	0.572		
16	0.550	0.523	0.468	0.605		
17	0.580	0.551	0.493	0.638		
18	0.610	0.580	0.519	0.671		
19	0.640	0.608	0.544	0.704		
20	0.670	0.637	0.570	0.737		

355ALH

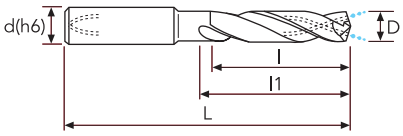
aluminium, polished flutes

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

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

355ALH

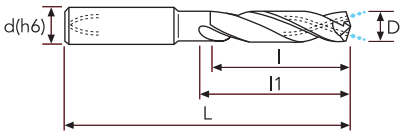
aluminium, polished flutes

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

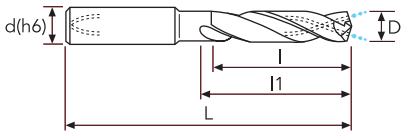
aluminium, polished flutes

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÷200	260÷300		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3	0.136	0.129	0.116	0.150		
4	0.162	0.153	0.137	0.178		
5	0.187	0.178	0.159	0.206		
6	0.213	0.202	0.181	0.234		
7	0.238	0.226	0.202	0.262		
8	0.264	0.250	0.224	0.290		
9	0.289	0.275	0.246	0.318		
10	0.315	0.299	0.267	0.346		
11	0.340	0.323	0.289	0.374		
12	0.366	0.347	0.311	0.402		
13	0.391	0.371	0.332	0.430		
14	0.417	0.396	0.354	0.458		
15	0.442	0.420	0.376	0.486		
16	0.468	0.444	0.397	0.514		
17	0.493	0.468	0.419	0.542		
18	0.519	0.493	0.441	0.570		
19	0.544	0.517	0.462	0.598		
20	0.570	0.541	0.484	0.626		



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

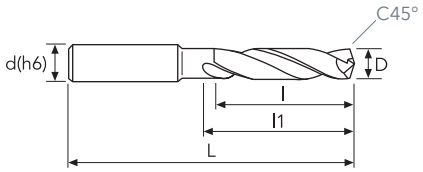
hardened steel 45÷62 HRC

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	●
6.80	0/-0.015	8	29	41	79	353HRC0680	●
6.90	0/-0.015	8	29	41	79	353HRC0690	●
7.00	0/-0.015	8	29	41	79	353HRC0700	●
7.40	0/-0.015	8	29	41	79	353HRC0740	●
7.50	0/-0.015	8	29	41	79	353HRC0750	●
7.80	0/-0.015	8	29	41	79	353HRC0780	●
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	●
8.50	0/-0.015	10	35	47	89	353HRC0850	●
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

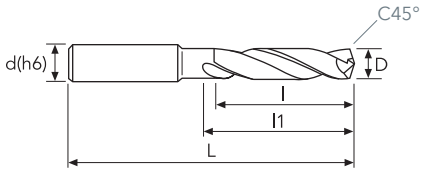
hardened steel 45÷62 HRC

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÷65 HRC	54÷62 HRC	60÷65 HRC	48÷65 HRC		
	Vc (m/min)	**15÷25**	**12÷18**	**8÷12**	**20÷30**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
	**3**	0.020	0.017	0.013	0.020		
	4	0.030	0.026	0.020	0.030		
	5	0.040	0.034	0.026	0.040		
	6	0.050	0.043	0.033	0.050		
	7	0.060	0.051	0.039	0.060		
	8	0.070	0.060	0.046	0.070		
	9	0.080	0.068	0.052	0.080		
	10	0.090	0.077	0.059	0.090		
	11	0.100	0.085	0.065	0.100		
	12	0.110	0.094	0.072	0.110		
	13	0.120	0.102	0.078	0.120		
	14	0.130	0.111	0.085	0.130		
	15	0.140	0.119	0.091	0.140		
	16	0.150	0.128	0.098	0.150		



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

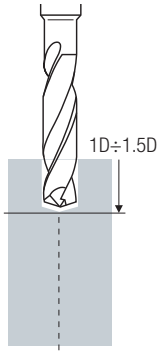
ESECUZIONE FORI PROFONDI ORTOGONALI ALLA SUPERFICIE

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 353CV with head angle 140° (SUH MINI=135°) and m7 tolerance (SUH MINI=h7)

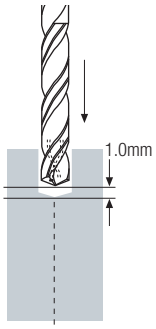
Utiliser un foret 353CV avec un angle en bout de 140° (SUH MINI=135°) et une tolérance m7 (SUH MINI=h7), pour effectuer un trou pilote (1xD -1.5xD) très précis.

Utilizzare una punta 353CV 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 353CV 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 353CV 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 353CV 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.

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS



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. Use the step drilling process whenever the chip ejection becomes poor.

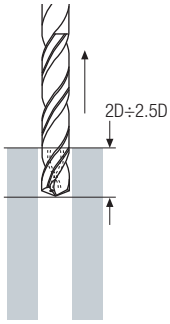
Percer sans step pour l'évacuation des copeaux. En présence de trous débouchants, 1 mm avant d'avoir terminé le trou, réduire l'avance de 30 %. Arrêter la lubrification. Man soll bei schlechter Spanabfuhr einen Step-Bohrvorgang machen.

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. Utilizzare il processo di foratura a step nel caso di evacuazione trucioli problematica.

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. Aplicar taladrado a step (por pasos) en el caso de problemas de evacuación de viruta.

Für die Späneabführung Stufenlos bohren. Bei Durchgangsbohrungen 1 mm vor Fertigstellung der Bohrung den Vorschub um 30% reduzieren. Die Kühlung deaktivieren. Man soll bei schlechter Spanabfuhr einen Step-Bohrvorgang machen.

Сверлите без остановок и выводов инструмента. В случае обработки сквозного отверстия, снизьте подачу на 30%, за 1 мм до выхода. Отключите подачу СОЖ. Используйте пошаговый процесс сверления при недостаточном удалении стружки.



STEP 4

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

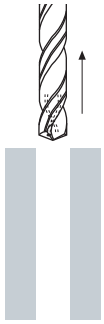
Retirer le foret en utilisant le maximum de tours disponibles et le double de l'avancement conseillé jusqu'à une profondeur 2xD.

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 (200-300 rpm).

Terminer la dernière partie du perçage avec une vitesse réduite et constante (200-300 rpm).

Completare l'ultimo tratto di arretramento con velocità ridotta e costante (200-300 rpm).

Complete el último tramo de retroceso con velocidad reducida y constante (200-300 rpm).

Den letzten Abschnitt beim Zurückziehen mit reduzierter und konstanter Geschwindigkeit fertigstellen (200-300 rpm).

Полностью выньте сверло на заниженных режимах (200-300 rpm).

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.

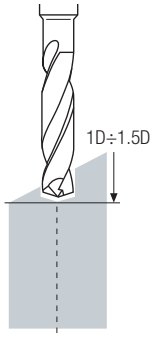
Réaliser une surface plane en utilisant une fraise avec une arête frontale. Le plan réalisé doit avoir les mêmes dimensions que le diamètre de perçage profond.

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 353CV with head angle 140° (SUH MINI=135°) and m7 tolerance (SUH MINI=h7).

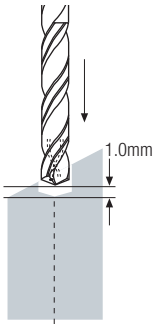
Utiliser un foret 353CV avec un angle en bout de 140° (SUH MINI=135°) et une tolérance m7 (SUH MINI=h7), pour effectuer un trou pilote (1xD -1.5xD) très précis.

Utilizzare una punta 353CV 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 353CV con ángulo punta de 140° (SUH MINI=135°) y tolerancia m7 (SUH MINI=h7), para realizar un agujero piloto (1xD -1,5xD) muy preciso.

Einen Bohrer 353CV 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 353CV 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.

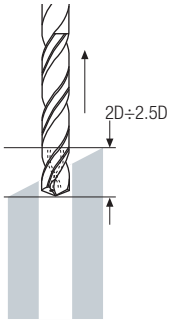
Percer sans step pour l'évacuation des copeaux.
En présence de trous débouchants, 1 mm avant d'avoir terminé le trou, réduire l'avance de 30 %.
Arrêter la lubrification.

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 (200-300 rpm).

Terminer la dernière partie du perçage avec une vitesse réduite et constante (200-300 rpm).

Completare l'ultimo tratto di arretramento con velocità ridotta e costante (200-300 rpm).

Complete el último tramo de retroceso con velocidad reducida y constante (200-300 rpm).

Den letzten Abschnitt beim Zurückziehen mit reduzierter und konstanter Geschwindigkeit fertigstellen (200-300 rpm).

Полностью выньте сверло на заниженных режимах (200-300 rpm).

355SUH MINI

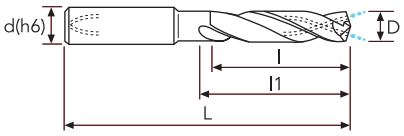
3 mm shank, polished flutes



5XD | 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	6.5	8	50	5 x D	355SUH0100N	●
1.10	0/-0.010	3	7.2	8.7	50	5 x D	355SUH0110N	●
1.20	0/-0.010	3	7.8	9.3	50	5 x D	355SUH0120N	●
1.30	0/-0.010	3	8.5	10	50	5 x D	355SUH0130N	●
1.40	0/-0.010	3	9.1	10.6	50	5 x D	355SUH0140N	●
1.50	0/-0.010	3	9.8	11.3	50	5 x D	355SUH0150N	●
1.60	0/-0.010	3	10.4	11.9	50	5 x D	355SUH0160N	●
1.70	0/-0.010	3	11.1	12.6	55	5 x D	355SUH0170N	●
1.80	0/-0.010	3	11.7	13.2	55	5 x D	355SUH0180N	●
1.90	0/-0.010	3	12.4	13.9	55	5 x D	355SUH0190N	●
2.00	0/-0.010	3	13	16	55	5 x D	355SUH0200N	●
2.10	0/-0.010	3	13.7	16.9	55	5 x D	355SUH0210N	●
2.20	0/-0.010	3	14.3	17.6	55	5 x D	355SUH0220N	●
2.30	0/-0.010	3	15	18.5	55	5 x D	355SUH0230N	●
2.40	0/-0.010	3	15.6	19.2	55	5 x D	355SUH0240N	●
2.50	0/-0.010	3	16.3	20.1	55	5 x D	355SUH0250N	●
2.60	0/-0.010	3	16.9	20.8	55	5 x D	355SUH0260N	●
2.70	0/-0.010	3	17.6	21.7	55	5 x D	355SUH0270N	●
2.80	0/-0.010	3	18.2	22.4	55	5 x D	355SUH0280N	●
2.90	0/-0.010	3	18.9	23.3	55	5 x D	355SUH0290N	●
3.00	0/-0.010	3	19.5	24	55	5 x D	355SUH030003N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

355SUH MINI

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
	Vc (m/min)	**85÷95***	**75÷85***	**65÷75***	**60÷70***	**55÷65***	**38÷42***
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
Ø RUN OUT <0.02mm	**1.0**	0.025	0.025	0.026	0.026	0.012	0.012
	1.1	0.027	0.028	0.029	0.029	0.014	0.013
	1.2	0.030	0.030	0.032	0.031	0.015	0.014
	1.3	0.032	0.033	0.034	0.034	0.016	0.015
	1.4	0.035	0.035	0.037	0.037	0.017	0.017
	1.5	0.037	0.038	0.040	0.039	0.018	0.018
	1.6	0.041	0.041	0.044	0.043	0.021	0.020
	1.7	0.044	0.044	0.047	0.046	0.022	0.021
	1.8	0.047	0.047	0.049	0.049	0.024	0.023
	1.9	0.049	0.049	0.052	0.051	0.025	0.024
	2.0	0.052	0.052	0.055	0.054	0.026	0.025
	2.1	0.056	0.056	0.059	0.059	0.029	0.028
	2.2	0.059	0.059	0.062	0.062	0.031	0.029
	2.3	0.062	0.061	0.065	0.064	0.032	0.031
	2.4	0.064	0.064	0.068	0.067	0.033	0.032
	2.5	0.067	0.067	0.071	0.070	0.035	0.033
	2.6	0.073	0.071	0.076	0.075	0.038	0.037
	2.7	0.075	0.074	0.079	0.078	0.040	0.038
	2.8	0.078	0.077	0.082	0.081	0.041	0.040
	2.9	0.081	0.080	0.085	0.084	0.043	0.041
	3.0	0.084	0.082	0.088	0.087	0.044	0.042

*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			
	Hardness/Rm						
	Vc (m/min)	**55÷65***	**50÷60***	**40÷50***			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
Ø RUN OUT <0.02mm	**1.0**	0.012	0.013	0.013			
	1.1	0.014	0.014	0.014			
	1.2	0.015	0.015	0.015			
	1.3	0.016	0.016	0.016			
	1.4	0.017	0.018	0.018			
	1.5	0.018	0.019	0.019			
	1.6	0.021	0.021	0.021			
	1.7	0.022	0.022	0.023			
	1.8	0.024	0.024	0.024			
	1.9	0.025	0.025	0.025			
	2.0	0.026	0.026	0.027			
	2.1	0.029	0.029	0.029			
	2.2	0.031	0.030	0.031			
	2.3	0.032	0.032	0.032			
	2.4	0.033	0.033	0.034			
	2.5	0.035	0.034	0.035			
	2.6	0.038	0.037	0.038			
	2.7	0.040	0.039	0.040			
	2.8	0.041	0.040	0.041			
	2.9	0.043	0.041	0.043			
	3.0	0.044	0.043	0.044			

*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)	**80÷90***	**70÷80***	**60÷70***	**55÷65***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.016	0.015	0.014	0.012		
1.1	0.018	0.017	0.015	0.014		
1.2	0.019	0.018	0.017	0.015		
1.3	0.021	0.020	0.018	0.016		
1.4	0.023	0.021	0.019	0.017		
1.5	0.024	0.023	0.021	0.018		
1.6	0.027	0.025	0.023	0.021		
1.7	0.028	0.027	0.025	0.022		
1.8	0.030	0.028	0.026	0.024		
1.9	0.032	0.030	0.028	0.025		
2.0	0.033	0.031	0.029	0.026		
2.1	0.036	0.034	0.032	0.029		
2.2	0.038	0.036	0.034	0.031		
2.3	0.040	0.038	0.035	0.032		
2.4	0.041	0.039	0.037	0.033		
2.5	0.043	0.041	0.038	0.035		
2.6	0.046	0.044	0.041	0.038		
2.7	0.048	0.046	0.043	0.040		
2.8	0.050	0.047	0.045	0.041		
2.9	0.051	0.049	0.046	0.043		
3.0	0.053	0.051	0.048	0.044		

*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)	**140÷150***	**120÷130***	**110÷120***	**155÷165***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.016	0.016	0.015	0.016		
1.1	0.018	0.018	0.016	0.017		
1.2	0.019	0.019	0.018	0.019		
1.3	0.021	0.021	0.019	0.020		
1.4	0.022	0.023	0.021	0.022		
1.5	0.024	0.024	0.022	0.023		
1.6	0.026	0.027	0.024	0.026		
1.7	0.028	0.028	0.026	0.027		
1.8	0.030	0.030	0.028	0.029		
1.9	0.031	0.032	0.029	0.031		
2.0	0.033	0.033	0.031	0.032		
2.1	0.035	0.036	0.033	0.035		
2.2	0.037	0.038	0.035	0.037		
2.3	0.039	0.039	0.036	0.038		
2.4	0.041	0.041	0.038	0.040		
2.5	0.042	0.043	0.040	0.042		
2.6	0.045	0.046	0.043	0.045		
2.7	0.047	0.048	0.044	0.047		
2.8	0.049	0.049	0.046	0.048		
2.9	0.050	0.051	0.048	0.050		
3.0	0.052	0.053	0.049	0.052		

*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	S1 S2	S3	S4	S5		
	Hardness/Rm	<35 HRC	35÷45 HRC				
	Vc (m/min)	**26÷30***	**24÷26***	**34÷36***	**28÷32***		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**1.0**	0.009	0.011	0.011	0.009		
	1.1	0.010	0.012	0.012	0.010		
	1.2	0.011	0.013	0.013	0.011		
	1.3	0.012	0.014	0.014	0.012		
	1.4	0.013	0.015	0.015	0.013		
	1.5	0.013	0.016	0.016	0.014		
	1.6	0.016	0.018	0.019	0.017		
	1.7	0.017	0.019	0.020	0.018		
	1.8	0.018	0.020	0.021	0.019		
	1.9	0.019	0.021	0.022	0.020		
	2.0	0.020	0.023	0.023	0.021		
	2.1	0.024	0.025	0.026	0.024		
	2.2	0.025	0.026	0.028	0.025		
	2.3	0.026	0.027	0.029	0.027		
	2.4	0.027	0.029	0.030	0.028		
	2.5	0.028	0.030	0.031	0.029		
	2.6	0.032	0.033	0.035	0.033		
	2.7	0.033	0.034	0.036	0.034		
	2.8	0.035	0.035	0.038	0.035		
	2.9	0.036	0.036	0.039	0.036		
	3.0	0.037	0.038	0.040	0.038		

*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

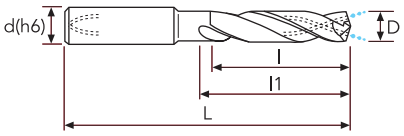
3 mm shank, polished flutes



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	358SUH0100N	●
1.10	0/-0.010	3	10.5	12	50	8 x D	358SUH0110N	●
1.20	0/-0.010	3	11.4	12.9	50	8 x D	358SUH0120N	●
1.30	0/-0.010	3	12.4	13.9	50	8 x D	358SUH0130N	●
1.40	0/-0.010	3	13.3	14.8	50	8 x D	358SUH0140N	●
1.50	0/-0.010	3	14.3	15.8	50	8 x D	358SUH0150N	●
1.60	0/-0.010	3	15.2	16.7	50	8 x D	358SUH0160N	●
1.70	0/-0.010	3	16.2	17.7	60	8 x D	358SUH0170N	●
1.80	0/-0.010	3	17.1	18.6	60	8 x D	358SUH0180N	●
1.90	0/-0.010	3	18.1	19.6	60	8 x D	358SUH0190N	●
2.00	0/-0.010	3	19	22	60	8 x D	358SUH0200N	●
2.10	0/-0.010	3	20	23.2	60	8 x D	358SUH0210N	●
2.20	0/-0.010	3	20.9	24.2	60	8 x D	358SUH0220N	●
2.30	0/-0.010	3	21.9	25.4	60	8 x D	358SUH0230N	●
2.40	0/-0.010	3	22.8	26.4	60	8 x D	358SUH0240N	●
2.50	0/-0.010	3	23.8	27.6	60	8 x D	358SUH0250N	●
2.60	0/-0.010	3	24.7	28.6	60	8 x D	358SUH0260N	●
2.70	0/-0.010	3	25.7	29.8	60	8 x D	358SUH0270N	●
2.80	0/-0.010	3	26.6	30.8	60	8 x D	358SUH0280N	●
2.90	0/-0.010	3	27.6	32	60	8 x D	358SUH0290N	●
3.00	0/-0.010	3	28.5	33	60	8 x D	358SUH0300N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

358SUH MINI

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
	Vc (m/min)	**85÷95***	**75÷85***	**65÷75***	**60÷70***	**55÷65***	**38÷42***
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
Ø RUN OUT <0.02mm	**1.0**	0.025	0.025	0.026	0.026	0.012	0.012
	1.1	0.027	0.028	0.029	0.029	0.014	0.013
	1.2	0.030	0.030	0.032	0.031	0.015	0.014
	1.3	0.032	0.033	0.034	0.034	0.016	0.015
	1.4	0.035	0.035	0.037	0.037	0.017	0.017
	1.5	0.037	0.038	0.040	0.039	0.018	0.018
	1.6	0.041	0.041	0.044	0.043	0.021	0.020
	1.7	0.044	0.044	0.047	0.046	0.022	0.021
	1.8	0.047	0.047	0.049	0.049	0.024	0.023
	1.9	0.049	0.049	0.052	0.051	0.025	0.024
	2.0	0.052	0.052	0.055	0.054	0.026	0.025
	2.1	0.056	0.056	0.059	0.059	0.029	0.028
	2.2	0.059	0.059	0.062	0.062	0.031	0.029
	2.3	0.062	0.061	0.065	0.064	0.032	0.031
	2.4	0.064	0.064	0.068	0.067	0.033	0.032
	2.5	0.067	0.067	0.071	0.070	0.035	0.033
	2.6	0.073	0.071	0.076	0.075	0.038	0.037
	2.7	0.075	0.074	0.079	0.078	0.040	0.038
	2.8	0.078	0.077	0.082	0.081	0.041	0.040
	2.9	0.081	0.080	0.085	0.084	0.043	0.041
	3.0	0.084	0.082	0.088	0.087	0.044	0.042

*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			
	Hardness/Rm						
	Vc (m/min)	**55÷65***	**50÷60***	**40÷50***			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
Ø RUN OUT <0.02mm	**1.0**	0.012	0.013	0.013			
	1.1	0.014	0.014	0.014			
	1.2	0.015	0.015	0.015			
	1.3	0.016	0.016	0.016			
	1.4	0.017	0.018	0.018			
	1.5	0.018	0.019	0.019			
	1.6	0.021	0.021	0.021			
	1.7	0.022	0.022	0.023			
	1.8	0.024	0.024	0.024			
	1.9	0.025	0.025	0.025			
	2.0	0.026	0.026	0.027			
	2.1	0.029	0.029	0.029			
	2.2	0.031	0.030	0.031			
	2.3	0.032	0.032	0.032			
	2.4	0.033	0.033	0.034			
	2.5	0.035	0.034	0.035			
	2.6	0.038	0.037	0.038			
	2.7	0.040	0.039	0.040			
	2.8	0.041	0.040	0.041			
	2.9	0.043	0.041	0.043			
	3.0	0.044	0.043	0.044			

*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	K1	K2	K3	K4		
Hardness/Rm	150÷250 HB	150÷350 HB	120÷260 HB	250÷500 HB		
Vc (m/min)	**80÷90***	**70÷80***	**60÷70***	**55÷65***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.016	0.015	0.014	0.012		
1.1	0.018	0.017	0.015	0.014		
1.2	0.019	0.018	0.017	0.015		
1.3	0.021	0.020	0.018	0.016		
1.4	0.023	0.021	0.019	0.017		
1.5	0.024	0.023	0.021	0.018		
1.6	0.027	0.025	0.023	0.021		
1.7	0.028	0.027	0.025	0.022		
1.8	0.030	0.028	0.026	0.024		
1.9	0.032	0.030	0.028	0.025		
2.0	0.033	0.031	0.029	0.026		
2.1	0.036	0.034	0.032	0.029		
2.2	0.038	0.036	0.034	0.031		
2.3	0.040	0.038	0.035	0.032		
2.4	0.041	0.039	0.037	0.033		
2.5	0.043	0.041	0.038	0.035		
2.6	0.046	0.044	0.041	0.038		
2.7	0.048	0.046	0.043	0.040		
2.8	0.050	0.047	0.045	0.041		
2.9	0.051	0.049	0.046	0.043		
3.0	0.053	0.051	0.048	0.044		

*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)	**140÷150***	**120÷130***	**110÷120***	**155÷165***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.016	0.016	0.015	0.016		
1.1	0.018	0.018	0.016	0.017		
1.2	0.019	0.019	0.018	0.019		
1.3	0.021	0.021	0.019	0.020		
1.4	0.022	0.023	0.021	0.022		
1.5	0.024	0.024	0.022	0.023		
1.6	0.026	0.027	0.024	0.026		
1.7	0.028	0.028	0.026	0.027		
1.8	0.030	0.030	0.028	0.029		
1.9	0.031	0.032	0.029	0.031		
2.0	0.033	0.033	0.031	0.032		
2.1	0.035	0.036	0.033	0.035		
2.2	0.037	0.038	0.035	0.037		
2.3	0.039	0.039	0.036	0.038		
2.4	0.041	0.041	0.038	0.040		
2.5	0.042	0.043	0.040	0.042		
2.6	0.045	0.046	0.043	0.045		
2.7	0.047	0.048	0.044	0.047		
2.8	0.049	0.049	0.046	0.048		
2.9	0.050	0.051	0.048	0.050		
3.0	0.052	0.053	0.049	0.052		

*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)	**26÷30***	**24÷26***	**34÷36***	**28÷32***		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
	1.0	0.009	0.011	0.011	0.009		
	1.1	0.010	0.012	0.012	0.010		
	1.2	0.011	0.013	0.013	0.011		
	1.3	0.012	0.014	0.014	0.012		
	1.4	0.013	0.015	0.015	0.013		
	1.5	0.013	0.016	0.016	0.014		
	1.6	0.016	0.018	0.019	0.017		
	1.7	0.017	0.019	0.020	0.018		
	1.8	0.018	0.020	0.021	0.019		
	1.9	0.019	0.021	0.022	0.020		
	2.0	0.020	0.023	0.023	0.021		
	2.1	0.024	0.025	0.026	0.024		
	2.2	0.025	0.026	0.028	0.025		
	2.3	0.026	0.027	0.029	0.027		
	2.4	0.027	0.029	0.030	0.028		
	2.5	0.028	0.030	0.031	0.029		
	2.6	0.032	0.033	0.035	0.033		
	2.7	0.033	0.034	0.036	0.034		
	2.8	0.035	0.035	0.038	0.035		
	2.9	0.036	0.036	0.039	0.036		
	3.0	0.037	0.038	0.040	0.038		

*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

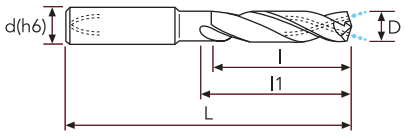
3 mm shank, polished flutes

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	3512SUH0100N	●
1.10	0/-0.010	3	14.9	16.4	55	12 x D	3512SUH0110N	●
1.20	0/-0.010	3	16.2	17.7	55	12 x D	3512SUH0120N	●
1.30	0/-0.010	3	17.6	19.1	55	12 x D	3512SUH0130N	●
1.40	0/-0.010	3	18.9	20.4	55	12 x D	3512SUH0140N	●
1.50	0/-0.010	3	20.3	21.8	55	12 x D	3512SUH0150N	●
1.60	0/-0.010	3	21.6	23.1	65	12 x D	3512SUH0160N	●
1.70	0/-0.010	3	23	24.5	65	12 x D	3512SUH0170N	●
1.80	0/-0.010	3	24.3	25.8	65	12 x D	3512SUH0180N	●
1.90	0/-0.010	3	25.7	27.2	65	12 x D	3512SUH0190N	●
2.00	0/-0.010	3	27	30	65	12 x D	3512SUH0200N	●
2.10	0/-0.010	3	28.4	31.6	65	12 x D	3512SUH0210N	●
2.20	0/-0.010	3	29.7	33	65	12 x D	3512SUH0220N	●
2.30	0/-0.010	3	31.1	34.6	65	12 x D	3512SUH0230N	●
2.40	0/-0.010	3	32.4	36	75	12 x D	3512SUH0240N	●
2.50	0/-0.010	3	33.8	37.6	75	12 x D	3512SUH0250N	●
2.60	0/-0.010	3	35.1	39	75	12 x D	3512SUH0260N	●
2.70	0/-0.010	3	36.5	40.6	75	12 x D	3512SUH0270N	●
2.80	0/-0.010	3	37.8	42	75	12 x D	3512SUH0280N	●
2.90	0/-0.010	3	39.2	43.6	75	12 x D	3512SUH0290N	●
3.00	0/-0.010	3	40.5	45	75	12 x D	3512SUH0300N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3512SUH MINI

Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
Vc (m/min)	**80÷90***	**60÷70***	**55÷65***	**50÷60***	**45÷55***	**38÷42***
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
1.0	0.012	0.010	0.010	0.007	0.008	0.007
1.1	0.013	0.011	0.012	0.008	0.009	0.008
1.2	0.014	0.012	0.013	0.008	0.010	0.008
1.3	0.015	0.014	0.014	0.009	0.011	0.009
1.4	0.016	0.015	0.015	0.010	0.011	0.010
1.5	0.017	0.016	0.016	0.010	0.012	0.011
1.6	0.020	0.019	0.018	0.013	0.014	0.013
1.7	0.021	0.020	0.019	0.014	0.015	0.013
1.8	0.023	0.021	0.020	0.014	0.016	0.014
1.9	0.024	0.022	0.021	0.015	0.017	0.015
2.0	0.025	0.023	0.022	0.016	0.018	0.016
2.1	0.028	0.027	0.024	0.019	0.020	0.018
2.2	0.030	0.028	0.025	0.020	0.021	0.019
2.3	0.031	0.029	0.027	0.021	0.022	0.020
2.4	0.032	0.031	0.028	0.022	0.023	0.021
2.5	0.034	0.032	0.029	0.023	0.024	0.022
2.6	0.037	0.035	0.031	0.027	0.026	0.024
2.7	0.038	0.037	0.033	0.028	0.027	0.025
2.8	0.039	0.038	0.034	0.029	0.028	0.026
2.9	0.041	0.039	0.035	0.030	0.029	0.027
3.0	0.042	0.041	0.036	0.031	0.030	0.028

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			
Hardness/Rm						
Vc (m/min)	**45÷55***	**45÷50***	**40÷45***			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
1.0	0.008	0.008	0.007			
1.1	0.009	0.008	0.008			
1.2	0.010	0.009	0.009			
1.3	0.011	0.010	0.009			
1.4	0.011	0.011	0.010			
1.5	0.012	0.012	0.011			
1.6	0.014	0.013	0.013			
1.7	0.015	0.014	0.014			
1.8	0.016	0.015	0.014			
1.9	0.017	0.016	0.015			
2.0	0.018	0.017	0.016			
2.1	0.020	0.019	0.018			
2.2	0.021	0.020	0.019			
2.3	0.022	0.021	0.020			
2.4	0.023	0.022	0.021			
2.5	0.024	0.023	0.022			
2.6	0.026	0.025	0.025			
2.7	0.027	0.026	0.026			
2.8	0.028	0.027	0.027			
2.9	0.029	0.028	0.028			
3.0	0.030	0.029	0.029			

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)

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

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)	**75÷85***	**60÷70***	**50÷60***	**48÷52***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.012	0.013	0.013	0.008		
1.1	0.014	0.014	0.014	0.009		
1.2	0.015	0.015	0.015	0.010		
1.3	0.016	0.016	0.016	0.011		
1.4	0.017	0.018	0.018	0.011		
1.5	0.019	0.019	0.019	0.012		
1.6	0.021	0.021	0.021	0.014		
1.7	0.022	0.023	0.022	0.015		
1.8	0.023	0.024	0.024	0.016		
1.9	0.025	0.025	0.025	0.017		
2.0	0.026	0.027	0.026	0.018		
2.1	0.028	0.029	0.029	0.020		
2.2	0.030	0.031	0.030	0.021		
2.3	0.031	0.032	0.032	0.022		
2.4	0.033	0.034	0.033	0.023		
2.5	0.034	0.035	0.034	0.024		
2.6	0.037	0.038	0.037	0.026		
2.7	0.038	0.040	0.039	0.027		
2.8	0.040	0.041	0.040	0.028		
2.9	0.041	0.043	0.041	0.029		
3.0	0.042	0.044	0.043	0.030		

*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)	**125÷135***	**110÷120***	**100÷110***	**140÷150***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.015	0.014	0.013	0.014		
1.1	0.016	0.016	0.014	0.016		
1.2	0.018	0.017	0.016	0.017		
1.3	0.019	0.018	0.017	0.019		
1.4	0.021	0.020	0.018	0.020		
1.5	0.022	0.021	0.020	0.021		
1.6	0.025	0.024	0.022	0.024		
1.7	0.026	0.025	0.023	0.025		
1.8	0.028	0.027	0.024	0.027		
1.9	0.029	0.028	0.026	0.028		
2.0	0.031	0.030	0.027	0.030		
2.1	0.034	0.032	0.029	0.033		
2.2	0.035	0.034	0.031	0.034		
2.3	0.037	0.035	0.032	0.036		
2.4	0.038	0.037	0.033	0.037		
2.5	0.040	0.038	0.035	0.039		
2.6	0.043	0.041	0.037	0.042		
2.7	0.044	0.043	0.039	0.044		
2.8	0.046	0.044	0.040	0.046		
2.9	0.048	0.046	0.042	0.047		
3.0	0.049	0.048	0.043	0.049		

*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)	**26÷30***	**24÷26***	**34÷36***	**28÷32***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.008	0.007	0.008	0.009		
1.1	0.009	0.008	0.009	0.010		
1.2	0.009	0.008	0.010	0.011		
1.3	0.010	0.009	0.011	0.012		
1.4	0.011	0.010	0.011	0.012		
1.5	0.012	0.010	0.012	0.013		
1.6	0.013	0.012	0.014	0.015		
1.7	0.014	0.013	0.015	0.016		
1.8	0.015	0.014	0.016	0.017		
1.9	0.016	0.014	0.017	0.018		
2.0	0.017	0.015	0.018	0.019		
2.1	0.019	0.017	0.021	0.021		
2.2	0.020	0.018	0.022	0.022		
2.3	0.021	0.019	0.023	0.023		
2.4	0.022	0.020	0.024	0.024		
2.5	0.022	0.020	0.025	0.025		
2.6	0.025	0.023	0.028	0.027		
2.7	0.026	0.024	0.029	0.028		
2.8	0.027	0.025	0.030	0.029		
2.9	0.028	0.026	0.031	0.030		
3.0	0.029	0.026	0.032	0.031		

*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)

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

3520SUH MINI

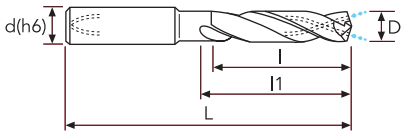
3 mm shank, polished flutes

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	3520SUH0100N	●
1.10	0/-0.010	3	23.7	25.2	65	20 x D	3520SUH0110N	○
1.20	0/-0.010	3	25.8	27.3	65	20 x D	3520SUH0120N	●
1.30	0/-0.010	3	28	29.5	65	20 x D	3520SUH0130N	●
1.40	0/-0.010	3	30.1	31.6	65	20 x D	3520SUH0140N	○
1.50	0/-0.010	3	32.3	33.8	75	20 x D	3520SUH0150N	●
1.60	0/-0.010	3	34.4	35.9	75	20 x D	3520SUH0160N	●
1.70	0/-0.010	3	36.6	38.1	75	20 x D	3520SUH0170N	●
1.80	0/-0.010	3	38.7	40.2	75	20 x D	3520SUH0180N	●
1.90	0/-0.010	3	40.9	42.4	75	20 x D	3520SUH0190N	○
2.00	0/-0.010	3	43	46	82	20 x D	3520SUH0200N	●
2.10	0/-0.010	3	45.2	48.4	82	20 x D	3520SUH0210N	○
2.20	0/-0.010	3	47.3	50.6	82	20 x D	3520SUH0220N	●
2.30	0/-0.010	3	49.5	53	100	20 x D	3520SUH0230N	●
2.40	0/-0.010	3	51.6	55.2	100	20 x D	3520SUH0240N	○
2.50	0/-0.010	3	53.8	57.6	100	20 x D	3520SUH0250N	●
2.60	0/-0.010	3	55.9	59.8	100	20 x D	3520SUH0260N	○
2.70	0/-0.010	3	58.1	62.2	100	20 x D	3520SUH0270N	○
2.80	0/-0.010	3	60.2	64.4	100	20 x D	3520SUH0280N	●
2.90	0/-0.010	3	61.4	65.8	100	20 x D	3520SUH0290N	○
3.00	0/-0.010	3	64.5	69	100	20 x D	3520SUH0300N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3520SUH MINI

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
	Vc (m/min)	**80÷90***	**60÷70***	**55÷65***	**50÷60***	**45÷55***	**38÷42***
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
Ø RUN OUT <0.02mm	**1.0**	0.012	0.010	0.010	0.007	0.008	0.007
	1.1	0.013	0.011	0.012	0.008	0.009	0.008
	1.2	0.014	0.012	0.013	0.008	0.010	0.008
	1.3	0.015	0.014	0.014	0.009	0.011	0.009
	1.4	0.016	0.015	0.015	0.010	0.011	0.010
	1.5	0.017	0.016	0.016	0.010	0.012	0.011
	1.6	0.020	0.019	0.018	0.013	0.014	0.013
	1.7	0.021	0.020	0.019	0.014	0.015	0.013
	1.8	0.023	0.021	0.020	0.014	0.016	0.014
	1.9	0.024	0.022	0.021	0.015	0.017	0.015
	2.0	0.025	0.023	0.022	0.016	0.018	0.016
	2.1	0.028	0.027	0.024	0.019	0.020	0.018
	2.2	0.030	0.028	0.025	0.020	0.021	0.019
	2.3	0.031	0.029	0.027	0.021	0.022	0.020
	2.4	0.032	0.031	0.028	0.022	0.023	0.021
	2.5	0.034	0.032	0.029	0.023	0.024	0.022
	2.6	0.037	0.035	0.031	0.027	0.026	0.024
	2.7	0.038	0.037	0.033	0.028	0.027	0.025
	2.8	0.039	0.038	0.034	0.029	0.028	0.026
	2.9	0.041	0.039	0.035	0.030	0.029	0.027
	3.0	0.042	0.041	0.036	0.031	0.030	0.028

*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			
	Hardness/Rm						
	Vc (m/min)	**45÷55***	**45÷50***	**40÷45***			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
Ø RUN OUT <0.02mm	**1.0**	0.008	0.008	0.007			
	1.1	0.009	0.008	0.008			
	1.2	0.010	0.009	0.009			
	1.3	0.011	0.010	0.009			
	1.4	0.011	0.011	0.010			
	1.5	0.012	0.012	0.011			
	1.6	0.014	0.013	0.013			
	1.7	0.015	0.014	0.014			
	1.8	0.016	0.015	0.014			
	1.9	0.017	0.016	0.015			
	2.0	0.018	0.017	0.016			
	2.1	0.020	0.019	0.018			
	2.2	0.021	0.020	0.019			
	2.3	0.022	0.021	0.020			
	2.4	0.023	0.022	0.021			
	2.5	0.024	0.023	0.022			
	2.6	0.026	0.025	0.025			
	2.7	0.027	0.026	0.026			
	2.8	0.028	0.027	0.027			
	2.9	0.029	0.028	0.028			
	3.0	0.030	0.029	0.029			

*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)	**75÷85***	**60÷70***	**50÷60***	**48÷52***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.012	0.013	0.013	0.008		
1.1	0.014	0.014	0.014	0.009		
1.2	0.015	0.015	0.015	0.010		
1.3	0.016	0.016	0.016	0.011		
1.4	0.017	0.018	0.018	0.011		
1.5	0.019	0.019	0.019	0.012		
1.6	0.021	0.021	0.021	0.014		
1.7	0.022	0.023	0.022	0.015		
1.8	0.023	0.024	0.024	0.016		
1.9	0.025	0.025	0.025	0.017		
2.0	0.026	0.027	0.026	0.018		
2.1	0.028	0.029	0.029	0.020		
2.2	0.030	0.031	0.030	0.021		
2.3	0.031	0.032	0.032	0.022		
2.4	0.033	0.034	0.033	0.023		
2.5	0.034	0.035	0.034	0.024		
2.6	0.037	0.038	0.037	0.026		
2.7	0.038	0.040	0.039	0.027		
2.8	0.040	0.041	0.040	0.028		
2.9	0.041	0.043	0.041	0.029		
3.0	0.042	0.044	0.043	0.030		

*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)	**125÷135***	**110÷120***	**100÷110***	**140÷150***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.015	0.014	0.013	0.014		
1.1	0.016	0.016	0.014	0.016		
1.2	0.018	0.017	0.016	0.017		
1.3	0.019	0.018	0.017	0.019		
1.4	0.021	0.020	0.018	0.020		
1.5	0.022	0.021	0.020	0.021		
1.6	0.025	0.024	0.022	0.024		
1.7	0.026	0.025	0.023	0.025		
1.8	0.028	0.027	0.024	0.027		
1.9	0.029	0.028	0.026	0.028		
2.0	0.031	0.030	0.027	0.030		
2.1	0.034	0.032	0.029	0.033		
2.2	0.035	0.034	0.031	0.034		
2.3	0.037	0.035	0.032	0.036		
2.4	0.038	0.037	0.033	0.037		
2.5	0.040	0.038	0.035	0.039		
2.6	0.043	0.041	0.037	0.042		
2.7	0.044	0.043	0.039	0.044		
2.8	0.046	0.044	0.040	0.046		
2.9	0.048	0.046	0.042	0.047		
3.0	0.049	0.048	0.043	0.049		

*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)	**26÷30***	**24÷26***	**34÷36***	**28÷32***		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**1.0**	0.008	0.007	0.008	0.009		
	1.1	0.009	0.008	0.009	0.010		
	1.2	0.009	0.008	0.010	0.011		
	1.3	0.010	0.009	0.011	0.012		
	1.4	0.011	0.010	0.011	0.012		
	1.5	0.012	0.010	0.012	0.013		
	1.6	0.013	0.012	0.014	0.015		
	1.7	0.014	0.013	0.015	0.016		
	1.8	0.015	0.014	0.016	0.017		
	1.9	0.016	0.014	0.017	0.018		
	2.0	0.017	0.015	0.018	0.019		
	2.1	0.019	0.017	0.021	0.021		
	2.2	0.020	0.018	0.022	0.022		
	2.3	0.021	0.019	0.023	0.023		
	2.4	0.022	0.020	0.024	0.024		
	2.5	0.022	0.020	0.025	0.025		
	2.6	0.025	0.023	0.028	0.027		
	2.7	0.026	0.024	0.029	0.028		
	2.8	0.027	0.025	0.030	0.029		
	2.9	0.028	0.026	0.031	0.030		
	3.0	0.029	0.026	0.032	0.031		

*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

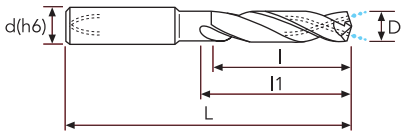
3 mm shank, polished flutes

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	3525SUH0100N	●
1.10	0/-0.010	3	29.2	30.7	70	25 x D	3525SUH0110N	○
1.20	0/-0.010	3	31.8	33.3	75	25 x D	3525SUH0120N	○
1.30	0/-0.010	3	34.5	36	75	25 x D	3525SUH0130N	○
1.40	0/-0.010	3	37.1	38.6	75	25 x D	3525SUH0140N	○
1.50	0/-0.010	3	39.8	41.3	80	25 x D	3525SUH0150N	●
1.60	0/-0.010	3	42.4	43.9	80	25 x D	3525SUH0160N	○
1.70	0/-0.010	3	45.1	46.6	80	25 x D	3525SUH0170N	○
1.80	0/-0.010	3	47.7	49.2	90	25 x D	3525SUH0180N	○
1.90	0/-0.010	3	50.4	51.9	90	25 x D	3525SUH0190N	○
2.00	0/-0.010	3	53	56	90	25 x D	3525SUH0200N	●
2.10	0/-0.010	3	55.7	58.8	100	25 x D	3525SUH0210N	○
2.20	0/-0.010	3	58.3	61.6	100	25 x D	3525SUH0220N	○
2.30	0/-0.010	3	61	64.4	100	25 x D	3525SUH0230N	○
2.40	0/-0.010	3	63.6	67.2	100	25 x D	3525SUH0240N	○
2.50	0/-0.010	3	66.3	70	110	25 x D	3525SUH0250N	●
2.60	0/-0.010	3	68.9	72.8	110	25 x D	3525SUH0260N	○
2.70	0/-0.010	3	71.6	75.6	110	25 x D	3525SUH0270N	○
2.80	0/-0.010	3	74.2	78.4	110	25 x D	3525SUH0280N	○
2.90	0/-0.010	3	76.9	81.2	120	25 x D	3525SUH0290N	○
3.00	0/-0.010	3	79.5	84	120	25 x D	3525SUH0300N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3525SUH MINI

Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
Vc (m/min)	**80÷90***	**60÷70***	**55÷65***	**50÷60***	**45÷55***	**38÷42***
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
1.0	0.008	0.008	0.007	0.005	0.005	0.005
1.1	0.009	0.009	0.008	0.006	0.006	0.006
1.2	0.010	0.010	0.008	0.006	0.006	0.006
1.3	0.010	0.010	0.009	0.007	0.007	0.007
1.4	0.011	0.011	0.010	0.007	0.007	0.007
1.5	0.012	0.012	0.011	0.008	0.008	0.008
1.6	0.014	0.014	0.012	0.009	0.009	0.009
1.7	0.014	0.015	0.013	0.010	0.010	0.009
1.8	0.015	0.016	0.014	0.010	0.010	0.010
1.9	0.016	0.017	0.014	0.011	0.011	0.010
2.0	0.017	0.017	0.015	0.011	0.011	0.011
2.1	0.019	0.020	0.017	0.013	0.013	0.012
2.2	0.020	0.021	0.018	0.014	0.013	0.013
2.3	0.021	0.022	0.019	0.014	0.014	0.014
2.4	0.022	0.023	0.019	0.015	0.014	0.014
2.5	0.023	0.024	0.020	0.016	0.015	0.015
2.6	0.025	0.026	0.022	0.018	0.016	0.016
2.7	0.026	0.027	0.023	0.019	0.017	0.017
2.8	0.027	0.028	0.024	0.019	0.018	0.018
2.9	0.028	0.029	0.025	0.020	0.018	0.018
3.0	0.029	0.030	0.026	0.021	0.019	0.019

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			
Hardness/Rm						
Vc (m/min)	**45÷55***	**45÷50***	**40÷45***			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
1.0	0.005	0.005	0.005			
1.1	0.006	0.006	0.006			
1.2	0.006	0.006	0.007			
1.3	0.007	0.007	0.007			
1.4	0.007	0.007	0.008			
1.5	0.008	0.008	0.008			
1.6	0.009	0.009	0.009			
1.7	0.010	0.010	0.010			
1.8	0.010	0.010	0.011			
1.9	0.011	0.011	0.011			
2.0	0.011	0.011	0.012			
2.1	0.013	0.013	0.013			
2.2	0.013	0.013	0.014			
2.3	0.014	0.014	0.014			
2.4	0.014	0.014	0.015			
2.5	0.015	0.015	0.016			
2.6	0.016	0.017	0.017			
2.7	0.017	0.017	0.018			
2.8	0.018	0.018	0.018			
2.9	0.018	0.018	0.019			
3.0	0.019	0.019	0.020			

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)

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

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)	**75÷85***	**60÷70***	**50÷60***	**45÷55***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.008	0.009	0.010	0.005		
1.1	0.009	0.010	0.011	0.006		
1.2	0.010	0.011	0.012	0.006		
1.3	0.011	0.012	0.013	0.007		
1.4	0.012	0.013	0.014	0.007		
1.5	0.012	0.014	0.015	0.008		
1.6	0.014	0.015	0.016	0.009		
1.7	0.015	0.016	0.017	0.010		
1.8	0.016	0.017	0.019	0.010		
1.9	0.016	0.018	0.020	0.011		
2.0	0.017	0.019	0.021	0.011		
2.1	0.019	0.021	0.023	0.013		
2.2	0.020	0.022	0.024	0.013		
2.3	0.021	0.023	0.025	0.014		
2.4	0.022	0.024	0.026	0.014		
2.5	0.023	0.025	0.027	0.015		
2.6	0.025	0.028	0.030	0.016		
2.7	0.025	0.029	0.031	0.017		
2.8	0.026	0.030	0.032	0.018		
2.9	0.027	0.031	0.033	0.018		
3.0	0.028	0.032	0.034	0.019		

*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)	**125÷135***	**105÷115***	**96÷104***	**135÷140***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.012	0.012	0.010	0.012		
1.1	0.013	0.013	0.011	0.013		
1.2	0.015	0.014	0.012	0.015		
1.3	0.016	0.015	0.013	0.016		
1.4	0.017	0.017	0.014	0.017		
1.5	0.018	0.018	0.015	0.018		
1.6	0.020	0.020	0.017	0.020		
1.7	0.021	0.021	0.018	0.021		
1.8	0.023	0.022	0.019	0.023		
1.9	0.024	0.023	0.020	0.024		
2.0	0.025	0.025	0.021	0.025		
2.1	0.027	0.027	0.023	0.027		
2.2	0.029	0.028	0.024	0.029		
2.3	0.030	0.029	0.025	0.030		
2.4	0.031	0.031	0.026	0.031		
2.5	0.033	0.032	0.027	0.033		
2.6	0.035	0.034	0.029	0.035		
2.7	0.037	0.035	0.031	0.036		
2.8	0.038	0.037	0.032	0.038		
2.9	0.039	0.038	0.033	0.039		
3.0	0.041	0.039	0.034	0.040		

*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)

CUTTING PARAMETERS

3525SUH MINI

	Material Group ISO 513	S1 S2	S3	S4	S5		
	Hardness/Rm	<35 HRC	35÷45 HRC				
	Vc (m/min)	**26÷30***	**24÷26***	**34÷36***	**28÷32***		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**1.0**	0.005	0.005	0.004	0.005		
	1.1	0.006	0.006	0.005	0.005		
	1.2	0.006	0.007	0.005	0.006		
	1.3	0.007	0.007	0.006	0.006		
	1.4	0.007	0.008	0.006	0.007		
	1.5	0.008	0.008	0.007	0.007		
	1.6	0.009	0.010	0.008	0.008		
	1.7	0.010	0.011	0.008	0.009		
	1.8	0.010	0.011	0.009	0.009		
	1.9	0.011	0.012	0.009	0.010		
	2.0	0.011	0.013	0.010	0.010		
	2.1	0.013	0.015	0.011	0.012		
	2.2	0.014	0.016	0.012	0.013		
	2.3	0.014	0.016	0.012	0.013		
	2.4	0.015	0.017	0.013	0.014		
	2.5	0.016	0.018	0.013	0.014		
	2.6	0.018	0.020	0.015	0.016		
	2.7	0.019	0.021	0.016	0.017		
	2.8	0.019	0.022	0.016	0.018		
	2.9	0.020	0.023	0.017	0.018		
	3.0	0.021	0.024	0.018	0.019		

*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)

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

3530SUH MINI

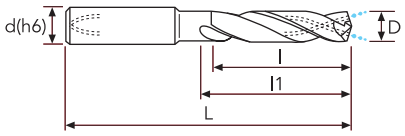
3 mm shank, polished flutes

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	3530SUH0100N	●
1.10	0/-0.010	3	34.7	36.2	75	30 x D	3530SUH0110N	○
1.20	0/-0.010	3	37.8	39.3	75	30 x D	3530SUH0120N	○
1.30	0/-0.010	3	41	42.5	85	30 x D	3530SUH0130N	○
1.40	0/-0.010	3	44.1	45.6	85	30 x D	3530SUH0140N	○
1.50	0/-0.010	3	47.3	48.8	85	30 x D	3530SUH0150N	●
1.60	0/-0.010	3	50.4	51.9	90	30 x D	3530SUH0160N	○
1.70	0/-0.010	3	53.6	55.1	90	30 x D	3530SUH0170N	○
1.80	0/-0.010	3	56.7	58.2	100	30 x D	3530SUH0180N	○
1.90	0/-0.010	3	59.9	61.4	100	30 x D	3530SUH0190N	○
2.00	0/-0.010	3	63	66	100	30 x D	3530SUH0200N	●
2.10	0/-0.010	3	66.2	69.3	110	30 x D	3530SUH0210N	○
2.20	0/-0.010	3	69.3	72.6	110	30 x D	3530SUH0220N	○
2.30	0/-0.010	3	72.5	75.9	110	30 x D	3530SUH0230N	○
2.40	0/-0.010	3	75.6	79.2	120	30 x D	3530SUH0240N	○
2.50	0/-0.010	3	78.8	82.5	120	30 x D	3530SUH0250N	●
2.60	0/-0.010	3	81.9	85.8	120	30 x D	3530SUH0260N	○
2.70	0/-0.010	3	85.1	89.1	130	30 x D	3530SUH0270N	○
2.80	0/-0.010	3	88.2	92.4	130	30 x D	3530SUH0280N	○
2.90	0/-0.010	3	91.4	95.7	130	30 x D	3530SUH0290N	○
3.00	0/-0.010	3	94.5	99	130	30 x D	3530SUH0300N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3530SUH MINI

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
	Vc (m/min)	**80÷90***	**60÷70***	**55÷65***	**50÷60***	**45÷55***	**38÷42***
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
Ø RUN OUT <0.02mm	**1.0**	0.008	0.008	0.007	0.005	0.005	0.005
	1.1	0.009	0.009	0.008	0.006	0.006	0.006
	1.2	0.010	0.010	0.008	0.006	0.006	0.006
	1.3	0.010	0.010	0.009	0.007	0.007	0.007
	1.4	0.011	0.011	0.010	0.007	0.007	0.007
	1.5	0.012	0.012	0.011	0.008	0.008	0.008
	1.6	0.014	0.014	0.012	0.009	0.009	0.009
	1.7	0.014	0.015	0.013	0.010	0.010	0.009
	1.8	0.015	0.016	0.014	0.010	0.010	0.010
	1.9	0.016	0.017	0.014	0.011	0.011	0.010
	2.0	0.017	0.017	0.015	0.011	0.011	0.011
	2.1	0.019	0.020	0.017	0.013	0.013	0.012
	2.2	0.020	0.021	0.018	0.014	0.013	0.013
	2.3	0.021	0.022	0.019	0.014	0.014	0.014
	2.4	0.022	0.023	0.019	0.015	0.014	0.014
	2.5	0.023	0.024	0.020	0.016	0.015	0.015
	2.6	0.025	0.026	0.022	0.018	0.016	0.016
	2.7	0.026	0.027	0.023	0.019	0.017	0.017
	2.8	0.027	0.028	0.024	0.019	0.018	0.018
	2.9	0.028	0.029	0.025	0.020	0.018	0.018
	3.0	0.029	0.030	0.026	0.021	0.019	0.019

*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			
	Hardness/Rm						
	Vc (m/min)	**45÷55***	**45÷50***	**40÷45***			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
Ø RUN OUT <0.02mm	**1.0**	0.005	0.005	0.005			
	1.1	0.006	0.006	0.006			
	1.2	0.006	0.006	0.007			
	1.3	0.007	0.007	0.007			
	1.4	0.007	0.007	0.008			
	1.5	0.008	0.008	0.008			
	1.6	0.009	0.009	0.009			
	1.7	0.010	0.010	0.010			
	1.8	0.010	0.010	0.011			
	1.9	0.011	0.011	0.011			
	2.0	0.011	0.011	0.012			
	2.1	0.013	0.013	0.013			
	2.2	0.013	0.013	0.014			
	2.3	0.014	0.014	0.014			
	2.4	0.014	0.014	0.015			
	2.5	0.015	0.015	0.016			
	2.6	0.016	0.017	0.017			
	2.7	0.017	0.017	0.018			
	2.8	0.018	0.018	0.018			
	2.9	0.018	0.018	0.019			
	3.0	0.019	0.019	0.020			

*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)

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

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)	**75÷85***	**60÷70***	**50÷60***	**45÷55***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.008	0.009	0.010	0.005		
1.1	0.009	0.010	0.011	0.006		
1.2	0.010	0.011	0.012	0.006		
1.3	0.011	0.012	0.013	0.007		
1.4	0.012	0.013	0.014	0.007		
1.5	0.012	0.014	0.015	0.008		
1.6	0.014	0.015	0.016	0.009		
1.7	0.015	0.016	0.017	0.010		
1.8	0.016	0.017	0.019	0.010		
1.9	0.016	0.018	0.020	0.011		
2.0	0.017	0.019	0.021	0.011		
2.1	0.019	0.021	0.023	0.013		
2.2	0.020	0.022	0.024	0.013		
2.3	0.021	0.023	0.025	0.014		
2.4	0.022	0.024	0.026	0.014		
2.5	0.023	0.025	0.027	0.015		
2.6	0.025	0.028	0.030	0.016		
2.7	0.025	0.029	0.031	0.017		
2.8	0.026	0.030	0.032	0.018		
2.9	0.027	0.031	0.033	0.018		
3.0	0.028	0.032	0.034	0.019		

*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)	**125÷135***	**105÷115***	**96÷104***	**135÷140***		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
1.0	0.012	0.012	0.010	0.012		
1.1	0.013	0.013	0.011	0.013		
1.2	0.015	0.014	0.012	0.015		
1.3	0.016	0.015	0.013	0.016		
1.4	0.017	0.017	0.014	0.017		
1.5	0.018	0.018	0.015	0.018		
1.6	0.020	0.020	0.017	0.020		
1.7	0.021	0.021	0.018	0.021		
1.8	0.023	0.022	0.019	0.023		
1.9	0.024	0.023	0.020	0.024		
2.0	0.025	0.025	0.021	0.025		
2.1	0.027	0.027	0.023	0.027		
2.2	0.029	0.028	0.024	0.029		
2.3	0.030	0.029	0.025	0.030		
2.4	0.031	0.031	0.026	0.031		
2.5	0.033	0.032	0.027	0.033		
2.6	0.035	0.034	0.029	0.035		
2.7	0.037	0.035	0.031	0.036		
2.8	0.038	0.037	0.032	0.038		
2.9	0.039	0.038	0.033	0.039		
3.0	0.041	0.039	0.034	0.040		

*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)	**26÷30***	**24÷26***	**34÷36***	**28÷32***		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**1.0**	0.005	0.005	0.004	0.005		
	1.1	0.006	0.006	0.005	0.005		
	1.2	0.006	0.007	0.005	0.006		
	1.3	0.007	0.007	0.006	0.006		
	1.4	0.007	0.008	0.006	0.007		
	1.5	0.008	0.008	0.007	0.007		
	1.6	0.009	0.010	0.008	0.008		
	1.7	0.010	0.011	0.008	0.009		
	1.8	0.010	0.011	0.009	0.009		
	1.9	0.011	0.012	0.009	0.010		
	2.0	0.011	0.013	0.010	0.010		
	2.1	0.013	0.015	0.011	0.012		
	2.2	0.014	0.016	0.012	0.013		
	2.3	0.014	0.016	0.012	0.013		
	2.4	0.015	0.017	0.013	0.014		
	2.5	0.016	0.018	0.013	0.014		
	2.6	0.018	0.020	0.015	0.016		
	2.7	0.019	0.021	0.016	0.017		
	2.8	0.019	0.022	0.016	0.018		
	2.9	0.020	0.023	0.017	0.018		
	3.0	0.021	0.024	0.018	0.019		

*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.

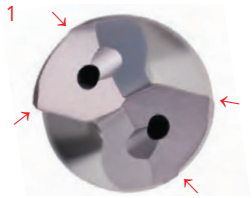
La gamme Typhoon HL de forets longs et extra longs est conçue pour le perçage de matériaux ISO P, M, K, N, S.

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 ①: 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 ②: highly polished to prevent welding and to improve the chip ejection
- Wide gash ③ to protect the drill edge thanks to faster and smoother 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
- Large entaille ③ pour protéger l'arête de coupe du foret grâce à une meilleure évacuation des copeaux plus rapide et plus fluide
- 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

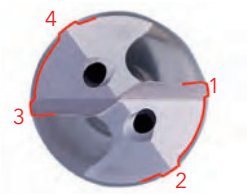
- Punte progettate per la foratura profonda di materiali ISO P, M, K, N, S
- Geometria del tagliente: 4 Margini per esecuzione di fori profondi precisi e rettilinei. Garantisce stabilità e affidabilità anche nel caso di fori con uscita inclinata o fori intersecanti
- Finitura gole: lappate per ridurre il problema dell'incollaggio e facilitare l'evacuazione dei trucioli
- Ampio scarico frontale ③ per proteggere il tagliente grazie ad una rapida ed efficace 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
- corte frontal amplio ③ para proteger el filo de la broca gracias a una expulsión de viruta más rápida y suave
- 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
- Großer Raum ③ auf der Stirnseite um die Schneide zu schützen, weil dadurch ein gute Spanabfuhr ermöglicht wird
- 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
- глубокая фронтальная ③ подточка служит для защиты режущей кромки и лучшему удалению стружки
- 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

INFO
CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA
HSS DRILLS
LFTA
SUTA
HSS-HSS/CO
CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH
HSS END-MILLS
CARBIDE BURRS

MACHINING OF DEEP HOLES PERPENDICULAR TO THE SURFACE

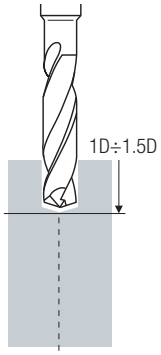
ESECUZIONE FORI PROFONDI ORTOGONALI ALLA SUPERFICIE

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 373HGA or 353HPU with head angle 140° (HL=135°) and m7 tolerance (HL=h7).

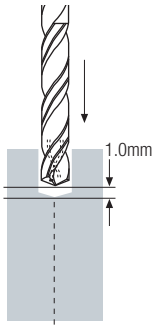
Utiliser un foret 373HGA ou 353HPU avec un angle en bout de 140° (HL=135°) et une tolérance m7 (HL=h7), pour effectuer un trou pilote (1xD÷1.5xD) très précis.

Utilizzare una punta 373HGA 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 373HGA 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 373HGA 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 373HGA 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.

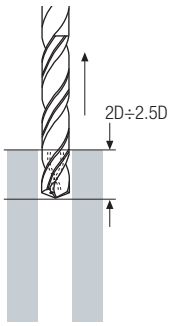
Percer sans step pour l'évacuation des copeaux.
En présence de trous débouchants, 1 mm avant d'avoir terminé le trou, réduire l'avancement du 30 %. Arrêter la lubrification.

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.

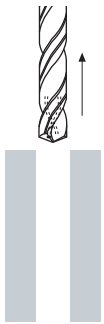
Retirer le foret en utilisant le maximum de tours disponibles et le double de l'avancement conseillé jusqu'à une profondeur 2xD.

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.

TYPHOON HL

HIGH PERFORMANCE - LONG AND EXTRA-LONG

MACHINING OF DEEP HOLES ON SLANTED OR IRREGULAR SURFACES

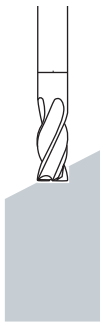
ESECUZIONE FORI PROFONDI SU SUPERFICI IRREGOLARI O OBLIQUE

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.

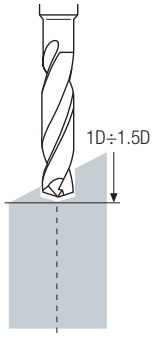
Réaliser une surface plane en utilisant une fraise avec une arête frontale. Le plan réalisé doit avoir les mêmes dimensions que le diamètre de perçage profond.

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 373HGA or 353HPU with head angle 140° (HL=135°) and m7 tolerance (HL=h7).

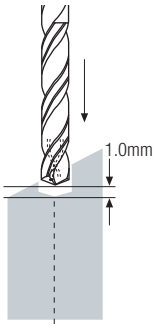
Utiliser un foret 373HGA ou 353HPU avec un angle en bout de 140° (HL=135°) et une tolérance m7 (HL=h7), pour effectuer un trou pilote (1xD÷1.5xD) très précis.

Utilizzare una punta 373HGA 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 373HGA 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 373HGA 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 373HGA 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.

INFO

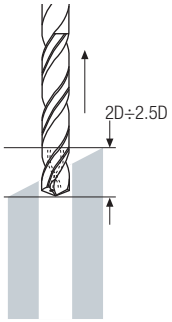
CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS



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

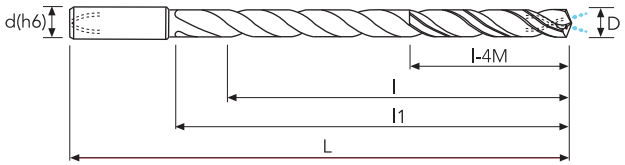
4-margin lands, polished flutes

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	3512HL0310N	●
3.20	0/-0.012	4	45	50	85	16	12 x D	3512HL0320N	●
3.30	0/-0.012	4	45	50	85	16.5	12 x D	3512HL0330N	●
3.40	0/-0.012	4	48	54	90	17	12 x D	3512HL0340N	●
3.50	0/-0.012	4	48	54	90	17.5	12 x D	3512HL0350N	●
3.60	0/-0.012	4	48	54	90	18	12 x D	3512HL0360N	●
3.70	0/-0.012	4	48	54	90	18.5	12 x D	3512HL0370N	●
3.80	0/-0.012	4	57	64	100	19	12 x D	3512HL0380N	●
3.90	0/-0.012	4	57	64	100	19.5	12 x D	3512HL0390N	●
4.00	0/-0.012	4	57	64	100	20	12 x D	3512HL0400N	●
4.10	0/-0.012	5	57	64	100	20.5	12 x D	3512HL0410N	●
4.20	0/-0.012	5	57	64	100	21	12 x D	3512HL0420N	●
4.30	0/-0.012	5	57	64	100	21.5	12 x D	3512HL0430N	●
4.40	0/-0.012	5	57	64	100	22	12 x D	3512HL0440N	●
4.50	0/-0.012	5	57	64	100	22.5	12 x D	3512HL0450N	●
4.60	0/-0.012	5	57	64	100	23	12 x D	3512HL0460N	●
4.70	0/-0.012	5	57	64	100	23.5	12 x D	3512HL0470N	●
4.80	0/-0.012	5	67	74	110	24	12 x D	3512HL0480N	●
4.90	0/-0.012	5	72	81	120	24.5	12 x D	3512HL0490N	●
5.00	0/-0.012	5	72	81	120	25	12 x D	3512HL0500N	●
5.10	0/-0.012	6	72	81	120	25.5	12 x D	3512HL0510N	●
5.20	0/-0.012	6	72	81	120	26	12 x D	3512HL0520N	●
5.30	0/-0.012	6	72	81	120	26.5	12 x D	3512HL0530N	●
5.40	0/-0.012	6	72	81	120	27	12 x D	3512HL0540N	●
5.50	0/-0.012	6	72	81	120	27.5	12 x D	3512HL0550N	●
5.60	0/-0.012	6	72	81	120	28	12 x D	3512HL0560N	●
5.70	0/-0.012	6	72	81	120	28.5	12 x D	3512HL0570N	●
5.80	0/-0.012	6	72	81	120	29	12 x D	3512HL0580N	●
5.90	0/-0.012	6	72	81	120	29.5	12 x D	3512HL0590N	●
6.00	0/-0.012	6	72	81	120	30	12 x D	3512HL0600N	●
6.10	0/-0.015	8	88	97	135	30.5	12 x D	3512HL0610N	●
6.20	0/-0.015	8	88	97	135	31	12 x D	3512HL0620N	●
6.30	0/-0.015	8	88	97	135	31.5	12 x D	3512HL0630N	●
6.40	0/-0.015	8	96	108	145	32	12 x D	3512HL0640N	●
6.50	0/-0.015	8	96	108	145	32.5	12 x D	3512HL0650N	●
6.60	0/-0.015	8	96	108	145	33	12 x D	3512HL0660N	●
6.70	0/-0.015	8	96	108	145	33.5	12 x D	3512HL0670N	●
6.80	0/-0.015	8	96	108	145	34	12 x D	3512HL0680N	●
6.90	0/-0.015	8	96	108	145	34.5	12 x D	3512HL0690N	●

* Ø1÷Ø3 = 3512 SUH MINI page 140

● stock standard ○ non-standard stock ▽ stock exhaustion

3512HL

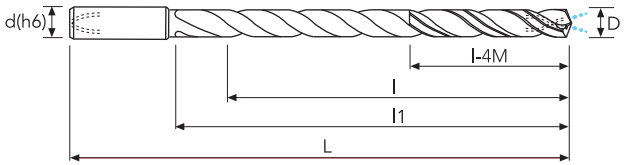
4-margin lands, polished flutes

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	3512HL0700N	●
7.10	0/-0.015	8	96	108	145	35.5	12 x D	3512HL0710N	○
7.20	0/-0.015	8	96	108	145	36	12 x D	3512HL0720N	●
7.30	0/-0.015	8	96	108	145	36.5	12 x D	3512HL0730N	○
7.40	0/-0.015	8	96	108	145	37	12 x D	3512HL0740N	●
7.50	0/-0.015	8	96	108	145	37.5	12 x D	3512HL0750N	●
7.60	0/-0.015	8	96	108	145	38	12 x D	3512HL0760N	○
7.70	0/-0.015	8	96	108	145	38.5	12 x D	3512HL0770N	○
7.80	0/-0.015	8	96	108	145	39	12 x D	3512HL0780N	●
7.90	0/-0.015	8	96	108	145	39.5	12 x D	3512HL0790N	○
8.00	0/-0.015	8	96	108	145	40	12 x D	3512HL0800N	●
8.10	0/-0.015	10	115	127	170	40.5	12 x D	3512HL0810N	●
8.20	0/-0.015	10	120	135	180	41	12 x D	3512HL0820N	●
8.30	0/-0.015	10	120	135	180	41.5	12 x D	3512HL0830N	●
8.40	0/-0.015	10	120	135	180	42	12 x D	3512HL0840N	○
8.50	0/-0.015	10	120	135	180	42.5	12 x D	3512HL0850N	●
8.60	0/-0.015	10	120	135	180	43	12 x D	3512HL0860N	●
8.70	0/-0.015	10	120	135	180	43.5	12 x D	3512HL0870N	●
8.80	0/-0.015	10	120	135	180	44	12 x D	3512HL0880N	●
8.90	0/-0.015	10	120	135	180	44.5	12 x D	3512HL0890N	○
9.00	0/-0.015	10	120	135	180	45	12 x D	3512HL0900N	●
9.10	0/-0.015	10	120	135	180	45.5	12 x D	3512HL0910N	●
9.20	0/-0.015	10	120	135	180	46	12 x D	3512HL0920N	●
9.30	0/-0.015	10	120	135	180	46.5	12 x D	3512HL0930N	●
9.40	0/-0.015	10	120	135	180	47	12 x D	3512HL0940N	○
9.50	0/-0.015	10	120	135	180	47.5	12 x D	3512HL0950N	●
9.60	0/-0.015	10	120	135	180	48	12 x D	3512HL0960N	○
9.70	0/-0.015	10	120	135	180	48.5	12 x D	3512HL0970N	○
9.80	0/-0.015	10	120	135	180	49	12 x D	3512HL0980N	●
9.90	0/-0.015	10	120	135	180	49.5	12 x D	3512HL0990N	○
10.00	0/-0.015	10	120	135	180	50	12 x D	3512HL1000N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3512HL

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	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**	**45÷65**	**40÷60**	**35÷40**
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3.0	0.047	0.046	0.046	0.045	0.047	0.044
	3.5	0.057	0.055	0.054	0.053	0.056	0.053
	4.0	0.068	0.066	0.064	0.063	0.067	0.063
	4.5	0.079	0.076	0.076	0.075	0.077	0.071
	5.0	0.090	0.088	0.087	0.086	0.087	0.081
	5.5	0.102	0.098	0.099	0.097	0.100	0.092
	6.0	0.117	0.109	0.110	0.109	0.113	0.105
	6.5	0.128	0.121	0.125	0.123	0.123	0.118
	7.0	0.144	0.135	0.138	0.137	0.136	0.126
	7.5	0.156	0.151	0.152	0.150	0.150	0.144
	8.0	0.175	0.166	0.167	0.165	0.167	0.156
	8.5	0.184	0.173	0.170	0.168	0.172	0.163
	9.0	0.194	0.176	0.180	0.178	0.177	0.160
	9.5	0.198	0.185	0.186	0.184	0.181	0.168
	10.0	0.210	0.188	0.192	0.190	0.185	0.177

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm						
	Vc (m/min)	**40÷60**	**40÷60**	**35÷55**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3.0	0.047	0.042	0.041			
	3.5	0.056	0.051	0.048			
	4.0	0.067	0.060	0.058			
	4.5	0.077	0.070	0.067			
	5.0	0.087	0.079	0.075			
	5.5	0.100	0.091	0.086			
	6.0	0.113	0.103	0.096			
	6.5	0.123	0.113	0.108			
	7.0	0.136	0.125	0.122			
	7.5	0.150	0.135	0.127			
	8.0	0.167	0.150	0.145			
	8.5	0.172	0.157	0.147			
	9.0	0.177	0.159	0.156			
	9.5	0.181	0.162	0.159			
	10.0	0.185	0.170	0.169			

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)	**65÷85**	**60÷80**	**45÷65**	**45÷65**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3.0	0.048	0.045	0.048	0.047		
3.5	0.058	0.055	0.057	0.056		
4.0	0.069	0.064	0.067	0.066		
4.5	0.080	0.075	0.079	0.078		
5.0	0.093	0.087	0.090	0.089		
5.5	0.105	0.097	0.103	0.101		
6.0	0.117	0.109	0.114	0.113		
6.5	0.133	0.122	0.130	0.128		
7.0	0.149	0.136	0.143	0.142		
7.5	0.161	0.152	0.157	0.155		
8.0	0.179	0.166	0.173	0.171		
8.5	0.186	0.173	0.176	0.174		
9.0	0.187	0.174	0.187	0.185		
9.5	0.197	0.183	0.191	0.189		
10.0	0.200	0.187	0.195	0.194		



Material Group ISO 513	N1	N2	N3 N4			
Hardness/Rm						
Vc (m/min)	**125÷145**	**110÷130**	**100÷120**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3.0	0.060	0.059	0.058			
3.5	0.073	0.071	0.070			
4.0	0.086	0.085	0.083			
4.5	0.100	0.099	0.096			
5.0	0.115	0.114	0.111			
5.5	0.132	0.129	0.126			
6.0	0.149	0.145	0.140			
6.5	0.167	0.161	0.158			
7.0	0.185	0.181	0.175			
7.5	0.202	0.196	0.195			
8.0	0.222	0.218	0.213			
8.5	0.229	0.227	0.218			
9.0	0.237	0.231	0.229			
9.5	0.246	0.243	0.236			
10.0	0.251	0.250	0.243			

3512HL

Material Group ISO 513	S1 S2	S3	S4	S5		
Hardness/Rm	<35 HRC	35÷45 HRC				
Vc (m/min)	**24÷28**	**20÷25**	**28÷32**	**25÷30**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3.0	0.040	0.037	0.047	0.044		
3.5	0.048	0.046	0.055	0.052		
4.0	0.057	0.055	0.065	0.063		
4.5	0.067	0.061	0.077	0.070		
5.0	0.075	0.069	0.088	0.080		
5.5	0.084	0.077	0.104	0.094		
6.0	0.100	0.086	0.124	0.113		
6.5	0.109	0.092	0.136	0.123		
7.0	0.119	0.100	0.150	0.136		
7.5	0.133	0.114	0.164	0.150		
8.0	0.138	0.130	0.181	0.167		
8.5	0.148	0.130	0.189	0.163		
9.0	0.160	0.144	0.183	0.173		
9.5	0.155	0.139	0.195	0.168		
10.0	0.167	0.150	0.191	0.180		

Ø RUN OUT <0.02mm

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

*en phase de sortie, pour éviter le grippage dû à une surchauffe, il est nécessaire d'utiliser l'arrosage externe pour maintenir l'outil et la pièce refroidis et lubrifiés.

*en la fase de salida, para evitar el bloqueo debido al sobrecalentamiento, es necesario usar la aducción externa del refrigerante para mantener enfriadas y lubricadas la herramienta y la pieza.

*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

3515HL

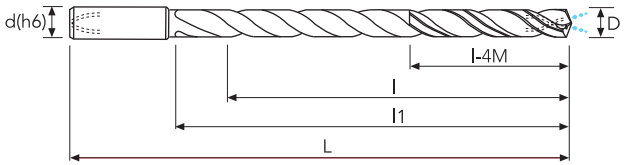
4-margin lands, polished flutes

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	3515HL0310N	○
3.20	0/-0.012	4	50	55	90	16	15 x D	3515HL0320N	○
3.30	0/-0.012	4	52	56	90	16.5	15 x D	3515HL0330N	○
3.40	0/-0.012	4	53	58	95	17	15 x D	3515HL0340N	○
3.50	0/-0.012	4	55	60	95	17.5	15 x D	3515HL0350N	●
3.60	0/-0.012	4	56	61	95	18	15 x D	3515HL0360N	○
3.70	0/-0.012	4	58	63	100	18.5	15 x D	3515HL0370N	○
3.80	0/-0.012	4	60	65	100	19	15 x D	3515HL0380N	○
3.90	0/-0.012	4	60	66	100	19.5	15 x D	3515HL0390N	○
4.00	0/-0.012	4	62	68	105	20	15 x D	3515HL0400N	●
4.10	0/-0.012	5	64	70	105	20.5	15 x D	3515HL0410N	○
4.20	0/-0.012	5	65	71	110	21	15 x D	3515HL0420N	○
4.30	0/-0.012	5	67	73	110	21.5	15 x D	3515HL0430N	●
4.40	0/-0.012	5	68	75	110	22	15 x D	3515HL0440N	○
4.50	0/-0.012	5	70	76	115	22.5	15 x D	3515HL0450N	●
4.60	0/-0.012	5	71	78	115	23	15 x D	3515HL0460N	○
4.70	0/-0.012	5	73	80	115	23.5	15 x D	3515HL0470N	○
4.80	0/-0.012	5	75	82	115	24	15 x D	3515HL0480N	○
4.90	0/-0.012	5	76	83	120	24.5	15 x D	3515HL0490N	○
5.00	0/-0.012	5	77	85	120	25	15 x D	3515HL0500N	●
5.10	0/-0.012	6	79	86	125	25.5	15 x D	3515HL0510N	○
5.20	0/-0.012	6	80	88	125	26	15 x D	3515HL0520N	○
5.30	0/-0.012	6	82	89	130	26.5	15 x D	3515HL0530N	○
5.40	0/-0.012	6	83	91	130	27	15 x D	3515HL0540N	○
5.50	0/-0.012	6	85	93	130	27.5	15 x D	3515HL0550N	●
5.60	0/-0.012	6	86	94	135	28	15 x D	3515HL0560N	○
5.70	0/-0.012	6	88	96	135	28.5	15 x D	3515HL0570N	○
5.80	0/-0.012	6	89	98	135	29	15 x D	3515HL0580N	○
5.90	0/-0.012	6	91	99	140	29.5	15 x D	3515HL0590N	○
6.00	0/-0.012	6	92	101	140	30	15 x D	3515HL0600N	●
6.10	0/-0.015	8	94	103	140	30.5	15 x D	3515HL0610N	○
6.20	0/-0.015	8	95	104	140	31	15 x D	3515HL0620N	○
6.30	0/-0.015	8	98	108	145	31.5	15 x D	3515HL0630N	○
6.40	0/-0.015	8	100	110	145	32	15 x D	3515HL0640N	○
6.50	0/-0.015	8	100	110	150	32.5	15 x D	3515HL0650N	●
6.60	0/-0.015	8	101	111	150	33	15 x D	3515HL0660N	○
6.70	0/-0.015	8	103	113	150	33.5	15 x D	3515HL0670N	○
6.80	0/-0.015	8	104	114	155	34	15 x D	3515HL0680N	○
6.90	0/-0.015	8	106	116	155	34.5	15 x D	3515HL0690N	○

● stock standard ○ non-standard stock ▽ stock exhaustion

3515HL

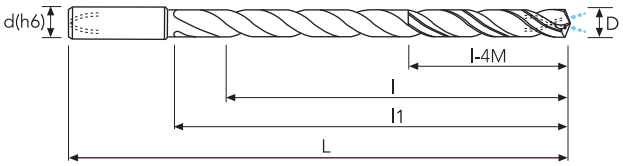
4-margin lands, polished flutes

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	3515HL0700N	●
7.10	0/-0.015	8	109	119	160	35.5	15 x D	3515HL0710N	○
7.20	0/-0.015	8	110	121	160	36	15 x D	3515HL0720N	○
7.30	0/-0.015	8	112	122	165	36.5	15 x D	3515HL0730N	○
7.40	0/-0.015	8	113	124	165	37	15 x D	3515HL0740N	○
7.50	0/-0.015	8	115	126	165	37.5	15 x D	3515HL0750N	●
7.60	0/-0.015	8	116	127	170	38	15 x D	3515HL0760N	○
7.70	0/-0.015	8	118	129	170	38.5	15 x D	3515HL0770N	○
7.80	0/-0.015	8	119	131	170	39	15 x D	3515HL0780N	○
7.90	0/-0.015	8	121	132	175	39.5	15 x D	3515HL0790N	○
8.00	0/-0.015	8	122	134	175	40	15 x D	3515HL0800N	●
8.10	0/-0.015	10	125	137	180	40.5	15 x D	3515HL0810N	○
8.20	0/-0.015	10	125	137	180	41	15 x D	3515HL0820N	○
8.30	0/-0.015	10	127	139	180	41.5	15 x D	3515HL0830N	○
8.40	0/-0.015	10	128	141	185	42	15 x D	3515HL0840N	○
8.50	0/-0.015	10	130	142	185	42.5	15 x D	3515HL0850N	●
8.60	0/-0.015	10	131	144	185	43	15 x D	3515HL0860N	○
8.70	0/-0.015	10	133	146	190	43.5	15 x D	3515HL0870N	○
8.80	0/-0.015	10	134	147	190	44	15 x D	3515HL0880N	○
8.90	0/-0.015	10	136	149	190	44.5	15 x D	3515HL0890N	○
9.00	0/-0.015	10	137	151	195	45	15 x D	3515HL0900N	●
9.10	0/-0.015	10	139	152	195	45.5	15 x D	3515HL0910N	○
9.20	0/-0.015	10	140	154	195	46	15 x D	3515HL0920N	○
9.30	0/-0.015	10	142	155	200	46.5	15 x D	3515HL0930N	○
9.40	0/-0.015	10	143	157	200	47	15 x D	3515HL0940N	○
9.50	0/-0.015	10	145	159	200	47.5	15 x D	3515HL0950N	●
9.60	0/-0.015	10	146	160	205	48	15 x D	3515HL0960N	○
9.70	0/-0.015	10	148	162	205	48.5	15 x D	3515HL0970N	○
9.80	0/-0.015	10	149	164	205	49	15 x D	3515HL0980N	○
9.90	0/-0.015	10	151	165	210	49.5	15 x D	3515HL0990N	○
10.00	0/-0.015	10	152	167	210	50	15 x D	3515HL1000N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

3515HL



Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
Vc (m/min)	65÷85	50÷70	40÷60	35÷55	40÷50	30÷40
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
3.0	0.044	0.043	0.045	0.044	0.043	0.035
3.5	0.054	0.053	0.054	0.053	0.052	0.042
4.0	0.065	0.063	0.065	0.064	0.063	0.050
4.5	0.075	0.075	0.077	0.076	0.072	0.057
5.0	0.085	0.086	0.088	0.086	0.084	0.065
5.5	0.098	0.097	0.102	0.100	0.097	0.075
6.0	0.111	0.109	0.112	0.110	0.107	0.086
6.5	0.125	0.123	0.130	0.128	0.120	0.098
7.0	0.138	0.137	0.140	0.138	0.135	0.105
7.5	0.151	0.152	0.156	0.154	0.145	0.121
8.0	0.171	0.169	0.175	0.173	0.165	0.131
8.5	0.177	0.172	0.179	0.176	0.171	0.137
9.0	0.177	0.183	0.183	0.180	0.178	0.133
9.5	0.186	0.186	0.189	0.187	0.182	0.139
10.0	0.189	0.190	0.196	0.194	0.188	0.146



Material Group ISO 513	M1	M2	M3			
Hardness/Rm						
Vc (m/min)	40÷50	40÷50	35÷45			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3.0	0.043	0.039	0.031			
3.5	0.052	0.048	0.038			
4.0	0.063	0.057	0.046			
4.5	0.072	0.066	0.053			
5.0	0.084	0.077	0.061			
5.5	0.097	0.088	0.071			
6.0	0.107	0.098	0.080			
6.5	0.120	0.110	0.088			
7.0	0.135	0.123	0.099			
7.5	0.145	0.132	0.106			
8.0	0.165	0.150	0.120			
8.5	0.171	0.155	0.124			
9.0	0.178	0.161	0.128			
9.5	0.182	0.165	0.132			
10.0	0.188	0.171	0.136			

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

*en phase de sortie, pour éviter le grippage dû à une surchauffe, il est nécessaire d'utiliser l'arrosage externe pour maintenir l'outil et la pièce refroidis et lubrifiés.

*en la fase de salida, para evitar el bloqueo debido al sobrecalentamiento, es necesario usar la aducción externa del refrigerante para mantener enfriadas y lubricadas la herramienta y la pieza.

*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

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)	**60÷80**	**55÷75**	**40÷60**	**40÷60**		
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
	3.0	0.047	0.045	0.047	0.047		
	3.5	0.057	0.055	0.057	0.056		
	4.0	0.067	0.065	0.068	0.067		
	4.5	0.079	0.077	0.081	0.079		
	5.0	0.092	0.089	0.092	0.090		
	5.5	0.103	0.101	0.106	0.105		
	6.0	0.116	0.112	0.117	0.115		
	6.5	0.130	0.127	0.135	0.133		
	7.0	0.146	0.144	0.146	0.144		
	7.5	0.163	0.158	0.163	0.160		
	8.0	0.178	0.173	0.182	0.180		
	8.5	0.185	0.175	0.186	0.183		
	9.0	0.186	0.184	0.190	0.188		
	9.5	0.196	0.188	0.195	0.193		
	10.0	0.200	0.191	0.200	0.199		

	Material Group ISO 513	N1	N2	N3 N4			
	Hardness/Rm						
	Vc (m/min)	**115÷135**	**95÷115**	**85÷105**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3.0	0.058	0.057	0.056			
	3.5	0.071	0.070	0.068			
	4.0	0.084	0.083	0.081			
	4.5	0.098	0.096	0.095			
	5.0	0.114	0.111	0.110			
	5.5	0.129	0.127	0.125			
	6.0	0.147	0.142	0.141			
	6.5	0.163	0.160	0.158			
	7.0	0.182	0.177	0.177			
	7.5	0.201	0.198	0.194			
	8.0	0.222	0.217	0.214			
	8.5	0.229	0.222	0.220			
	9.0	0.238	0.232	0.226			
	9.5	0.242	0.238	0.233			
	10.0	0.253	0.246	0.241			

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

*en phase de sortie, pour éviter le grippage dû à une surchauffe, il est nécessaire d'utiliser l'arrosage externe pour maintenir l'outil et la pièce refroidis et lubrifiés.

*en la fase de salida, para evitar el bloqueo debido al sobrecalentamiento, es necesario usar la aducción externa del refrigerante para mantener enfriadas y lubricadas la herramienta y la pieza.

*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

CUTTING PARAMETERS

3515HL



Material Group ISO 513	S1 S2	S3	S4	S5		
Hardness/Rm	<35 HRC	35÷45 HRC				
Vc (m/min)	**24÷28**	**20÷25**	**28÷32**	**25÷30**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3.0	0.037	0.030	0.050	0.044		
3.5	0.044	0.037	0.058	0.052		
4.0	0.052	0.045	0.069	0.063		
4.5	0.062	0.050	0.081	0.070		
5.0	0.069	0.056	0.093	0.080		
5.5	0.078	0.063	0.109	0.094		
6.0	0.093	0.071	0.129	0.113		
6.5	0.102	0.077	0.142	0.123		
7.0	0.112	0.083	0.157	0.136		
7.5	0.125	0.095	0.171	0.150		
8.0	0.129	0.110	0.188	0.167		
8.5	0.139	0.110	0.198	0.163		
9.0	0.150	0.122	0.192	0.173		
9.5	0.145	0.117	0.205	0.168		
10.0	0.156	0.125	0.200	0.180		

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

*en phase de sortie, pour éviter le grippage dû à une surchauffe, il est nécessaire d'utiliser l'arrosage externe pour maintenir l'outil et la pièce refroidis et lubrifiés.

*en la fase de salida, para evitar el bloqueo debido al sobrecalentamiento, es necesario usar la aducción externa del refrigerante para mantener enfriadas y lubricadas la herramienta y la pieza.

*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

3520HL

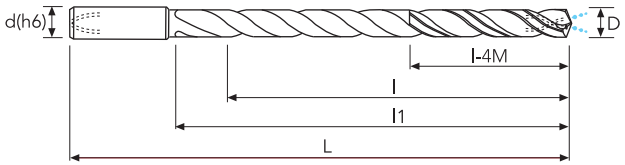
4-margin lands, polished flutes

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	3520HL0310N	○
3.20	0/-0.012	4	66	71	105	16	20 x D	3520HL0320N	●
3.30	0/-0.012	4	68	73	110	16.5	20 x D	3520HL0330N	●
3.40	0/-0.012	4	70	75	110	17	20 x D	3520HL0340N	○
3.50	0/-0.012	4	72	77	110	17.5	20 x D	3520HL0350N	●
3.60	0/-0.012	4	74	79	115	18	20 x D	3520HL0360N	○
3.70	0/-0.012	4	76	82	115	18.5	20 x D	3520HL0370N	○
3.80	0/-0.012	4	78	84	120	19	20 x D	3520HL0380N	○
3.90	0/-0.012	4	80	86	120	19.5	20 x D	3520HL0390N	○
4.00	0/-0.012	4	82	88	125	20	20 x D	3520HL0400N	●
4.10	0/-0.012	5	84	90	125	20.5	20 x D	3520HL0410N	○
4.20	0/-0.012	5	86	92	130	21	20 x D	3520HL0420N	○
4.30	0/-0.012	5	88	94	130	21.5	20 x D	3520HL0430N	○
4.40	0/-0.012	5	90	97	135	22	20 x D	3520HL0440N	○
4.50	0/-0.012	5	92	99	135	22.5	20 x D	3520HL0450N	●
4.60	0/-0.012	5	94	101	140	23	20 x D	3520HL0460N	○
4.70	0/-0.012	5	96	103	140	23.5	20 x D	3520HL0470N	○
4.80	0/-0.012	5	98	105	140	24	20 x D	3520HL0480N	○
4.90	0/-0.012	5	100	107	145	24.5	20 x D	3520HL0490N	○
5.00	0/-0.012	5	102	110	145	25	20 x D	3520HL0500N	●
5.10	0/-0.012	6	104	112	150	25.5	20 x D	3520HL0510N	○
5.20	0/-0.012	6	106	114	155	26	20 x D	3520HL0520N	○
5.30	0/-0.012	6	108	116	155	26.5	20 x D	3520HL0530N	○
5.40	0/-0.012	6	110	118	155	27	20 x D	3520HL0540N	○
5.50	0/-0.012	6	112	120	160	27.5	20 x D	3520HL0550N	●
5.60	0/-0.012	6	114	122	160	28	20 x D	3520HL0560N	○
5.70	0/-0.012	6	116	125	165	28.5	20 x D	3520HL0570N	○
5.80	0/-0.012	6	118	127	165	29	20 x D	3520HL0580N	○
5.90	0/-0.012	6	120	129	170	29.5	20 x D	3520HL0590N	○
6.00	0/-0.012	6	122	131	170	30	20 x D	3520HL0600N	●
6.10	0/-0.015	8	124	133	170	30.5	20 x D	3520HL0610N	○
6.20	0/-0.015	8	126	135	175	31	20 x D	3520HL0620N	○
6.30	0/-0.015	8	128	137	175	31.5	20 x D	3520HL0630N	○
6.40	0/-0.015	8	130	140	180	32	20 x D	3520HL0640N	○
6.50	0/-0.015	8	132	142	180	32.5	20 x D	3520HL0650N	●
6.60	0/-0.015	8	134	144	185	33	20 x D	3520HL0660N	○
6.70	0/-0.015	8	136	146	185	33.5	20 x D	3520HL0670N	○
6.80	0/-0.015	8	138	148	185	34	20 x D	3520HL0680N	○
6.90	0/-0.015	8	140	150	190	34.5	20 x D	3520HL0690N	○

* Ø1÷Ø3 = 3520 SUH MINI page 144

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

3520HL

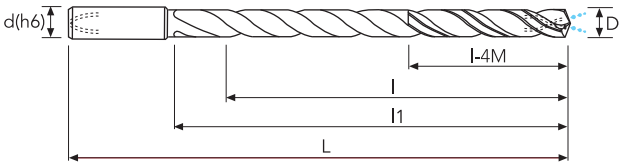
4-margin lands, polished flutes

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	3520HL0700N	●
7.10	0/-0.015	8	144	155	195	35.5	20 x D	3520HL0710N	○
7.20	0/-0.015	8	146	157	200	36	20 x D	3520HL0720N	○
7.30	0/-0.015	8	148	159	200	36.5	20 x D	3520HL0730N	○
7.40	0/-0.015	8	150	161	200	37	20 x D	3520HL0740N	○
7.50	0/-0.015	8	152	163	205	37.5	20 x D	3520HL0750N	●
7.60	0/-0.015	8	154	165	205	38	20 x D	3520HL0760N	○
7.70	0/-0.015	8	156	168	210	38.5	20 x D	3520HL0770N	○
7.80	0/-0.015	8	158	170	210	39	20 x D	3520HL0780N	○
7.90	0/-0.015	8	160	172	215	39.5	20 x D	3520HL0790N	○
8.00	0/-0.015	8	162	174	215	40	20 x D	3520HL0800N	●
8.10	0/-0.015	10	164	176	220	40.5	20 x D	3520HL0810N	○
8.20	0/-0.015	10	166	178	220	41	20 x D	3520HL0820N	○
8.30	0/-0.015	10	168	180	225	41.5	20 x D	3520HL0830N	○
8.40	0/-0.015	10	170	183	225	42	20 x D	3520HL0840N	○
8.50	0/-0.015	10	172	185	230	42.5	20 x D	3520HL0850N	●
8.60	0/-0.015	10	174	187	230	43	20 x D	3520HL0860N	○
8.70	0/-0.015	10	176	189	230	43.5	20 x D	3520HL0870N	○
8.80	0/-0.015	10	178	191	235	44	20 x D	3520HL0880N	○
8.90	0/-0.015	10	180	193	235	44.5	20 x D	3520HL0890N	○
9.00	0/-0.015	10	182	196	240	45	20 x D	3520HL0900N	●
9.10	0/-0.015	10	184	198	240	45.5	20 x D	3520HL0910N	○
9.20	0/-0.015	10	186	200	245	46	20 x D	3520HL0920N	○
9.30	0/-0.015	10	188	202	245	46.5	20 x D	3520HL0930N	○
9.40	0/-0.015	10	190	204	245	47	20 x D	3520HL0940N	○
9.50	0/-0.015	10	192	206	250	47.5	20 x D	3520HL0950N	●
9.60	0/-0.015	10	194	208	250	48	20 x D	3520HL0960N	○
9.70	0/-0.015	10	196	211	255	48.5	20 x D	3520HL0970N	○
9.80	0/-0.015	10	198	213	255	49	20 x D	3520HL0980N	○
9.90	0/-0.015	10	200	215	260	49.5	20 x D	3520HL0990N	○
10.00	0/-0.015	10	202	217	260	50	20 x D	3520HL1000N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3520HL

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
	Vc (m/min)	**65÷85**	**50÷70**	**40÷60**	**35÷55**	**40÷50**	**30÷40**
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3.0	0.044	0.043	0.045	0.044	0.043	0.035
	3.5	0.054	0.053	0.054	0.053	0.052	0.042
	4.0	0.065	0.063	0.065	0.064	0.063	0.050
	4.5	0.075	0.075	0.077	0.076	0.072	0.057
	5.0	0.085	0.086	0.088	0.086	0.084	0.065
	5.5	0.098	0.097	0.102	0.100	0.097	0.075
	6.0	0.111	0.109	0.112	0.110	0.107	0.086
	6.5	0.125	0.123	0.130	0.128	0.120	0.098
	7.0	0.138	0.137	0.140	0.138	0.135	0.105
	7.5	0.151	0.152	0.156	0.154	0.145	0.121
	8.0	0.171	0.169	0.175	0.173	0.165	0.131
	8.5	0.177	0.172	0.179	0.176	0.171	0.137
	9.0	0.177	0.183	0.183	0.180	0.178	0.133
	9.5	0.186	0.186	0.189	0.187	0.182	0.139
	10.0	0.189	0.190	0.196	0.194	0.188	0.146

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm						
	Vc (m/min)	**40÷50**	**40÷50**	**35÷45**			
Ø RUN OUT <0.02mm	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3.0	0.043	0.039	0.031			
	3.5	0.052	0.048	0.038			
	4.0	0.063	0.057	0.046			
	4.5	0.072	0.066	0.053			
	5.0	0.084	0.077	0.061			
	5.5	0.097	0.088	0.071			
	6.0	0.107	0.098	0.080			
	6.5	0.120	0.110	0.088			
	7.0	0.135	0.123	0.099			
	7.5	0.145	0.132	0.106			
	8.0	0.165	0.150	0.120			
	8.5	0.171	0.155	0.124			
	9.0	0.178	0.161	0.128			
	9.5	0.182	0.165	0.132			
	10.0	0.188	0.171	0.136			

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

*en phase de sortie, pour éviter le grippage dû à une surchauffe, il est nécessaire d'utiliser l'arrosage externe pour maintenir l'outil et la pièce refroidis et lubrifiés.

*en la fase de salida, para evitar el bloqueo debido al sobrecalentamiento, es necesario usar la aducción externa del refrigerante para mantener enfriadas y lubricadas la herramienta y la pieza.

*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

CUTTING PARAMETERS

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**	**55÷75**	**40÷60**	**40÷60**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3.0	0.047	0.045	0.047	0.047		
3.5	0.057	0.055	0.057	0.056		
4.0	0.067	0.065	0.068	0.067		
4.5	0.079	0.077	0.081	0.079		
5.0	0.092	0.089	0.092	0.090		
5.5	0.103	0.101	0.106	0.105		
6.0	0.116	0.112	0.117	0.115		
6.5	0.130	0.127	0.135	0.133		
7.0	0.146	0.144	0.146	0.144		
7.5	0.163	0.158	0.163	0.160		
8.0	0.178	0.173	0.182	0.180		
8.5	0.185	0.175	0.186	0.183		
9.0	0.186	0.184	0.190	0.188		
9.5	0.196	0.188	0.195	0.193		
10.0	0.200	0.191	0.200	0.199		



Material Group ISO 513	N1	N2	N3 N4			
Hardness/Rm						
Vc (m/min)	**115÷135**	**95÷115**	**85÷105**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3.0	0.058	0.057	0.056			
3.5	0.071	0.070	0.068			
4.0	0.084	0.083	0.081			
4.5	0.098	0.096	0.095			
5.0	0.114	0.111	0.110			
5.5	0.129	0.127	0.125			
6.0	0.147	0.142	0.141			
6.5	0.163	0.160	0.158			
7.0	0.182	0.177	0.177			
7.5	0.201	0.198	0.194			
8.0	0.222	0.217	0.214			
8.5	0.229	0.222	0.220			
9.0	0.238	0.232	0.226			
9.5	0.242	0.238	0.233			
10.0	0.253	0.246	0.241			

3520HL

	Material Group ISO 513	S1 S2	S3	S4	S5		
	Hardness/Rm	<35 HRC	35÷45 HRC				
	Vc (m/min)	**24÷28**	**20÷25**	**28÷32**	**25÷30**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**3.0**	0.037	0.030	0.050	0.044		
	3.5	0.044	0.037	0.058	0.052		
	4.0	0.052	0.045	0.069	0.063		
	4.5	0.062	0.050	0.081	0.070		
	5.0	0.069	0.056	0.093	0.080		
	5.5	0.078	0.063	0.109	0.094		
	6.0	0.093	0.071	0.129	0.113		
	6.5	0.102	0.077	0.142	0.123		
	7.0	0.112	0.083	0.157	0.136		
	7.5	0.125	0.095	0.171	0.150		
	8.0	0.129	0.110	0.188	0.167		
	8.5	0.139	0.110	0.198	0.163		
	9.0	0.150	0.122	0.192	0.173		
	9.5	0.145	0.117	0.205	0.168		
	10.0	0.156	0.125	0.200	0.180		

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

*en phase de sortie, pour éviter le grippage dû à une surchauffe, il est nécessaire d'utiliser l'arrosage externe pour maintenir l'outil et la pièce refroidis et lubrifiés.

*en la fase de salida, para evitar el bloqueo debido al sobrecalentamiento, es necesario usar la aducción externa del refrigerante para mantener enfriadas y lubricadas la herramienta y la pieza.

*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

3525HL

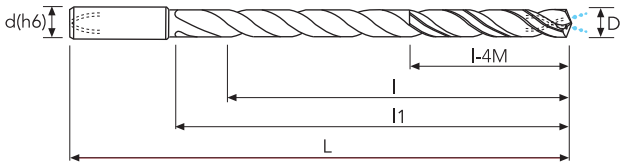
4-margin lands, polished flutes

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	3525HL0310N	○
3.20	0/-0.012	4	81	86	120	16	25 x D	3525HL0320N	○
3.30	0/-0.012	4	84	88	125	16.5	25 x D	3525HL0330N	○
3.40	0/-0.012	4	86	91	125	17	25 x D	3525HL0340N	○
3.50	0/-0.012	4	89	94	130	17.5	25 x D	3525HL0350N	●
3.60	0/-0.012	4	91	96	130	18	25 x D	3525HL0360N	○
3.70	0/-0.012	4	94	99	135	18.5	25 x D	3525HL0370N	○
3.80	0/-0.012	4	96	102	135	19	25 x D	3525HL0380N	○
3.90	0/-0.012	4	99	104	140	19.5	25 x D	3525HL0390N	○
4.00	0/-0.012	4	101	107	140	20	25 x D	3525HL0400N	●
4.10	0/-0.012	5	104	110	145	20.5	25 x D	3525HL0410N	○
4.20	0/-0.012	5	106	112	150	21	25 x D	3525HL0420N	○
4.30	0/-0.012	5	109	115	150	21.5	25 x D	3525HL0430N	○
4.40	0/-0.012	5	111	118	155	22	25 x D	3525HL0440N	○
4.50	0/-0.012	5	114	120	155	22.5	25 x D	3525HL0450N	●
4.60	0/-0.012	5	116	123	160	23	25 x D	3525HL0460N	○
4.70	0/-0.012	5	119	126	165	23.5	25 x D	3525HL0470N	○
4.80	0/-0.012	5	121	128	165	24	25 x D	3525HL0480N	○
4.90	0/-0.012	5	124	131	170	24.5	25 x D	3525HL0490N	○
5.00	0/-0.012	5	126	134	170	25	25 x D	3525HL0500N	●
5.10	0/-0.012	6	129	136	175	25.5	25 x D	3525HL0510N	○
5.20	0/-0.012	6	131	139	180	26	25 x D	3525HL0520N	○
5.30	0/-0.012	6	134	141	180	26.5	25 x D	3525HL0530N	○
5.40	0/-0.012	6	136	144	185	27	25 x D	3525HL0540N	○
5.50	0/-0.012	6	139	147	185	27.5	25 x D	3525HL0550N	●
5.60	0/-0.012	6	141	149	190	28	25 x D	3525HL0560N	○
5.70	0/-0.012	6	144	152	190	28.5	25 x D	3525HL0570N	○
5.80	0/-0.012	6	146	155	195	29	25 x D	3525HL0580N	○
5.90	0/-0.012	6	149	157	195	29.5	25 x D	3525HL0590N	○
6.00	0/-0.012	6	151	160	200	30	25 x D	3525HL0600N	●
6.10	0/-0.015	8	154	163	200	30.5	25 x D	3525HL0610N	○
6.20	0/-0.015	8	156	165	205	31	25 x D	3525HL0620N	○
6.30	0/-0.015	8	159	168	205	31.5	25 x D	3525HL0630N	○
6.40	0/-0.015	8	161	171	210	32	25 x D	3525HL0640N	○
6.50	0/-0.015	8	164	173	210	32.5	25 x D	3525HL0650N	●
6.60	0/-0.015	8	166	176	215	33	25 x D	3525HL0660N	○
6.70	0/-0.015	8	169	179	220	33.5	25 x D	3525HL0670N	○
6.80	0/-0.015	8	171	181	220	34	25 x D	3525HL0680N	○
6.90	0/-0.015	8	174	184	225	34.5	25 x D	3525HL0690N	○

* Ø1÷Ø3 = 3525 SUH MINI page 148

● stock standard ○ non-standard stock ▽ stock exhaustion

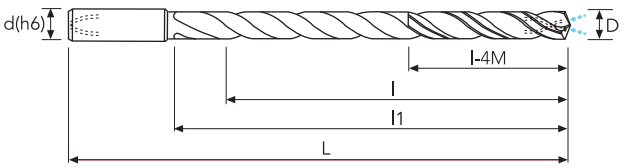
3525HL

4-margin lands, polished flutes



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	3525HL0700N	●
7.10	0/-0.015	8	179	189	230	35.5	25 x D	3525HL0710N	○
7.20	0/-0.015	8	181	192	235	36	25 x D	3525HL0720N	○
7.30	0/-0.015	8	184	194	235	36.5	25 x D	3525HL0730N	○
7.40	0/-0.015	8	186	197	240	37	25 x D	3525HL0740N	○
7.50	0/-0.015	8	189	200	240	37.5	25 x D	3525HL0750N	●
7.60	0/-0.015	8	191	202	245	38	25 x D	3525HL0760N	○
7.70	0/-0.015	8	194	205	245	38.5	25 x D	3525HL0770N	○
7.80	0/-0.015	8	196	208	250	39	25 x D	3525HL0780N	○
7.90	0/-0.015	8	199	210	250	39.5	25 x D	3525HL0790N	○
8.00	0/-0.015	8	201	213	255	40	25 x D	3525HL0800N	●
8.10	0/-0.015	10	204	216	260	40.5	25 x D	3525HL0810N	○
8.20	0/-0.015	10	206	218	260	41	25 x D	3525HL0820N	○
8.30	0/-0.015	10	209	221	265	41.5	25 x D	3525HL0830N	○
8.40	0/-0.015	10	211	224	265	42	25 x D	3525HL0840N	○
8.50	0/-0.015	10	214	226	270	42.5	25 x D	3525HL0850N	○
8.60	0/-0.015	10	216	229	270	43	25 x D	3525HL0860N	●
8.70	0/-0.015	10	219	232	275	43.5	25 x D	3525HL0870N	○
8.80	0/-0.015	10	221	234	275	44	25 x D	3525HL0880N	○
8.90	0/-0.015	10	224	237	280	44.5	25 x D	3525HL0890N	○
9.00	0/-0.015	10	226	240	285	45	25 x D	3525HL0900N	●
9.10	0/-0.015	10	229	242	285	45.5	25 x D	3525HL0910N	○
9.20	0/-0.015	10	231	245	290	46	25 x D	3525HL0920N	○
9.30	0/-0.015	10	234	247	290	46.5	25 x D	3525HL0930N	○
9.40	0/-0.015	10	236	250	295	47	25 x D	3525HL0940N	○
9.50	0/-0.015	10	239	253	295	47.5	25 x D	3525HL0950N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3525HL



Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
Vc (m/min)	**60÷80**	**45÷65**	**40÷55**	**35÷50**	**35÷45**	**25÷35**
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
3.0	0.040	0.041	0.042	0.041	0.035	0.037
3.5	0.049	0.050	0.051	0.050	0.044	0.045
4.0	0.059	0.060	0.061	0.060	0.053	0.054
4.5	0.070	0.071	0.072	0.071	0.063	0.062
5.0	0.082	0.082	0.086	0.084	0.072	0.070
5.5	0.094	0.094	0.098	0.097	0.081	0.081
6.0	0.107	0.106	0.109	0.107	0.096	0.095
6.5	0.120	0.118	0.124	0.122	0.104	0.103
7.0	0.135	0.132	0.141	0.139	0.119	0.119
7.5	0.153	0.148	0.152	0.150	0.130	0.130
8.0	0.169	0.167	0.173	0.170	0.150	0.143
8.5	0.177	0.167	0.174	0.171	0.153	0.139
9.0	0.179	0.168	0.175	0.172	0.156	0.146
9.5	0.187	0.167	0.176	0.174	0.147	0.150



Material Group ISO 513	M1	M2	M3			
Hardness/Rm						
Vc (m/min)	**35÷45**	**35÷45**	**25÷35**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3.0	0.035	0.035	0.036			
3.5	0.044	0.043	0.044			
4.0	0.053	0.051	0.052			
4.5	0.063	0.061	0.061			
5.0	0.072	0.071	0.069			
5.5	0.081	0.083	0.083			
6.0	0.096	0.095	0.092			
6.5	0.104	0.103	0.105			
7.0	0.119	0.118	0.114			
7.5	0.130	0.128	0.124			
8.0	0.150	0.141	0.136			
8.5	0.153	0.144	0.141			
9.0	0.156	0.147	0.146			
9.5	0.147	0.147	0.149			

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

*en phase de sortie, pour éviter le grippage dû à une surchauffe, il est nécessaire d'utiliser l'arrosage externe pour maintenir l'outil et la pièce refroidis et lubrifiés.

*en la fase de salida, para evitar el bloqueo debido al sobrecalentamiento, es necesario usar la aducción externa del refrigerante para mantener enfriadas y lubricadas la herramienta y la pieza.

*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

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**	**35÷55**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3.0	0.044	0.046	0.044	0.044		
3.5	0.053	0.056	0.054	0.053		
4.0	0.063	0.067	0.065	0.064		
4.5	0.074	0.079	0.076	0.075		
5.0	0.088	0.091	0.091	0.089		
5.5	0.099	0.105	0.103	0.102		
6.0	0.113	0.119	0.115	0.113		
6.5	0.127	0.133	0.130	0.128		
7.0	0.140	0.148	0.148	0.146		
7.5	0.158	0.165	0.159	0.157		
8.0	0.173	0.183	0.180	0.178		
8.5	0.172	0.184	0.182	0.179		
9.0	0.178	0.184	0.183	0.181		
9.5	0.177	0.185	0.185	0.182		

Ø RUN OUT <0.02mm

Material Group ISO 513	N1	N2	N3 N4			
Hardness/Rm						
Vc (m/min)	**105÷125**	**85÷105**	**75÷95**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3.0	0.057	0.055	0.054			
3.5	0.070	0.068	0.066			
4.0	0.083	0.081	0.079			
4.5	0.097	0.095	0.093			
5.0	0.113	0.110	0.108			
5.5	0.129	0.126	0.125			
6.0	0.146	0.143	0.139			
6.5	0.164	0.160	0.157			
7.0	0.184	0.179	0.175			
7.5	0.201	0.198	0.194			
8.0	0.224	0.219	0.216			
8.5	0.229	0.221	0.218			
9.0	0.229	0.224	0.221			
9.5	0.235	0.225	0.225			

Ø RUN OUT <0.02mm

CUTTING PARAMETERS

3525HL

	Material Group ISO 513	S1 S2	S3	S4	S5		
	Hardness/Rm	<35 HRC	35÷45 HRC				
	Vc (m/min)	**24÷28**	**20÷25**	**28÷32**	**25÷30**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**3.0**	0.033	0.026	0.047	0.041		
	3.5	0.040	0.033	0.055	0.048		
	4.0	0.048	0.040	0.065	0.058		
	4.5	0.057	0.044	0.077	0.066		
	5.0	0.064	0.050	0.088	0.075		
	5.5	0.072	0.057	0.104	0.089		
	6.0	0.087	0.064	0.124	0.106		
	6.5	0.095	0.069	0.136	0.117		
	7.0	0.104	0.075	0.150	0.129		
	7.5	0.117	0.086	0.164	0.142		
	8.0	0.121	0.100	0.181	0.158		
	8.5	0.127	0.095	0.192	0.154		
	9.0	0.135	0.100	0.188	0.164		
	9.5	0.130	0.100	0.191	0.155		

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

*en phase de sortie, pour éviter le grippage dû à une surchauffe, il est nécessaire d'utiliser l'arrosage externe pour maintenir l'outil et la pièce refroidis et lubrifiés.

*en la fase de salida, para evitar el bloqueo debido al sobrecalentamiento, es necesario usar la aducción externa del refrigerante para mantener enfriadas y lubricadas la herramienta y la pieza.

*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

3530HL

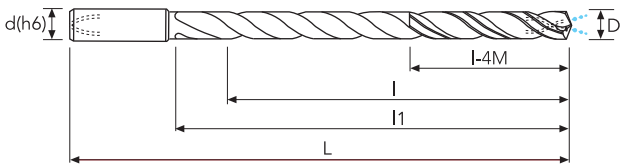
4-margin lands, polished flutes

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	3530HL0310N	○
3.20	0/-0.012	4	97	102	135	16	30 x D	3530HL0320N	○
3.30	0/-0.012	4	100	105	140	16.5	30 x D	3530HL0330N	○
3.40	0/-0.012	4	103	108	145	17	30 x D	3530HL0340N	○
3.50	0/-0.012	4	106	111	145	17.5	30 x D	3530HL0350N	●
3.60	0/-0.012	4	109	114	150	18	30 x D	3530HL0360N	○
3.70	0/-0.012	4	112	118	155	18.5	30 x D	3530HL0370N	○
3.80	0/-0.012	4	115	121	155	19	30 x D	3530HL0380N	○
3.90	0/-0.012	4	118	124	160	19.5	30 x D	3530HL0390N	○
4.00	0/-0.012	4	121	127	160	20	30 x D	3530HL0400N	●
4.10	0/-0.012	5	124	130	165	20.5	30 x D	3530HL0410N	○
4.20	0/-0.012	5	127	133	170	21	30 x D	3530HL0420N	○
4.30	0/-0.012	5	130	136	175	21.5	30 x D	3530HL0430N	○
4.40	0/-0.012	5	133	140	175	22	30 x D	3530HL0440N	○
4.50	0/-0.012	5	136	143	180	22.5	30 x D	3530HL0450N	●
4.60	0/-0.012	5	139	146	185	23	30 x D	3530HL0460N	○
4.70	0/-0.012	5	142	149	185	23.5	30 x D	3530HL0470N	○
4.80	0/-0.012	5	145	152	190	24	30 x D	3530HL0480N	○
4.90	0/-0.012	5	148	155	190	24.5	30 x D	3530HL0490N	○
5.00	0/-0.012	5	151	159	195	25	30 x D	3530HL0500N	●
5.10	0/-0.012	6	154	162	200	25.5	30 x D	3530HL0510N	○
5.20	0/-0.012	6	157	165	205	26	30 x D	3530HL0520N	○
5.30	0/-0.012	6	160	168	205	26.5	30 x D	3530HL0530N	○
5.40	0/-0.012	6	163	171	210	27	30 x D	3530HL0540N	○
5.50	0/-0.012	6	166	174	215	27.5	30 x D	3530HL0550N	●
5.60	0/-0.012	6	169	177	215	28	30 x D	3530HL0560N	○
5.70	0/-0.012	6	172	181	220	28.5	30 x D	3530HL0570N	○
5.80	0/-0.012	6	175	184	225	29	30 x D	3530HL0580N	○
5.90	0/-0.012	6	178	187	225	29.5	30 x D	3530HL0590N	○
6.00	0/-0.012	6	181	190	230	30	30 x D	3530HL0600N	●
6.10	0/-0.015	8	184	193	230	30.5	30 x D	3530HL0610N	○
6.20	0/-0.015	8	187	196	135	31	30 x D	3530HL0620N	○
6.30	0/-0.015	8	190	199	240	31.5	30 x D	3530HL0630N	○
6.40	0/-0.015	8	193	203	240	32	30 x D	3530HL0640N	○
6.50	0/-0.015	8	196	206	245	32.5	30 x D	3530HL0650N	●
6.60	0/-0.015	8	199	209	250	33	30 x D	3530HL0660N	○
6.70	0/-0.015	8	202	212	250	33.5	30 x D	3530HL0670N	○
6.80	0/-0.015	8	205	215	255	34	30 x D	3530HL0680N	○
6.90	0/-0.015	8	208	218	255	34.5	30 x D	3530HL0690N	○

* Ø1÷Ø3 = 3530 SUH MINI page 152

● stock standard ○ non-standard stock ▽ stock exhaustion

3530HL

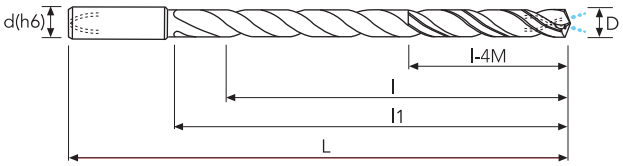
4-margin lands, polished flutes

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	3530HL0700N	●
7.10	0/-0.015	8	214	225	265	35.5	30 x D	3530HL0710N	○
7.20	0/-0.015	8	217	228	270	36	30 x D	3530HL0720N	○
7.30	0/-0.015	8	220	231	270	36.5	30 x D	3530HL0730N	○
7.40	0/-0.015	8	223	234	275	37	30 x D	3530HL0740N	○
7.50	0/-0.015	8	226	237	280	37.5	30 x D	3530HL0750N	●
7.60	0/-0.015	8	229	240	280	38	30 x D	3530HL0760N	○
7.70	0/-0.015	8	232	244	285	38.5	30 x D	3530HL0770N	○
7.80	0/-0.015	8	235	247	290	39	30 x D	3530HL0780N	○
7.90	0/-0.015	8	238	250	290	39.5	30 x D	3530HL0790N	○
8.00	0/-0.015	8	241	253	295	40	30 x D	3530HL0800N	●

● stock standard ○ non-standard stock ▽ stock exhaustion

3530HL

	Material Group ISO 513	P1 P2	P3 P4	P5	P6	P7	P8
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	900÷1200 N/mm²	1200÷1400 N/mm²		
	Vc (m/min)	**60÷80**	**45÷65**	**40÷55**	**35÷50**	**35÷45**	**25÷35**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	3.0	0.040	0.041	0.042	0.041	0.035	0.037
	3.5	0.049	0.050	0.051	0.050	0.044	0.045
	4.0	0.059	0.060	0.061	0.060	0.053	0.054
	4.5	0.070	0.071	0.072	0.071	0.063	0.062
	5.0	0.082	0.082	0.086	0.084	0.072	0.070
	5.5	0.094	0.094	0.098	0.097	0.081	0.081
	6.0	0.107	0.106	0.109	0.107	0.096	0.095
	6.5	0.120	0.118	0.124	0.122	0.104	0.103
	7.0	0.135	0.132	0.141	0.139	0.119	0.119
	7.5	0.153	0.148	0.152	0.150	0.130	0.130
	8.0	0.169	0.167	0.173	0.170	0.150	0.143

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm						
	Vc (m/min)	**35÷45**	**35÷45**	**25÷35**			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3.0	0.035	0.035	0.036			
	3.5	0.044	0.043	0.044			
	4.0	0.053	0.051	0.052			
	4.5	0.063	0.061	0.061			
	5.0	0.072	0.071	0.069			
	5.5	0.081	0.083	0.083			
	6.0	0.096	0.095	0.092			
	6.5	0.104	0.103	0.105			
	7.0	0.119	0.118	0.114			
	7.5	0.130	0.128	0.124			
	8.0	0.150	0.141	0.136			

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

*nella fase di uscita, per evitare il grippaggio causa surriscaldamento, è necessario usare l'adduzione esterna del refrigerante per mantenere raffreddati e lubrificati l'utensile ed il pezzo in lavorazione.

*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

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*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.

CUTTING PARAMETERS

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)	**55÷75**	**45÷65**	**35÷55**	**35÷55**		
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
3.0	0.044	0.046	0.044	0.044		
3.5	0.053	0.056	0.054	0.053		
4.0	0.063	0.067	0.065	0.064		
4.5	0.074	0.079	0.076	0.075		
5.0	0.088	0.091	0.091	0.089		
5.5	0.099	0.105	0.103	0.102		
6.0	0.113	0.119	0.115	0.113		
6.5	0.127	0.133	0.130	0.128		
7.0	0.140	0.148	0.148	0.146		
7.5	0.158	0.165	0.159	0.157		
8.0	0.173	0.183	0.180	0.178		



Material Group ISO 513	N1	N2	N3 N4			
Hardness/Rm						
Vc (m/min)	**105÷125**	**85÷105**	**75÷95**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3.0	0.057	0.055	0.054			
3.5	0.070	0.068	0.066			
4.0	0.083	0.081	0.079			
4.5	0.097	0.095	0.093			
5.0	0.113	0.110	0.108			
5.5	0.129	0.126	0.125			
6.0	0.146	0.143	0.139			
6.5	0.164	0.160	0.157			
7.0	0.184	0.179	0.175			
7.5	0.201	0.198	0.194			
8.0	0.224	0.219	0.216			

3530HL

	Material Group ISO 513	S1 S2	S3	S4	S5		
	Hardness/Rm	<35 HRC	35÷45 HRC				
	Vc (m/min)	**24÷28**	**20÷25**	**28÷32**	**25÷30**		
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
Ø RUN OUT <0.02mm	**3.0**	0.033	0.026	0.047	0.041		
	3.5	0.040	0.033	0.055	0.048		
	4.0	0.048	0.040	0.065	0.058		
	4.5	0.057	0.044	0.077	0.066		
	5.0	0.064	0.050	0.088	0.075		
	5.5	0.072	0.057	0.104	0.089		
	6.0	0.087	0.064	0.124	0.106		
	6.5	0.095	0.069	0.136	0.117		
	7.0	0.104	0.075	0.150	0.129		
	7.5	0.117	0.086	0.164	0.142		
	8.0	0.121	0.100	0.181	0.158		

*during the exit phase the use of external coolant supply is recommended to keep the tool and the workpiece cooled and lubricated to avoid failures due to overheating.

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*beim Herausfahren des Bohrers aus der Bohrung, muss beachtet werden, um das Einklemmen wegen Überhitzung zu verhindern, dass von Aussen Kühlmittel zugeführt wird um das Werkzeug und das Teil zu Kühlen und zu Schmieren.

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*на этапе выхода, чтобы избежать заклинивания из-за перегрева, необходимо использовать внешний подвод СОЖ, чтобы инструмент и заготовка охлаждались и смазывались.



TYPHOON HSD

STEP DRILL FOR 90° CHAMFERING

Chamfer drill for universal application ISO P, M, S.

Punta svasatore per applicazione universale ISO P, M, S.

Fasenbohrer für allgemeine Anwendungen auf ISO P, M, S.

Fraise à chanfreiner pour application universelle ISO P, M, S.

Broca de chaflanar universal ISO P, M, S.

Фасочное сверло для универсального применения ISO P, M, S.

TYPHOON HSD

STEP DRILL FOR 90° CHAMFERING





- Combined tool: boring and chamfering at the same time
- Straight edge geometry: stable cutting, produces relative small chips
- Flute design: wide flutes for better chip ejection
- Substrate and coating: specifically selected to perform on wide range of workpiece materials

- Outil combiné: alésage et chanfreinage en même temps
- Géométrie de bord droit: coupe stable, produit des copeaux relativement petits
- Conception de gougures: large gougure pour faciliter l'évacuation des copeaux
- Substrat et revêtement: spécialement sélectionnés pour fonctionner sur une large gamme de matière de pièces

- Utensile combinato: foratura e svasatura in un'unica operazione
- Tagliente diritto: garantisce stabilità e produce trucioli più corti
- Design delle gole: ampie per agevolare l'evacuazione dei trucioli
- Substrato e rivestimento: specifici per performare al meglio su una vasta gamma di materiali

- Herramienta mixta: taladrado y chaflanado al mismo tiempo
- Geometría filo recto: corte estable, produce virutas relativamente pequeñas
- Diseño canales: canales anchos para una mejor expulsión de viruta
- Sustrato y revestimiento: específicamente seleccionados para un óptimo rendimiento en una gran variedad de materiales

- Kombiwerkzeug: Bohren und Fasen in einem Arbeitsgang
- Gerade Schnittgeometrie: stabiles schneiden, erzeugt kleine Späne
- Nutenform: breite Nuten um die Späne besser abzuführen
- Substrat und Beschichtung: so ausgewählt um sehr flexibel auf unterschiedlichen Materialgruppen eingesetzt zu werden

- Комбинированное сверло: сверление и снятие фаски
- Прямая режущая кромка: гарантирует стабильность и получение более короткой стружки
- Конструкция канавки: широкая для облегчения удаления стружки
- Исходный материал и покрытие: специально для работы с широким спектром материалов.

372HSD

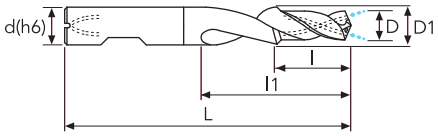
through coolant step drill for 90° chamfering, weldon shank, universal application

3XD | OSAWA NORM | HSD | MG PV300 | 140° | 30°



P	M	K	N	S	H
★	★			★	

★ 1st choice ☆ suitable



D(m7)	Thread Size	D Tol.	D1(h10)	d(h6)	l	l1	L	EDP No.	Stock
2.50	M3 /C	+0.012/+0.002	4.00	4	9	25	62	372HSD0250	●
2.80	M3 /F	+0.012/+0.002	4.00	4	9	25	62	372HSD0280	●
3.30	M4 /C	+0.016/+0.004	5.00	6	11	28	66	372HSD0330	●
3.70	M4 /F	+0.016/+0.004	6.00	6	11	28	66	372HSD0370	●
4.20	M5 /C	+0.016/+0.004	6.00	6	14	28	66	372HSD0420	●
4.65	M5 /F	+0.016/+0.004	6.00	6	14	28	66	372HSD0465	●
5.00	M6 /C	+0.016/+0.004	8.00	8	17	41	79	372HSD0500	●
5.55	M6 /F	+0.016/+0.004	8.00	8	17	41	79	372HSD0555	●
6.80	M8 /C	+0.021/+0.006	10.00	10	21	47	89	372HSD0680	●
7.45	M8 /F	+0.021/+0.006	10.00	10	21	47	89	372HSD0745	●
8.50	M10 /C	+0.021/+0.006	12.00	12	26	55	102	372HSD0850	●
9.35	M10 /F	+0.021/+0.006	12.00	12	26	55	102	372HSD0935	●
10.30	M12 /C	+0.025/+0.007	14.00	14	30	60	107	372HSD1030	●
11.22	M12 /F	+0.025/+0.007	14.00	14	30	60	107	372HSD1122	○

C: Cutting taps, F: Forming taps

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

372HSD



Material Group ISO 513	P1 P2	P3 P4	P7			
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	<700 N/mm²			
Vc (m/min)	**80÷120**	**70÷110**	**40÷80**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3	0.130	0.130	0.075			
4	0.150	0.150	0.090			
5	0.170	0.170	0.100			
6	0.190	0.190	0.110			
7	0.220	0.220	0.120			
8	0.250	0.250	0.130			
9	0.280	0.280	0.140			
10	0.300	0.300	0.150			
11	0.310	0.310	0.155			
12	0.330	0.330	0.160			
13	0.340	0.340	0.165			
14	0.360	0.360	0.175			
15	0.380	0.380	0.180			
16	0.400	0.400	0.185			
17	0.410	0.410	0.195			
18	0.420	0.420	0.200			
19	0.420	0.420	0.200			
20	0.420	0.420	0.210			

372HSD

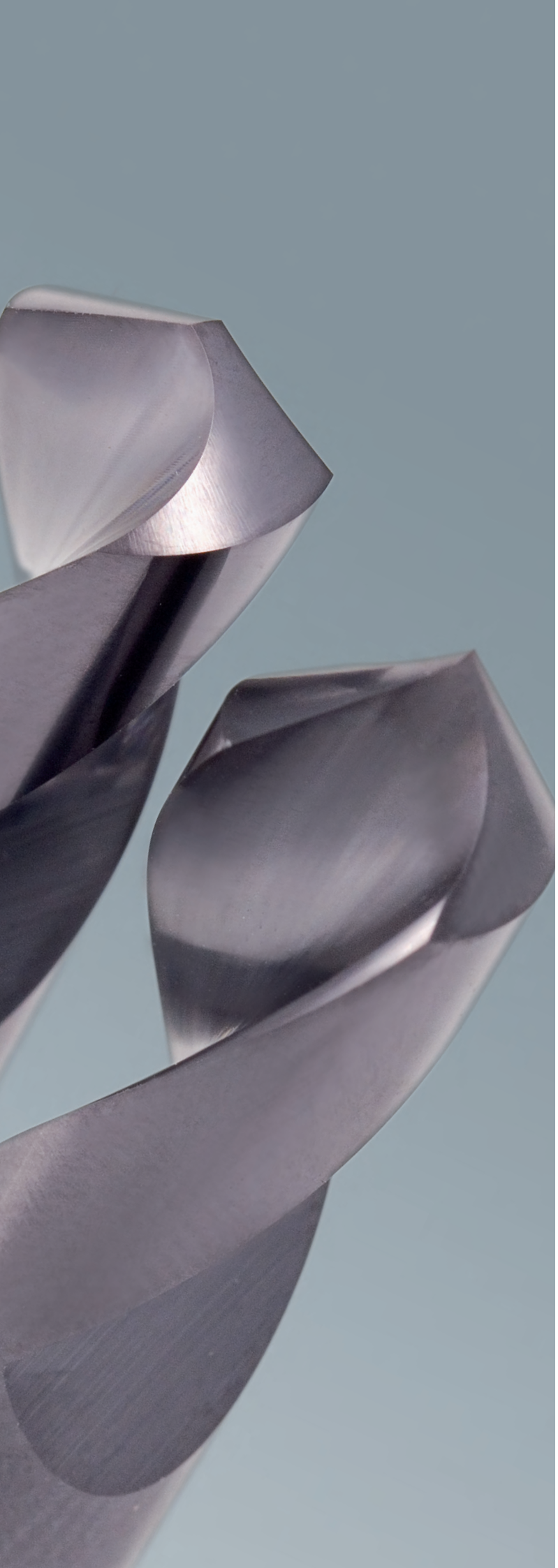


Material Group ISO 513	M1	M2	M3			
Hardness/Rm	<750 N/mm²	550÷850 N/mm²	650÷950 N/mm²			
Vc (m/min)	**40÷80**	**40÷80**	**30÷60**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3	0.075	0.055	0.055			
4	0.090	0.070	0.070			
5	0.100	0.075	0.075			
6	0.110	0.075	0.075			
7	0.120	0.080	0.080			
8	0.130	0.090	0.090			
9	0.140	0.095	0.095			
10	0.150	0.105	0.105			
11	0.155	0.115	0.115			
12	0.160	0.120	0.120			
13	0.165	0.125	0.125			
14	0.175	0.135	0.135			
15	0.180	0.135	0.135			
16	0.185	0.140	0.140			
17	0.195	0.145	0.145			
18	0.200	0.150	0.150			
19	0.200	0.160	0.160			
20	0.210	0.170	0.170			

372HSD



Material Group ISO 513	S1 S2	S3	S5			
Hardness/Rm	<35 HRC	35÷45 HRC				
Vc (m/min)	**30÷50**	**30÷50**	**25÷45**			
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
3	0.030÷0.080	0.030÷0.070	0.030÷0.060			
4	0.040÷0.100	0.040÷0.100	0.040÷0.080			
5	0.050÷0.100	0.050÷0.100	0.040÷0.090			
6	0.050÷0.100	0.050÷0.100	0.050÷0.100			
7	0.050÷0.110	0.050÷0.110	0.050÷0.110			
8	0.060÷0.120	0.060÷0.120	0.060÷0.110			
9	0.060÷0.130	0.060÷0.130	0.060÷0.120			
10	0.070÷0.140	0.070÷0.140	0.070÷0.120			
11	0.080÷0.150	0.080÷0.150	0.080÷0.130			
12	0.080÷0.160	0.080÷0.160	0.080÷0.140			
13	0.080÷0.170	0.080÷0.170	0.080÷0.150			
14	0.090÷0.180	0.090÷0.180	0.090÷0.160			
15	0.090÷0.180	0.090÷0.180	0.090÷0.160			
16	0.100÷0.180	0.100÷0.180	0.100÷0.160			
17	0.100÷0.190	0.100÷0.190	0.100÷0.170			
18	0.100÷0.200	0.100÷0.200	0.100÷0.180			
19	0.110÷0.210	0.110÷0.210	0.110÷0.190			
20	0.120÷0.220	0.120÷0.220	0.120÷0.200			



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.

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

C-SD-TA

solid carbide NC starting drills, 90°-120°

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



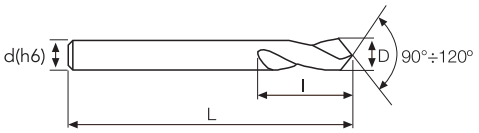
90°



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	P7	P8
	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**	**50÷70**	**20÷30**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	6	0.140	0.126	0.112	0.098	0.091	0.055
	7	0.160	0.144	0.128	0.112	0.104	0.062
	8	0.180	0.162	0.144	0.126	0.117	0.070
	9	0.200	0.180	0.160	0.140	0.130	0.078
	10	0.220	0.198	0.176	0.154	0.143	0.086
	11	0.240	0.216	0.192	0.168	0.156	0.094
	12	0.260	0.234	0.208	0.182	0.169	0.101
	13	0.280	0.252	0.224	0.196	0.182	0.109
	14	0.300	0.270	0.240	0.210	0.195	0.117
	15	0.320	0.288	0.256	0.224	0.208	0.125
	16	0.340	0.306	0.272	0.238	0.221	0.133

	Material Group ISO 513	M1	M2	M3			
	Hardness/Rm						
	Vc (m/min)	**50÷70**	**40÷60**	**30÷40**			
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	6	0.091	0.073	0.064			
	7	0.104	0.083	0.073			
	8	0.117	0.094	0.082			
	9	0.130	0.104	0.091			
	10	0.143	0.114	0.100			
	11	0.156	0.125	0.109			
	12	0.169	0.135	0.118			
	13	0.182	0.146	0.127			
	14	0.195	0.156	0.137			
	15	0.208	0.166	0.146			
	16	0.221	0.177	0.155			

	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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
	6	0.140	0.126	0.112	0.098		
	7	0.160	0.144	0.128	0.112		
	8	0.180	0.162	0.144	0.126		
	9	0.200	0.180	0.160	0.140		
	10	0.220	0.198	0.176	0.154		
	11	0.240	0.216	0.192	0.168		
	12	0.260	0.234	0.208	0.182		
	13	0.280	0.252	0.224	0.196		
	14	0.300	0.270	0.240	0.210		
	15	0.320	0.288	0.256	0.224		
	16	0.340	0.306	0.272	0.238		

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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
	6	0.175	0.158	0.140	0.158		
	7	0.200	0.180	0.160	0.180		
	8	0.225	0.203	0.180	0.203		
	9	0.250	0.225	0.200	0.225		
	10	0.275	0.248	0.220	0.248		
	11	0.300	0.270	0.240	0.270		
	12	0.325	0.293	0.260	0.293		
	13	0.350	0.315	0.280	0.315		
	14	0.375	0.338	0.300	0.338		
	15	0.400	0.360	0.320	0.360		
	16	0.425	0.383	0.340	0.383		

	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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)		
	6	0.063	0.044	0.060	0.050		
	7	0.072	0.050	0.068	0.058		
	8	0.081	0.057	0.077	0.065		
	9	0.090	0.063	0.086	0.072		
	10	0.099	0.069	0.094	0.079		
	11	0.108	0.076	0.103	0.086		
	12	0.117	0.082	0.111	0.094		
	13	0.126	0.088	0.120	0.101		
	14	0.135	0.095	0.128	0.108		
	15	0.144	0.101	0.137	0.115		
	16	0.153	0.107	0.145	0.122		

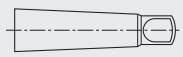
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Legenda Verzeichnis Légende Leyenda Условные обозначения

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	

* The stock category of items in this catalogue may change without prior notice
La categoria di stock dei prodotti a catalogo può variare senza preavviso
Die Einstufung der Produkte kann sich jederzeit ändern
La catégorie de stock des articles dans ce catalogue peut être modifiée sans préavis.
La categoría de Stock de los artículos de este catálogo puede cambiar sin previo aviso
Классификация склада продукции в этом каталоге может быть изменена без предварительного уведомления.

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°

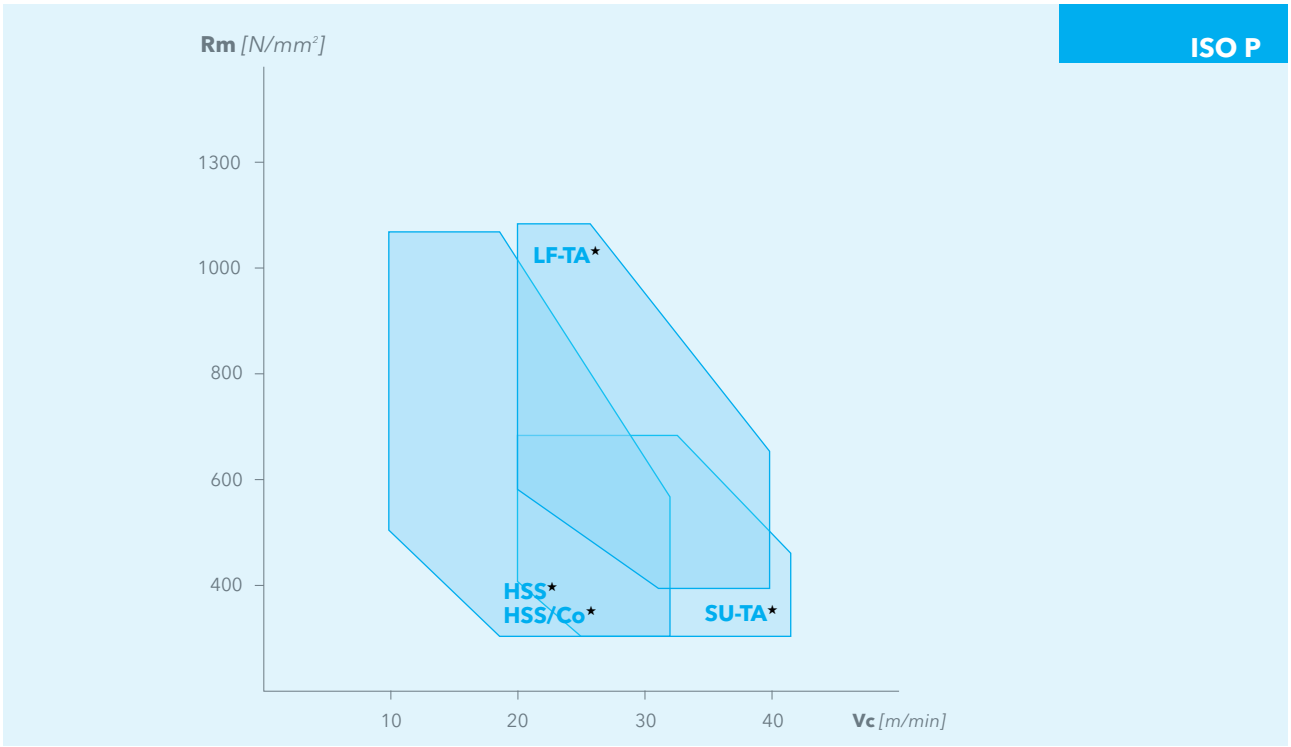
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LFTA high performance	**218LFTA**	212	
	238LFTA	216	
SUTA high performance	**980SUTA**	222	
	990SUTA	226	
HSS-HSS/Co general purpose	**118N**	232	
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RANGE	DRILLING DEPTH	NORM	TYPE	MATERIAL / COATING	HRC	POINT ANGLE	HELIX ANGLE	CHAMFER	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
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°		★		☆	☆		
1.5-10	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	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°		★	☆	★			

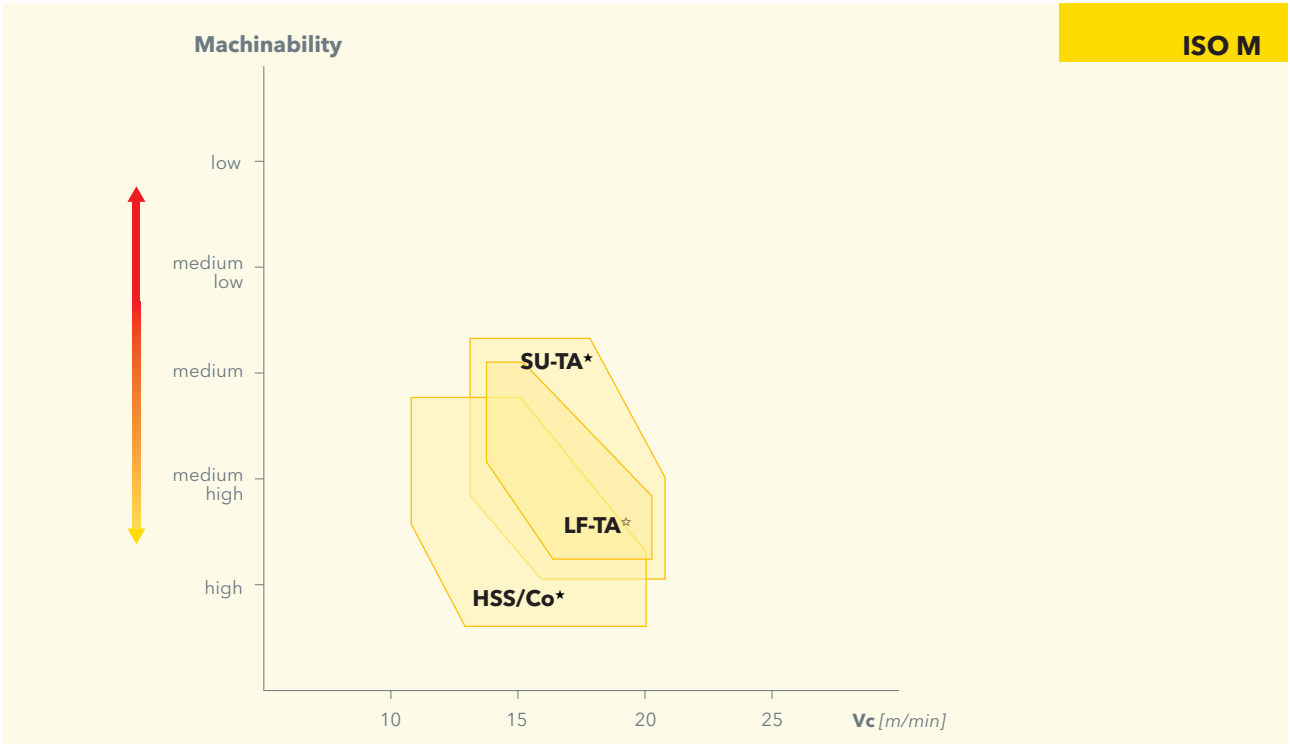
★ 1st choice ☆ suitable

STEEL APPLICATION



★ 1st choice ☆ suitable

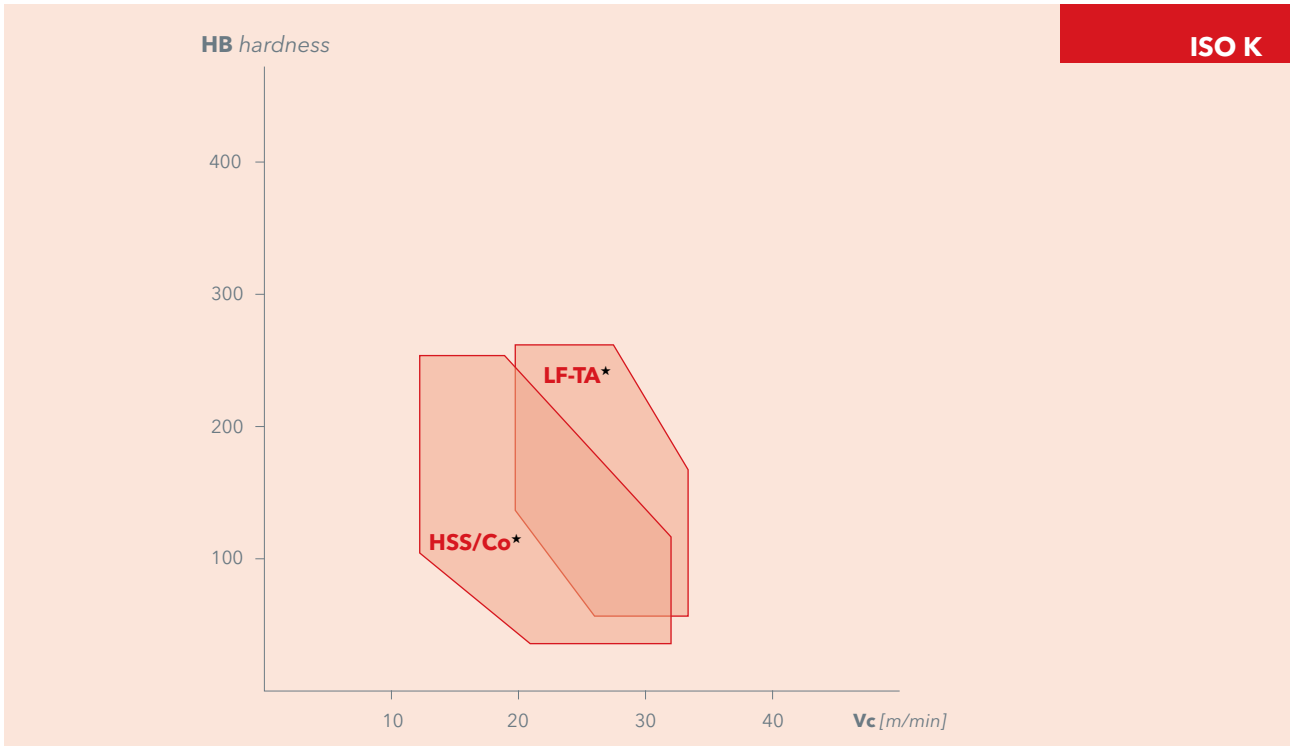
STAINLESS STEEL APPLICATION



★ 1st choice ☆ suitable

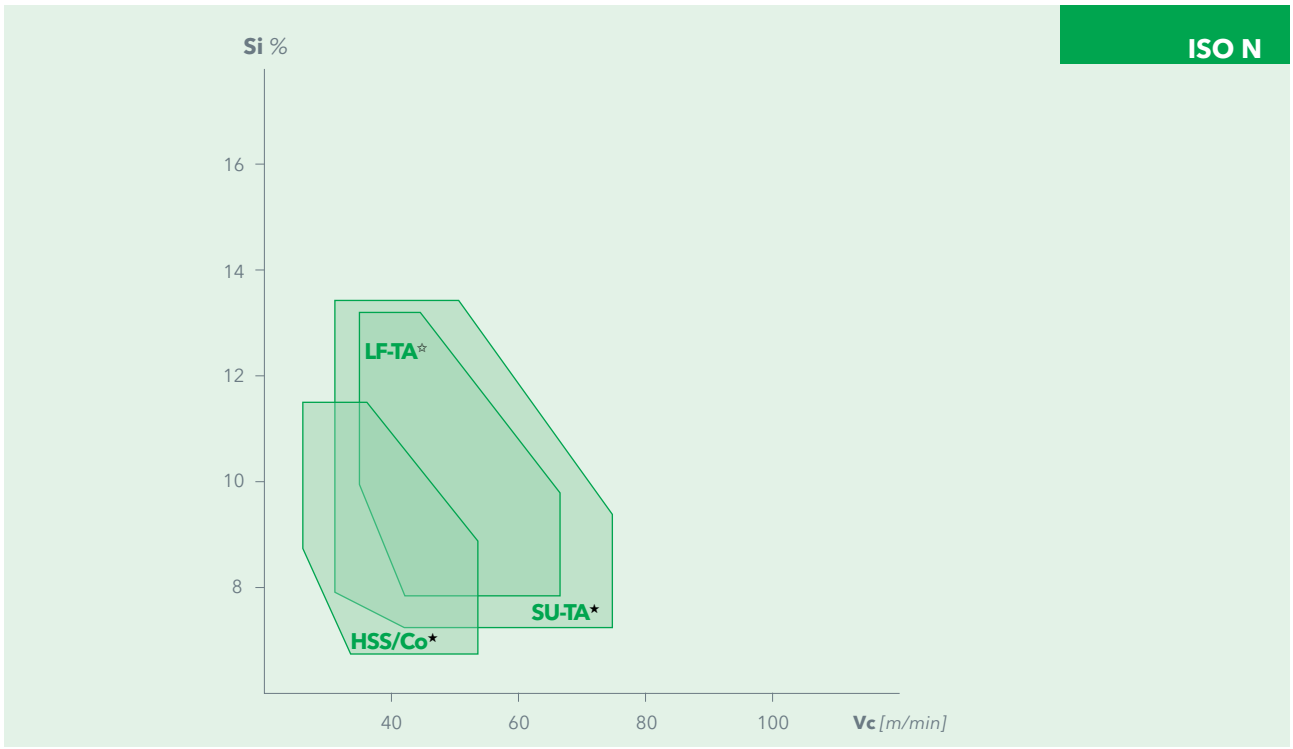
LFTA : high performance (page 211)
SUTA : high performance (page 221)
HSS-HSS/Co : general purpose (page 231)

CAST IRON APPLICATION



★ 1st choice ☆ suitable

NON-FERROUS MATERIALS APPLICATION

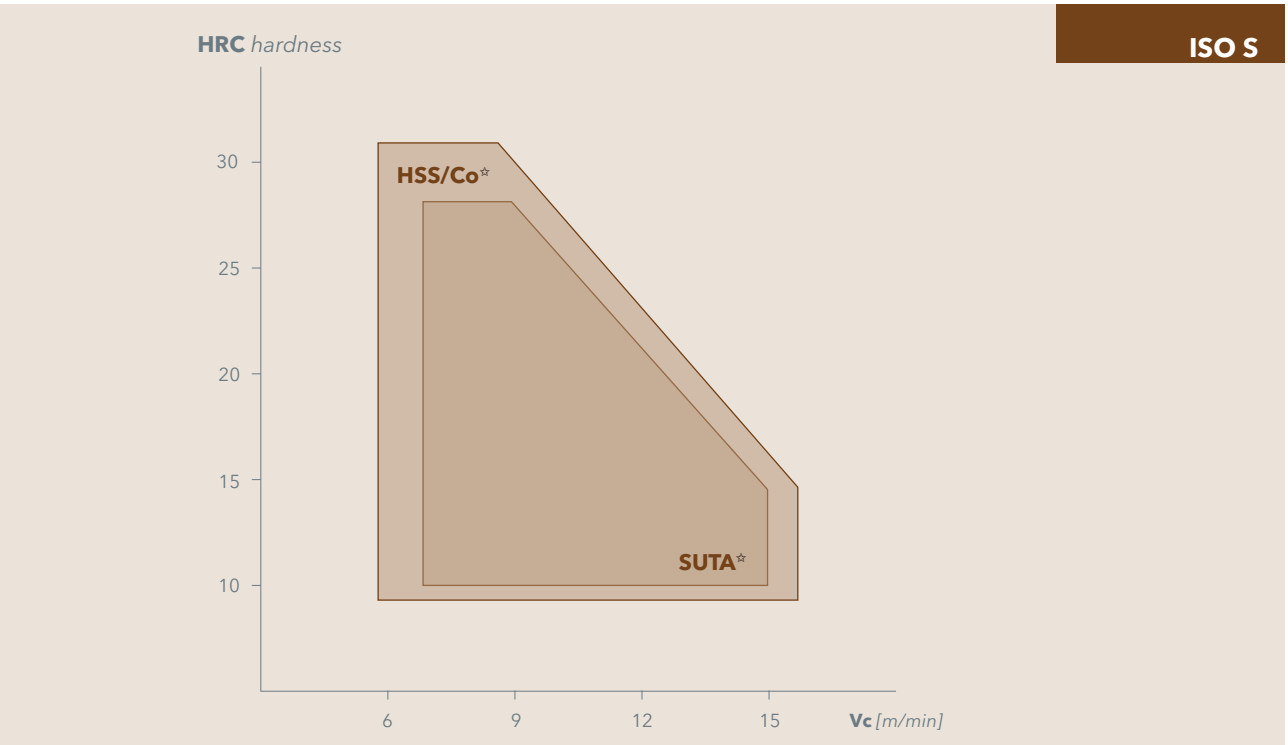


★ 1st choice ☆ suitable

LFTA : high performance (page 211)
SUTA : high performance (page 221)
HSS-HSS/Co : general purpose (page 231)

Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

SUPER ALLOYS APPLICATION



★ 1st choice ☆ suitable

SUTA : high performance (page 221)
HSS-HSS/Co : general purpose (page 231)



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.

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

218LFTA

self-centering, general purpose, extra-short

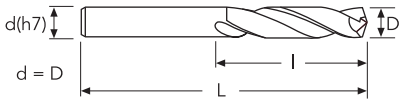
DIN 1897 | LF | HSS/CO PV10 | 130° | 35-40°



218LFTA will be exhausted and gradually replaced by new 218PTA

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

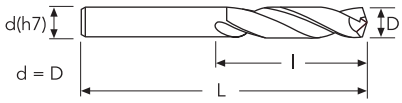
DIN 1897 | LF | HSS/CO PV10 | 130° | 35-40°



218LFTA will be exhausted and gradually replaced by new 218PTA

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

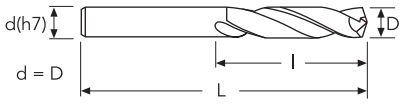
DIN 1897 | LF | HSS/CO PV10 | 130° | 35-40°



218LFTA will be exhausted and gradually replaced by new 218PTA

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	89	5	P218LFTA0980	●
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

218LFTA

	Material Group ISO 513	P1 P2	P3 P4	P7	M1	K1 K2	N1 N2	N3 N4	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB			
	Vc (m/min)	**40÷50**	**30÷40**	**18÷22**	**18÷22**	**30÷40**	**65÷75**	**45÷55**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	2	0.060	0.051	0.042	0.042	0.057	0.066	0.060	
	3	0.084	0.071	0.059	0.059	0.080	0.092	0.084	
	4	0.108	0.092	0.076	0.076	0.103	0.119	0.108	
	5	0.132	0.112	0.092	0.092	0.125	0.145	0.132	
	6	0.156	0.133	0.109	0.109	0.148	0.172	0.156	
	7	0.180	0.153	0.126	0.126	0.171	0.198	0.180	
	8	0.204	0.173	0.143	0.143	0.194	0.224	0.204	
	9	0.228	0.194	0.160	0.160	0.217	0.251	0.228	
	10	0.252	0.214	0.176	0.176	0.239	0.277	0.252	
	11	0.276	0.235	0.179	0.179	0.262	0.304	0.276	
	12	0.300	0.255	0.195	0.195	0.285	0.330	0.300	
	13	0.324	0.275	0.204	0.204	0.308	0.356	0.324	
	14	0.348	0.296	0.219	0.219	0.331	0.383	0.348	
	15	0.372	0.316	0.223	0.223	0.353	0.409	0.372	
	16	0.396	0.337	0.238	0.238	0.376	0.436	0.396	
	17	0.420	0.357	0.252	0.252	0.399	0.462	0.420	
	18	0.444	0.377	0.266	0.266	0.422	0.488	0.444	
	19	0.468	0.398	0.281	0.281	0.445	0.515	0.468	
	20	0.492	0.418	0.295	0.295	0.467	0.541	0.492	

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

238LFTA

self-centering, general purpose, short

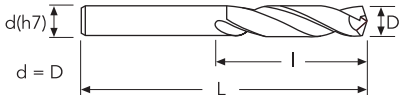
DIN 338 | LF | HSS/CO PV10 | 130° | 35-40°



238LFTA will be exhausted and gradually replaced by new 238PTA

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

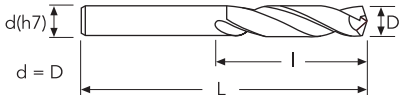
DIN 338 | LF | HSS/CO PV10 | 130° | 35-40°



238LFTA will be exhausted and gradually replaced by new 238PTA

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

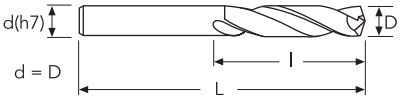
DIN 338 | LF | HSS/CO PV10 | 130° | 35-40°



238LFTA will be exhausted and gradually replaced by new 238PTA

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

238LFTA

	Material Group ISO 513	P1 P2	P3 P4	P7	M1	K1 K2	N1 N2	N3 N4	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB			
	Vc (m/min)	**30÷40**	**20÷30**	**14÷18**	**14÷18**	**25÷35**	**50÷60**	**35÷45**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	2	0.054	0.046	0.038	0.038	0.051	0.059	0.054	
	3	0.076	0.064	0.053	0.053	0.072	0.083	0.076	
	4	0.097	0.083	0.068	0.068	0.092	0.107	0.097	
	5	0.119	0.101	0.083	0.083	0.113	0.131	0.119	
	6	0.140	0.119	0.098	0.098	0.133	0.154	0.140	
	7	0.162	0.138	0.113	0.113	0.154	0.178	0.162	
	8	0.184	0.156	0.129	0.129	0.174	0.202	0.184	
	9	0.205	0.174	0.144	0.144	0.195	0.226	0.205	
	10	0.227	0.193	0.159	0.159	0.215	0.249	0.227	
	11	0.248	0.211	0.161	0.161	0.236	0.273	0.248	
	12	0.270	0.230	0.176	0.176	0.257	0.297	0.270	
	13	0.292	0.248	0.184	0.184	0.277	0.321	0.292	
	14	0.313	0.266	0.197	0.197	0.298	0.345	0.313	
	15	0.335	0.285	0.201	0.201	0.318	0.368	0.335	
	16	0.356	0.303	0.214	0.214	0.339	0.392	0.356	
	17	0.378	0.321	0.227	0.227	0.359	0.416	0.378	
	18	0.400	0.340	0.240	0.240	0.380	0.440	0.400	
	19	0.421	0.358	0.253	0.253	0.400	0.463	0.421	
	20	0.443	0.376	0.266	0.266	0.421	0.487	0.443	



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

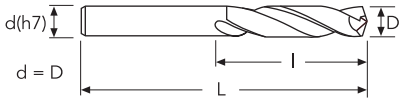
self centering, stainless steel, extra-short

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

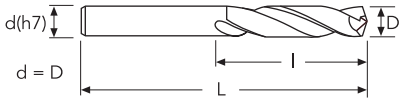
self centering, stainless steel, extra-short

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

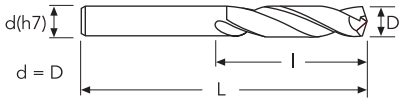
self centering, stainless steel, extra-short

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

980SUTA

	Material Group ISO 513	P1 P2	P7	M1	M2	N1 N2 N4	N3	S1 S2	S4
	Hardness/Rm	500÷700 N/mm²	400÷700 N/mm²					<30 HRC	
	Vc (m/min)	**35÷45**	**18÷22**	**18÷22**	**12÷16**	**60÷80**	**30÷40**	**8÷12**	**12÷16**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	2	0.060	0.060	0.060	0.042	0.066	0.051	0.024	0.042
	3	0.080	0.080	0.080	0.056	0.088	0.068	0.032	0.056
	4	0.100	0.100	0.100	0.070	0.120	0.085	0.040	0.070
	5	0.120	0.120	0.120	0.084	0.144	0.102	0.060	0.084
	6	0.140	0.140	0.140	0.098	0.182	0.119	0.070	0.098
	7	0.160	0.160	0.160	0.112	0.208	0.136	0.096	0.128
	8	0.180	0.180	0.180	0.126	0.252	0.153	0.108	0.144
	9	0.200	0.200	0.200	0.140	0.280	0.170	0.120	0.160
	10	0.230	0.230	0.230	0.161	0.322	0.196	0.138	0.184
	11	0.260	0.260	0.260	0.169	0.364	0.221	0.156	0.208
	12	0.300	0.300	0.300	0.195	0.420	0.255	0.180	0.240
	13	0.340	0.340	0.340	0.221	0.476	0.289	0.204	0.272
	14	0.360	0.360	0.360	0.234	0.504	0.306	0.216	0.288
	15	0.380	0.380	0.380	0.247	0.532	0.323	0.228	0.304
	16	0.400	0.400	0.400	0.260	0.560	0.340	0.240	0.320
	17	0.425	0.425	0.425	0.276	0.595	0.361	0.255	0.340
	18	0.450	0.450	0.450	0.293	0.630	0.383	0.270	0.360
	19	0.460	0.460	0.460	0.299	0.644	0.391	0.276	0.368
	20	0.470	0.470	0.470	0.306	0.658	0.400	0.282	0.376

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

990SUTA

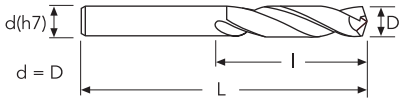
self centering, stainless steel, short

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

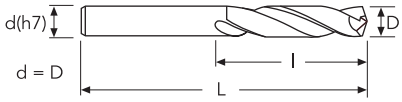
self centering, stainless steel, short

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

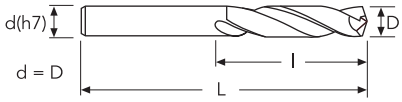
self centering, stainless steel, short

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

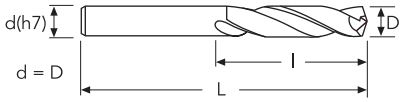
self centering, stainless steel, short

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



P	M	K	N	S	H
★	★		★	☆	

★ 1st choice ☆ suitable



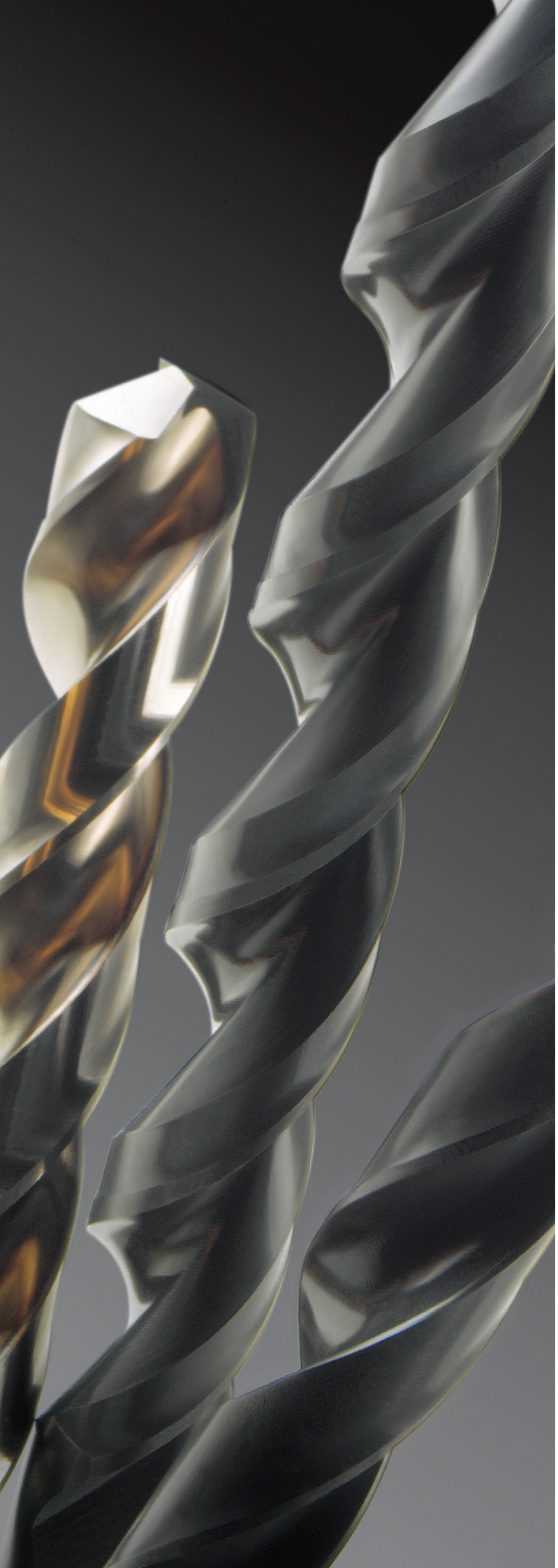
D(h8)	D Tol.	d(h7)	l	L	PACKAGING	EDP No.	Stock
15.60	0/-0.027	15.6	112	172	1	P990SUTA1560	●
16.00	0/-0.027	16	112	172	1	P990SUTA1600	●
16.50	0/-0.027	16.5	115	181	1	P990SUTA1650	●
17.00	0/-0.027	17	115	181	1	P990SUTA1700	●
17.50	0/-0.027	17.5	118	184	1	P990SUTA1750	●
17.6	0/-0.027	17.6	118	184	1	P990SUTA1760	●
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	P7	M1	M2	N1 N2 N4	N3	S1 S2	S4
	Hardness/Rm	500÷700 N/mm²	400÷700 N/mm²					<30 HRC	
	Vc (m/min)	**35÷45**	**18÷22**	**18÷22**	**12÷16**	**60÷80**	**30÷40**	**8÷12**	**12÷16**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	2	0.057	0.057	0.057	0.040	0.063	0.048	0.023	0.040
	3	0.076	0.076	0.076	0.053	0.084	0.065	0.030	0.053
	4	0.095	0.095	0.095	0.067	0.105	0.081	0.038	0.067
	5	0.114	0.114	0.114	0.080	0.125	0.097	0.057	0.080
	6	0.133	0.133	0.133	0.093	0.146	0.113	0.067	0.093
	7	0.152	0.152	0.152	0.106	0.167	0.129	0.091	0.122
	8	0.171	0.171	0.171	0.120	0.188	0.145	0.103	0.137
	9	0.190	0.190	0.190	0.133	0.209	0.162	0.114	0.152
	10	0.219	0.219	0.219	0.153	0.240	0.186	0.131	0.175
	11	0.247	0.247	0.247	0.161	0.272	0.210	0.148	0.198
	12	0.285	0.285	0.285	0.185	0.314	0.242	0.171	0.228
	13	0.323	0.323	0.323	0.203	0.355	0.275	0.194	0.258
	14	0.342	0.342	0.342	0.215	0.376	0.291	0.205	0.274
	15	0.361	0.361	0.361	0.217	0.397	0.307	0.217	0.289
	16	0.380	0.380	0.380	0.228	0.418	0.323	0.228	0.304
	17	0.404	0.404	0.404	0.242	0.444	0.343	0.242	0.323
	18	0.428	0.428	0.428	0.257	0.470	0.363	0.257	0.342
	19	0.437	0.437	0.437	0.262	0.481	0.371	0.262	0.350
	20	0.447	0.447	0.447	0.268	0.491	0.380	0.268	0.357



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.

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

118N

N type for general purpose, extra-short

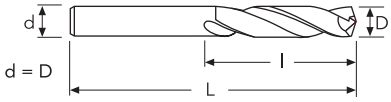
DIN 1897 | N | HSS OX * | 118° | 25-30°

* < 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

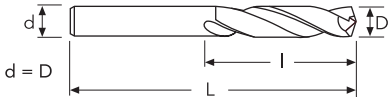
N type for general purpose, extra-short

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

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CARBIDE END-MILLS
G2
HF VH/UP
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UH/MH

HSS END-MILLS

CARBIDE BURRS

118N

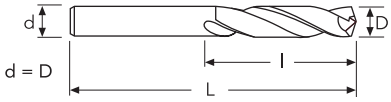
N type for general purpose, extra-short

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

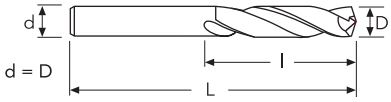
N type for general purpose, extra-short

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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	1	0.017	0.014	0.019	0.024	0.017	
	1.5	0.035	0.030	0.039	0.049	0.035	
	2	0.050	0.043	0.055	0.070	0.050	
	2.5	0.070	0.060	0.077	0.098	0.070	
	3	0.080	0.068	0.088	0.112	0.080	
	3.5	0.090	0.077	0.099	0.126	0.090	
	4	0.100	0.085	0.110	0.140	0.100	
	5	0.110	0.094	0.121	0.154	0.110	
	6	0.120	0.102	0.132	0.168	0.120	
	7	0.130	0.111	0.143	0.182	0.130	
	8	0.140	0.119	0.154	0.196	0.140	
	9	0.160	0.136	0.176	0.224	0.160	
	10	0.170	0.145	0.187	0.238	0.170	
	11	0.180	0.153	0.198	0.252	0.180	
	12	0.190	0.162	0.209	0.266	0.190	
	13	0.200	0.170	0.220	0.280	0.200	
	14	0.210	0.179	0.231	0.294	0.210	
	15	0.220	0.187	0.242	0.308	0.220	
	16	0.240	0.204	0.264	0.336	0.240	

218NVA

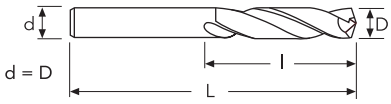
NVA type for tough materials, extra-short

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

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C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

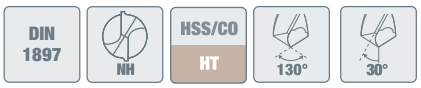
HSS END-MILLS

CARBIDE BURRS

218NVA

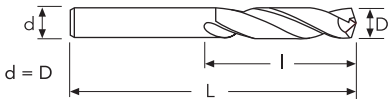
NVA type for tough materials, extra-short





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

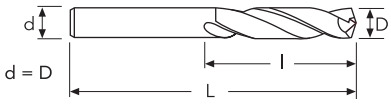
NVA type for tough materials, extra-short

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

218NVA

Material Group ISO 513	P1 P2	P3 P4	P7	M1 M2	M3
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			
Vc (m/min)	**25÷35**	**20÷30**	**12÷18**	**12÷18**	**8÷12**
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
1	0.017	0.014	0.012	0.012	0.009
1.5	0.035	0.030	0.025	0.025	0.018
2	0.050	0.043	0.035	0.035	0.025
2.5	0.070	0.060	0.049	0.049	0.035
3	0.080	0.068	0.056	0.056	0.040
3.5	0.090	0.077	0.063	0.063	0.045
4	0.100	0.085	0.070	0.070	0.050
5	0.110	0.094	0.077	0.077	0.055
6	0.120	0.102	0.084	0.084	0.060
7	0.130	0.111	0.091	0.091	0.065
8	0.140	0.119	0.098	0.098	0.070
9	0.160	0.136	0.112	0.112	0.080
10	0.170	0.145	0.119	0.119	0.085
11	0.180	0.153	0.126	0.126	0.090
12	0.190	0.162	0.133	0.133	0.095
13	0.200	0.170	0.140	0.140	0.100
14	0.210	0.179	0.147	0.147	0.105
15	0.220	0.187	0.154	0.154	0.110
16	0.240	0.204	0.168	0.168	0.120
17	0.260	0.221	0.182	0.182	0.130
18	0.280	0.238	0.196	0.196	0.140
19	0.300	0.255	0.210	0.210	0.150
20	0.320	0.272	0.224	0.224	0.160

Material Group ISO 513	K1	K3	N1 N5	N2 N3 N4	S1 S2 S4
Hardness/Rm	150÷350 HB	<350 HB			<35 HRC
Vc (m/min)	**25÷35**	**20÷30**	**50÷70**	**40÷60**	**8÷12**
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
1	0.019	0.013	0.024	0.017	0.007
1.5	0.039	0.026	0.049	0.035	0.014
2	0.055	0.038	0.070	0.050	0.020
2.5	0.077	0.053	0.098	0.070	0.028
3	0.088	0.060	0.112	0.080	0.032
3.5	0.099	0.068	0.126	0.090	0.036
4	0.110	0.075	0.140	0.100	0.040
5	0.121	0.083	0.154	0.110	0.044
6	0.132	0.090	0.168	0.120	0.048
7	0.143	0.098	0.182	0.130	0.052
8	0.154	0.105	0.196	0.140	0.056
9	0.176	0.120	0.224	0.160	0.064
10	0.187	0.128	0.238	0.170	0.068
11	0.198	0.135	0.252	0.180	0.072
12	0.209	0.143	0.266	0.190	0.076
13	0.220	0.150	0.280	0.200	0.080
14	0.231	0.158	0.294	0.210	0.084
15	0.242	0.165	0.308	0.220	0.088
16	0.264	0.180	0.336	0.240	0.096
17	0.286	0.195	0.364	0.260	0.104
18	0.308	0.210	0.392	0.280	0.112
19	0.330	0.225	0.420	0.300	0.120
20	0.352	0.240	0.448	0.320	0.128

1386STI

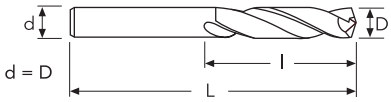
STI type for general purpose, split point, TiN pointed, short

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

1386STI

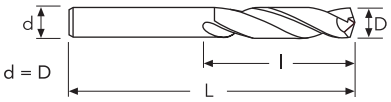
STI type for general purpose, split point, TiN pointed, short

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

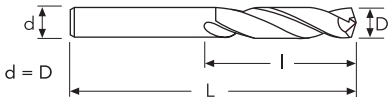
STI type for general purpose, split point, TiN pointed, short

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

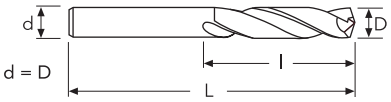
STI type for general purpose, split point, TiN pointed, short

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	P7	M1	K1 K2	N1 N5	N2 N3 N4	S1 S2 S4
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB			<35 HRC
	Vc (m/min)	**30÷40**	**25÷35**	**15÷25**	**15÷25**	**30÷40**	**60÷80**	**50÷70**	**12÷18**
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
	1	0.017	0.014	0.012	0.012	0.019	0.024	0.017	0.007
	1.5	0.035	0.030	0.025	0.025	0.039	0.049	0.035	0.014
	2	0.050	0.043	0.035	0.035	0.055	0.070	0.050	0.020
	2.5	0.075	0.064	0.053	0.053	0.083	0.105	0.075	0.030
	3	0.090	0.077	0.063	0.063	0.099	0.126	0.090	0.036
	3.5	0.105	0.089	0.074	0.074	0.116	0.147	0.105	0.042
	4	0.110	0.094	0.077	0.077	0.121	0.154	0.110	0.044
	5	0.125	0.106	0.088	0.088	0.138	0.175	0.125	0.050
	6	0.160	0.136	0.112	0.112	0.176	0.224	0.160	0.064
	7	0.175	0.149	0.123	0.123	0.193	0.245	0.175	0.070
	8	0.200	0.170	0.140	0.140	0.220	0.280	0.200	0.080
	9	0.210	0.179	0.147	0.147	0.231	0.294	0.210	0.084
	10	0.220	0.187	0.154	0.154	0.242	0.308	0.220	0.088
	11	0.235	0.200	0.165	0.165	0.259	0.329	0.235	0.094
	12	0.250	0.213	0.175	0.175	0.275	0.350	0.250	0.100
	13	0.265	0.225	0.186	0.186	0.292	0.371	0.265	0.106

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

138N

N type for general purpose, short

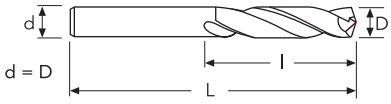
DIN 338 | N | HSS OX * | 118° | 25-30°

* < Ø2 mm = BR



P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
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	●
1.10	0/-0.014	1.1	14	36	10	P138NB0110	●
1.20	0/-0.014	1.2	16	38	10	P138NB0120	●
1.25	0/-0.014	1.25	16	38	10	P138NB0125	●
1.30	0/-0.014	1.3	16	38	10	P138NB0130	●
1.40	0/-0.014	1.4	18	40	10	P138NB0140	●
1.50	0/-0.014	1.5	18	40	10	P138NB0150	●
1.60	0/-0.014	1.6	20	43	10	P138NB0160	●
1.70	0/-0.014	1.7	20	43	10	P138NB0170	●
1.75	0/-0.014	1.75	22	46	10	P138NB0175	●
1.80	0/-0.014	1.8	22	46	10	P138NB0180	●
1.90	0/-0.014	1.9	22	46	10	P138NB0190	●
2.00	0/-0.014	2	24	49	10	P138N0200	●
2.10	0/-0.014	2.1	24	49	10	P138N0210	●
2.20	0/-0.014	2.2	27	53	10	P138N0220	●
2.25	0/-0.014	2.25	27	53	10	P138N0225	●
2.30	0/-0.014	2.3	27	53	10	P138N0230	●
2.40	0/-0.014	2.4	30	57	10	P138N0240	●
2.50	0/-0.014	2.5	30	57	10	P138N0250	●
2.60	0/-0.014	2.6	30	57	10	P138N0260	●
2.70	0/-0.014	2.7	33	61	10	P138N0270	●
2.75	0/-0.014	2.75	33	61	10	P138N0275	●
2.80	0/-0.014	2.8	33	61	10	P138N0280	●
2.90	0/-0.014	2.9	33	61	10	P138N0290	●
3.00	0/-0.014	3	33	61	10	P138N0300	●
3.10	0/-0.018	3.1	36	65	10	P138N0310	●
3.20	0/-0.018	3.2	36	65	10	P138N0320	●
3.25	0/-0.018	3.25	36	65	10	P138N0325	●
3.30	0/-0.018	3.3	36	65	10	P138N0330	●
3.40	0/-0.018	3.4	39	70	10	P138N0340	●
3.50	0/-0.018	3.5	39	70	10	P138N0350	●

● stock standard ○ non-standard stock ▽ stock exhaustion

138N

N type for general purpose, short

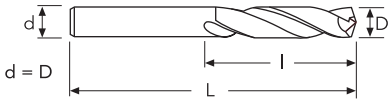
DIN 338 | N | HSS OX * | 118° | 25-30°

* < Ø2 mm = BR



P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



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

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

138N

N type for general purpose, short

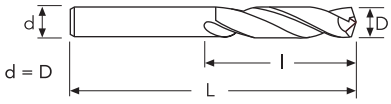
DIN 338 | N | HSS OX * | 118° | 25-30°

* < Ø2 mm = BR



P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
6.80	0/-0.022	6.8	69	109	5	P138N0680	●
6.90	0/-0.022	6.9	69	109	5	P138N0690	●
7.00	0/-0.022	7	69	109	5	P138N0700	●
7.10	0/-0.022	7.1	69	109	5	P138N0710	●
7.20	0/-0.022	7.2	69	109	5	P138N0720	●
7.25	0/-0.022	7.25	69	109	5	P138N0725	●
7.30	0/-0.022	7.3	69	109	5	P138N0730	●
7.40	0/-0.022	7.4	69	109	5	P138N0740	●
7.50	0/-0.022	7.5	69	109	5	P138N0750	●
7.60	0/-0.022	7.6	75	117	5	P138N0760	●
7.70	0/-0.022	7.7	75	117	5	P138N0770	●
7.75	0/-0.022	7.75	75	117	5	P138N0775	●
7.80	0/-0.022	7.8	75	117	5	P138N0780	●
7.90	0/-0.022	7.9	75	117	5	P138N0790	●
8.00	0/-0.022	8	75	117	5	P138N0800	●
8.10	0/-0.022	8.1	75	117	5	P138N0810	●
8.20	0/-0.022	8.2	75	117	5	P138N0820	●
8.25	0/-0.022	8.25	75	117	5	P138N0825	●
8.30	0/-0.022	8.3	75	117	5	P138N0830	●
8.40	0/-0.022	8.4	75	117	5	P138N0840	●
8.50	0/-0.022	8.5	75	117	5	P138N0850	●
8.60	0/-0.022	8.6	81	125	5	P138N0860	●
8.70	0/-0.022	8.7	81	125	5	P138N0870	●
8.75	0/-0.022	8.75	81	125	5	P138N0875	●
8.80	0/-0.022	8.8	81	125	5	P138N0880	●
8.90	0/-0.022	8.9	81	125	5	P138N0890	●
9.00	0/-0.022	9	81	125	5	P138N0900	●
9.10	0/-0.022	9.1	81	125	5	P138N0910	●
9.20	0/-0.022	9.2	81	125	5	P138N0920	●
9.25	0/-0.022	9.25	81	125	5	P138N0925	●
9.30	0/-0.022	9.3	81	125	5	P138N0930	●
9.40	0/-0.022	9.4	81	125	5	P138N0940	●
9.50	0/-0.022	9.5	81	125	5	P138N0950	●
9.60	0/-0.022	9.6	87	133	5	P138N0960	●
9.70	0/-0.022	9.7	87	133	5	P138N0970	●
9.75	0/-0.022	9.75	87	133	5	P138N0975	●
9.80	0/-0.022	9.8	87	133	5	P138N0980	●
9.90	0/-0.022	9.9	87	133	5	P138N0990	●
10.00	0/-0.022	10	87	133	5	P138N1000	●

● stock standard ○ non-standard stock ▽ stock exhaustion

138N

N type for general purpose, short

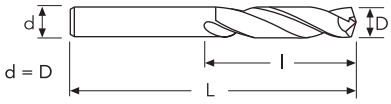


DIN 338 | N | HSS OX * | 118° | 25-30°

* < Ø2 mm = BR

P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
10.10	0/-0.027	10.1	87	133	5	P138N1010	●
10.20	0/-0.027	10.2	87	133	5	P138N1020	●
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	●
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	●
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	●
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	●
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	●
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	●
13.25	0/-0.027	13.25	108	160	1	P138N1325	●
13.50	0/-0.027	13.5	108	160	1	P138N1350	●
13.75	0/-0.027	13.75	108	160	1	P138N1375	●

● stock standard ○ non-standard stock ▽ stock exhaustion

138N

N type for general purpose, short

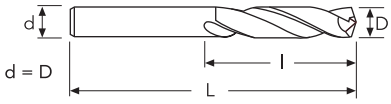
DIN 338 | N | HSS OX * | 118° | 25-30°

* < Ø2 mm = BR



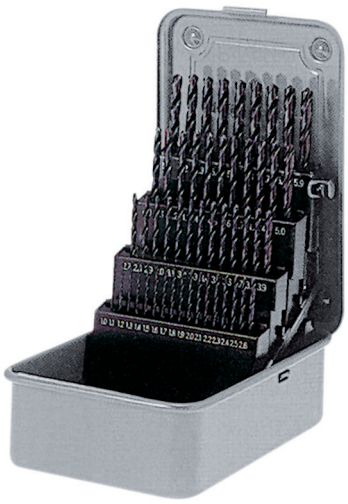
P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable

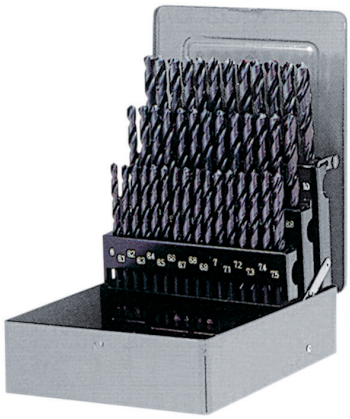


D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock
14.00	0/-0.027	14	108	160	1	P138N1400	●
14.25	0/-0.027	14.25	114	169	1	P138N1425	●
14.50	0/-0.027	14.5	114	169	1	P138N1450	●
14.75	0/-0.027	14.75	114	169	1	P138N1475	●
15.00	0/-0.027	15	114	169	1	P138N1500	●
15.25	0/-0.027	15.25	120	178	1	P138N1525	●
15.50	0/-0.027	15.5	120	178	1	P138N1550	●
15.75	0/-0.027	15.75	120	178	1	P138N1575	●
16.00	0/-0.027	16	120	178	1	P138N1600	●
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	●

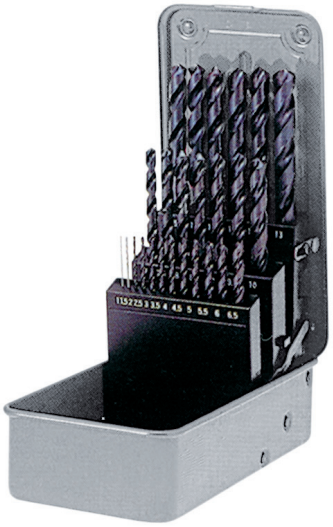
● stock standard ○ non-standard stock ▽ stock exhaustion



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	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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	0.2	0.007	0.006	0.008	0.010	0.007	
	0.5	0.011	0.009	0.012	0.015	0.011	
	0.8	0.013	0.011	0.014	0.018	0.013	
	1	0.017	0.014	0.019	0.024	0.017	
	1.5	0.035	0.030	0.039	0.049	0.035	
	2	0.050	0.043	0.055	0.070	0.050	
	2.5	0.060	0.051	0.066	0.084	0.060	
	3	0.070	0.060	0.077	0.098	0.070	
	3.5	0.080	0.068	0.088	0.112	0.080	
	4	0.090	0.077	0.099	0.126	0.090	
	5	0.100	0.085	0.110	0.140	0.100	
	6	0.110	0.094	0.121	0.154	0.110	
	7	0.120	0.102	0.132	0.168	0.120	
	8	0.130	0.111	0.143	0.182	0.130	
	9	0.140	0.119	0.154	0.196	0.140	
	10	0.160	0.136	0.176	0.224	0.160	
	11	0.170	0.145	0.187	0.238	0.170	
	12	0.180	0.153	0.198	0.252	0.180	
	13	0.190	0.162	0.209	0.266	0.190	
	14	0.200	0.170	0.220	0.280	0.200	
	15	0.210	0.179	0.231	0.294	0.210	
	16	0.220	0.187	0.242	0.308	0.220	
	17	0.230	0.196	0.253	0.322	0.230	
	18	0.240	0.204	0.264	0.336	0.240	
	19	0.250	0.213	0.275	0.350	0.250	
	20	0.260	0.221	0.286	0.364	0.260	

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

138HB

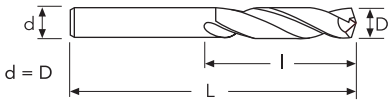
HB type for brass, short

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

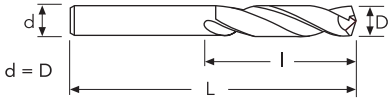
HB type for brass, short

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

138HB

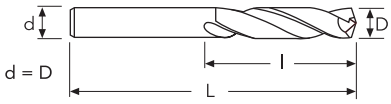
HB type for brass, short

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)	fn (mm/rev)					
	1.5	0.065					
	2	0.080					
	2.5	0.090					
	3	0.100					
	3.5	0.110					
	4	0.120					
	4.5	0.130					
	5	0.140					
	6	0.160					
	7	0.180					
	8	0.200					
	9	0.220					
	10	0.250					

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

138WB

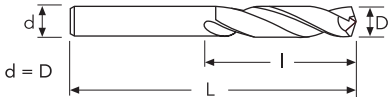
WB type for aluminium, short

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

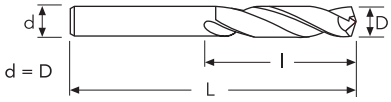
WB type for aluminium, short

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

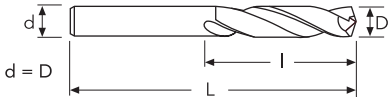
WB type for aluminium, short

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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	1.5	0.070	0.063	0.060			
	2	0.080	0.072	0.068			
	2.5	0.090	0.081	0.077			
	3	0.100	0.090	0.085			
	3.5	0.110	0.099	0.094			
	4	0.120	0.108	0.102			
	4.5	0.130	0.117	0.111			
	5	0.140	0.126	0.119			
	6	0.160	0.144	0.136			
	7	0.180	0.162	0.153			
	8	0.200	0.180	0.170			
	9	0.220	0.198	0.187			
	10	0.250	0.225	0.213			

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

2386STI

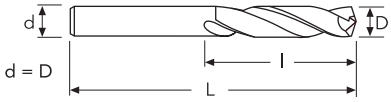
STI type for tough materials, split point, TiN pointed, short

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

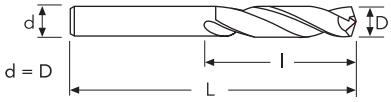
STI type for tough materials, split point, TiN pointed, short

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

2386STI

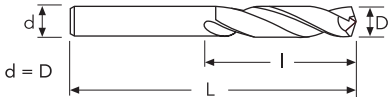
STI type for tough materials, split point, TiN pointed, short

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

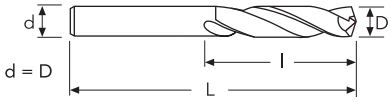
STI type for tough materials, split point, TiN pointed, short

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

2386STI

Material Group ISO 513	P1 P2	P3 P4	P7	M1	M2
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			
Vc (m/min)	**30÷40**	**25÷35**	**15÷25**	**15÷25**	**12÷18**
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
1	0.017	0.014	0.012	0.012	0.009
1.5	0.035	0.030	0.025	0.025	0.018
2	0.050	0.043	0.035	0.035	0.025
2.5	0.075	0.064	0.053	0.053	0.038
3	0.090	0.077	0.063	0.063	0.045
3.5	0.105	0.089	0.074	0.074	0.053
4	0.110	0.094	0.077	0.077	0.055
5	0.125	0.106	0.088	0.088	0.063
6	0.160	0.136	0.112	0.112	0.080
7	0.175	0.149	0.123	0.123	0.088
8	0.200	0.170	0.140	0.140	0.100
9	0.210	0.179	0.147	0.147	0.105
10	0.220	0.187	0.154	0.154	0.110
11	0.235	0.200	0.165	0.165	0.118
12	0.250	0.213	0.175	0.175	0.125
13	0.265	0.225	0.186	0.186	0.133

Material Group ISO 513	K1 K2	K3 K4	N1 N5	N2 N3 N4	S1 S2 S4
Hardness/Rm	150÷350 HB	<350 HB			<35 HRC
Vc (m/min)	**30÷40**	**25÷35**	**60÷80**	**50÷70**	**12÷18**
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
1	0.019	0.013	0.024	0.017	0.007
1.5	0.039	0.026	0.049	0.035	0.014
2	0.055	0.038	0.070	0.050	0.020
2.5	0.083	0.056	0.105	0.075	0.030
3	0.099	0.068	0.126	0.090	0.036
3.5	0.116	0.079	0.147	0.105	0.042
4	0.121	0.083	0.154	0.110	0.044
5	0.138	0.094	0.175	0.125	0.050
6	0.176	0.120	0.224	0.160	0.064
7	0.193	0.131	0.245	0.175	0.070
8	0.220	0.150	0.280	0.200	0.080
9	0.231	0.158	0.294	0.210	0.084
10	0.242	0.165	0.308	0.220	0.088
11	0.259	0.176	0.329	0.235	0.094
12	0.275	0.188	0.350	0.250	0.100
13	0.292	0.199	0.371	0.265	0.106

238NVA

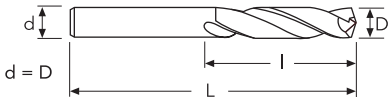
NVA type for tough materials, short

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

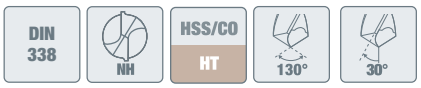
HSS END-MILLS

CARBIDE BURRS

238NVA

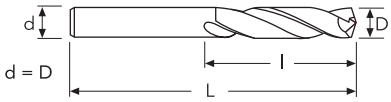
NVA type for tough materials, short





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

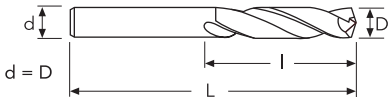
NVA type for tough materials, short

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

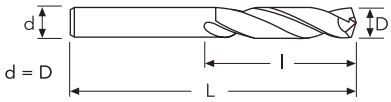
NVA type for tough materials, short

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	P7	M1	M2 M3	
Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²				
Vc (m/min)	**25÷35**	**20÷30**	**12÷18**	**12÷18**	**8÷12**	
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
1	0.017	0.014	0.012	0.012	0.009	
1.5	0.035	0.030	0.025	0.025	0.018	
2	0.050	0.043	0.035	0.035	0.025	
2.5	0.060	0.051	0.042	0.042	0.030	
3	0.070	0.060	0.049	0.049	0.035	
3.5	0.080	0.068	0.056	0.056	0.040	
4	0.090	0.077	0.063	0.063	0.045	
5	0.100	0.085	0.070	0.070	0.050	
6	0.110	0.094	0.077	0.077	0.055	
7	0.120	0.102	0.084	0.084	0.060	
8	0.130	0.111	0.091	0.091	0.065	
9	0.140	0.119	0.098	0.098	0.070	
10	0.160	0.136	0.112	0.112	0.080	
11	0.170	0.145	0.119	0.119	0.085	
12	0.180	0.153	0.126	0.126	0.090	
13	0.190	0.162	0.133	0.133	0.095	
14	0.200	0.170	0.140	0.140	0.100	
15	0.210	0.179	0.147	0.147	0.105	
16	0.220	0.187	0.154	0.154	0.110	
17	0.230	0.196	0.161	0.161	0.115	
18	0.240	0.204	0.168	0.168	0.120	
19	0.250	0.213	0.175	0.175	0.125	
20	0.260	0.221	0.182	0.182	0.130	

Material Group ISO 513	K1 K2	K3 K4	N1 N5	N2 N3 N4	S1 S2 S4	
Hardness/Rm	150÷350 HB	<350 HB			<35 HRC	
Vc (m/min)	**25÷35**	**20÷30**	**50÷70**	**40÷60**	**8÷12**	
D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
1	0.019	0.013	0.024	0.017	0.007	
1.5	0.039	0.026	0.049	0.035	0.014	
2	0.055	0.038	0.070	0.050	0.020	
2.5	0.066	0.045	0.084	0.060	0.024	
3	0.077	0.053	0.098	0.070	0.028	
3.5	0.088	0.060	0.112	0.080	0.032	
4	0.099	0.068	0.126	0.090	0.036	
5	0.110	0.075	0.140	0.100	0.040	
6	0.121	0.083	0.154	0.110	0.044	
7	0.132	0.090	0.168	0.120	0.048	
8	0.143	0.098	0.182	0.130	0.052	
9	0.154	0.105	0.196	0.140	0.056	
10	0.176	0.120	0.224	0.160	0.064	
11	0.187	0.128	0.238	0.170	0.068	
12	0.198	0.135	0.252	0.180	0.072	
13	0.209	0.143	0.266	0.190	0.076	
14	0.220	0.150	0.280	0.200	0.080	
15	0.231	0.158	0.294	0.210	0.084	
16	0.242	0.165	0.308	0.220	0.088	
17	0.253	0.173	0.322	0.230	0.092	
18	0.264	0.180	0.336	0.240	0.096	
19	0.275	0.188	0.350	0.250	0.100	
20	0.286	0.195	0.364	0.260	0.104	

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

234NVA

NVA type for tough materials, long



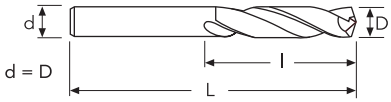
* < Ø2 mm = HSS BR



134NB (Ø 0.5 mm ÷ 1.9 mm) will be exhausted and gradually replaced by new 234NVA

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

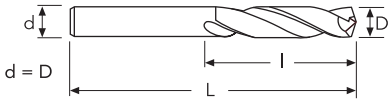
NVA type for tough materials, long

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

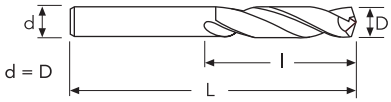
234NVA

NVA type for tough materials, long



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	P7	M1	M2 M3	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²				
	Vc (m/min)	**20÷30**	**15÷25**	**12÷16**	**12÷16**	**8÷12**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	0.5	0.008	0.007	0.006	0.006	0.004	
	0.8	0.015	0.013	0.011	0.011	0.008	
	1	0.020	0.017	0.014	0.014	0.010	
	1.5	0.030	0.026	0.021	0.021	0.015	
	2	0.040	0.034	0.028	0.028	0.020	
	2.5	0.050	0.043	0.035	0.035	0.025	
	3	0.060	0.051	0.042	0.042	0.030	
	3.5	0.070	0.060	0.049	0.049	0.035	
	4	0.080	0.068	0.056	0.056	0.040	
	5	0.090	0.077	0.063	0.063	0.045	
	6	0.100	0.085	0.070	0.070	0.050	
	7	0.110	0.094	0.077	0.077	0.055	
	8	0.120	0.102	0.084	0.084	0.060	
	9	0.130	0.111	0.091	0.091	0.065	
	10	0.140	0.119	0.098	0.098	0.070	
	11	0.150	0.128	0.105	0.105	0.075	
	12	0.160	0.136	0.112	0.112	0.080	

	Material Group ISO 513	K1 K2	K3 K4	N1 N5	N2 N3 N4	S1 S2 S4	
	Hardness/Rm	150÷350 HB	<350 HB			<35 HRC	
	Vc (m/min)	**20÷30**	**20÷30**	**40÷60**	**30÷50**	**8÷12**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	0.5	0.009	0.006	0.011	0.008	0.003	
	0.8	0.017	0.011	0.021	0.015	0.006	
	1	0.022	0.015	0.028	0.020	0.008	
	1.5	0.033	0.023	0.042	0.030	0.012	
	2	0.044	0.030	0.056	0.040	0.016	
	2.5	0.055	0.038	0.070	0.050	0.020	
	3	0.066	0.045	0.084	0.060	0.024	
	3.5	0.077	0.053	0.098	0.070	0.028	
	4	0.088	0.060	0.112	0.080	0.032	
	5	0.099	0.068	0.126	0.090	0.036	
	6	0.110	0.075	0.140	0.100	0.040	
	7	0.121	0.083	0.154	0.110	0.044	
	8	0.132	0.090	0.168	0.120	0.048	
	9	0.143	0.098	0.182	0.130	0.052	
	10	0.154	0.105	0.196	0.140	0.056	
	11	0.165	0.113	0.210	0.150	0.060	
	12	0.176	0.120	0.224	0.160	0.064	

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

234LS-234LSTH

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





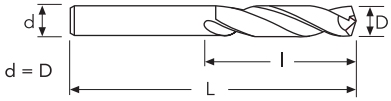
234LS



234LSTH

P	M	K	N	S	H
★	☆	★			

★ 1st choice ☆ suitable

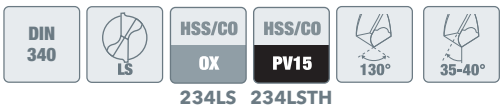


						234LS		234LSTH	
D(h8)	D Tol.	d	l	L	PACKAGING	EDP No.	Stock	EDP No.	Stock
2.00	0/-0.014	2	56	85	10	P234LS0200	●	P234LSTH0200	●
2.10	0/-0.014	2.1	56	85	10	P234LS0210	●	P234LSTH0210	●
2.20	0/-0.014	2.2	59	90	10	P234LS0220	●	P234LSTH0220	●
2.30	0/-0.014	2.3	59	90	10	P234LS0230	●	P234LSTH0230	●
2.40	0/-0.014	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)





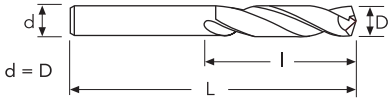
234LS



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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

234LS

	Material Group ISO 513	P1 P2	P3 P4	P7	M1	K1 K2	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB	
	Vc (m/min)	**20÷30**	**15÷25**	**10÷14**	**10÷14**	**20÷30**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	2	0.040	0.034	0.028	0.028	0.044	
	2.5	0.050	0.043	0.035	0.035	0.055	
	3	0.060	0.051	0.042	0.042	0.066	
	3.5	0.070	0.060	0.049	0.049	0.077	
	4	0.080	0.068	0.056	0.056	0.088	
	5	0.090	0.077	0.063	0.063	0.099	
	6	0.100	0.085	0.070	0.070	0.110	
	7	0.110	0.094	0.077	0.077	0.121	
	8	0.120	0.102	0.084	0.084	0.132	
	9	0.130	0.111	0.091	0.091	0.143	
	10	0.140	0.119	0.098	0.098	0.154	
	11	0.150	0.128	0.105	0.105	0.165	
	12	0.160	0.136	0.112	0.112	0.176	
	13	0.170	0.145	0.119	0.119	0.187	

234LSTH

	Material Group ISO 513	P1 P2	P3 P4	P7	M1	K1 K2	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB	
	Vc (m/min)	**25÷35**	**20÷30**	**16÷20**	**16÷20**	**25÷35**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	2	0.040	0.034	0.028	0.028	0.044	
	2.5	0.050	0.043	0.035	0.035	0.055	
	3	0.060	0.051	0.042	0.042	0.066	
	3.5	0.070	0.060	0.049	0.049	0.077	
	4	0.080	0.068	0.056	0.056	0.088	
	5	0.090	0.077	0.063	0.063	0.099	
	6	0.100	0.085	0.070	0.070	0.110	
	7	0.110	0.094	0.077	0.077	0.121	
	8	0.120	0.102	0.084	0.084	0.132	
	9	0.130	0.111	0.091	0.091	0.143	
	10	0.140	0.119	0.098	0.098	0.154	
	11	0.150	0.128	0.105	0.105	0.165	
	12	0.160	0.136	0.112	0.112	0.176	
	13	0.170	0.145	0.119	0.119	0.187	

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



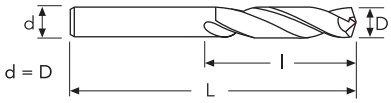
2691LS



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	P7	M1	K1 K2	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB	
	Vc (m/min)	**20÷24**	**16÷20**	**8÷12**	**8÷12**	**20÷24**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	2	0.032	0.027	0.022	0.022	0.035	
	2.5	0.040	0.034	0.028	0.028	0.044	
	3	0.048	0.041	0.034	0.034	0.053	
	3.5	0.056	0.048	0.039	0.039	0.062	
	4	0.064	0.054	0.045	0.045	0.070	
	5	0.072	0.061	0.050	0.050	0.079	
	6	0.080	0.068	0.056	0.056	0.088	
	7	0.088	0.075	0.062	0.062	0.097	
	8	0.096	0.082	0.067	0.067	0.106	
	9	0.104	0.088	0.073	0.073	0.114	
	10	0.112	0.095	0.078	0.078	0.123	
	11	0.120	0.102	0.084	0.084	0.132	
	12	0.128	0.109	0.090	0.090	0.141	
	13	0.136	0.116	0.095	0.095	0.150	

2691LSTH

	Material Group ISO 513	P1 P2	P3 P4	P7	M1	K1 K2	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB	
	Vc (m/min)	**24÷28**	**20÷24**	**10÷14**	**10÷14**	**24÷28**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	2	0.032	0.027	0.022	0.022	0.035	
	2.5	0.040	0.034	0.028	0.028	0.044	
	3	0.048	0.041	0.034	0.034	0.053	
	3.5	0.056	0.048	0.039	0.039	0.062	
	4	0.064	0.054	0.045	0.045	0.070	
	5	0.072	0.061	0.050	0.050	0.079	
	6	0.080	0.068	0.056	0.056	0.088	
	7	0.088	0.075	0.062	0.062	0.097	
	8	0.096	0.082	0.067	0.067	0.106	
	9	0.104	0.088	0.073	0.073	0.114	
	10	0.112	0.095	0.078	0.078	0.123	
	11	0.120	0.102	0.084	0.084	0.132	
	12	0.128	0.109	0.090	0.090	0.141	
	13	0.136	0.116	0.095	0.095	0.150	

1692LS

LS type for deep holes. extra-long/2

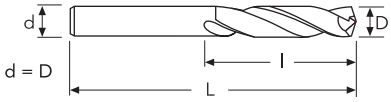
DIN 1869/2 | LS | HSS BR | 130° | 35-40°



1692LS HSS will be exhausted and gradually replaced by new 2692LS HSS/Co

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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3.5	0.045	0.038	0.050			
	4	0.053	0.045	0.058			
	5	0.060	0.051	0.066			
	6	0.068	0.057	0.074			
	7	0.075	0.064	0.083			
	8	0.083	0.070	0.091			
	9	0.090	0.077	0.099			
	10	0.098	0.083	0.107			
	11	0.105	0.089	0.116			
	12	0.113	0.096	0.124			
	13	0.120	0.102	0.132			

1693LS

LS type for deep holes. extra-long/3

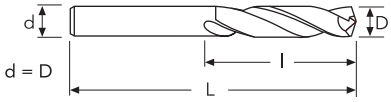
DIN 1869/3 | LS | HSS BR | 130° | 35-40°



1693LS HSS will be exhausted and gradually replaced by new 2693LS HSS/Co

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	●

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

● 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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)			
	3.5	0.045	0.038	0.050			
	4	0.053	0.045	0.058			
	5	0.060	0.051	0.066			
	6	0.068	0.057	0.074			
	7	0.075	0.064	0.083			
	8	0.083	0.070	0.091			
	9	0.090	0.077	0.099			
	10	0.098	0.083	0.107			
	11	0.105	0.089	0.116			
	12	0.113	0.096	0.124			
	13	0.120	0.102	0.132			

145N

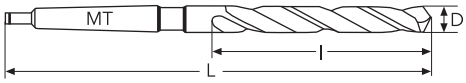
N type for general purpose. MT shank. short

DIN 345 | N | HSS OX | 118° | 25-30°



P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	MT	l	L	PACKAGING	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	●
13.25	0/-0.027	1	108	189	1	P145N1325	●
13.50	0/-0.027	1	108	189	1	P145N1350	●
13.75	0/-0.027	1	108	189	1	P145N1375	●
14.00	0/-0.027	1	108	189	1	P145N1400	●
14.25	0/-0.027	2	114	212	1	P145N1425	●
14.50	0/-0.027	2	114	212	1	P145N1450	●

● stock standard ○ non-standard stock ▽ stock exhaustion

145N

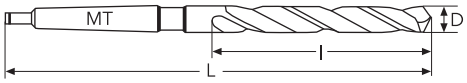
N type for general purpose. MT shank. short

DIN 345 | N | HSS OX | 118° | 25-30°



P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock
14.75	0/-0.027	2	114	212	1	P145N1475	●
15.00	0/-0.027	2	114	212	1	P145N1500	●
15.25	0/-0.027	2	120	218	1	P145N1525	●
15.50	0/-0.027	2	120	218	1	P145N1550	●
15.75	0/-0.027	2	120	218	1	P145N1575	●
16.00	0/-0.027	2	120	218	1	P145N1600	●
16.25	0/-0.027	2	125	223	1	P145N1625	●
16.50	0/-0.027	2	125	223	1	P145N1650	●
16.75	0/-0.027	2	125	223	1	P145N1675	●
17.00	0/-0.027	2	125	223	1	P145N1700	●
17.25	0/-0.027	2	130	228	1	P145N1725	●
17.50	0/-0.027	2	130	228	1	P145N1750	●
17.75	0/-0.027	2	130	228	1	P145N1775	●
18.00	0/-0.027	2	130	228	1	P145N1800	●
18.25	0/-0.033	2	135	233	1	P145N1825	●
18.50	0/-0.033	2	135	233	1	P145N1850	●
18.75	0/-0.033	2	135	233	1	P145N1875	●
19.00	0/-0.033	2	135	233	1	P145N1900	●
19.25	0/-0.033	2	140	238	1	P145N1925	●
19.50	0/-0.033	2	140	238	1	P145N1950	●
19.75	0/-0.033	2	140	238	1	P145N1975	●
20.00	0/-0.033	2	140	238	1	P145N2000	●
20.25	0/-0.033	2	145	243	1	P145N2025	●
20.50	0/-0.033	2	145	243	1	P145N2050	●
20.75	0/-0.033	2	145	243	1	P145N2075	●
21.00	0/-0.033	2	145	243	1	P145N2100	●
21.25	0/-0.033	2	150	248	1	P145N2125	●
21.50	0/-0.033	2	150	248	1	P145N2150	●
21.75	0/-0.033	2	150	248	1	P145N2175	●
22.00	0/-0.033	2	150	248	1	P145N2200	●
22.25	0/-0.033	2	150	248	1	P145N2225	●
22.50	0/-0.033	2	155	253	1	P145N2250	●
22.75	0/-0.033	2	155	253	1	P145N2275	●
23.00	0/-0.033	2	155	253	1	P145N2300	●
23.25	0/-0.033	3	155	276	1	P145N2325	●
23.50	0/-0.033	3	155	276	1	P145N2350	●
23.75	0/-0.033	3	160	281	1	P145N2375	●
24.00	0/-0.033	3	160	281	1	P145N2400	●
24.25	0/-0.033	3	160	281	1	P145N2425	●

● stock standard ○ non-standard stock ▽ stock exhaustion

145N

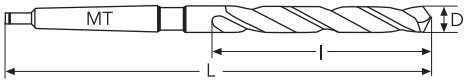
N type for general purpose. MT shank. short

DIN 345 | N | HSS OX | 118° | 25-30°



P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock
24.50	0/-0.033	3	160	281	1	P145N2450	●
24.75	0/-0.033	3	160	281	1	P145N2475	●
25.00	0/-0.033	3	160	281	1	P145N2500	●
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	●
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	●
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	●
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	●
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	●
30.50	0/-0.039	3	180	301	1	P145N3050	●
31.00	0/-0.039	3	180	301	1	P145N3100	●
31.50	0/-0.039	3	180	301	1	P145N3150	●
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	●
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	●

● stock standard ○ non-standard stock ▽ stock exhaustion

145N

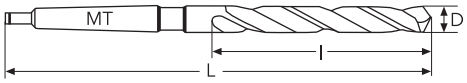
N type for general purpose. MT shank. short

DIN 345 | N | HSS OX | 118° | 25-30°



P	M	K	N	S	H
★		☆	☆		

★ 1st choice ☆ suitable



D(h8)	D Tol.	MT	l	L	PACKAGING	EDP No.	Stock
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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	5	0.100	0.085	0.110	0.140	0.100	
	6	0.120	0.102	0.132	0.168	0.120	
	7	0.140	0.119	0.154	0.196	0.140	
	8	0.160	0.136	0.176	0.224	0.160	
	9	0.180	0.153	0.198	0.252	0.180	
	10	0.200	0.170	0.220	0.280	0.200	
	11	0.208	0.177	0.229	0.291	0.208	
	12	0.216	0.184	0.238	0.302	0.216	
	13	0.224	0.190	0.246	0.314	0.224	
	14	0.232	0.197	0.255	0.325	0.232	
	15	0.240	0.204	0.264	0.336	0.240	
	16	0.250	0.213	0.275	0.350	0.250	
	17	0.265	0.225	0.292	0.371	0.265	
	18	0.280	0.238	0.308	0.392	0.280	
	19	0.295	0.251	0.325	0.413	0.295	
	20	0.315	0.268	0.347	0.441	0.315	
	22	0.330	0.281	0.363	0.462	0.330	
	25	0.350	0.298	0.385	0.490	0.350	
	27	0.370	0.315	0.407	0.518	0.370	
	30	0.400	0.340	0.440	0.560	0.400	
	35	0.450	0.383	0.495	0.630	0.450	
	40	0.500	0.425	0.550	0.700	0.500	
	45	0.560	0.476	0.616	0.784	0.560	
	50	0.630	0.536	0.693	0.882	0.630	
	55	0.700	0.595	0.770	0.980	0.700	
	60	0.800	0.680	0.880	1.120	0.800	

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)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	13	0.224	0.190	0.246	0.314	0.224	
	14	0.232	0.197	0.255	0.325	0.232	
	15	0.240	0.204	0.264	0.336	0.240	
	16	0.250	0.213	0.275	0.350	0.250	
	17	0.265	0.225	0.292	0.371	0.265	
	18	0.280	0.238	0.308	0.392	0.280	
	19	0.295	0.251	0.325	0.413	0.295	
	20	0.315	0.268	0.347	0.441	0.315	
	22	0.330	0.281	0.363	0.462	0.330	
	25	0.350	0.298	0.385	0.490	0.350	
	27	0.370	0.315	0.407	0.518	0.370	
	30	0.400	0.340	0.440	0.560	0.400	

245N

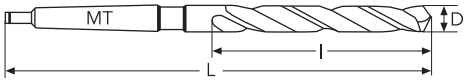
N type for tough materials. MT shank. short

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	P7	M1	M2 M3	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²				
	Vc (m/min)	**25÷35**	**20÷30**	**12÷18**	**12÷18**	**8÷12**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	13	0.224	0.190	0.157	0.157	0.112	
	14	0.232	0.197	0.162	0.162	0.116	
	15	0.240	0.204	0.168	0.168	0.120	
	16	0.250	0.213	0.175	0.175	0.125	
	17	0.265	0.225	0.186	0.186	0.133	
	18	0.280	0.238	0.196	0.196	0.140	
	19	0.295	0.251	0.207	0.207	0.148	
	20	0.315	0.268	0.221	0.221	0.158	
	22	0.330	0.281	0.231	0.231	0.165	
	25	0.350	0.298	0.245	0.245	0.175	
	27	0.370	0.315	0.259	0.259	0.185	
	30	0.400	0.340	0.280	0.280	0.200	

	Material Group ISO 513	K1 K2	K3 K4	N1 N5	N2 N3 N4	S1 S2 S4	
	Hardness/Rm	150÷350 HB	<350 HB			<35 HRC	
	Vc (m/min)	**25÷35**	**20÷30**	**50÷70**	**40÷60**	**8÷12**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	13	0.246	0.168	0.314	0.224	0.090	
	14	0.255	0.174	0.325	0.232	0.093	
	15	0.264	0.180	0.336	0.240	0.096	
	16	0.275	0.188	0.350	0.250	0.100	
	17	0.292	0.199	0.371	0.265	0.106	
	18	0.308	0.210	0.392	0.280	0.112	
	19	0.325	0.221	0.413	0.295	0.118	
	20	0.347	0.236	0.441	0.315	0.126	
	22	0.363	0.248	0.462	0.330	0.132	
	25	0.385	0.263	0.490	0.350	0.140	
	27	0.407	0.278	0.518	0.370	0.148	
	30	0.440	0.300	0.560	0.400	0.160	

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

241LS

LS type for deep holes. MT shank. long

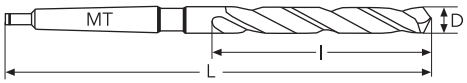
DIN 341 | LS | HSS/CO OX | 130° | 35-40°



241LS HSS/Co will be exhausted and gradually replaced by new 141N HSS

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	▽
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

241LS

	Material Group ISO 513	P1 P2	P3 P4	P7	M1	K1 K2	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB	
	Vc (m/min)	**15÷25**	**10÷20**	**10÷14**	**10÷14**	**20÷30**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	13	0.160	0.136	0.112	0.112	0.176	
	14	0.170	0.145	0.119	0.119	0.187	
	15	0.180	0.153	0.126	0.126	0.198	
	16	0.200	0.170	0.140	0.140	0.220	
	17	0.190	0.162	0.133	0.133	0.209	
	18	0.205	0.174	0.144	0.144	0.226	
	19	0.220	0.187	0.154	0.154	0.242	
	20	0.235	0.200	0.165	0.165	0.259	
	21	0.250	0.213	0.175	0.175	0.275	
	22	0.265	0.225	0.186	0.186	0.292	
	23	0.280	0.238	0.196	0.196	0.308	
	24	0.295	0.251	0.207	0.207	0.325	
	25	0.310	0.264	0.217	0.217	0.341	
	26	0.325	0.276	0.228	0.228	0.358	
	27	0.340	0.289	0.238	0.238	0.374	
	28	0.355	0.302	0.249	0.249	0.391	
	29	0.370	0.315	0.259	0.259	0.407	
	30	0.385	0.327	0.270	0.270	0.424	

2701LS

LS type for deep holes. MT shank. extra-long/1

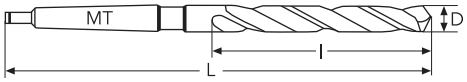
DIN 1870/1 | LS | HSS/CO OX | 130° | 35-40°



2701LS HSS/Co will be exhausted and gradually replaced by new 1701N HSS

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	P7	M1	K1 K2	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²			150÷350 HB	
	Vc (m/min)	**20÷24**	**16÷20**	**8÷12**	**8÷12**	**20÷24**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	13	0.140	0.119	0.098	0.098	0.154	
	14	0.150	0.128	0.105	0.105	0.165	
	15	0.160	0.136	0.112	0.112	0.176	
	16	0.180	0.153	0.126	0.126	0.198	
	17	0.190	0.162	0.133	0.133	0.209	
	18	0.200	0.170	0.140	0.140	0.220	
	19	0.210	0.179	0.147	0.147	0.231	
	20	0.220	0.187	0.154	0.154	0.242	
	21	0.220	0.187	0.154	0.154	0.242	
	22	0.230	0.196	0.161	0.161	0.253	
	23	0.250	0.213	0.175	0.175	0.275	
	24	0.260	0.221	0.182	0.182	0.286	
	25	0.280	0.238	0.196	0.196	0.308	
	26	0.290	0.247	0.203	0.203	0.319	
	27	0.300	0.255	0.210	0.210	0.330	
	28	0.310	0.264	0.217	0.217	0.341	
	29	0.325	0.276	0.228	0.228	0.358	
	30	0.340	0.289	0.238	0.238	0.374	

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

2702LS

LS type for deep holes. MT shank. extra-long/2

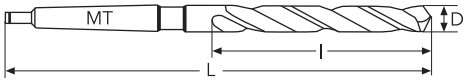
DIN 1870/2 | LS | HSS/CO OX | 130° | 35-40°



2702LS HSS/Co will be exhausted and gradually replaced by new 1702N HSS

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

2702LS

	Material Group ISO 513	P1 P2	P3 P4	P7	M1	K1 K2	
	Hardness/Rm	500÷700 N/mm²	600÷1000 N/mm²	<700 N/mm²	<750 N/mm²	150÷350 HB	
	Vc (m/min)	**20÷24**	**16÷20**	**8÷12**	**8÷12**	**20÷24**	
	D (mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	
	13	0.130	0.111	0.091	0.091	0.143	
	14	0.140	0.119	0.098	0.098	0.154	
	15	0.150	0.128	0.105	0.105	0.165	
	16	0.160	0.136	0.112	0.112	0.176	
	17	0.170	0.145	0.119	0.119	0.187	
	18	0.180	0.153	0.126	0.126	0.198	
	19	0.190	0.162	0.133	0.133	0.209	
	20	0.200	0.170	0.140	0.140	0.220	
	21	0.210	0.179	0.147	0.147	0.231	
	22	0.220	0.187	0.154	0.154	0.242	
	23	0.230	0.196	0.161	0.161	0.253	
	24	0.240	0.204	0.168	0.168	0.264	
	25	0.250	0.213	0.175	0.175	0.275	
	26	0.270	0.230	0.189	0.189	0.297	
	27	0.280	0.238	0.196	0.196	0.308	
	28	0.290	0.247	0.203	0.203	0.319	
	29	0.300	0.255	0.210	0.210	0.330	
	30	0.310	0.264	0.217	0.217	0.341	

CARBIDE END MILLS

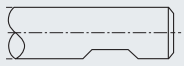


CAPTION . 298
SELECTION GUIDE . 302
SYSTEM CHARTS . 312
G2 . 315
HF VH/UP . 365
MEF . 463
ALU . 477
MEX/MH . 507
UH/MH . 565

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
	3D machining fresatura 3D 3D-Bearbeitung	fraisage 3D fresado 3D 3D фрезерование
	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

* The stock category of items in this catalogue may change without prior notice
La categoria di stock dei prodotti a catalogo può variare senza preavviso
Die Einstufung der Produkte kann sich jederzeit ändern
La catégorie de stock des articles dans ce catalogue peut être modifiée sans préavis.
La categoría de Stock de los artículos de este catálogo puede cambiar sin previo aviso
Классификация склада продукции в этом каталоге может быть изменена без предварительного уведомления.

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 décalé < 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 décalé 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 décalé (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
MH	30÷70 HRC general purpose and hardened steel 30÷70 HRC uso generico e acciaio temprato 30÷70 HRC allgemeine Anwendung und gehärtete Stähle	30÷70 HRC utilisation générale et aciers trempés 30÷70 HRC mecanizado genérico y acero templado 30÷70 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°
	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 décalé 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 décalé 4 filos paso diferenciado 4 зуба с неравномерным шагом
	5 flutes 5 taglienti 5 Schneiden	5 arêtes de coupe 5 filos 5 зуба
	5 flutes up 5 taglienti up 5 Schneiden up	5 arêtes de coupe up 5 filos up 5 зуба up
	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

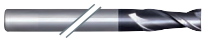
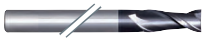
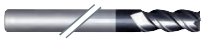
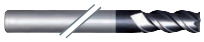
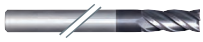
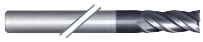
NMG	nano micrograin nano micrograna nano Mikrokörnung	nano micrograin nano micrograno нано микрозернистый твёрдый сплав
UMG	ultra fine micrograin micrograna ultra fine ultrafeine Mikrokörnung	micrograin ultra-fin micrograno ultra fino ультра микрозернистый твёрдый сплав
MG	micrograin micrograna Mikrokörnung	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

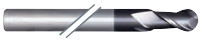
COATINGS RIVESTIMENTI BESCHICHTUNGEN REVÊTEMENTS RECUBRIMIENTOS ПОКРЫТИЕ

		PV200	PV300	ENDLESS	ENDLESS ORANGE	MH COAT	UH RED	DLC
hardness (HV) durezza (HV) Härte (HV)	dureté (HV) dureza (HV) твёрдость (HV)	3300	3300	3300	3300	3600	3600	4000
friction coefficient coefficiente d'attrito Reibungskoeffizient	coefficent de frottement coeficiente de rozamiento коэффициент трения	0.3	0.3	0.3	0.35	0.3	0.35	0.1
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	2.5÷3.5	0.1÷0.5
max working temperature (°C) temperatura max (°C) hochste Temperatur (°C)	température maximale (°C) temperatura máx (°C) макс. температура (°C)	950°	1100°	900°	1000°	1300°	1200°	500°

	ITEM No.	PAGE	
G2 general purpose, square	GB205	316	
	GBL2	318	
	G2CS2	320	
	G2WS2	322	
	G2210	324	
	G2211	324	
	G2212	324	
	GB305	327	
	G2CSH3	329	
	G2WSH3	331	
	G2310	333	
	G2311	333	
	G2312	333	
	GB405	335	
	GBL4	337	
	G2CS4	339	
	G2WS4	341	
	G2410	343	
	G2411	343	
	G2412	343	
	G2413	343	
	G2CSHM	345	
G2 general purpose, roughing	G2CSFR	347	
	G2WSFR	349	
G2 general purpose, corner radius	G2CS2R	351	
	G2CS4R	353	
	G2CL4R	355	

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	★	☆	★	☆		
3-12	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	★	☆	★	☆		
2-8	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	★	☆	★	☆		
3-12	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	★	☆	★	☆		
2-8	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
3-16	OSAWA	N	MG PV200	<45	30°	SQUARE	4	★	☆	★	☆		
6-20	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	★	☆	★	☆		

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
G2 general purpose, ball nose	**GB255**	357	
	G2CSB2	359	
	G2250	361	
	G2251	361	
	G2CSB4	363	
HF UNI < 40 HRC, 45° chamfer	**HF840**	368	
	HF440	372	
	HF441	377	
HF UNI < 40 HRC, roughing	**HF844**	383	
	HF444	387	
	HF445	391	
HF UNI < 40 HRC, corner radius	**HF342**	396	
	HF842	399	
	HF442	403	
	HF443	408	
	HF542	413	
	HF942	416	
	HF943	420	
	HF642	424	
	HF643	427	
	HF742	430	
	HF743	433	
	HF535T	436	
HF UNI SC <40HRC, 45° chamfer	**HF471**	438	
HF HARD 30÷55 HRC, 45° chamfer	**HF850**	443	
	HF450	447	
	HF451	451	
HF HARD 30÷55 HRC, corner radius	**HF852**	455	
	HF452	459	

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°	BALL NOSE	2	★	☆	★	☆		
1-20	OSAWA	N	MG PV200	<45	30°	BALL NOSE	2	★	☆	★	☆		
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	★	☆	★	☆		
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	★	★	★		★	
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	★	★	★		★	
10-20	OSAWA	VH/UP	MG PV300	<45	36°-37°-38°	CORNER RADIUS	5	★	☆	★		☆	
1-20	OSAWA	VH/UP	MG PV300	<40	36°-39°	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	★	★	★		★	★
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	★	★	★		★	★

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
MEF stainless steel and super alloys, square	**MEFCS2**	464	
	MEFCSH3	466	
	MEFCS4	468	
	MEF600	470	
MEF stainless steel and super alloys, roughing	**MEF901**	472	
	MEF902	474	
ALU unequal pitch, square	**HFAL4**	478	
ALU unequal pitch, corner radius	**HFAL3**	481	
	HFA3D	484	
	HFA53	487	
ALU square	**MDCSA1**	490	
	MDCSA2	492	
	MDCSA3	495	
	MDA310	497	
	MDA311	497	
	MDA312	497	
	MDCSAM	500	
ALU corner radius	**MCA212R**	502	
ALU ball nose	**MDCAB2**	504	
MEX 30÷55 HRC, square	**MEXM2**	508	
	MEXM2SC	510	
	MEXLN2	512	
	MEXCS2	517	
	MEXCL2	519	
	MEX400	521	
	MEXCL4	523	
	MEXCSHM	525	
	MEXCLHM	527	

Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

RANGE	NORM	TYPE	MATERIAL / COATING	HRC	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
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				★		
1-20	OSAWA	UP ALU	MG POLISHED		30°	CORNER RADIUS	3				★		
1-10	OSAWA	UP ALU	MG DLC		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				★		
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	40°	SQUARE	2	★		★			★
1-12	OSAWA	MEX	UMG ENDLESS ORANGE	<55	40°	SQUARE	2	★		★			★
1-25	OSAWA	MEX UP	UMG ENDLESS ORANGE	<55	40°	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	50°	SQUARE	6-8	★		★			★

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
MEX 30÷55 HRC, corner radius	**MEXLN2R**	529	
	MEXLS2R	535	
	MEXCS4R	537	
	MEX410R	540	
	MEXLS4R	542	
	MEX610R	544	
	MEX611R	546	
MEX 30÷55 HRC and MH 30÷70 HRC, ball nose	**MHMB204**	548	
	MHMB206	550	
	MHLNB2	552	
	MHCRB2	557	
	MEXCSB2	559	
	MEXCLSB2	561	
	MEX253	563	
UH < 70 HRC, square	**UHM204**	566	
	UHLN2	568	
	UH600	573	
	UH612	575	
UH < 70 HRC, corner radius	**UHM206**	577	
	UH211	579	
	UH212	581	
	UHCS2	587	
	UHF4LN	589	
	UHF-RT	593	
	UHF4	595	
	UHCS4	597	
	UH410	599	

RANGE	NORM	TYPE	MATERIAL / COATING	HRC	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
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	MH	NMG MH COAT	30÷70	30°	BALL NOSE	2	★		★			★
0.2-0.8	OSAWA	MH	NMG MH COAT	30÷70	30°	BALL NOSE	2	★		★			★
0.2-4	OSAWA	MH	NMG MH COAT	30÷70	30°	BALL NOSE	2	★		★			★
0.5-2	OSAWA	MH	NMG MH COAT	30÷70	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	☆		☆			★
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	40°	CORNER RADIUS	2	☆		☆			★
0.2-4	OSAWA	UH	NMG UH RED	<70	40°	CORNER RADIUS	2	☆		☆			★
1-12	OSAWA	UH	NMG UH RED	<70	40°	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	4-6	☆		☆			★
2-12	OSAWA	UH	NMG UH RED	<70	25°	CORNER RADIUS	4	☆		☆			★
1-12	OSAWA	UH	NMG UH RED	<70	40°	CORNER RADIUS	4	☆		☆			★
1-20	OSAWA	UH	NMG UH RED	<70	40°	CORNER RADIUS	4	☆		☆			★

★ 1st choice ☆ suitable

	ITEM No.	PAGE	
UH < 70 HRC, corner radius	**UH411**	602	
	UH412	604	
	UH413	606	
	UH610R	608	
	UH611R	610	
UH < 70 HRC and MH 30÷70 HRC, ball nose	**MHMB204**	612	
	MHMB206	614	
	MHLNB2	616	
	MHCRB2	621	
	UHCSB2	623	
	UH250	625	
	UH253	627	

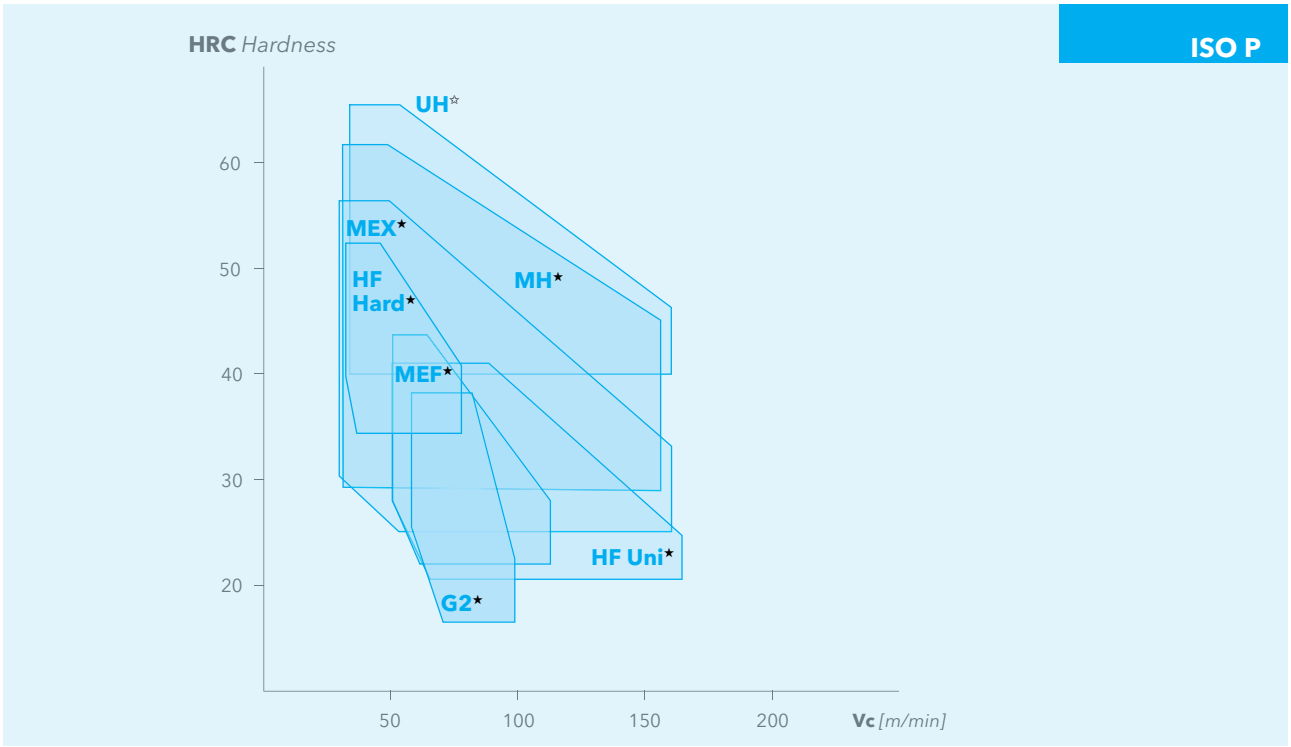
Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

RANGE	NORM	TYPE	MATERIAL / COATING	HRC	HELIX ANGLE	GEOMETRY	Z	ISO P	ISO M	ISO K	ISO N	ISO S	ISO H
3-12	OSAWA	UH	NMG UH RED	<70	40°	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	50°	CORNER RADIUS	6	☆		☆			★
6-20	OSAWA	UH	NMG UH RED	<70	50°	CORNER RADIUS	6	☆		☆			★
0.2-0.8	OSAWA	MH	NMG MH COAT	30÷70	30°	BALL NOSE	2	☆		☆			★
0.4-0.8	OSAWA	MH	NMG MH COAT	30÷70	30°	BALL NOSE	2	☆		☆			★
0.2-4	OSAWA	MH	NMG MH COAT	30÷70	30°	BALL NOSE	2	☆		☆			★
0.5-2	OSAWA	MH	NMG MH COAT	30÷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

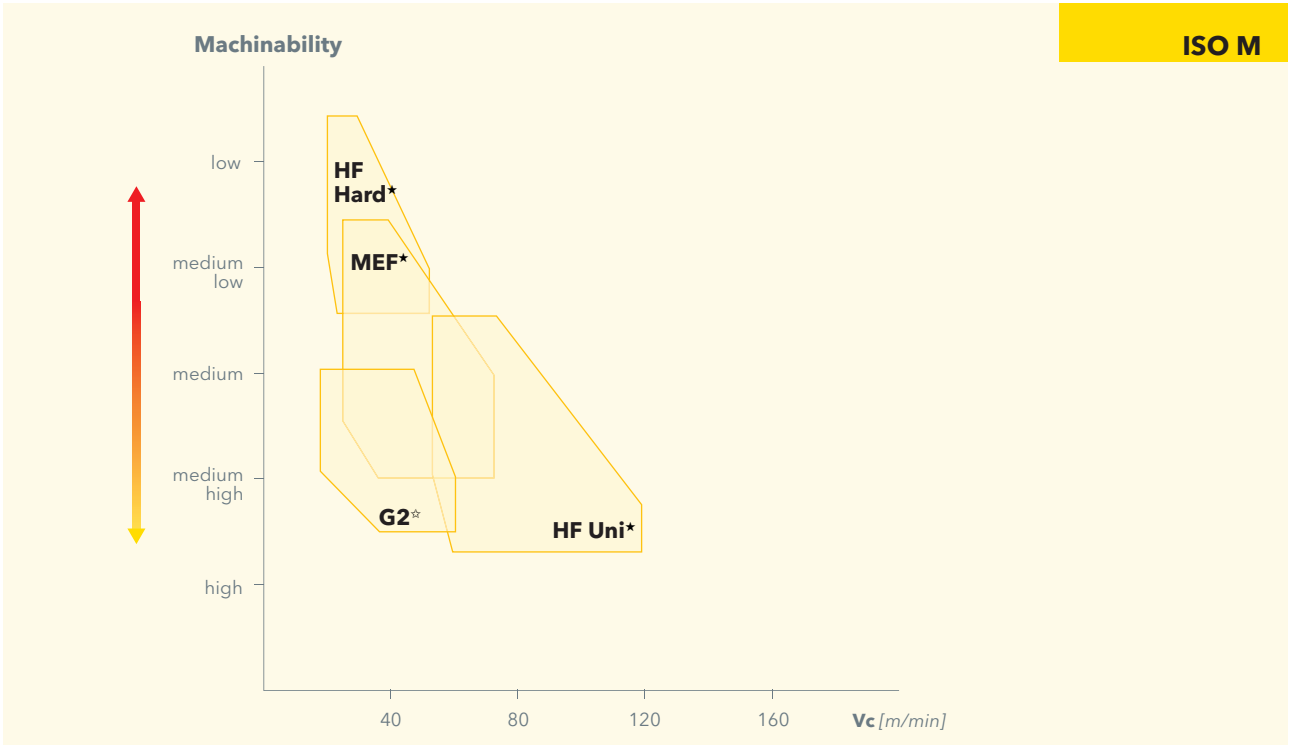
Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

STEEL APPLICATION



★ 1st choice ☆ suitable

STAINLESS STEEL APPLICATION

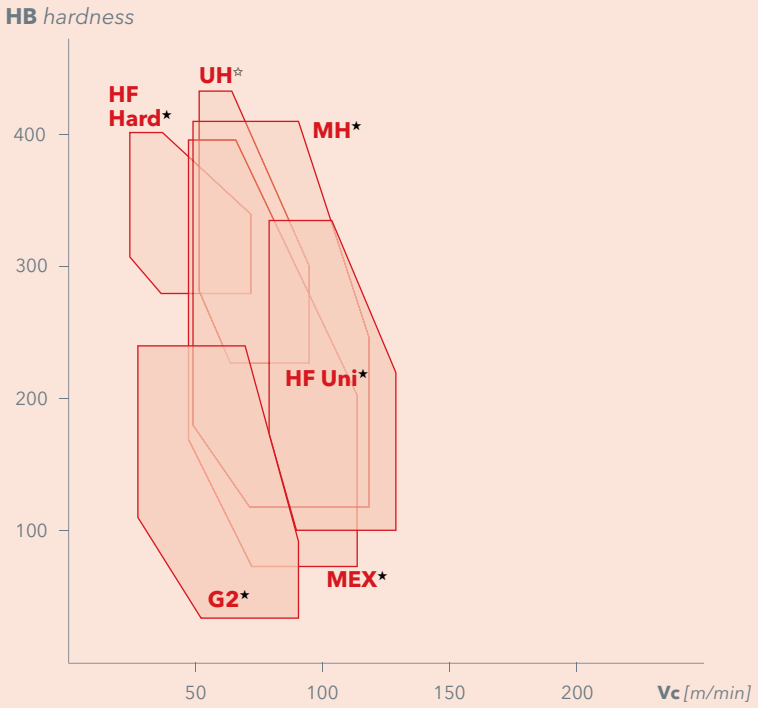


★ 1st choice ☆ suitable

G2 : general purpose (page 315)
HF UNI : universal purpose (page 365)
HF HARD : special purpose (page 443)
MEF : special purpose (page 463)
MEX : special purpose (page 507)
MH : special purpose (page 548/612)
UH :special purpose (page 565)

CAST IRON APPLICATION

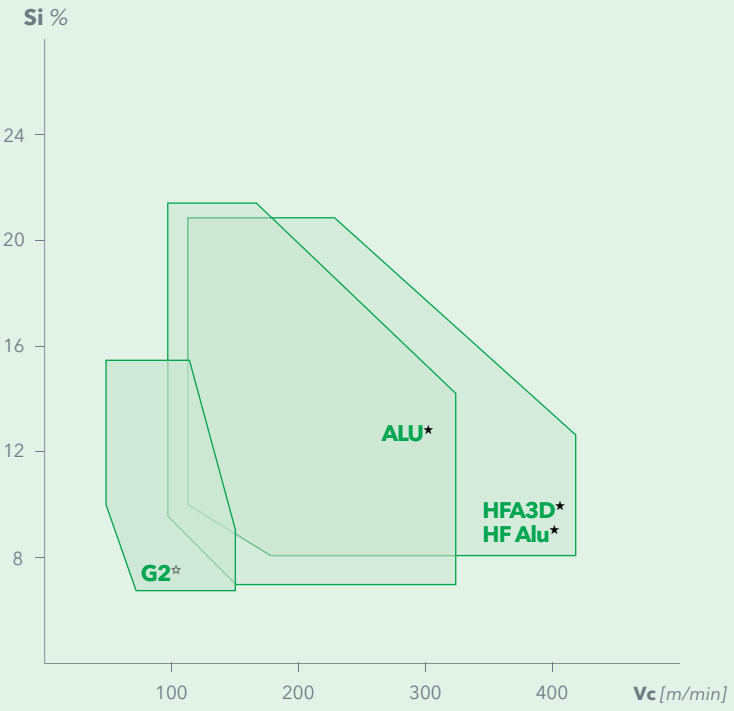
ISO K



★ 1st choice ☆ suitable

NON-FERROUS MATERIALS APPLICATION

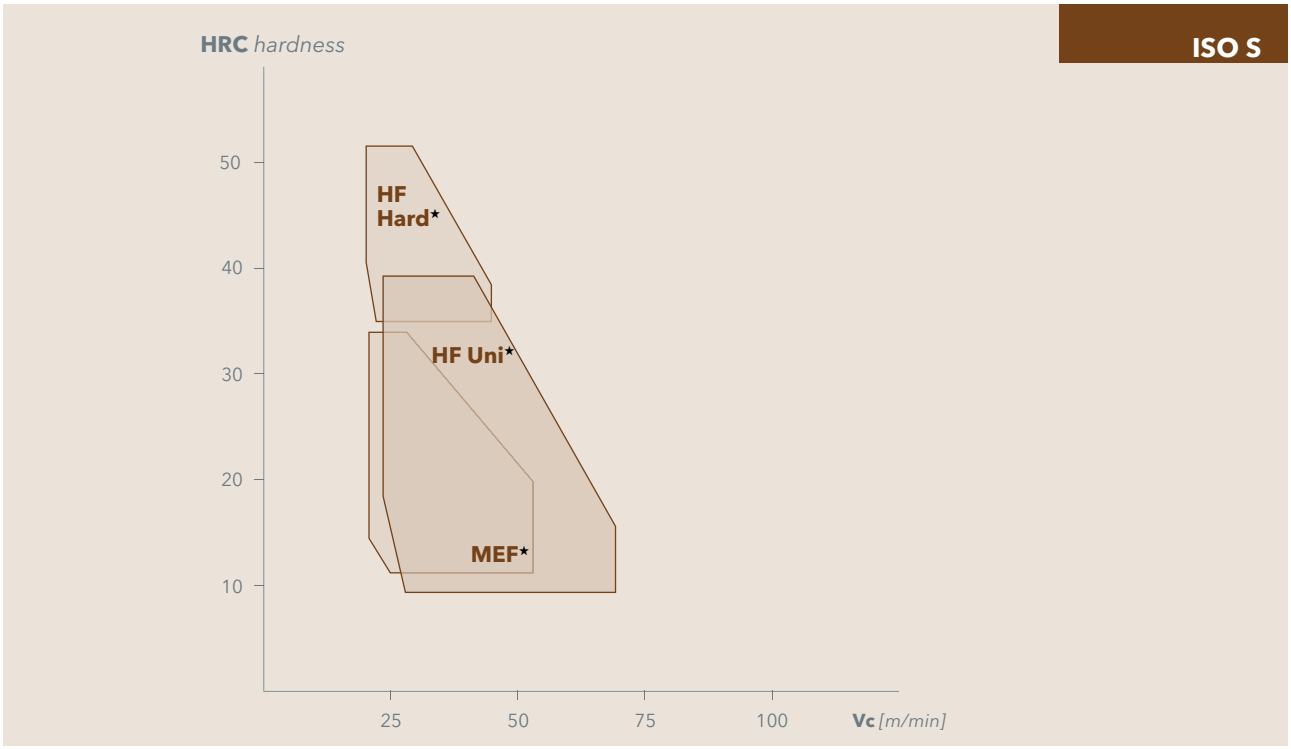
ISO N



★ 1st choice ☆ suitable

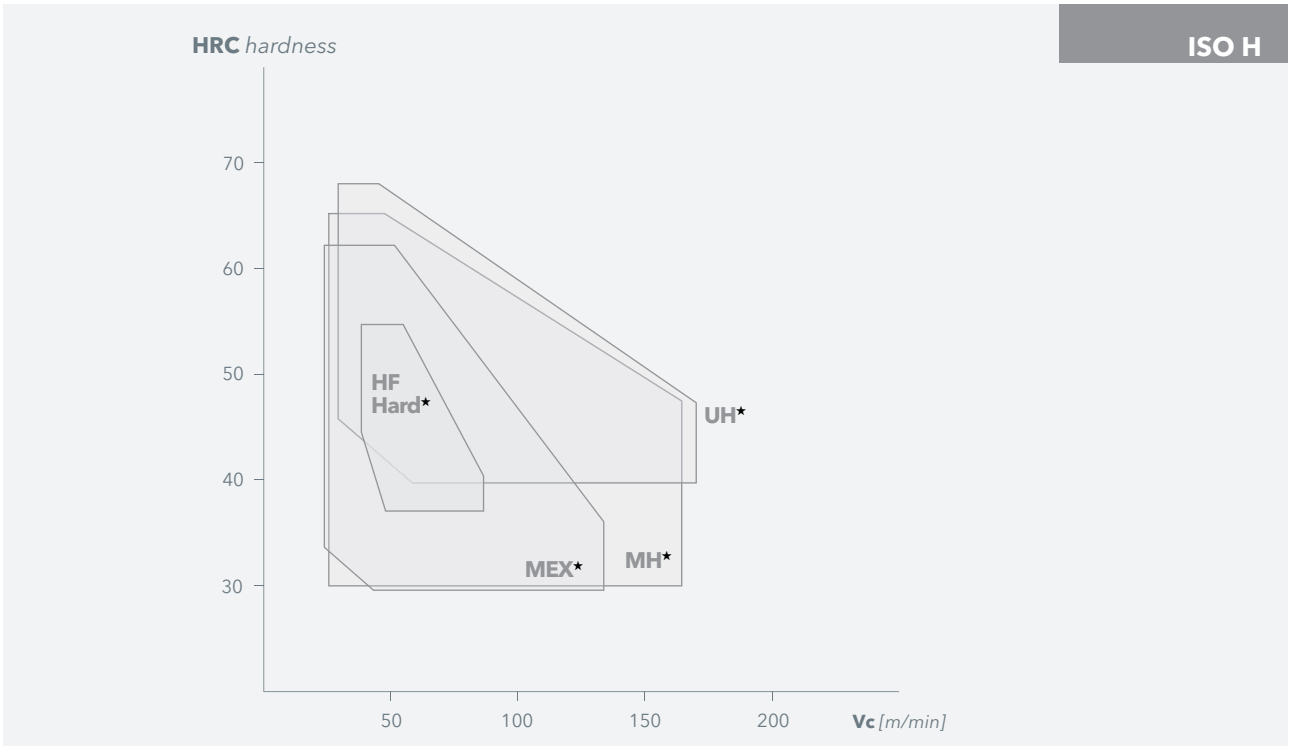
G2 : general purpose (page 315)
HF UNI : universal purpose (page 365)
HF HARD : special purpose (page 443)
HF ALU - HFA3D : special purpose (page 477)
ALU : special purpose (page 477)
MEX : special purpose (page 507)
MH : special purpose (page 548/612)
UH :special purpose (page 565)

SUPER ALLOYS APPLICATION



★ 1st choice ☆ suitable

HARDENED STEEL APPLICATION



★ 1st choice ☆ suitable

HF UNI : universal purpose (page 365)
HF HARD : special purpose (page 443)
MEF : special purpose (page 463)
MEX : special purpose (page 507)
MH : special purpose (page 548/612)
UH :special purpose (page 565)



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 höheren 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

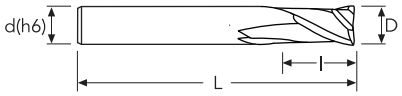
OSAWA NORM | N | MG / BR | <45 HRC | 30° | SQUARE | Z2



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

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.003	0.003	0.005
	2	0.007	0.006	0.005	0.009
	3	0.010	0.009	0.008	0.013
	4	0.014	0.012	0.011	0.018
	5	0.018	0.015	0.014	0.023
	6	0.023	0.020	0.017	0.030
	8	0.030	0.026	0.023	0.039
	10	0.038	0.032	0.029	0.049
	12	0.045	0.038	0.034	0.059

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.004	0.003	0.006
	2	0.009	0.007	0.007	0.011
	3	0.013	0.011	0.009	0.016
	4	0.018	0.015	0.013	0.023
	5	0.023	0.019	0.017	0.029
	6	0.029	0.024	0.022	0.037
	8	0.038	0.032	0.028	0.049
	10	0.048	0.040	0.036	0.062
	12	0.056	0.048	0.042	0.073

< D3 mm: ae = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	
	ap x ae	**D x D**	**D x D**	**D x D**	**D x D**
	Vc (m/min)	**40÷50**	**30÷40**	**20÷30**	**60÷80**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.002	0.002	0.002	0.003
	2	0.004	0.004	0.003	0.006
	3	0.006	0.005	0.005	0.008
	4	0.009	0.007	0.007	0.011
	5	0.011	0.010	0.008	0.015
	6	0.014	0.012	0.011	0.019
	8	0.019	0.016	0.014	0.024
	10	0.024	0.020	0.018	0.031
	12	0.028	0.024	0.021	0.037

< D3 mm: ap = 0.5D

GBL2

cylindrical shank, 2 flutes, long

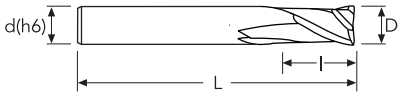
OSAWA NORM | N | MG / BR | <45 HRC | 30° | SQUARE | Z2



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/-0.020			3	30		75	2	GBL2030	●
4	0/-0.020			4	30		75	2	GBL2040	●
5	0/-0.020			5	40		100	2	GBL2050	●
6	0/-0.020			6	60		150	2	GBL2060	●
8	0/-0.025			8	60		150	2	GBL2080	●
10	0/-0.025			10	75		150	2	GBL2100	●
12	0/-0.025			12	75		150	2	GBL2120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

GBL2

SLOTTING	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.010	0.008	0.007	0.011
	4	0.013	0.011	0.010	0.014
	5	0.016	0.014	0.012	0.018
	6	0.020	0.017	0.015	0.022
	8	0.026	0.022	0.019	0.033
	10	0.030	0.026	0.023	0.040
	12	0.036	0.031	0.027	0.047

< D3 mm: ap = 0.2D

SIDE MILLING	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.012	0.010	0.009	0.013
	4	0.015	0.013	0.012	0.017
	5	0.019	0.016	0.014	0.021
	6	0.024	0.020	0.018	0.027
	8	0.031	0.026	0.023	0.040
	10	0.036	0.031	0.027	0.047
	12	0.043	0.037	0.032	0.056

G2CS2

cylindrical shank, 2 flutes

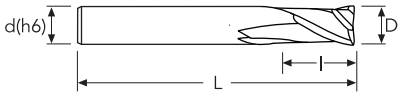
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z2



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			2	8		50	2	G2CS2020S02	●
2	0/-0.020			4	6		50	2	G2CS2020	●
2.5	0/-0.020			4	7		50	2	G2CS2025	●
3	0/-0.020			3	9		50	2	G2CS2030S03	●
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 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.003	0.003	0.005
	2	0.008	0.007	0.006	0.010
	3	0.012	0.010	0.009	0.016
	4	0.016	0.014	0.012	0.021
	5	0.020	0.017	0.015	0.026
	6	0.025	0.021	0.019	0.033
	8	0.032	0.027	0.024	0.042
	10	0.038	0.032	0.029	0.049
	12	0.045	0.038	0.034	0.059
	14	0.052	0.044	0.039	0.068
	16	0.060	0.051	0.045	0.078
	18	0.070	0.060	0.053	0.091
	20	0.080	0.068	0.060	0.104

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.005	0.004	0.004	0.006
	2	0.010	0.008	0.007	0.012
	3	0.014	0.012	0.011	0.019
	4	0.019	0.016	0.014	0.025
	5	0.024	0.020	0.018	0.031
	6	0.030	0.026	0.023	0.039
	8	0.038	0.033	0.029	0.050
	10	0.046	0.039	0.034	0.059
	12	0.054	0.046	0.041	0.070
	14	0.062	0.053	0.047	0.081
	16	0.072	0.061	0.054	0.094
	18	0.084	0.071	0.063	0.109
	20	0.096	0.082	0.072	0.125

< D3 mm: ae = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	
	ap x ae	**D x D**	**D x D**	**D x D**	**D x D**
	Vc (m/min)	**70÷90**	**40÷60**	**25÷35**	**80÷100**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.002	0.002	0.002	0.003
	2	0.005	0.004	0.004	0.006
	3	0.007	0.006	0.005	0.009
	4	0.010	0.008	0.007	0.012
	5	0.012	0.010	0.009	0.016
	6	0.015	0.013	0.011	0.020
	8	0.019	0.016	0.014	0.025
	10	0.023	0.019	0.017	0.030
	12	0.027	0.023	0.020	0.035
	14	0.031	0.027	0.023	0.041
	16	0.036	0.031	0.027	0.047
	18	0.042	0.036	0.032	0.055
	20	0.048	0.041	0.036	0.062

< D3 mm: ap = 0.5D

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

G2WS2

weldon shank, 2 flutes

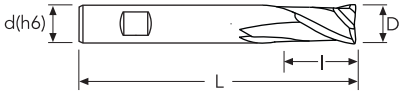
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z2



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 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.012	0.010	0.009	0.016
	4	0.016	0.014	0.012	0.021
	5	0.020	0.017	0.015	0.026
	6	0.025	0.021	0.019	0.033
	8	0.032	0.027	0.024	0.042
	10	0.038	0.032	0.029	0.049
	12	0.045	0.038	0.034	0.059
	14	0.052	0.044	0.039	0.068
	16	0.060	0.051	0.045	0.078
	18	0.070	0.060	0.053	0.091
	20	0.080	0.068	0.060	0.104

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.014	0.012	0.011	0.019
	4	0.019	0.016	0.014	0.025
	5	0.024	0.020	0.018	0.031
	6	0.030	0.026	0.023	0.039
	8	0.038	0.033	0.029	0.050
	10	0.046	0.039	0.034	0.059
	12	0.054	0.046	0.041	0.070
	14	0.062	0.053	0.047	0.081
	16	0.072	0.061	0.054	0.094
	18	0.084	0.071	0.063	0.109
	20	0.096	0.082	0.072	0.125

< D3 mm: ae = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	
	ap x ae	**D x D**	**D x D**	**D x D**	**D x D**
	Vc (m/min)	**70÷90**	**40÷60**	**25÷35**	**80÷100**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.007	0.006	0.005	0.009
	4	0.010	0.008	0.007	0.012
	5	0.012	0.010	0.009	0.016
	6	0.015	0.013	0.011	0.020
	8	0.019	0.016	0.014	0.025
	10	0.023	0.019	0.017	0.030
	12	0.027	0.023	0.020	0.035
	14	0.031	0.027	0.023	0.041
	16	0.036	0.031	0.027	0.047
	18	0.042	0.036	0.032	0.055
	20	0.048	0.041	0.036	0.062

< D3 mm: ap = 0.5D

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

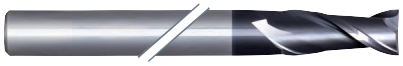
G2210-11-12

cylindrical shank, 2 flutes, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z2



G2210

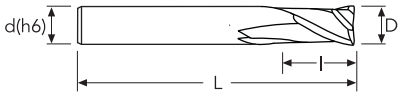


G2211-G2212

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	●
3	0/-0.030			3	25		75	2	G2210030CL25	●
4	0/-0.030			4	20		75	2	G2210040	●
4	0/-0.030			4	30		75	2	G2210040CL30	●
5	0/-0.030			6	25		75	2	G2210050	●
5	0/-0.030			5	30		75	2	G2210050S05	●
6	0/-0.030			6	25		75	2	G2210060	●
6	0/-0.030			6	35		75	2	G2210060CL35	●
8	0/-0.030			8	30		75	2	G2210080	●
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

CUTTING PARAMETERS

G2210-G2211

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.007	0.006	0.005	0.009
	3	0.010	0.009	0.008	0.013
	4	0.014	0.012	0.011	0.018
	5	0.018	0.015	0.014	0.023
	6	0.023	0.019	0.017	0.029
	8	0.030	0.026	0.023	0.039
	10	0.035	0.030	0.026	0.046
	12	0.041	0.035	0.031	0.053

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.008	0.007	0.006	0.011
	3	0.012	0.010	0.009	0.016
	4	0.017	0.014	0.013	0.022
	5	0.022	0.018	0.016	0.028
	6	0.027	0.023	0.020	0.035
	8	0.036	0.031	0.027	0.047
	10	0.042	0.036	0.032	0.055
	12	0.049	0.042	0.037	0.064

< D3 mm: ae = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	
	ap x ae	**D x D**	**D x D**	**D x D**	**D x D**
	Vc (m/min)	**60÷80**	**40÷60**	**25÷35**	**70÷100**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.004	0.004	0.003	0.005
	3	0.006	0.005	0.005	0.008
	4	0.008	0.007	0.006	0.011
	5	0.011	0.009	0.008	0.014
	6	0.014	0.011	0.010	0.018
	8	0.018	0.015	0.014	0.023
	10	0.021	0.018	0.016	0.027
	12	0.025	0.021	0.018	0.032

< D3 mm: ap = 0.5D

CUTTING PARAMETERS

G2212



Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
8	0.026	0.022	0.020	0.034
10	0.032	0.027	0.024	0.042
12	0.036	0.031	0.027	0.047
14	0.042	0.036	0.032	0.055
16	0.048	0.041	0.036	0.062



Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
8	0.031	0.027	0.023	0.041
10	0.038	0.033	0.029	0.050
12	0.043	0.037	0.032	0.056
14	0.050	0.043	0.038	0.066
16	0.058	0.049	0.043	0.075



Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	
ap x ae	**D x D**	**D x D**	**D x D**	**D x D**
Vc (m/min)	**50÷70**	**35÷55**	**20÷30**	**60÷80**
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
8	0.016	0.013	0.012	0.020
10	0.019	0.016	0.014	0.025
12	0.022	0.018	0.016	0.028
14	0.025	0.021	0.019	0.033
16	0.029	0.024	0.022	0.037

GB305

cylindrical shank, 3 flutes

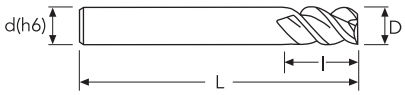
OSAWA NORM | N | MG / BR | <45 HRC | 45° | SQUARE | Z3



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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

GB305

SLOTTING	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	
	ap x ae	**0.5D x D**	**0.5D x D**	**0.5D x D**	**0.5D x D**
	Vc (m/min)	**50÷60**	**30÷50**	**20÷40**	**70÷90**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.003	0.003	0.002	0.004
	2	0.006	0.005	0.004	0.008
	3	0.009	0.007	0.006	0.011
	4	0.012	0.010	0.009	0.016
	5	0.015	0.013	0.012	0.020
	6	0.020	0.017	0.015	0.026
	8	0.026	0.022	0.019	0.033
	10	0.032	0.028	0.024	0.042
	12	0.038	0.033	0.029	0.050

< D3 mm: ap = 0.2D

SIDE MILLING	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	**50÷70**	**40÷60**	**20÷40**	**80÷100**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.003	0.003	0.005
	2	0.007	0.006	0.005	0.009
	3	0.010	0.009	0.008	0.013
	4	0.014	0.012	0.011	0.019
	5	0.018	0.016	0.014	0.024
	6	0.024	0.020	0.018	0.031
	8	0.031	0.026	0.023	0.040
	10	0.039	0.033	0.029	0.051
	12	0.046	0.039	0.035	0.060

< D3 mm: ae = 0.1D

G2CSH3

cylindrical shank, 3 flutes

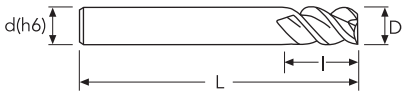
OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z3



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			3	9		50	3	G2CSH3030S03	●
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

SLOTTING

Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.003	0.003	0.002	0.004
2	0.006	0.005	0.005	0.008
3	0.009	0.008	0.007	0.012
4	0.013	0.011	0.009	0.016
5	0.016	0.013	0.012	0.020
6	0.019	0.016	0.014	0.024
8	0.025	0.021	0.019	0.033
10	0.031	0.027	0.023	0.041
12	0.040	0.034	0.030	0.052
14	0.046	0.039	0.035	0.060
16	0.056	0.048	0.042	0.073
18	0.065	0.055	0.049	0.085
20	0.075	0.064	0.056	0.098

< D3 mm: ap = 0.2D

SIDE MILLING

Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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÷130**
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.004	0.003	0.003	0.005
2	0.008	0.006	0.006	0.010
3	0.011	0.010	0.008	0.015
4	0.015	0.013	0.011	0.020
5	0.019	0.016	0.014	0.024
6	0.023	0.019	0.017	0.029
8	0.030	0.026	0.023	0.039
10	0.038	0.032	0.028	0.049
12	0.048	0.041	0.036	0.062
14	0.056	0.047	0.042	0.072
16	0.068	0.057	0.051	0.088
18	0.078	0.066	0.059	0.101
20	0.090	0.077	0.068	0.117

< D3 mm: ae = 0.1D

G2WSH3

weldon shank, 3 flutes

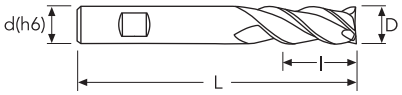
OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z3



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 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.009	0.008	0.007	0.012
	4	0.013	0.011	0.009	0.016
	5	0.016	0.013	0.012	0.020
	6	0.019	0.016	0.014	0.024
	8	0.025	0.021	0.019	0.033
	10	0.031	0.027	0.023	0.041
	12	0.040	0.034	0.030	0.052
	14	0.046	0.039	0.035	0.060
	16	0.056	0.048	0.042	0.073
	18	0.065	0.055	0.049	0.085
	20	0.075	0.064	0.056	0.098

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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÷130**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.011	0.010	0.008	0.015
	4	0.015	0.013	0.011	0.020
	5	0.019	0.016	0.014	0.024
	6	0.023	0.019	0.017	0.029
	8	0.030	0.026	0.023	0.039
	10	0.038	0.032	0.028	0.049
	12	0.048	0.041	0.036	0.062
	14	0.056	0.047	0.042	0.072
	16	0.068	0.057	0.051	0.088
	18	0.078	0.066	0.059	0.101
	20	0.090	0.077	0.068	0.117

< D3 mm: ae = 0.1D

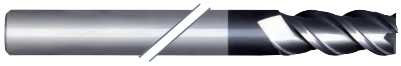
G2310-11-12

cylindrical shank, 3 flutes, long

OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z3



G2310

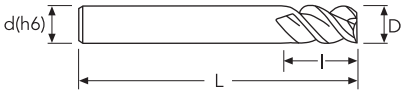


G2311-G2312

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

G2310-G2311

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.006	0.005	0.004	0.007
	3	0.008	0.007	0.006	0.011
	4	0.011	0.010	0.008	0.015
	5	0.014	0.012	0.011	0.018
	6	0.017	0.014	0.013	0.022
	8	0.023	0.019	0.017	0.029
	10	0.028	0.024	0.021	0.037
	12	0.036	0.031	0.027	0.047

< D3 mm: ap = 0.2D

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.007	0.006	0.005	0.009
	3	0.011	0.009	0.008	0.014
	4	0.014	0.012	0.011	0.018
	5	0.018	0.015	0.013	0.023
	6	0.021	0.018	0.016	0.027
	8	0.028	0.024	0.021	0.037
	10	0.035	0.030	0.026	0.046
	12	0.045	0.038	0.034	0.059

< D3 mm: ae = 0.1D

G2312

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	8	0.020	0.017	0.015	0.026
	10	0.025	0.021	0.019	0.033
	12	0.032	0.027	0.024	0.042
	14	0.037	0.031	0.028	0.048
	16	0.045	0.038	0.034	0.059
	20	0.060	0.051	0.045	0.078

GB405

cylindrical shank, 4 flutes

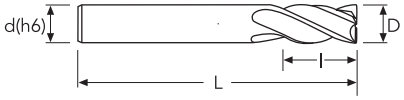
OSAWA NORM | N | MG / BR | <45 HRC | 30° | SQUARE | Z4



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

SIDE MILLING	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.003	0.003	0.002	0.004
	2	0.006	0.006	0.005	0.008
	3	0.010	0.008	0.007	0.013
	4	0.013	0.011	0.010	0.017
	5	0.016	0.014	0.012	0.021
	6	0.020	0.017	0.015	0.026
	8	0.026	0.022	0.019	0.034
	10	0.031	0.026	0.023	0.040
	12	0.036	0.031	0.027	0.047

< D3 mm: ae = 0.1D

GBL4

cylindrical shank, 4 flutes, long

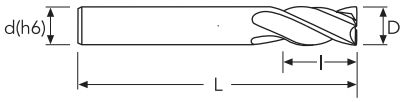
OSAWA NORM | N | MG / BR | <45 HRC | 30° | SQUARE | Z4



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/-0.020			3	30		75	4	GBL4030	●
4	0/-0.020			4	30		75	4	GBL4040	●
5	0/-0.020			5	40		100	4	GBL4050	●
6	0/-0.020			6	60		150	4	GBL4060	●
8	0/-0.025			8	60		150	4	GBL4080	●
10	0/-0.025			10	75		150	4	GBL4100	●
12	0/-0.025			12	75		150	4	GBL4120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

GBL4

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	**45÷55**	**30÷40**	**25÷35**	**70÷90**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.008	0.007	0.006	0.009
	4	0.010	0.009	0.008	0.011
	5	0.013	0.011	0.010	0.014
	6	0.015	0.013	0.011	0.017
	8	0.020	0.017	0.015	0.026
	10	0.026	0.022	0.019	0.033
	12	0.032	0.027	0.024	0.042

G2CS4

cylindrical shank, 4 flutes

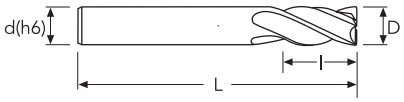
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z4



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			2	8		50	4	G2CS4020S02	●
2	0/-0.020			4	6		50	4	G2CS4020	●
2.5	0/-0.020			4	7		50	4	G2CS4025	●
3	0/-0.020			3	9		50	4	G2CS4030S03	●
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

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.003	0.003	0.005
	2	0.007	0.006	0.005	0.009
	3	0.010	0.009	0.008	0.013
	4	0.013	0.011	0.010	0.017
	5	0.016	0.014	0.012	0.021
	6	0.019	0.016	0.014	0.025
	8	0.025	0.021	0.019	0.033
	10	0.032	0.027	0.024	0.042
	12	0.040	0.034	0.030	0.052
	14	0.047	0.040	0.035	0.061
	16	0.054	0.046	0.041	0.070
	18	0.060	0.051	0.045	0.078
	20	0.065	0.055	0.049	0.085
	22	0.073	0.062	0.055	0.095
	25	0.083	0.071	0.062	0.108

< D3 mm: ae = 0.1D

G2WS4

weldon shank, 4 flutes

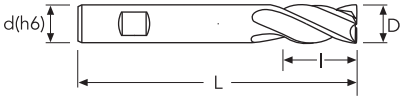
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z4



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	●

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

● stock standard ○ non-standard stock ∇ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

G2WS4

SIDE MILLING

Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
3	0.010	0.009	0.008	0.013
4	0.013	0.011	0.010	0.017
5	0.016	0.014	0.012	0.021
6	0.019	0.016	0.014	0.025
8	0.025	0.021	0.019	0.033
10	0.032	0.027	0.024	0.042
12	0.040	0.034	0.030	0.052
14	0.047	0.040	0.035	0.061
16	0.054	0.046	0.041	0.070
18	0.060	0.051	0.045	0.078
20	0.065	0.055	0.049	0.085

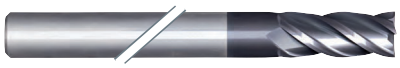
G2410-11-12-13

cylindrical shank, 4 flutes, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | SQUARE | Z4



G2410

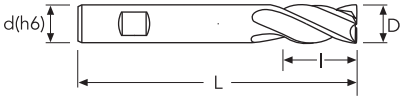


G2411-G2412-G2413

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	0/-0.030			3	25		75	4	G2410030CL25	●
3.5	0/-0.030			4	15		75	4	G2410035	●
4	0/-0.030			4	20		75	4	G2410040	●
4	0/-0.030			4	30		75	4	G2410040CL30	●
4.5	0/-0.030			6	20		75	4	G2410045	●
5	0/-0.030			6	25		75	4	G2410050	●
5	0/-0.030			5	30		75	4	G2410050S05	●
6	0/-0.030			6	25		75	4	G2410060	●
6	0/-0.030			6	35		75	4	G2410060CL35	●
8	0/-0.030			8	30		75	4	G2410080	●
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	●
14	0/-0.040			14	45		100	4	G2411140	●
16	0/-0.040			16	45		100	4	G2411160	●
6	0/-0.035			6	40		150	4	G2412060CL40	●
6	0/-0.035			6	60		150	4	G2412060CL60	●
8	0/-0.035			8	40		150	4	G2412080	●
8	0/-0.035			8	60		150	4	G2412080CL60	●
10	0/-0.035			10	50		150	4	G2412100	●
10	0/-0.035			10	75		150	4	G2412100CL75	●
12	0/-0.035			12	50		150	4	G2412120	●
12	0/-0.035			12	75		150	4	G2412120CL75	●
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 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.006	0.005	0.005	0.008
	3	0.009	0.008	0.007	0.012
	4	0.012	0.010	0.009	0.015
	5	0.014	0.012	0.011	0.019
	6	0.017	0.015	0.013	0.022
	8	0.023	0.019	0.017	0.029
	10	0.029	0.024	0.022	0.037
	12	0.036	0.031	0.027	0.047
	16	0.048	0.041	0.036	0.062

< D3 mm: ae = 0.1D

G2412-G2413

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	8	0.020	0.017	0.015	0.026
	10	0.026	0.022	0.019	0.033
	12	0.032	0.027	0.024	0.042
	14	0.038	0.032	0.028	0.049
	16	0.043	0.037	0.032	0.056
	20	0.065	0.055	0.049	0.085

G2CSHM

cylindrical shank, multi flute

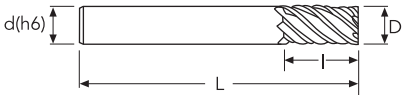
OSAWA NORM | N | MG PV200 | <45 HRC | 45° | SQUARE | Z6



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 P7 M1 K2	P5 M2 K3	
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	
	6	0.016	0.014	0.012	
	8	0.020	0.017	0.015	
	10	0.025	0.021	0.019	
	12	0.030	0.026	0.023	
	14	0.035	0.030	0.026	
	16	0.040	0.034	0.030	
	20	0.050	0.043	0.038	

G2CSFR

cylindrical shank, roughing HR

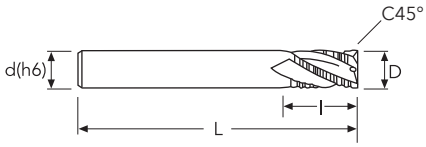
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | C45° | HR FINE | Z3~Z4



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
4	0/-0.070	0.28	+/-0.020	6	11		50	3	G2CSFR040	●
5	0/-0.070	0.35	+/-0.020	6	13		50	3	G2CSFR050	●
6	0/-0.070	0.42	+/-0.020	6	15		50	3	G2CSFR060	●
7	0/-0.070	0.49	+/-0.020	8	20		60	3	G2CSFR070	●
8	0/-0.070	0.56	+/-0.020	8	20		60	3	G2CSFR080	●
9	0/-0.070	0.63	+/-0.020	10	25		75	3	G2CSFR090	●
10	0/-0.070	0.70	+/-0.020	10	30		75	4	G2CSFR100	●
11	0/-0.070	0.77	+/-0.020	12	30		75	4	G2CSFR110	●
12	0/-0.070	0.84	+/-0.020	12	30		75	4	G2CSFR120	●
13	0/-0.070	0.91	+/-0.020	14	30		83	4	G2CSFR130	●
14	0/-0.070	0.98	+/-0.020	14	30		83	4	G2CSFR140	●
15	0/-0.070	1.05	+/-0.020	16	30		92	4	G2CSFR150	●
16	0/-0.070	1.12	+/-0.020	16	35		92	4	G2CSFR160	●
20	0/-0.070	1.40	+/-0.020	20	40		100	4	G2CSFR200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CSFR

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**	
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	
	6	0.030	0.026	0.023	
	8	0.045	0.038	0.034	
	10	0.060	0.051	0.045	
	12	0.072	0.061	0.054	
	14	0.085	0.072	0.064	
	16	0.096	0.082	0.072	
	20	0.120	0.102	0.090	

D6-8: Z3
D10-20: Z4

G2WSFR

weldon shank, roughing HR

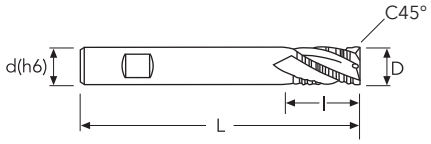
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | C45° | HR FINE | Z3~Z4



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/-0.070	0.42	+/-0.020	6	13		57	3	G2WSFR060	●
8	0/-0.070	0.56	+/-0.020	8	19		63	3	G2WSFR080	●
10	0/-0.070	0.70	+/-0.020	10	22		72	4	G2WSFR100	●
12	0/-0.070	0.84	+/-0.020	12	26		83	4	G2WSFR120	●
14	0/-0.070	0.98	+/-0.020	14	26		83	4	G2WSFR140	●
16	0/-0.070	1.12	+/-0.020	16	32		92	4	G2WSFR160	●
20	0/-0.070	1.40	+/-0.020	20	38		104	4	G2WSFR200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2WSFR

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**	
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	
	6	0.030	0.026	0.023	
	8	0.045	0.038	0.034	
	10	0.060	0.051	0.045	
	12	0.072	0.061	0.054	
	14	0.085	0.072	0.064	
	16	0.096	0.082	0.072	
	20	0.120	0.102	0.090	

D6-8: Z3
D10-20: Z4

G2CS2R

cylindrical shank, 2 flutes, corner radius

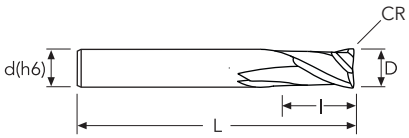
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | RADIUS | Z2



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 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.003	0.003	0.005
	2	0.008	0.007	0.006	0.010
	3	0.012	0.010	0.009	0.016
	4	0.016	0.014	0.012	0.021
	5	0.020	0.017	0.015	0.026
	6	0.025	0.021	0.019	0.033
	8	0.032	0.027	0.024	0.042
	10	0.038	0.032	0.029	0.049
	12	0.045	0.038	0.034	0.059

< D3 mm: ap = 0.2D

SIDE MILLING	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.005	0.004	0.004	0.006
	2	0.010	0.008	0.007	0.012
	3	0.014	0.012	0.011	0.019
	4	0.019	0.016	0.014	0.025
	5	0.024	0.020	0.018	0.031
	6	0.030	0.026	0.023	0.039
	8	0.038	0.033	0.029	0.050
	10	0.046	0.039	0.034	0.059
	12	0.054	0.046	0.041	0.070

< D3 mm: ae = 0.2D

DRILLING	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	
	ap x ae	**D x D**	**D x D**	**D x D**	**D x D**
	Vc (m/min)	**70÷90**	**40÷60**	**25÷35**	**80÷100**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.002	0.002	0.002	0.003
	2	0.005	0.004	0.004	0.006
	3	0.007	0.006	0.005	0.009
	4	0.010	0.008	0.007	0.012
	5	0.012	0.010	0.009	0.016
	6	0.015	0.013	0.011	0.020
	8	0.019	0.016	0.014	0.025
	10	0.023	0.019	0.017	0.030
	12	0.027	0.023	0.020	0.035

< D3 mm: ap = 0.5D

G2CS4R

cylindrical shank, 4 flutes, corner radius

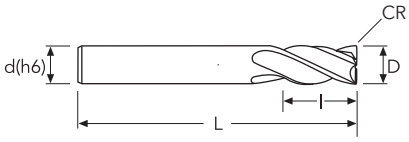
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | RADIUS | Z4



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 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.003	0.003	0.005
	2	0.007	0.006	0.005	0.009
	3	0.010	0.009	0.008	0.013
	4	0.013	0.011	0.010	0.017
	5	0.016	0.014	0.012	0.021
	6	0.019	0.016	0.014	0.025
	8	0.025	0.021	0.019	0.033
	10	0.032	0.027	0.024	0.042
	12	0.040	0.034	0.030	0.052

< D3 mm: ae = 0.1D

G2CL4R

cylindrical shank, 4 flutes, long, corner radius

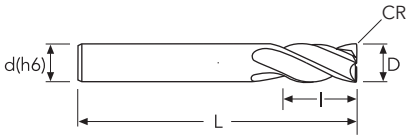
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | RADIUS | Z4



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

	Material Group ISO 513	P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.003	0.003	0.004
	2	0.006	0.005	0.005	0.007
	3	0.009	0.008	0.007	0.010
	4	0.012	0.010	0.009	0.013
	5	0.015	0.013	0.011	0.017
	6	0.017	0.014	0.013	0.019
	8	0.023	0.020	0.017	0.030
	10	0.029	0.025	0.022	0.038
	12	0.036	0.031	0.027	0.047

< D3 mm: ae = 0.1D

GB255

cylindrical shank, 2 flutes ball nose

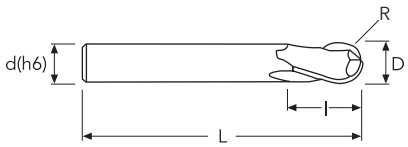
OSAWA NORM | N | MG / BR | <45 HRC | 30° | BALL NOSE | Z2 BALL



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 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
Hardness/Rm		≤700 N/mm²	600÷1000 N/mm²	≤35 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)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**
1	**0.60**	0.030	0.023	0.021	0.036
2	**1.20**	0.040	0.030	0.028	0.048
3	**1.80**	0.050	0.038	0.035	0.060
4	**2.40**	0.060	0.045	0.042	0.072
5	**3.00**	0.070	0.053	0.049	0.084
6	**3.60**	0.080	0.060	0.056	0.096
8	**4.80**	0.090	0.068	0.063	0.108
10	**6.00**	0.105	0.079	0.074	0.126
12	**7.20**	0.120	0.090	0.084	0.144

G2CSB2

cylindrical shank, 2 flutes ball nose

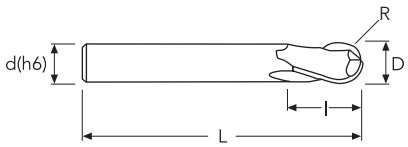
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | BALL NOSE | Z2 BALL



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	3	3		50	2	G2CSB2010S03	●
1	0/-0.020	0.50	+/-0.015	4	2		50	2	G2CSB2010	●
1.5	0/-0.020	0.75	+/-0.015	3	5		50	2	G2CSB2015S03	●
1.5	0/-0.020	0.75	+/-0.015	4	3		50	2	G2CSB2015	●
2	0/-0.020	1.00	+/-0.015	3	7		50	2	G2CSB2020S03	●
2	0/-0.020	1.00	+/-0.015	4	4		50	2	G2CSB2020	●
2.5	0/-0.020	1.25	+/-0.015	3	8		50	2	G2CSB2025S03	●
2.5	0/-0.020	1.25	+/-0.015	4	5		50	2	G2CSB2025	●
3	0/-0.020	1.50	+/-0.015	3	9		50	2	G2CSB2030S03	●
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	5	10		50	2	G2CSB2050S05	●
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

	Material Group ISO 513		P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm		≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	**0.60**	0.030	0.023	0.021	0.036
	2	**1.20**	0.040	0.030	0.028	0.048
	3	**1.80**	0.050	0.038	0.035	0.060
	4	**2.40**	0.060	0.045	0.042	0.072
	5	**3.00**	0.070	0.053	0.049	0.084
	6	**3.60**	0.080	0.060	0.056	0.096
	8	**4.80**	0.090	0.068	0.063	0.108
	10	**6.00**	0.105	0.079	0.074	0.126
	12	**7.20**	0.120	0.090	0.084	0.144
	16	**9.60**	0.150	0.113	0.105	0.180
	20	**12.00**	0.180	0.135	0.126	0.216

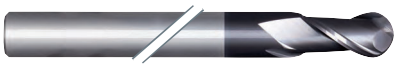
G2250-51

cylindrical shank, 2 flutes ball nose, long

OSAWA NORM | N | MG PV200 | <45 HRC | 30° | BALL NOSE | Z2 BALL



G2250

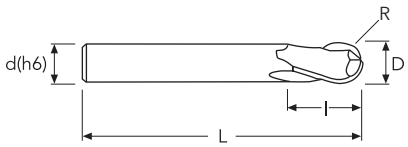


G2251

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	3	6		75	2	G2250030S03	●
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	5	8		75	2	G2250050S05	●
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

COPYING	Material Group ISO 513		P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm		≤700 N/mm²	600÷1000 N/mm²	≤35 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	**0.60**	0.027	0.020	0.019	0.032
	2	**1.20**	0.036	0.027	0.025	0.043
	3	**1.80**	0.045	0.034	0.032	0.054
	4	**2.40**	0.054	0.041	0.038	0.065
	5	**3.00**	0.063	0.047	0.044	0.076
	6	**3.60**	0.072	0.054	0.050	0.086
	8	**4.80**	0.081	0.061	0.057	0.097
	10	**6.00**	0.095	0.071	0.066	0.113
	12	**7.20**	0.108	0.081	0.076	0.130

G2251

COPYING	Material Group ISO 513		P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm		≤700 N/mm²	600÷1000 N/mm²	≤35 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**
	D (mm)	D(eff.) (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	**3.60**	0.058	0.044	0.041	0.070
	8	**4.80**	0.066	0.049	0.046	0.079
	10	**6.00**	0.077	0.057	0.054	0.092
	12	**7.20**	0.087	0.066	0.061	0.105
	16	**9.60**	0.122	0.092	0.085	0.146
	20	**12.00**	0.146	0.110	0.102	0.175

G2CSB4

cylindrical shank, 4 flutes ball nose

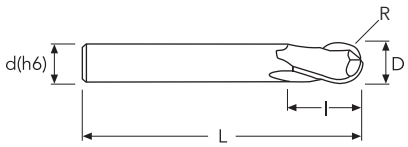
OSAWA NORM | N | MG PV200 | <45 HRC | 30° | BALL NOSE | Z4 BALL



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	4	G2CSB4010	●
1.5	0/-0.020	0.75	+/-0.015	4	3		50	4	G2CSB4015	●
2	0/-0.020	1.00	+/-0.015	4	4		50	4	G2CSB4020	●
3	0/-0.020	1.50	+/-0.015	4	6		50	4	G2CSB4030	●
4	0/-0.020	2.00	+/-0.015	4	8		50	4	G2CSB4040	●
5	0/-0.020	2.50	+/-0.015	6	10		50	4	G2CSB4050	●
6	0/-0.020	3.00	+/-0.015	6	12		50	4	G2CSB4060	●
8	0/-0.025	4.00	+/-0.015	8	16		60	4	G2CSB4080	●
10	0/-0.025	5.00	+/-0.015	10	20		75	4	G2CSB4100	●
12	0/-0.025	6.00	+/-0.015	12	24		75	4	G2CSB4120	●
16	0/-0.030	8.00	+/-0.015	16	30		92	4	G2CSB4160	●
20	0/-0.030	10.00	+/-0.015	20	30		100	4	G2CSB4200	●

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

G2CSB4

	Material Group ISO 513		P1 P2 K1	P3 P4 P7 M1 K2	P5 M2 K3	N1 N2 N3 N4
	Hardness/Rm		≤700 N/mm²	600÷1000 N/mm²	≤35 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**
COPYING	D (mm)	D(eff.) (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	**0.60**	0.030	0.023	0.021	0.036
	2	**1.20**	0.040	0.030	0.028	0.048
	3	**1.80**	0.050	0.038	0.035	0.060
	4	**2.40**	0.060	0.045	0.042	0.072
	5	**3.00**	0.070	0.053	0.049	0.084
	6	**3.60**	0.080	0.060	0.056	0.096
	8	**4.80**	0.090	0.068	0.063	0.108
	10	**6.00**	0.105	0.079	0.074	0.126
	12	**7.20**	0.120	0.090	0.084	0.144
	16	**9.60**	0.150	0.113	0.105	0.180
	20	**12.00**	0.180	0.135	0.126	0.216



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.

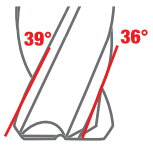
HF EVOlution heißt die Linie der Universalfräser aus mikrokörnigem Hartmetall von Osawa, mit Schneidekanten und spezifischen Beschichtungen zur Hochleistungsbearbeitung von allen Materialien der ISO-Skala. Die Fräser HF EVOlution sind in einer reichen Auswahl an Typologien, Längen und Torusradien erhältlich. 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.

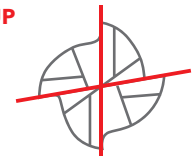
HF EVOlution es la línea de fresas universales de metal duro microgranulado con inclinación y revestimientos específicos para el mecanizado de alto rendimiento de todos los materiales de la escala ISO. Las fresas HF EVOlution están disponibles en una amplia gama de tipologías, longitudes y radios tóricos. 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.

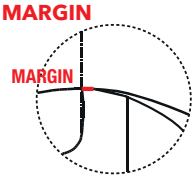
(1) VH



(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.

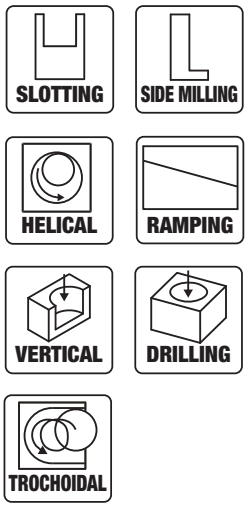
Les fraises HF EVOlution sont des outils universels aussi bien pour tous types de matériaux que pour tous types d'usinages et de stratégies de fraisages applicables : fraisage de pièces taillées dans la masse, contournage, interpolation hélicoïdale, entrée sur rampe, fraisage axial, perçage et fraisage 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 HF535T for trochoidal milling which allows small chips and high feed thanks to the optimized chipbreaker, becoming the optimal choice for high metal removal rate application.
- 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 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'étend désormais avec le nouveau HF535T pour le fraisage trochoïdal qui permet de petits copeaux et une avance élevée grâce au brise-copeaux optimisé, devenant ainsi le choix optimal pour les applications à taux d'enlèvement de copeaux élevé.
- 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 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 HF535T per fresatura trocoidale che favorisce la formazione di trucioli piccoli e consente elevati avanzamenti grazie al rompitruciolo ottimizzato, diventando così la migliore scelta per elevate asportazioni.
- 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 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 crece con la incorporación de la nueva HF535T para fresado trocoidal, qe favorece la formación de viruta pequeña y consiente altos avances gracias a un rompevirutas optimizado, convirtiendose así en la mejor elección para altas profundidades de corte.
- 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 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 HF UNI-Produktpalette wird mit dem neuen HF535T Fräser für Trochoidalfräsen bereichert, der sehr kleine Späne erzeugt und dank des optimierten Spanbrechers hohe Vorschübe ermöglicht, wodurch er zur besten Wahl für hohe Abtragsraten wird.
- 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 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. Серия HF UNI теперь расширена за счет новинки HF535T для трохоидального фрезерования, которое позволяет получать мелкую стружку и работать на более высоких подачах благодаря оптимизированному стружколому, и является оптимальным выбором для задач с высокой скоростью удаление стружки.
- 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

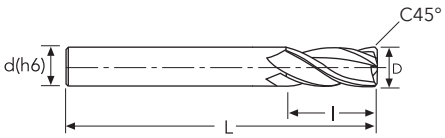
OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | Z4 UP



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/-0.020	0.10	+/-0.020	6	9		57	4	HF840030	●
4	0/-0.020	0.10	+/-0.020	6	11		57	4	HF840040	●
5	0/-0.020	0.10	+/-0.020	6	13		57	4	HF840050	●
6	0/-0.020	0.10	+/-0.020	6	13		57	4	HF840060	●
8	0/-0.020	0.20	+/-0.020	8	20		64	4	HF840080	●
10	0/-0.020	0.20	+/-0.020	10	22		72	4	HF840100	●
12	0/-0.020	0.20	+/-0.020	12	26		83	4	HF840120	●
14	0/-0.020	0.30	+/-0.020	14	26		83	4	HF840140	●
16	0/-0.020	0.30	+/-0.020	16	32		92	4	HF840160	●
18	0/-0.020	0.30	+/-0.020	18	32		92	4	HF840180	●
20	0/-0.020	0.40	+/-0.020	20	38		104	4	HF840200	●

● stock standard ○ non-standard stock ∇ stock exhaustion

HF840

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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**	**70÷90**	**50÷70**	**30÷50**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.014	0.013	0.011	0.010
	4	0.019	0.017	0.014	0.013
	5	0.023	0.021	0.017	0.016
	6	0.027	0.024	0.020	0.019
	8	0.035	0.032	0.026	0.025
	10	0.042	0.038	0.032	0.029
	12	0.048	0.043	0.036	0.034
	14	0.054	0.049	0.041	0.038
	16	0.060	0.054	0.045	0.042
	18	0.066	0.059	0.050	0.046
	20	0.073	0.066	0.055	0.051
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.017	0.015	0.013	0.018
	4	0.022	0.020	0.018	0.024
	5	0.028	0.025	0.022	0.030
	6	0.032	0.029	0.026	0.036
	8	0.042	0.038	0.034	0.046
	10	0.050	0.045	0.040	0.055
	12	0.058	0.052	0.046	0.063
	14	0.065	0.058	0.052	0.071
	16	0.072	0.065	0.058	0.079
	18	0.079	0.071	0.063	0.087
	20	0.088	0.079	0.070	0.096
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.010	0.010	0.008	0.008
	4	0.013	0.013	0.011	0.010
	5	0.017	0.016	0.014	0.013
	6	0.020	0.018	0.016	0.015
	8	0.025	0.024	0.021	0.020
	10	0.031	0.029	0.025	0.024
	12	0.035	0.033	0.029	0.027
	14	0.039	0.037	0.032	0.030
	16	0.044	0.041	0.036	0.034
	18	0.048	0.045	0.040	0.037
	20	0.053	0.050	0.044	0.041
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF840

RAMPING

Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.022	0.020	0.019	0.026
8	0.028	0.026	0.024	0.034
10	0.034	0.031	0.029	0.040
12	0.038	0.035	0.034	0.046
14	0.043	0.040	0.038	0.052
16	0.048	0.044	0.042	0.058
18	0.053	0.048	0.046	0.063
20	0.058	0.054	0.051	0.070

VERTICAL

Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.027	0.024	0.020	0.019
8	0.035	0.032	0.026	0.025
10	0.042	0.038	0.032	0.029
12	0.048	0.043	0.036	0.034
14	0.054	0.049	0.041	0.038
16	0.060	0.054	0.045	0.042
18	0.066	0.059	0.050	0.046
20	0.073	0.066	0.055	0.051

DRILLING

Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
Hardness/Rm	≤700 N/mm²	600÷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**	**20÷40**
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
3	0.007	0.006	0.006	0.008
4	0.009	0.008	0.007	0.010
5	0.012	0.010	0.009	0.013
6	0.014	0.012	0.011	0.015
8	0.018	0.016	0.014	0.019
10	0.021	0.019	0.017	0.023
12	0.024	0.022	0.019	0.026
14	0.027	0.024	0.022	0.030
16	0.030	0.027	0.024	0.033
18	0.033	0.030	0.026	0.036
20	0.037	0.033	0.029	0.040

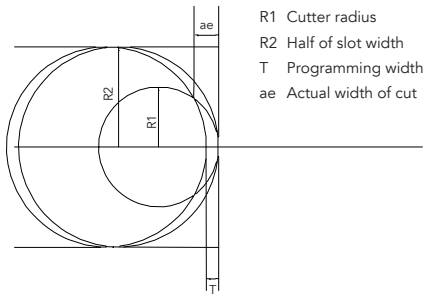
ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

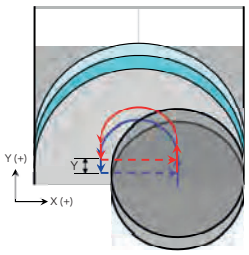
HF840

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.035	0.032	0.028	0.039
	4	0.046	0.042	0.037	0.051
	5	0.058	0.052	0.046	0.063
	6	0.068	0.061	0.054	0.074
	8	0.088	0.079	0.070	0.096
	10	0.105	0.095	0.084	0.116
	12	0.120	0.108	0.096	0.132
	14	0.135	0.122	0.108	0.149
	16	0.150	0.135	0.120	0.165
	18	0.165	0.149	0.132	0.182
	20	0.183	0.164	0.146	0.201
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



HF440

cylindrical shank and reduced neck, 45° chamfer

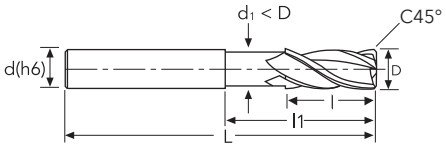
OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | Z4 UP



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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.013	0.011	0.009	0.009
	4	0.017	0.015	0.012	0.012
	5	0.021	0.019	0.016	0.014
	6	0.024	0.022	0.018	0.017
	8	0.032	0.028	0.024	0.022
	10	0.038	0.034	0.028	0.026
	12	0.043	0.039	0.032	0.030
	14	0.049	0.044	0.036	0.034
	16	0.054	0.049	0.041	0.038
	20	0.066	0.059	0.049	0.046
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 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	ap x ae	**1.5D x D**	**1.5D x D**		
	Vc (m/min)	**85÷105**	**55÷75**		
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)		
	8	0.025	0.023		
	10	0.030	0.027		
	12	0.035	0.031		
	14	0.039	0.035		
	16	0.043	0.039		
	20	0.053	0.047		

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.015	0.014	0.012	0.017
	4	0.020	0.018	0.016	0.022
	5	0.025	0.022	0.020	0.027
	6	0.029	0.026	0.023	0.032
	8	0.038	0.034	0.030	0.042
	10	0.045	0.041	0.036	0.050
	12	0.052	0.047	0.041	0.057
	14	0.058	0.052	0.047	0.064
	16	0.065	0.058	0.052	0.071
	20	0.079	0.071	0.063	0.087
ap x ae	**≤ D5**	1.5D x 0.25D	1.5D x 0.25D	1.2D x 0.1D	1.2D x 0.1D

INFO
CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA
HSS DRILLS
LFTA
SUTA
HSS-HSS/CO
CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH
HSS END-MILLS
CARBIDE BURRS

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF440

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	**110÷130**	**70÷90**	**50÷70**	**30÷50**
HELICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.009	0.009	0.008	0.007
	4	0.012	0.011	0.010	0.009
	5	0.015	0.014	0.012	0.012
	6	0.018	0.016	0.015	0.014
	8	0.023	0.021	0.019	0.018
	10	0.028	0.026	0.023	0.021
	12	0.031	0.029	0.026	0.024
	14	0.035	0.033	0.029	0.027
	16	0.039	0.037	0.032	0.030
	20	0.048	0.045	0.039	0.037
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.019	0.018	0.017	0.023
	8	0.025	0.023	0.022	0.030
	10	0.030	0.028	0.026	0.036
	12	0.034	0.032	0.030	0.042
	14	0.039	0.036	0.034	0.047
	16	0.043	0.040	0.038	0.052
	20	0.052	0.048	0.046	0.063

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	α° x ae	**30° x D**	**15° x D**		
	Vc (m/min)	**80÷100**	**50÷70**		
RAMPING	D (mm)	fz (mm/z)	fz (mm/z)		
	10	0.025	0.023		
	12	0.028	0.026		
	14	0.032	0.029		
	16	0.035	0.032		
	20	0.043	0.039		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF440

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.024	0.022	0.018	0.017
	8	0.032	0.028	0.024	0.022
	10	0.038	0.034	0.028	0.026
	12	0.043	0.039	0.032	0.030
	14	0.049	0.044	0.036	0.034
	16	0.054	0.049	0.041	0.038
	20	0.066	0.059	0.049	0.046

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.006	0.006	0.005	0.007
	4	0.008	0.007	0.007	0.009
	5	0.010	0.009	0.008	0.011
	6	0.012	0.011	0.010	0.013
	8	0.016	0.014	0.013	0.017
	10	0.019	0.017	0.015	0.021
	12	0.022	0.019	0.017	0.024
	14	0.024	0.022	0.019	0.027
	16	0.027	0.024	0.022	0.030
	20	0.033	0.030	0.026	0.036
ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

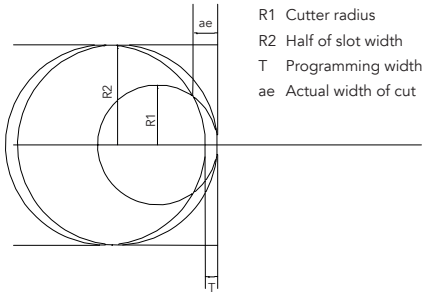
CARBIDE BURRS

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

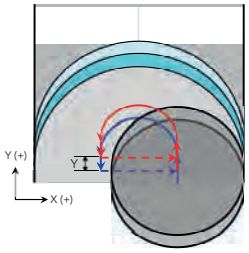
HF440

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	**160÷200**	**110÷130**	**80÷100**	**50÷70**
TROCHOIDAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.032	0.028	0.025	0.035
	4	0.042	0.037	0.033	0.046
	5	0.052	0.047	0.041	0.057
	6	0.061	0.055	0.049	0.067
	8	0.079	0.071	0.063	0.087
	10	0.095	0.085	0.076	0.104
	12	0.108	0.097	0.086	0.119
	14	0.122	0.109	0.097	0.134
	16	0.135	0.122	0.108	0.149
	20	0.164	0.148	0.131	0.181
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

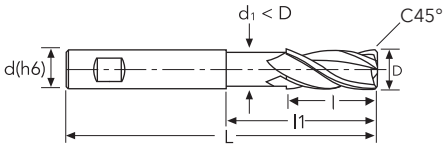
OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | Z4 UP



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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.013	0.011	0.009	0.009
	4	0.017	0.015	0.012	0.012
	5	0.021	0.019	0.016	0.014
	6	0.024	0.022	0.018	0.017
	8	0.032	0.028	0.024	0.022
	10	0.038	0.034	0.028	0.026
	12	0.043	0.039	0.032	0.030
	14	0.049	0.044	0.036	0.034
	16	0.054	0.049	0.041	0.038
	18	0.059	0.053	0.045	0.042
	20	0.066	0.059	0.049	0.046
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 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	ap x ae	**1.5D x D**	**1.5D x D**		
	Vc (m/min)	**85÷105**	**55÷75**		
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)		
	8	0.025	0.023		
	10	0.030	0.027		
	12	0.035	0.031		
	14	0.039	0.035		
	16	0.043	0.039		
	18	0.048	0.043		
	20	0.053	0.047		

	Material Group ISO 513	P1 P2 P7 K1			
	Hardness/Rm	≤700 N/mm²			
	ap x ae	**2D x D**			
	Vc (m/min)	**60÷80**			
SLOTTING	D (mm)	fz (mm/z)			
	10	0.023			
	12	0.026			
	14	0.029			
	16	0.032			
	18	0.036			
	20	0.039			

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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.015	0.014	0.012	0.017
	4	0.020	0.018	0.016	0.022
	5	0.025	0.022	0.020	0.027
	6	0.029	0.026	0.023	0.032
	8	0.038	0.034	0.030	0.042
	10	0.045	0.041	0.036	0.050
	12	0.052	0.047	0.041	0.057
	14	0.058	0.052	0.047	0.064
	16	0.065	0.058	0.052	0.071
	18	0.071	0.064	0.057	0.078
	20	0.079	0.071	0.063	0.087
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.009	0.009	0.008	0.007
	4	0.012	0.011	0.010	0.009
	5	0.015	0.014	0.012	0.012
	6	0.018	0.016	0.015	0.014
	8	0.023	0.021	0.019	0.018
	10	0.028	0.026	0.023	0.021
	12	0.031	0.029	0.026	0.024
	14	0.035	0.033	0.029	0.027
	16	0.039	0.037	0.032	0.030
	18	0.043	0.040	0.036	0.033
	20	0.048	0.045	0.039	0.037
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.019	0.018	0.017	0.023
	8	0.025	0.023	0.022	0.030
	10	0.030	0.028	0.026	0.036
	12	0.034	0.032	0.030	0.042
	14	0.039	0.036	0.034	0.047
	16	0.043	0.040	0.038	0.052
	18	0.047	0.044	0.042	0.057
	20	0.052	0.048	0.046	0.063

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	α° x ae	**30° x D**	**15° x D**		
	Vc (m/min)	**80÷100**	**50÷70**		
RAMPING	D (mm)	fz (mm/z)	fz (mm/z)		
	10	0.025	0.023		
	12	0.028	0.026		
	14	0.032	0.029		
	16	0.035	0.032		
	18	0.039	0.036		
	20	0.043	0.039		

	Material Group ISO 513	P1 P2 P7 K1			
	Hardness/Rm	≤700 N/mm²			
	α° x ae	**45° x D**			
	Vc (m/min)	**60÷80**			
RAMPING	D (mm)	fz (mm/z)			
	10	0.024			
	12	0.028			
	14	0.031			
	16	0.035			
	18	0.038			
	20	0.042			

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
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HF441

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.024	0.022	0.018	0.017
	8	0.032	0.028	0.024	0.022
	10	0.038	0.034	0.028	0.026
	12	0.043	0.039	0.032	0.030
	14	0.049	0.044	0.036	0.034
	16	0.054	0.049	0.041	0.038
	18	0.059	0.053	0.045	0.042
	20	0.066	0.059	0.049	0.046

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.006	0.006	0.005	0.007
	4	0.008	0.007	0.007	0.009
	5	0.010	0.009	0.008	0.011
	6	0.012	0.011	0.010	0.013
	8	0.016	0.014	0.013	0.017
	10	0.019	0.017	0.015	0.021
	12	0.022	0.019	0.017	0.024
	14	0.024	0.022	0.019	0.027
	16	0.027	0.024	0.022	0.030
	18	0.030	0.027	0.024	0.033
	20	0.033	0.030	0.026	0.036
ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

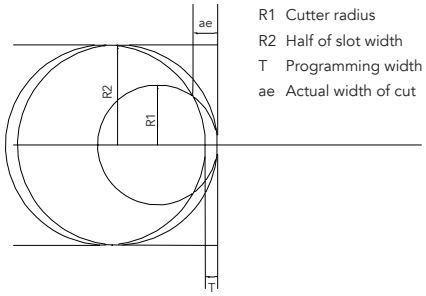
PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF440 PARAMETERS.

CUTTING PARAMETERS

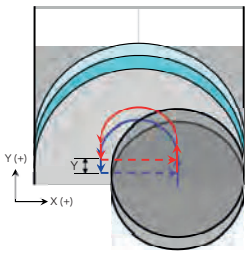
HF441

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.032	0.028	0.025	0.035
	4	0.042	0.037	0.033	0.046
	5	0.052	0.047	0.041	0.057
	6	0.061	0.055	0.049	0.067
	8	0.079	0.071	0.063	0.087
	10	0.095	0.085	0.076	0.104
	12	0.108	0.097	0.086	0.119
	14	0.122	0.109	0.097	0.134
	16	0.135	0.122	0.108	0.149
	18	0.149	0.134	0.119	0.163
	20	0.164	0.148	0.131	0.181
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

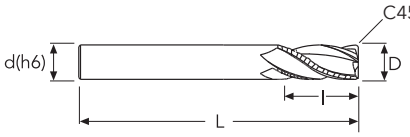
OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | HR FINE | Z4 UP



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/-0.020	0.10	+/-0.020	6	16		57	4	HF844060	●
8	0/-0.020	0.20	+/-0.020	8	20		64	4	HF844080	●
10	0/-0.020	0.20	+/-0.020	10	22		72	4	HF844100	●
12	0/-0.020	0.20	+/-0.020	12	26		83	4	HF844120	●
14	0/-0.020	0.20	+/-0.020	14	26		83	4	HF844140	●
16	0/-0.020	0.30	+/-0.020	16	32		92	4	HF844160	●
18	0/-0.020	0.30	+/-0.020	18	32		92	4	HF844180	●
20	0/-0.020	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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.029	0.026	0.022	0.020
	8	0.038	0.034	0.028	0.026
	10	0.045	0.041	0.034	0.032
	12	0.052	0.047	0.039	0.036
	14	0.058	0.052	0.044	0.041
	16	0.065	0.058	0.049	0.045
	20	0.079	0.071	0.059	0.055

SLOTTING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	ap x ae	**1.5D x D**	**1.5D x D**		
	Vc (m/min)	**85÷105**	**55÷75**		
	D (mm)	fz (mm/z)	fz (mm/z)		
	8	0.030	0.027		
	10	0.036	0.033		
	12	0.041	0.037		
	14	0.047	0.042		
	16	0.052	0.047		
	20	0.063	0.057		

SIDE MILLING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.035	0.031	0.028	0.038
	8	0.045	0.041	0.036	0.050
	10	0.054	0.049	0.044	0.060
	12	0.062	0.056	0.050	0.068
	14	0.070	0.063	0.056	0.077
	16	0.078	0.070	0.062	0.086
	20	0.095	0.085	0.076	0.104

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF844

HELICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.020	0.019	0.016	0.016
	8	0.026	0.024	0.021	0.021
	10	0.031	0.029	0.026	0.025
	12	0.036	0.033	0.029	0.029
	14	0.040	0.037	0.033	0.033
	16	0.045	0.041	0.037	0.036
	20	0.055	0.050	0.045	0.044

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	8	0.030	0.028	0.026	0.036
	10	0.036	0.033	0.032	0.044
	12	0.041	0.038	0.036	0.050
	14	0.047	0.043	0.041	0.056
	16	0.052	0.048	0.045	0.062
	20	0.063	0.058	0.055	0.076

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	α° x ae	**30° x D**	**15° x D**		
	Vc (m/min)	**85÷105**	**45÷65**		
	D (mm)	fz (mm/z)	fz (mm/z)		
	10	0.030	0.027		
	12	0.034	0.031		
	14	0.038	0.035		
	16	0.042	0.039		
	20	0.051	0.047		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

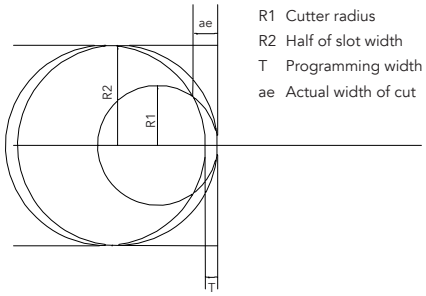
CUTTING PARAMETERS

HF844

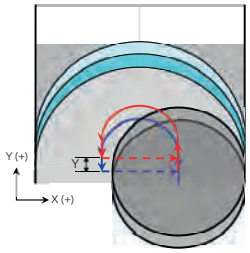
VERTICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x 0.4D**	**D x 0.4D**	**D x 0.25D**	**D x 0.25D**
	Vc (m/min)	**100÷120**	**60÷80**	**45÷65**	**30÷40**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.029	0.026	0.022	0.020
	8	0.038	0.034	0.028	0.026
	10	0.045	0.041	0.034	0.032
	12	0.052	0.047	0.039	0.036
	14	0.058	0.052	0.044	0.041
	16	0.065	0.058	0.049	0.045
	20	0.079	0.071	0.059	0.055

TROCHOIDAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.073	0.066	0.058	0.080
	8	0.095	0.085	0.076	0.104
	10	0.113	0.102	0.091	0.125
	12	0.130	0.117	0.104	0.143
	14	0.146	0.131	0.117	0.160
	16	0.162	0.146	0.130	0.178
	20	0.197	0.177	0.158	0.217

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

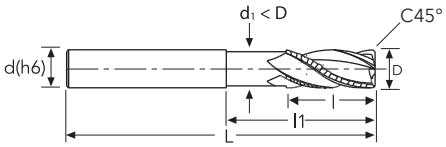


OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | HR FINE | Z4 UP

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/-0.050	0.10	+/-0.020	6	13	20	5.80	57	4	HF444060	●
8	0/-0.050	0.20	+/-0.020	8	20	26	7.80	64	4	HF444080	●
10	0/-0.050	0.20	+/-0.020	10	22	30	9.80	72	4	HF444100	●
12	0/-0.050	0.20	+/-0.020	12	26	36	11.80	83	4	HF444120	●
14	0/-0.050	0.20	+/-0.020	14	26	36	13.70	83	4	HF444140	●
16	0/-0.050	0.30	+/-0.020	16	32	42	15.70	92	4	HF444160	●
20	0/-0.050	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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.026	0.024	0.020	0.018
	8	0.034	0.031	0.026	0.024
	10	0.041	0.037	0.031	0.029
	12	0.047	0.042	0.035	0.033
	14	0.052	0.047	0.039	0.037
	16	0.058	0.052	0.044	0.041
	20	0.071	0.064	0.053	0.050

SLOTTING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	ap x ae	**1.5D x D**	**1.5D x D**		
	Vc (m/min)	**85÷105**	**55÷75**		
	D (mm)	fz (mm/z)	fz (mm/z)		
	8	0.027	0.024		
	10	0.033	0.029		
	12	0.037	0.034		
	14	0.042	0.038		
	16	0.047	0.042		
	20	0.057	0.051		

SIDE MILLING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.031	0.028	0.025	0.035
	8	0.041	0.037	0.033	0.045
	10	0.049	0.044	0.039	0.054
	12	0.056	0.050	0.045	0.062
	14	0.063	0.057	0.050	0.069
	16	0.070	0.063	0.056	0.077
	20	0.085	0.077	0.068	0.094

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF444

HELICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.017	0.016	0.015
	8	0.024	0.022	0.020	0.019
	10	0.029	0.027	0.025	0.023
	12	0.033	0.031	0.028	0.026
	14	0.037	0.034	0.032	0.029
	16	0.041	0.038	0.035	0.033
	20	0.050	0.046	0.043	0.040

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	8	0.027	0.025	0.024	0.033
	10	0.033	0.030	0.029	0.039
	12	0.037	0.034	0.033	0.045
	14	0.042	0.039	0.037	0.050
	16	0.047	0.043	0.041	0.056
	20	0.057	0.052	0.050	0.068

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	α° x ae	**30° x D**	**15° x D**		
	Vc (m/min)	**80÷100**	**50÷70**		
	D (mm)	fz (mm/z)	fz (mm/z)		
	10	0.027	0.024		
	12	0.030	0.028		
	14	0.034	0.031		
	16	0.038	0.035		
	20	0.046	0.042		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

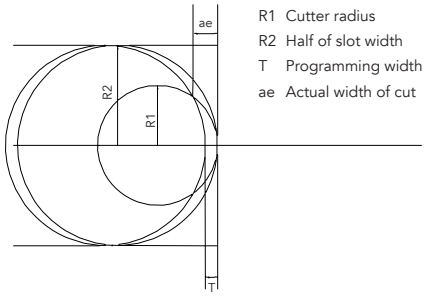
CUTTING PARAMETERS

HF444

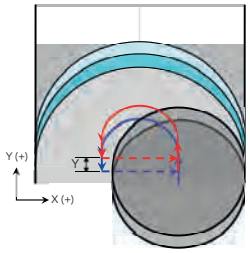
VERTICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x 0.4D**	**D x 0.4D**	**D x 0.25D**	**D x 0.25D**
	Vc (m/min)	**100÷120**	**60÷80**	**45÷65**	**30÷40**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.026	0.024	0.020	0.018
	8	0.034	0.031	0.026	0.024
	10	0.041	0.037	0.031	0.029
	12	0.047	0.042	0.035	0.033
	14	0.052	0.047	0.039	0.037
	16	0.058	0.052	0.044	0.041
	20	0.071	0.064	0.053	0.050

TROCHOIDAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.066	0.059	0.052	0.072
	8	0.085	0.077	0.068	0.094
	10	0.102	0.092	0.082	0.112
	12	0.117	0.105	0.093	0.128
	14	0.131	0.118	0.105	0.144
	16	0.146	0.131	0.117	0.160
	20	0.177	0.160	0.142	0.195

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

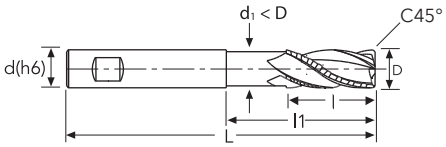


OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | HR FINE | Z4 UP

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/-0.050	0.10	+/-0.020	6	13	20	5.80	57	4	HF445060	●
8	0/-0.050	0.20	+/-0.020	8	20	26	7.80	64	4	HF445080	●
10	0/-0.050	0.20	+/-0.020	10	22	30	9.80	72	4	HF445100	●
12	0/-0.050	0.20	+/-0.020	12	26	36	11.80	83	4	HF445120	●
14	0/-0.050	0.20	+/-0.020	14	26	36	13.70	83	4	HF445140	●
16	0/-0.050	0.30	+/-0.020	16	32	42	15.70	92	4	HF445160	●
20	0/-0.050	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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.026	0.024	0.020	0.018
	8	0.034	0.031	0.026	0.024
	10	0.041	0.037	0.031	0.029
	12	0.047	0.042	0.035	0.033
	14	0.052	0.047	0.039	0.037
	16	0.058	0.052	0.044	0.041
	20	0.071	0.064	0.053	0.050

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	ap x ae	**1.5D x D**	**1.5D x D**		
	Vc (m/min)	**85÷105**	**55÷75**		
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)		
	8	0.027	0.024		
	10	0.033	0.029		
	12	0.037	0.034		
	14	0.042	0.038		
	16	0.047	0.042		
	20	0.057	0.051		

	Material Group ISO 513	P1 P2 P7 K1			
	Hardness/Rm	≤700 N/mm²			
	ap x ae	**2D x D**			
	Vc (m/min)	**60÷80**			
SLOTTING	D (mm)	fz (mm/z)			
	10	0.024			
	12	0.028			
	14	0.031			
	16	0.035			
	20	0.043			

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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.031	0.028	0.025	0.035
	8	0.041	0.037	0.033	0.045
	10	0.049	0.044	0.039	0.054
	12	0.056	0.050	0.045	0.062
	14	0.063	0.057	0.050	0.069
	16	0.070	0.063	0.056	0.077
	20	0.085	0.077	0.068	0.094

HELICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.017	0.016	0.015
	8	0.024	0.022	0.020	0.019
	10	0.029	0.027	0.025	0.023
	12	0.033	0.031	0.028	0.026
	14	0.037	0.034	0.032	0.029
	16	0.041	0.038	0.035	0.033
	20	0.050	0.046	0.043	0.040

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	8	0.027	0.025	0.024	0.033
	10	0.033	0.030	0.029	0.039
	12	0.037	0.034	0.033	0.045
	14	0.042	0.039	0.037	0.050
	16	0.047	0.043	0.041	0.056
	20	0.057	0.052	0.050	0.068

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 P7 K1	P3 P4 M1 K2 K3		
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
α° x ae	**30° x D**	**15° x D**		
Vc (m/min)	**80÷100**	**50÷70**		
D (mm)	fz (mm/z)	fz (mm/z)		
10	0.027	0.024		
12	0.030	0.028		
14	0.034	0.031		
16	0.038	0.035		
20	0.046	0.042		

RAMPING

Material Group ISO 513	P1 P2 P7 K1			
Hardness/Rm	≤700 N/mm²			
α° x ae	**45° x D**			
Vc (m/min)	**60÷80**			
D (mm)	fz (mm/z)			
10	0.026			
12	0.030			
14	0.034			
16	0.038			
20	0.046			

VERTICAL

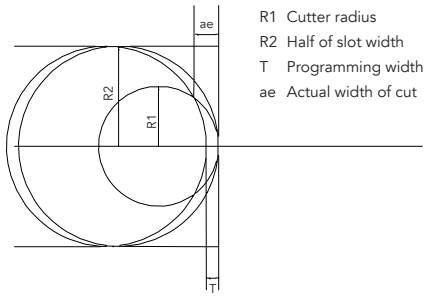
Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
ap x ae	**D x 0.4D**	**D x 0.4D**	**D x 0.25D**	**D x 0.25D**
Vc (m/min)	**100÷120**	**60÷80**	**45÷65**	**30÷40**
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.026	0.024	0.020	0.018
8	0.034	0.031	0.026	0.024
10	0.041	0.037	0.031	0.029
12	0.047	0.042	0.035	0.033
14	0.052	0.047	0.039	0.037
16	0.058	0.052	0.044	0.041
20	0.071	0.064	0.053	0.050

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF444 PARAMETERS.

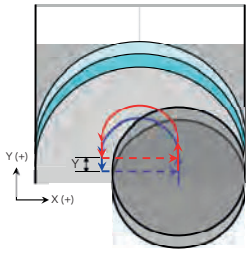
HF445

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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**
TROCHOIDAL	Vc (m/min)	**160÷200**	**110÷130**	**80÷100**	**50÷70**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.066	0.059	0.052	0.072
	8	0.085	0.077	0.068	0.094
	10	0.102	0.092	0.082	0.112
	12	0.117	0.105	0.093	0.128
	14	0.131	0.118	0.105	0.144
	16	0.146	0.131	0.117	0.160
	20	0.177	0.160	0.142	0.195

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

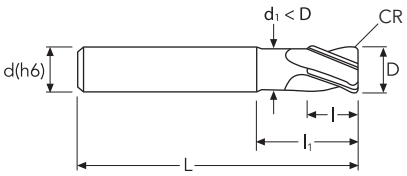


OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.014	0.013	0.011	0.010
	4	0.019	0.017	0.014	0.013
	5	0.023	0.021	0.017	0.016
	6	0.027	0.024	0.020	0.019
	8	0.035	0.032	0.026	0.025
	10	0.042	0.038	0.032	0.029
	12	0.048	0.043	0.036	0.034
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	**160÷180**	**100÷120**	**70÷90**	**40÷60**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.017	0.015	0.013	0.018
	4	0.022	0.020	0.018	0.024
	5	0.028	0.025	0.022	0.030
	6	0.032	0.029	0.026	0.036
	8	0.042	0.038	0.034	0.046
	10	0.050	0.045	0.040	0.055
	12	0.058	0.052	0.046	0.063
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.010	0.010	0.008	0.008
	4	0.013	0.013	0.011	0.010
	5	0.017	0.016	0.014	0.013
	6	0.020	0.018	0.016	0.015
	8	0.025	0.024	0.021	0.020
	10	0.031	0.029	0.025	0.024
	12	0.035	0.033	0.029	0.027
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

INFO
CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA
HSS DRILLS
LFTA
SUTA
HSS-HSS/CO
CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH
HSS END-MILLS
CARBIDE BURRS

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF342

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	**120÷140**	**70÷90**	**55÷75**	**25÷45**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.022	0.020	0.019	0.026
	8	0.028	0.026	0.024	0.034
	10	0.034	0.031	0.029	0.040
	12	0.038	0.035	0.034	0.046

VERTICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.027	0.024	0.020	0.019
	8	0.035	0.032	0.026	0.025
	10	0.042	0.038	0.032	0.029
	12	0.048	0.043	0.036	0.034

DRILLING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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**	**20÷40**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.007	0.006	0.006	0.008
	4	0.009	0.008	0.007	0.010
	5	0.012	0.010	0.009	0.013
	6	0.014	0.012	0.011	0.015
	8	0.018	0.016	0.014	0.019
	10	0.021	0.019	0.017	0.023
	12	0.024	0.022	0.019	0.026
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

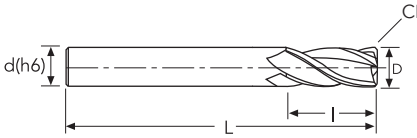


OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

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	+/-0.015	6	11		57	4	HF84203040	●
4	0/-0.025	0.50	+/-0.015	6	11		57	4	HF84205040	●
5	0/-0.025	0.30	+/-0.015	6	13		57	4	HF84203050	●
5	0/-0.025	0.50	+/-0.015	6	13		57	4	HF84205050	●
6	0/-0.025	0.30	+/-0.015	6	13		57	4	HF84203060	●
6	0/-0.025	0.50	+/-0.015	6	13		57	4	HF84205060	●
6	0/-0.025	1.00	+/-0.015	6	13		57	4	HF84210060	●
8	0/-0.030	0.50	+/-0.015	8	20		64	4	HF84205080	●
8	0/-0.030	1.00	+/-0.015	8	20		64	4	HF84210080	●
10	0/-0.030	0.50	+/-0.020	10	22		72	4	HF84205100	●
10	0/-0.030	1.00	+/-0.020	10	22		72	4	HF84210100	●
12	0/-0.030	0.50	+/-0.020	12	26		83	4	HF84205120	●
12	0/-0.030	1.00	+/-0.020	12	26		83	4	HF84210120	●
12	0/-0.030	2.00	+/-0.020	12	26		83	4	HF84220120	●
12	0/-0.030	3.00	+/-0.020	12	26		83	4	HF84230120	●
14	0/-0.030	1.00	+/-0.020	14	26		83	4	HF84210140	●
16	0/-0.030	1.00	+/-0.020	16	32		92	4	HF84210160	●
16	0/-0.030	2.00	+/-0.020	16	32		92	4	HF84220160	●
16	0/-0.030	3.00	+/-0.020	16	32		92	4	HF84230160	●
18	0/-0.030	1.00	+/-0.020	18	32		92	4	HF84210180	●
20	0/-0.030	1.00	+/-0.020	20	38		104	4	HF84210200	●
20	0/-0.030	2.00	+/-0.020	20	38		104	4	HF84220200	●
20	0/-0.030	3.00	+/-0.020	20	38		104	4	HF84230200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF842

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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**	**70÷90**	**50÷70**	**30÷50**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.014	0.013	0.011	0.010
	4	0.019	0.017	0.014	0.013
	5	0.023	0.021	0.017	0.016
	6	0.027	0.024	0.020	0.019
	8	0.035	0.032	0.026	0.025
	10	0.042	0.038	0.032	0.029
	12	0.048	0.043	0.036	0.034
	14	0.054	0.049	0.041	0.038
	16	0.060	0.054	0.045	0.042
	18	0.066	0.059	0.050	0.046
	20	0.073	0.066	0.055	0.051
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	**160÷180**	**100÷120**	**70÷90**	**40÷60**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.017	0.015	0.013	0.018
	4	0.022	0.020	0.018	0.024
	5	0.028	0.025	0.022	0.030
	6	0.032	0.029	0.026	0.036
	8	0.042	0.038	0.034	0.046
	10	0.050	0.045	0.040	0.055
	12	0.058	0.052	0.046	0.063
	14	0.065	0.058	0.052	0.071
	16	0.072	0.065	0.058	0.079
	18	0.079	0.071	0.063	0.087
	20	0.088	0.079	0.070	0.096
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.010	0.010	0.008	0.008
	4	0.013	0.013	0.011	0.010
	5	0.017	0.016	0.014	0.013
	6	0.020	0.018	0.016	0.015
	8	0.025	0.024	0.021	0.020
	10	0.031	0.029	0.025	0.024
	12	0.035	0.033	0.029	0.027
	14	0.039	0.037	0.032	0.030
	16	0.044	0.041	0.036	0.034
	18	0.048	0.045	0.040	0.037
	20	0.053	0.050	0.044	0.041
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF842

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.022	0.020	0.019	0.026
	8	0.028	0.026	0.024	0.034
	10	0.034	0.031	0.029	0.040
	12	0.038	0.035	0.034	0.046
	14	0.043	0.040	0.038	0.052
	16	0.048	0.044	0.042	0.058
	18	0.053	0.048	0.046	0.063
	20	0.058	0.054	0.051	0.070

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.027	0.024	0.020	0.019
	8	0.035	0.032	0.026	0.025
	10	0.042	0.038	0.032	0.029
	12	0.048	0.043	0.036	0.034
	14	0.054	0.049	0.041	0.038
	16	0.060	0.054	0.045	0.042
	18	0.066	0.059	0.050	0.046
	20	0.073	0.066	0.055	0.051

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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**	**20÷40**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.007	0.006	0.006	0.008
	4	0.009	0.008	0.007	0.010
	5	0.012	0.010	0.009	0.013
	6	0.014	0.012	0.011	0.015
	8	0.018	0.016	0.014	0.019
	10	0.021	0.019	0.017	0.023
	12	0.024	0.022	0.019	0.026
	14	0.027	0.024	0.022	0.030
	16	0.030	0.027	0.024	0.033
	18	0.033	0.030	0.026	0.036
	20	0.037	0.033	0.029	0.040
ap x ae	**≤ D5**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

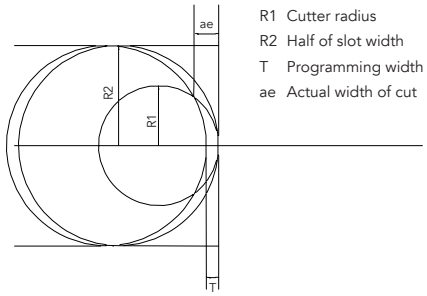
PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

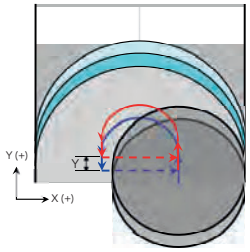
HF842

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.035	0.032	0.028	0.039
	4	0.046	0.042	0.037	0.051
	5	0.058	0.052	0.046	0.063
	6	0.068	0.061	0.054	0.074
	8	0.088	0.079	0.070	0.096
	10	0.105	0.095	0.084	0.116
	12	0.120	0.108	0.096	0.132
	14	0.135	0.122	0.108	0.149
	16	0.150	0.135	0.120	0.165
	18	0.165	0.149	0.132	0.182
	20	0.183	0.164	0.146	0.201
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

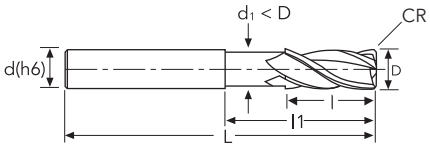
OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP



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

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.013	0.011	0.009	0.009
	4	0.017	0.015	0.012	0.012
	5	0.021	0.019	0.016	0.014
	6	0.024	0.022	0.018	0.017
	8	0.032	0.028	0.024	0.022
	10	0.038	0.034	0.028	0.026
	12	0.043	0.039	0.032	0.030
	14	0.049	0.044	0.036	0.034
	16	0.054	0.049	0.041	0.038
	20	0.066	0.059	0.049	0.046
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 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	ap x ae	**1.5D x D**	**1.5D x D**		
	Vc (m/min)	**85÷105**	**55÷75**		
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)		
	8	0.025	0.023		
	10	0.030	0.027		
	12	0.035	0.031		
	14	0.039	0.035		
	16	0.043	0.039		
	20	0.053	0.047		

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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**	**90÷140**	**60÷80**	**40÷60**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.015	0.014	0.012	0.017
	4	0.020	0.018	0.016	0.022
	5	0.025	0.022	0.020	0.027
	6	0.029	0.026	0.023	0.032
	8	0.038	0.034	0.030	0.042
	10	0.045	0.041	0.036	0.050
	12	0.052	0.047	0.041	0.057
	14	0.058	0.052	0.047	0.064
	16	0.065	0.058	0.052	0.071
	20	0.079	0.071	0.063	0.087
ap x ae	**≤ D5**	1.5D x 0.25D	1.5D x 0.25D	1.2D x 0.1D	1.2D x 0.1D

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA
HSS DRILLS
LFTA
SUTA
HSS-HSS/CO
CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH
HSS END-MILLS
CARBIDE BURRS

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF442

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.009	0.009	0.008	0.007
	4	0.012	0.011	0.010	0.009
	5	0.015	0.014	0.012	0.012
	6	0.018	0.016	0.015	0.014
	8	0.023	0.021	0.019	0.018
	10	0.028	0.026	0.023	0.021
	12	0.031	0.029	0.026	0.024
	14	0.035	0.033	0.029	0.027
	16	0.039	0.037	0.032	0.030
	20	0.048	0.045	0.039	0.037
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.019	0.018	0.017	0.023
	8	0.025	0.023	0.022	0.030
	10	0.030	0.028	0.026	0.036
	12	0.034	0.032	0.030	0.042
	14	0.039	0.036	0.034	0.047
	16	0.043	0.040	0.038	0.052
	20	0.052	0.048	0.046	0.063

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	α° x ae	**30° x D**	**15° x D**		
	Vc (m/min)	**80÷100**	**50÷70**		
RAMPING	D (mm)	fz (mm/z)	fz (mm/z)		
	10	0.025	0.023		
	12	0.028	0.026		
	14	0.032	0.029		
	16	0.035	0.032		
	20	0.043	0.039		

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HF442

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.024	0.022	0.018	0.017
	8	0.032	0.028	0.024	0.022
	10	0.038	0.034	0.028	0.026
	12	0.043	0.039	0.032	0.030
	14	0.049	0.044	0.036	0.034
	16	0.054	0.049	0.041	0.038
	20	0.066	0.059	0.049	0.046

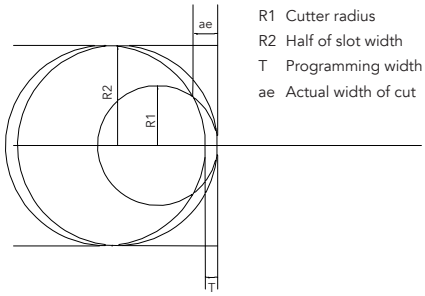
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x D**	**D x D**	**0.5D x D**	**0.5D x D**
	Vc (m/min)	**85÷105**	**55÷75**	**40÷60**	**20÷40**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.006	0.006	0.005	0.007
	4	0.008	0.007	0.007	0.009
	5	0.010	0.009	0.008	0.011
	6	0.012	0.011	0.010	0.013
	8	0.016	0.014	0.013	0.017
	10	0.019	0.017	0.015	0.021
	12	0.022	0.019	0.017	0.024
	14	0.024	0.022	0.019	0.027
	16	0.027	0.024	0.022	0.030
	20	0.033	0.030	0.026	0.036
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

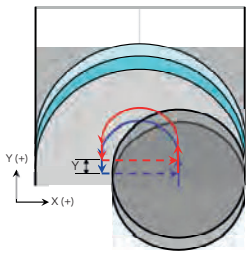
HF442

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.032	0.028	0.025	0.035
	4	0.042	0.037	0.033	0.046
	5	0.052	0.047	0.041	0.057
	6	0.061	0.055	0.049	0.067
	8	0.079	0.071	0.063	0.087
	10	0.095	0.085	0.076	0.104
	12	0.108	0.097	0.086	0.119
	14	0.122	0.109	0.097	0.134
	16	0.135	0.122	0.108	0.149
	20	0.164	0.148	0.131	0.181
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



HF443

weldon shank and reduced neck, corner radius

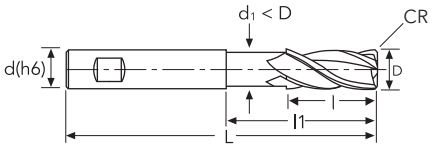
OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP



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

HF443

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.013	0.011	0.009	0.009
	4	0.017	0.015	0.012	0.012
	5	0.021	0.019	0.016	0.014
	6	0.024	0.022	0.018	0.017
	8	0.032	0.028	0.024	0.022
	10	0.038	0.034	0.028	0.026
	12	0.043	0.039	0.032	0.030
	14	0.049	0.044	0.036	0.034
	16	0.054	0.049	0.041	0.038
	18	0.059	0.053	0.045	0.042
	20	0.066	0.059	0.049	0.046
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 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	ap x ae	**1.5D x D**	**1.5D x D**		
	Vc (m/min)	**85÷105**	**55÷75**		
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)		
	8	0.025	0.023		
	10	0.030	0.027		
	12	0.035	0.031		
	14	0.039	0.035		
	16	0.043	0.039		
	18	0.048	0.043		
	20	0.053	0.047		

	Material Group ISO 513	P1 P2 P7 K1			
	Hardness/Rm	≤700 N/mm²			
	ap x ae	**2D x D**			
	Vc (m/min)	**60÷80**			
SLOTTING	D (mm)	fz (mm/z)			
	10	0.023			
	12	0.026			
	14	0.029			
	16	0.032			
	18	0.036			
	20	0.039			

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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.015	0.014	0.012	0.017
	4	0.020	0.018	0.016	0.022
	5	0.025	0.022	0.020	0.027
	6	0.029	0.026	0.023	0.032
	8	0.038	0.034	0.030	0.042
	10	0.045	0.041	0.036	0.050
	12	0.052	0.047	0.041	0.057
	14	0.058	0.052	0.047	0.064
	16	0.065	0.058	0.052	0.071
	18	0.071	0.064	0.057	0.078
	20	0.079	0.071	0.063	0.087
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.009	0.009	0.008	0.007
	4	0.012	0.011	0.010	0.009
	5	0.015	0.014	0.012	0.012
	6	0.018	0.016	0.015	0.014
	8	0.023	0.021	0.019	0.018
	10	0.028	0.026	0.023	0.021
	12	0.031	0.029	0.026	0.024
	14	0.035	0.033	0.029	0.027
	16	0.039	0.037	0.032	0.030
	18	0.043	0.040	0.036	0.033
	20	0.048	0.045	0.039	0.037
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

RAMPING

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.019	0.018	0.017	0.023
	8	0.025	0.023	0.022	0.030
	10	0.030	0.028	0.026	0.036
	12	0.034	0.032	0.030	0.042
	14	0.039	0.036	0.034	0.047
	16	0.043	0.040	0.038	0.052
	18	0.047	0.044	0.042	0.057
	20	0.052	0.048	0.046	0.063

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF442 PARAMETERS.

HF443

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	α° x ae	**30° x D**	**15° x D**		
	Vc (m/min)	**80÷100**	**50÷70**		
	D (mm)	fz (mm/z)	fz (mm/z)		
	10	0.025	0.023		
	12	0.028	0.026		
	14	0.032	0.029		
	16	0.035	0.032		
	18	0.039	0.036		
	20	0.043	0.039		

RAMPING	Material Group ISO 513	P1 P2 P7 K1			
	Hardness/Rm	≤700 N/mm²			
	α° x ae	**45° x D**			
	Vc (m/min)	**60÷80**			
	D (mm)	fz (mm/z)			
	10	0.024			
	12	0.028			
	14	0.031			
	16	0.035			
	18	0.038			
	20	0.042			

VERTICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.024	0.022	0.018	0.017
	8	0.032	0.028	0.024	0.022
	10	0.038	0.034	0.028	0.026
	12	0.043	0.039	0.032	0.030
	14	0.049	0.044	0.036	0.034
	16	0.054	0.049	0.041	0.038
	18	0.059	0.053	0.045	0.042
	20	0.066	0.059	0.049	0.046

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF442 PARAMETERS.

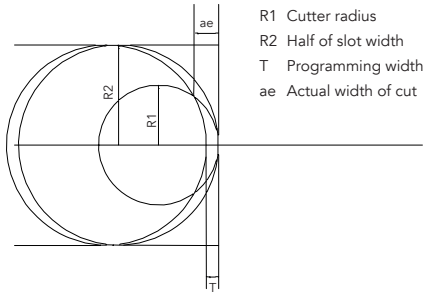
CUTTING PARAMETERS

HF443

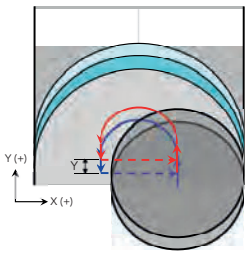
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x D**	**D x D**	**0.5D x D**	**0.5D x D**
	Vc (m/min)	**85÷105**	**55÷75**	**40÷60**	**20÷40**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.006	0.006	0.005	0.007
	4	0.008	0.007	0.007	0.009
	5	0.010	0.009	0.008	0.011
	6	0.012	0.011	0.010	0.013
	8	0.016	0.014	0.013	0.017
	10	0.019	0.017	0.015	0.021
	12	0.022	0.019	0.017	0.024
	14	0.024	0.022	0.019	0.027
	16	0.027	0.024	0.022	0.030
	18	0.030	0.027	0.024	0.033
	20	0.033	0.030	0.026	0.036
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.032	0.028	0.025	0.035
	4	0.042	0.037	0.033	0.046
	5	0.052	0.047	0.041	0.057
	6	0.061	0.055	0.049	0.067
	8	0.079	0.071	0.063	0.087
	10	0.095	0.085	0.076	0.104
	12	0.108	0.097	0.086	0.119
	14	0.122	0.109	0.097	0.134
	16	0.135	0.122	0.108	0.149
	18	0.149	0.134	0.119	0.163
	20	0.164	0.148	0.131	0.181
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

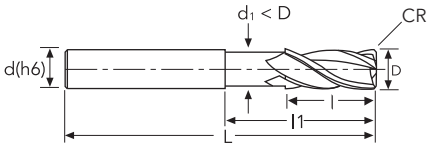


OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

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	+/-0.020	6	12	30	5.80	75	4	HF5420306075	●
6	0/-0.030	0.50	+/-0.020	6	12	30	5.80	75	4	HF5420506075	●
6	0/-0.030	1.00	+/-0.020	6	12	30	5.80	75	4	HF5421006075	●
6	0/-0.030	0.30	+/-0.020	6	12	30	5.80	100	4	HF54203060100	●
6	0/-0.030	0.50	+/-0.020	6	12	30	5.80	100	4	HF54205060100	●
6	0/-0.030	1.00	+/-0.020	6	12	30	5.80	100	4	HF54210060100	●
8	0/-0.030	0.50	+/-0.020	8	16	40	7.80	100	4	HF54205080100	●
8	0/-0.030	1.00	+/-0.020	8	16	40	7.80	100	4	HF54210080100	●
8	0/-0.030	2.00	+/-0.020	8	16	40	7.80	100	4	HF54220080100	●
10	0/-0.030	0.50	+/-0.020	10	20	50	9.80	125	4	HF54205100125	●
10	0/-0.030	1.00	+/-0.020	10	20	50	9.80	125	4	HF54210100125	●
10	0/-0.030	2.00	+/-0.020	10	20	50	9.80	125	4	HF54220100125	●
12	0/-0.030	0.50	+/-0.020	12	24	60	11.80	125	4	HF54205120125	●
12	0/-0.030	1.00	+/-0.020	12	24	60	11.80	125	4	HF54210120125	●
12	0/-0.030	2.00	+/-0.020	12	24	60	11.80	125	4	HF54220120125	●
12	0/-0.030	3.00	+/-0.020	12	24	60	11.80	125	4	HF54230120125	●
12	0/-0.030	0.50	+/-0.020	12	24	60	11.80	150	4	HF54205120150	●
12	0/-0.030	1.00	+/-0.020	12	24	60	11.80	150	4	HF54210120150	●
12	0/-0.030	2.00	+/-0.020	12	24	60	11.80	150	4	HF54220120150	●
12	0/-0.030	3.00	+/-0.020	12	24	60	11.80	150	4	HF54230120150	●
16	0/-0.030	0.50	+/-0.020	16	32	80	15.70	150	4	HF54205160150	●
16	0/-0.030	1.00	+/-0.020	16	32	80	15.70	150	4	HF54210160150	●
16	0/-0.030	2.00	+/-0.020	16	32	80	15.70	150	4	HF54220160150	●
16	0/-0.030	3.00	+/-0.020	16	32	80	15.70	150	4	HF54230160150	●
16	0/-0.030	4.00	+/-0.020	16	32	80	15.70	150	4	HF54240160150	●
20	0/-0.030	0.50	+/-0.020	20	40	100	19.70	150	4	HF54205200150	●
20	0/-0.030	1.00	+/-0.020	20	40	100	19.70	150	4	HF54210200150	●
20	0/-0.030	2.00	+/-0.020	20	40	100	19.70	150	4	HF54220200150	●
20	0/-0.030	3.00	+/-0.020	20	40	100	19.70	150	4	HF54230200150	●
20	0/-0.030	4.00	+/-0.020	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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.019	0.017	0.015	0.014
8	0.025	0.023	0.019	0.018
10	0.030	0.027	0.023	0.021
12	0.035	0.031	0.026	0.024
14	0.039	0.035	0.029	0.027
16	0.043	0.039	0.032	0.030
20	0.053	0.047	0.039	0.037

SIDE MILLING

Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.023	0.021	0.019	0.026
8	0.030	0.027	0.024	0.033
10	0.036	0.033	0.029	0.040
12	0.041	0.037	0.033	0.046
14	0.047	0.042	0.037	0.051
16	0.052	0.047	0.041	0.057
20	0.063	0.057	0.050	0.069

HELICAL

Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.015	0.014	0.012	0.012
8	0.019	0.018	0.015	0.016
10	0.023	0.022	0.018	0.019
12	0.026	0.025	0.021	0.022
14	0.029	0.028	0.023	0.025
16	0.033	0.031	0.026	0.027
20	0.040	0.038	0.032	0.033

RAMPING

Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
α° x ae	**7° x D**	**5° x D**	**3° x D**	**3° x D**
Vc (m/min)	**80÷100**	**50÷70**	**35÷55**	**20÷30**
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.016	0.015	0.015	0.021
8	0.021	0.020	0.019	0.027
10	0.025	0.024	0.023	0.032
12	0.029	0.027	0.027	0.037
14	0.033	0.031	0.030	0.041
16	0.036	0.034	0.033	0.046
20	0.044	0.041	0.040	0.056

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF542

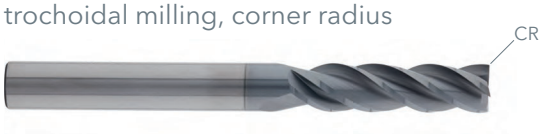
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x 0.4D**	**D x 0.4D**	**D x 0.25D**	**D x 0.25D**
	Vc (m/min)	**80÷100**	**50÷70**	**45÷55**	**20÷30**
VERTICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.019	0.017	0.015	0.014
	8	0.025	0.023	0.019	0.018
	10	0.030	0.027	0.023	0.021
	12	0.035	0.031	0.026	0.024
	14	0.039	0.035	0.029	0.027
	16	0.043	0.039	0.032	0.030
	20	0.053	0.047	0.039	0.037

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	**70÷90**	**50÷60**	**35÷45**	**20÷30**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.010	0.009	0.008	0.011
	8	0.013	0.011	0.010	0.014
	10	0.015	0.014	0.012	0.017
	12	0.017	0.016	0.014	0.019
	14	0.019	0.017	0.016	0.021
	16	0.022	0.019	0.017	0.024
	20	0.026	0.024	0.021	0.029

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF942

cylindrical shank, long cutting edge ideal for trochoidal milling, corner radius

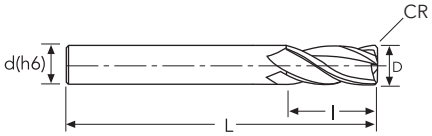


OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

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/-0.030	0.10	0/-0.015	6	19		75	4	HF9420104075	●
5	0/-0.030	0.10	0/-0.015	6	19		75	4	HF9420105075	●
6	0/-0.030	0.10	0/-0.015	6	25		75	4	HF9420106075	●
8	0/-0.030	0.20	0/-0.015	8	30		75	4	HF9420208075	●
10	0/-0.035	0.20	0/-0.020	10	40		100	4	HF94202100100	●
12	0/-0.035	0.30	0/-0.020	12	45		100	4	HF94203120100	●
16	0/-0.035	0.30	0/-0.020	16	65		125	4	HF94203160125	●
20	0/-0.035	0.30	0/-0.020	20	65		125	4	HF94203200125	●

● stock standard ○ non-standard stock ∇ stock exhaustion

HF942

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.016	0.015	0.013	0.018
	5	0.021	0.019	0.017	0.023
	6	0.026	0.023	0.021	0.029
	8	0.031	0.028	0.025	0.034
	10	0.036	0.033	0.029	0.040
	12	0.041	0.037	0.033	0.045
	16	0.047	0.042	0.038	0.052
	20	0.063	0.057	0.051	0.070
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.010	0.010	0.008	0.009
	5	0.013	0.013	0.011	0.011
	6	0.016	0.016	0.013	0.014
	8	0.019	0.018	0.015	0.016
	10	0.023	0.022	0.018	0.019
	12	0.026	0.025	0.021	0.022
	16	0.030	0.028	0.024	0.025
	20	0.040	0.038	0.032	0.033
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

HF942

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	α° x ae	**5° x D**	**5° x D**	**3° x D**	**3° x D**
	Vc (m/min)	**80÷100**	**50÷70**	**35÷55**	**20÷30**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.012	0.011	0.010	0.014
	5	0.015	0.014	0.014	0.019
	6	0.019	0.017	0.017	0.023
	8	0.022	0.020	0.020	0.027
	10	0.027	0.024	0.023	0.032
	12	0.030	0.027	0.026	0.036
	16	0.034	0.031	0.030	0.041
	20	0.046	0.042	0.041	0.056

VERTICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.014	0.012	0.010	0.010
	5	0.018	0.016	0.013	0.012
	6	0.022	0.019	0.016	0.015
	8	0.026	0.023	0.019	0.018
	10	0.030	0.027	0.023	0.021
	12	0.034	0.031	0.026	0.024
	16	0.039	0.035	0.029	0.027
	20	0.053	0.048	0.040	0.037

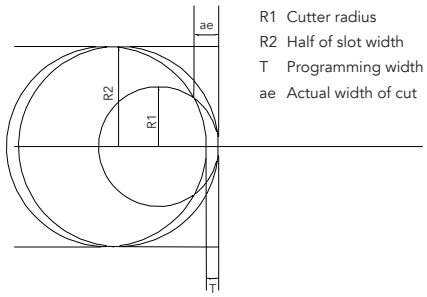
DRILLING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x D**	**D x D**	**D x 0.5D**	**D x 0.5D**
	Vc (m/min)	**70÷90**	**50÷60**	**35÷45**	**20÷30**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.007	0.006	0.005	0.007
	5	0.009	0.008	0.007	0.010
	6	0.011	0.010	0.009	0.012
	8	0.013	0.012	0.010	0.014
	10	0.015	0.014	0.012	0.017
	12	0.017	0.015	0.014	0.019
	16	0.020	0.018	0.016	0.022
	20	0.026	0.024	0.021	0.029
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

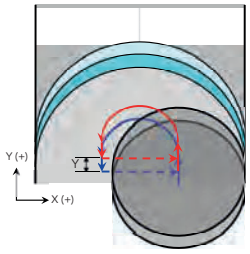
HF942

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	**140÷160**	**100÷120**	**70÷90**	**40÷60**
TROCHOIDAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.034	0.031	0.027	0.037
	5	0.044	0.040	0.035	0.048
	6	0.054	0.049	0.043	0.059
	8	0.064	0.058	0.051	0.070
	10	0.076	0.068	0.061	0.084
	12	0.086	0.077	0.069	0.095
	16	0.098	0.088	0.078	0.108
	20	0.132	0.119	0.106	0.145
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.

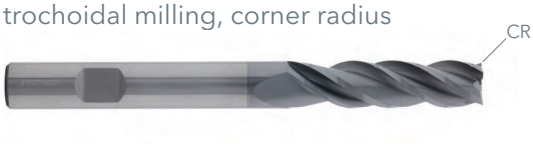


R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



HF943

weldon shank, long cutting edge ideal for trochoidal milling, corner radius

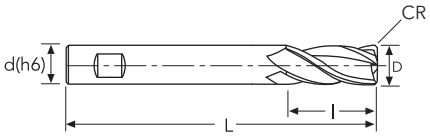


OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | RADIUS | Z4 UP

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/-0.030	0.10	0/-0.015	6	19		75	4	HF9430104075	●
5	0/-0.030	0.10	0/-0.015	6	19		75	4	HF9430105075	●
6	0/-0.030	0.10	0/-0.015	6	25		75	4	HF9430106075	●
8	0/-0.030	0.20	0/-0.015	8	30		75	4	HF9430208075	●
10	0/-0.035	0.20	0/-0.020	10	40		100	4	HF94302100100	●
12	0/-0.035	0.30	0/-0.020	12	45		100	4	HF94303120100	●
16	0/-0.035	0.30	0/-0.020	16	65		125	4	HF94303160125	●
20	0/-0.035	0.30	0/-0.020	20	65		125	4	HF94303200125	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF943

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.016	0.015	0.013	0.018
	5	0.021	0.019	0.017	0.023
	6	0.026	0.023	0.021	0.029
	8	0.031	0.028	0.025	0.034
	10	0.036	0.033	0.029	0.040
	12	0.041	0.037	0.033	0.045
	16	0.047	0.042	0.038	0.052
	20	0.063	0.057	0.051	0.070
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.010	0.010	0.008	0.009
	5	0.013	0.013	0.011	0.011
	6	0.016	0.016	0.013	0.014
	8	0.019	0.018	0.015	0.016
	10	0.023	0.022	0.018	0.019
	12	0.026	0.025	0.021	0.022
	16	0.030	0.028	0.024	0.025
	20	0.040	0.038	0.032	0.033
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	α° x ae	**5° x D**	**5° x D**	**3° x D**	**3° x D**
	Vc (m/min)	**80÷100**	**50÷70**	**35÷55**	**20÷30**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.012	0.011	0.010	0.014
	5	0.015	0.014	0.014	0.019
	6	0.019	0.017	0.017	0.023
	8	0.022	0.020	0.020	0.027
	10	0.027	0.024	0.023	0.032
	12	0.030	0.027	0.026	0.036
	16	0.034	0.031	0.030	0.041
	20	0.046	0.042	0.041	0.056

VERTICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.014	0.012	0.010	0.010
	5	0.018	0.016	0.013	0.012
	6	0.022	0.019	0.016	0.015
	8	0.026	0.023	0.019	0.018
	10	0.030	0.027	0.023	0.021
	12	0.034	0.031	0.026	0.024
	16	0.039	0.035	0.029	0.027
	20	0.053	0.048	0.040	0.037

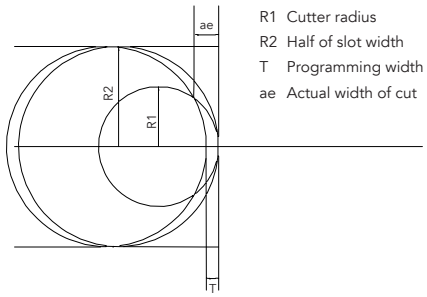
DRILLING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x D**	**D x D**	**D x 0.5D**	**D x 0.5D**
	Vc (m/min)	**70÷90**	**50÷60**	**35÷45**	**20÷30**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.007	0.006	0.005	0.007
	5	0.009	0.008	0.007	0.010
	6	0.011	0.010	0.009	0.012
	8	0.013	0.012	0.010	0.014
	10	0.015	0.014	0.012	0.017
	12	0.017	0.015	0.014	0.019
	16	0.020	0.018	0.016	0.022
	20	0.026	0.024	0.021	0.029
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.

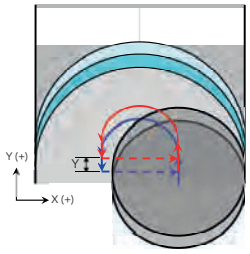
HF943

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	**140÷160**	**100÷120**	**70÷90**	**40÷60**
TROCHOIDAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.034	0.031	0.027	0.037
	5	0.044	0.040	0.035	0.048
	6	0.054	0.049	0.043	0.059
	8	0.064	0.058	0.051	0.070
	10	0.076	0.068	0.061	0.084
	12	0.086	0.077	0.069	0.095
	16	0.098	0.088	0.078	0.108
	20	0.132	0.119	0.106	0.145
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/-0.020	0.10	0/-0.015	6	12		57	5	HF64201040	●
5	0/-0.020	0.10	0/-0.015	6	13		57	5	HF64201050	●
6	0/-0.020	0.10	0/-0.015	6	13		57	5	HF64201060	●
8	0/-0.020	0.20	0/-0.015	8	20		64	5	HF64202080	●
10	0/-0.020	0.20	0/-0.020	10	22		72	5	HF64202100	●
12	0/-0.020	0.30	0/-0.020	12	26		83	5	HF64203120	●
16	0/-0.020	0.30	0/-0.020	16	32		92	5	HF64203160	●
20	0/-0.020	0.30	0/-0.020	20	38		104	5	HF64203200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF642

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.019	0.017	0.015	0.021
	5	0.023	0.021	0.019	0.026
	6	0.028	0.025	0.022	0.030
	8	0.036	0.032	0.029	0.039
	10	0.043	0.039	0.034	0.047
	12	0.049	0.044	0.039	0.054
	14	0.055	0.050	0.044	0.061
	16	0.061	0.055	0.049	0.067
	20	0.074	0.067	0.060	0.082
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	α° x ae	**5° x 0.4D**	**4° x 0.4D**	**3° x 0.4D**	**2° x 0.4D**
	Vc (m/min)	**130÷150**	**80÷100**	**60÷80**	**30÷50**
HELICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.011	0.011	0.009	0.009
	5	0.014	0.013	0.012	0.011
	6	0.017	0.016	0.014	0.013
	8	0.022	0.020	0.018	0.017
	10	0.026	0.024	0.021	0.020
	12	0.030	0.028	0.024	0.023
	14	0.033	0.031	0.028	0.026
	16	0.037	0.035	0.031	0.029
	20	0.045	0.042	0.037	0.035
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.017	0.016	0.022
	8	0.024	0.022	0.021	0.029
	10	0.028	0.026	0.025	0.034
	12	0.033	0.030	0.029	0.039
	14	0.037	0.034	0.032	0.044
	16	0.041	0.037	0.036	0.049
	20	0.050	0.046	0.043	0.060

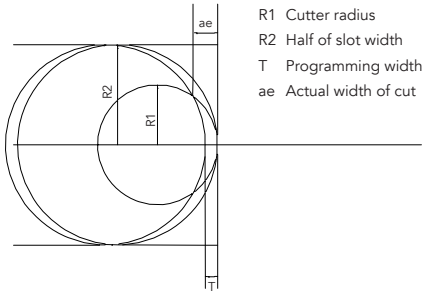
CUTTING PARAMETERS

HF642

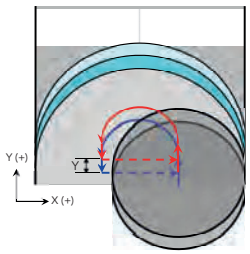
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x 0.4D**	**D x 0.4D**	**D x 0.25D**	**D x 0.25D**
	Vc (m/min)	**130÷150**	**80÷100**	**60÷80**	**30÷50**
VERTICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.023	0.021	0.017	0.016
	8	0.030	0.027	0.022	0.021
	10	0.036	0.032	0.027	0.025
	12	0.041	0.037	0.031	0.029
	14	0.046	0.041	0.034	0.032
	16	0.051	0.046	0.038	0.036
	20	0.062	0.056	0.047	0.043

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.039	0.035	0.031	0.043
	5	0.049	0.044	0.039	0.054
	6	0.057	0.052	0.046	0.063
	8	0.074	0.067	0.060	0.082
	10	0.089	0.080	0.071	0.098
	12	0.102	0.092	0.082	0.112
	14	0.115	0.103	0.092	0.126
	16	0.128	0.115	0.102	0.140
	20	0.155	0.140	0.124	0.171
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

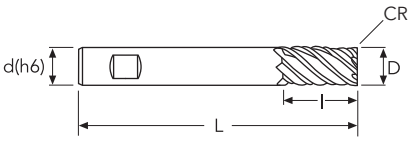
OSAWA NORM | MG PV300 | <40 HRC | 36°/37°/38° | RADIUS | Z5



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/-0.020	0.10	0/-0.015	6	12		57	5	HF64301040	●
5	0/-0.020	0.10	0/-0.015	6	13		57	5	HF64301050	●
6	0/-0.020	0.10	0/-0.015	6	13		57	5	HF64301060	●
8	0/-0.020	0.20	0/-0.015	8	20		64	5	HF64302080	●
10	0/-0.020	0.20	0/-0.020	10	22		72	5	HF64302100	●
12	0/-0.020	0.30	0/-0.020	12	26		83	5	HF64303120	●
16	0/-0.020	0.30	0/-0.020	16	32		92	5	HF64303160	●
20	0/-0.020	0.30	0/-0.020	20	38		104	5	HF64303200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF643

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.019	0.017	0.015	0.021
	5	0.023	0.021	0.019	0.026
	6	0.028	0.025	0.022	0.030
	8	0.036	0.032	0.029	0.039
	10	0.043	0.039	0.034	0.047
	12	0.049	0.044	0.039	0.054
	14	0.055	0.050	0.044	0.061
	16	0.061	0.055	0.049	0.067
	20	0.074	0.067	0.060	0.082
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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.011	0.011	0.009	0.009
	5	0.014	0.013	0.012	0.011
	6	0.017	0.016	0.014	0.013
	8	0.022	0.020	0.018	0.017
	10	0.026	0.024	0.021	0.020
	12	0.030	0.028	0.024	0.023
	14	0.033	0.031	0.028	0.026
	16	0.037	0.035	0.031	0.029
	20	0.045	0.042	0.037	0.035
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.017	0.016	0.022
	8	0.024	0.022	0.021	0.029
	10	0.028	0.026	0.025	0.034
	12	0.033	0.030	0.029	0.039
	14	0.037	0.034	0.032	0.044
	16	0.041	0.037	0.036	0.049
	20	0.050	0.046	0.043	0.060

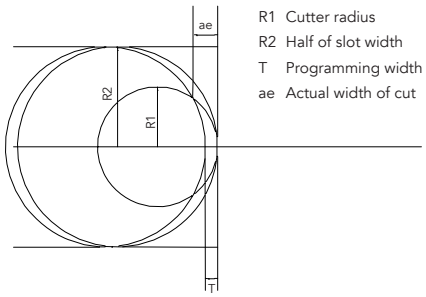
PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF642 PARAMETERS.

HF643

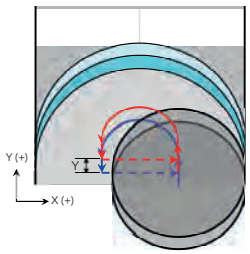
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x 0.4D**	**D x 0.4D**	**D x 0.25D**	**D x 0.25D**
	Vc (m/min)	**130÷150**	**80÷100**	**60÷80**	**30÷50**
VERTICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.023	0.021	0.017	0.016
	8	0.030	0.027	0.022	0.021
	10	0.036	0.032	0.027	0.025
	12	0.041	0.037	0.031	0.029
	14	0.046	0.041	0.034	0.032
	16	0.051	0.046	0.038	0.036
	20	0.062	0.056	0.047	0.043

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.039	0.035	0.031	0.043
	5	0.049	0.044	0.039	0.054
	6	0.057	0.052	0.046	0.063
	8	0.074	0.067	0.060	0.082
	10	0.089	0.080	0.071	0.098
	12	0.102	0.092	0.082	0.112
	14	0.115	0.103	0.092	0.126
	16	0.128	0.115	0.102	0.140
	20	0.155	0.140	0.124	0.171
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

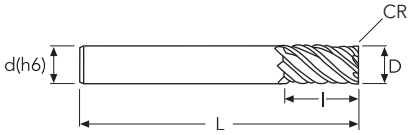
OSAWA NORM | MG PV300 | <40 HRC | 36°/37°/38° | RADIUS | Z5



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/-0.030	0.10	0/-0.015	6	25		75	5	HF7420106075	●
8	0/-0.030	0.20	0/-0.015	8	25		75	5	HF7420208075	●
10	0/-0.035	0.20	0/-0.020	10	38		100	5	HF74202100100	●
12	0/-0.035	0.30	0/-0.020	12	45		100	5	HF74203120100	●
16	0/-0.035	0.30	0/-0.020	16	55		125	5	HF74203160125	●
20	0/-0.035	0.30	0/-0.020	20	65		125	5	HF74203200125	●

● stock standard ○ non-standard stock ∇ stock exhaustion

HF742

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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**
SIDE MILLING	Vc (m/min)	**110÷130**	**70÷90**	**50÷70**	**30÷50**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.023	0.021	0.019	0.026
	8	0.028	0.025	0.022	0.030
	10	0.033	0.030	0.026	0.036
	12	0.037	0.033	0.030	0.041
	16	0.042	0.038	0.034	0.047
	20	0.057	0.051	0.046	0.063

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.016	0.016	0.013	0.014
	8	0.019	0.018	0.015	0.016
	10	0.023	0.022	0.018	0.019
	12	0.026	0.025	0.021	0.022
	16	0.030	0.028	0.024	0.025
	20	0.040	0.038	0.032	0.033

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.017	0.016	0.015	0.021
	8	0.020	0.019	0.018	0.024
	10	0.024	0.022	0.021	0.029
	12	0.027	0.025	0.024	0.033
	16	0.031	0.029	0.027	0.037
	20	0.042	0.039	0.037	0.050

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

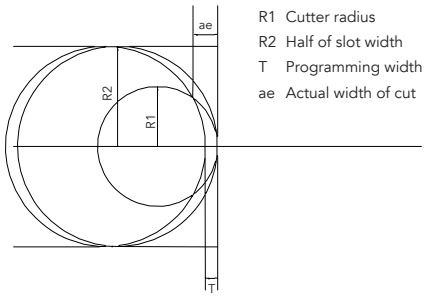
CUTTING PARAMETERS

HF742

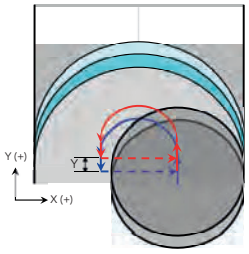
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
VERTICAL	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x 0.4D**	**D x 0.4D**	**D x 0.25D**	**D x 0.25D**
	Vc (m/min)	**80÷100**	**50÷70**	**35÷55**	**20÷30**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.022	0.019	0.016	0.015
	8	0.026	0.023	0.019	0.018
	10	0.030	0.027	0.023	0.021
	12	0.034	0.031	0.026	0.024
	16	0.039	0.035	0.029	0.027
	20	0.053	0.048	0.040	0.037

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
TROCHOIDAL	Hardness/Rm	≤700 N/mm²	600÷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÷120**	**70÷90**	**40÷60**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.054	0.049	0.043	0.059
	8	0.064	0.058	0.051	0.070
	10	0.076	0.068	0.061	0.084
	12	0.086	0.077	0.069	0.095
	16	0.098	0.088	0.078	0.108
	20	0.132	0.119	0.106	0.145

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

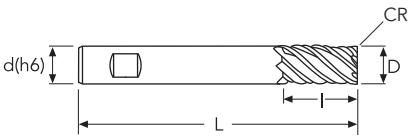
OSAWA NORM | MG PV300 | <40 HRC | 36°/37°/38° | RADIUS | Z5



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/-0.030	0.10	0/-0.015	6	25		75	5	HF7430106075	●
8	0/-0.030	0.20	0/-0.015	8	25		75	5	HF7430208075	●
10	0/-0.035	0.20	0/-0.020	10	38		100	5	HF74302100100	●
12	0/-0.035	0.30	0/-0.020	12	45		100	5	HF74303120100	●
16	0/-0.035	0.30	0/-0.020	16	55		125	5	HF74303160125	●
20	0/-0.035	0.30	0/-0.020	20	65		125	5	HF74303200125	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF743

SIDE MILLING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.023	0.021	0.019	0.026
	8	0.028	0.025	0.022	0.030
	10	0.033	0.030	0.026	0.036
	12	0.037	0.033	0.030	0.041
	16	0.042	0.038	0.034	0.047
	20	0.057	0.051	0.046	0.063

HELICAL	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.016	0.016	0.013	0.014
	8	0.019	0.018	0.015	0.016
	10	0.023	0.022	0.018	0.019
	12	0.026	0.025	0.021	0.022
	16	0.030	0.028	0.024	0.025
	20	0.040	0.038	0.032	0.033

RAMPING	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.017	0.016	0.015	0.021
	8	0.020	0.019	0.018	0.024
	10	0.024	0.022	0.021	0.029
	12	0.027	0.025	0.024	0.033
	16	0.031	0.029	0.027	0.037
	20	0.042	0.039	0.037	0.050

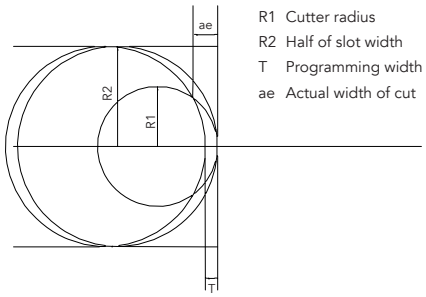
PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF742 PARAMETERS.

HF743

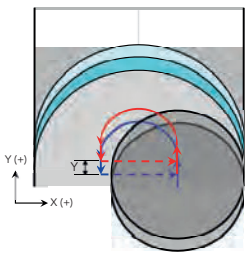
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
VERTICAL	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x 0.4D**	**D x 0.4D**	**D x 0.25D**	**D x 0.25D**
	Vc (m/min)	**80÷100**	**50÷70**	**35÷55**	**20÷30**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.022	0.019	0.016	0.015
	8	0.026	0.023	0.019	0.018
	10	0.030	0.027	0.023	0.021
	12	0.034	0.031	0.026	0.024
	16	0.039	0.035	0.029	0.027
	20	0.053	0.048	0.040	0.037

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
TROCHOIDAL	Hardness/Rm	≤700 N/mm²	600÷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÷120**	**70÷90**	**40÷60**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.054	0.049	0.043	0.059
	8	0.064	0.058	0.051	0.070
	10	0.076	0.068	0.061	0.084
	12	0.086	0.077	0.069	0.095
	16	0.098	0.088	0.078	0.108
	20	0.132	0.119	0.106	0.145

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.

HF535T

Weldon shank, 5 flutes, chipbreaker, corner radius, different core diameter, trochoidal milling



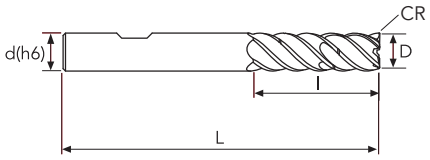
OSAWA NORM | MG PV300 | <45 HRC | 36°/37°/38° | RADIUS | Z5 UP

CD | CB

P	M	K	N	S	H
★	☆	★		☆	

★ 1st choice ☆ suitable

SIDE MILLING | TROCHOIDAL



D	D Tol.	R	R Tol.	d(h6)	l	l1	L	Z	EDP No.	Stock
10	0/-0.040	0.10	+/-0.020	10	35		90	5	HF535T010100	●
12	0/-0.050	0.12	+/-0.020	12	45		100	5	HF535T012120	●
16	0/-0.050	0.15	+/-0.020	16	55		115	5	HF535T015160	●
20	0/-0.050	0.20	+/-0.020	20	70		131	5	HF535T020200	●

● stock standard ○ non-standard stock

HF535T

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 P6 M2 M3 K4 S1 S4	S2 S3 S5
SIDE MILLING	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤45 HRC
	ap x ae	**3.5D x 0.05D**	**3.5D x 0.05D**	**3.5D x 0.05D**	**3.5D x 0.05D**
	Vc (m/min)	**170÷190**	**100÷120**	**80÷100**	**60÷80**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	10	0.100	0.100	0.080	0.072
	12	0.120	0.120	0.100	0.090
	16	0.150	0.150	0.130	0.117
	20	0.150	0.150	0.150	0.135

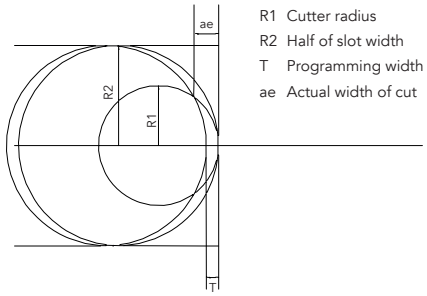
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 P6 M2 M3 K4 S1 S4	S2 S3 S5
TROCHOIDAL	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤45 HRC
	ap x ae	**3.5D x 0.05D**	**3.5D x 0.05D**	**3.5D x 0.05D**	**3.5D x 0.05D**
	Vc (m/min)	**170÷190**	**100÷120**	**80÷100**	**60÷80**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	10	0.100	0.100	0.080	0.072
	12	0.120	0.120	0.100	0.090
	16	0.150	0.150	0.130	0.117
	20	0.150	0.150	0.150	0.135

High speed cutting conditions (A highly rigidity CNC machine is required)

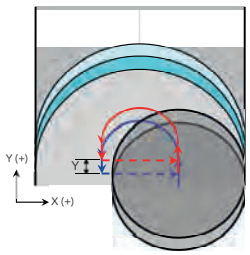
	Material Group ISO 513	P1 P2 P7	P3 P4	P5 P6	
TROCHOIDAL	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	
	ap x ae	**3.5D x 0.05D**	**3.5D x 0.05D**	**3.5D x 0.05D**	
	Vc (m/min)	**220÷260**	**120÷160**	**100÷140**	
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	
	10	0.100	0.100	0.080	
	12	0.120	0.120	0.100	
	16	0.150	0.150	0.130	
	20	0.150	0.150	0.150	

High speed cutting conditions is only suggested for material groups ISO P.

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



HF471

weldon shank, SC smooth cut for low cutting force, 45° chamfer

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C45° | Z4 UP



from D1 to D2.5: cylindrical shank

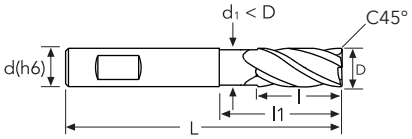


from D3: weldon shank

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
1	0/-0.020	0.1	+/-0.020	4	3			50	4	HF471010	●
1.5	0/-0.020	0.1	+/-0.020	4	4.5			50	4	HF471015	●
2	0/-0.020	0.1	+/-0.020	4	6.5			50	4	HF471020	●
2.5	0/-0.020	0.1	+/-0.020	4	6.5			50	4	HF471025	●
3	0/-0.020	0.1	+/-0.020	6	9	15	2.80	57	4	HF471030	●
3.5	0/-0.020	0.1	+/-0.020	6	11	20	3.30	57	4	HF471035	●
4	0/-0.020	0.1	+/-0.020	6	11	20	3.70	57	4	HF471040	●
4.5	0/-0.020	0.1	+/-0.020	6	13	20	4.20	57	4	HF471045	●
5	0/-0.020	0.1	+/-0.020	6	13	20	4.60	57	4	HF471050	●
5.5	0/-0.020	0.1	+/-0.020	6	13	20	5.10	57	4	HF471055	●
6	0/-0.020	0.1	+/-0.020	6	13	20	5.50	57	4	HF471060	●
7	0/-0.020	0.2	+/-0.020	8	20	26	6.50	64	4	HF471070	●
8	0/-0.020	0.2	+/-0.020	8	20	26	7.40	64	4	HF471080	●
9	0/-0.020	0.2	+/-0.020	10	22	32	8.40	72	4	HF471090	●
10	0/-0.020	0.2	+/-0.020	10	22	32	9.20	72	4	HF471100	●
11	0/-0.020	0.2	+/-0.020	12	26	37	10.20	83	4	HF471110	●
12	0/-0.020	0.2	+/-0.020	12	26	37	11.00	83	4	HF471120	●
13	0/-0.020	0.2	+/-0.020	14	26	37	12.00	83	4	HF471130	●
14	0/-0.020	0.2	+/-0.020	14	26	37	13.00	83	4	HF471140	●
15	0/-0.020	0.2	+/-0.020	16	32	42	14.00	92	4	HF471150	●
16	0/-0.020	0.2	+/-0.020	16	32	42	15.00	92	4	HF471160	●
18	0/-0.020	0.2	+/-0.020	18	32	42	17.00	92	4	HF471180	●
20	0/-0.020	0.2	+/-0.020	20	38	50	19.00	104	4	HF471200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF471

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.005	0.005	0.004	0.004
	2	0.010	0.009	0.008	0.007
	3	0.014	0.013	0.011	0.010
	4	0.019	0.017	0.014	0.013
	5	0.023	0.021	0.017	0.016
	6	0.027	0.024	0.020	0.019
	8	0.035	0.032	0.026	0.025
	10	0.042	0.038	0.032	0.029
	12	0.048	0.043	0.036	0.034
	14	0.054	0.049	0.041	0.038
	16	0.060	0.054	0.045	0.042
	18	0.066	0.059	0.050	0.046
	20	0.073	0.066	0.055	0.051
ap x ae	**D1**	0.25D x D	0.25D x D	0.2D x D	0.2D x D
ap x ae	**≤ D3**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	ap x ae	**1.5D x D**	**1.5D x D**		
	Vc (m/min)	**100÷120**	**60÷80**		
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)		
	8	0.028	0.025		
	10	0.034	0.030		
	12	0.038	0.035		
	14	0.043	0.039		
	16	0.048	0.043		
	18	0.053	0.048		
	20	0.058	0.053		

	Material Group ISO 513	P1 P2 P7 K1			
	Hardness/Rm	≤700 N/mm²			
	ap x ae	**2D x D**			
	Vc (m/min)	**75÷95**			
SLOTTING	D (mm)	fz (mm/z)			
	10	0.025			
	12	0.029			
	14	0.032			
	16	0.036			
	18	0.040			
	20	0.044			

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF840 PARAMETERS.

HF471

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.006	0.005	0.005	0.007
	2	0.012	0.011	0.010	0.013
	3	0.017	0.015	0.013	0.018
	4	0.022	0.020	0.018	0.024
	5	0.028	0.025	0.022	0.030
	6	0.032	0.029	0.026	0.036
	8	0.042	0.038	0.034	0.046
	10	0.050	0.045	0.040	0.055
	12	0.058	0.052	0.046	0.063
	14	0.065	0.058	0.052	0.071
	16	0.072	0.065	0.058	0.079
	18	0.079	0.071	0.063	0.087
	20	0.088	0.079	0.070	0.096
ap x ae	**≤ D3**	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 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.004	0.003	0.003	0.003
	2	0.007	0.007	0.006	0.006
	3	0.010	0.010	0.008	0.008
	4	0.013	0.013	0.011	0.010
	5	0.017	0.016	0.014	0.013
	6	0.020	0.018	0.016	0.015
	8	0.025	0.024	0.021	0.020
	10	0.031	0.029	0.025	0.024
	12	0.035	0.033	0.029	0.027
	14	0.039	0.037	0.032	0.030
	16	0.044	0.041	0.036	0.034
	18	0.048	0.045	0.040	0.037
	20	0.053	0.050	0.044	0.041
α° x ae	**≤ D3**	1° x 0.4D	1° x 0.4D	1° x 0.4D	1° x 0.4D

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF840 PARAMETERS.

HF471

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.022	0.020	0.019	0.026
	8	0.028	0.026	0.024	0.034
	10	0.034	0.031	0.029	0.040
	12	0.038	0.035	0.034	0.046
	14	0.043	0.040	0.038	0.052
	16	0.048	0.044	0.042	0.058
	18	0.053	0.048	0.046	0.063
	20	0.058	0.054	0.051	0.070

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3		
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²		
	α° x ae	**30° x D**	**15° x D**		
	Vc (m/min)	**80÷100**	**60÷80**		
RAMPING	D (mm)	fz (mm/z)	fz (mm/z)		
	10	0.025	0.023		
	12	0.028	0.026		
	14	0.032	0.029		
	16	0.035	0.032		
	18	0.039	0.036		
	20	0.043	0.039		

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.027	0.024	0.020	0.019
	8	0.035	0.032	0.026	0.025
	10	0.042	0.038	0.032	0.029
	12	0.048	0.043	0.036	0.034
	14	0.054	0.049	0.041	0.038
	16	0.060	0.054	0.045	0.042
	18	0.066	0.059	0.050	0.046
	20	0.073	0.066	0.055	0.051

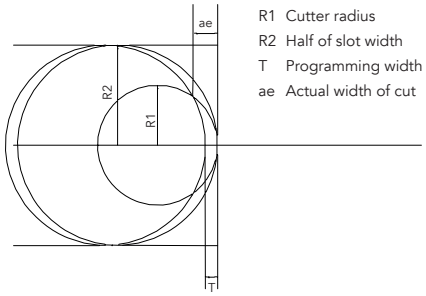
PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF840 PARAMETERS.

HF471

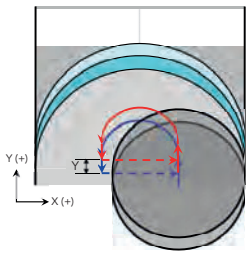
	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷1000 N/mm²	≤35 HRC	≤40 HRC
	ap x ae	**D x D**	**D x D**	**0.5D x D**	**0.5D x D**
	Vc (m/min)	**100÷120**	**60÷80**	**45÷65**	**20÷40**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.003	0.002	0.002	0.003
	2	0.005	0.005	0.004	0.006
	3	0.007	0.006	0.006	0.008
	4	0.009	0.008	0.007	0.010
	5	0.012	0.010	0.009	0.013
	6	0.014	0.012	0.011	0.015
	8	0.018	0.016	0.014	0.019
	10	0.021	0.019	0.017	0.023
	12	0.024	0.022	0.019	0.026
	14	0.027	0.024	0.022	0.030
	16	0.030	0.027	0.024	0.033
	18	0.033	0.030	0.026	0.036
	20	0.037	0.033	0.029	0.040
ap x ae	**≤ D3**	0.5D x D	0.5D x D	0.25D x D	0.25D x D

	Material Group ISO 513	P1 P2 P7 K1	P3 P4 M1 K2 K3	P5 M2 M3 K4 S1 S4	S2 S3 S5
	Hardness/Rm	≤700 N/mm²	600÷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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.013	0.011	0.010	0.014
	2	0.025	0.023	0.020	0.028
	3	0.035	0.032	0.028	0.039
	4	0.046	0.042	0.037	0.051
	5	0.058	0.052	0.046	0.063
	6	0.068	0.061	0.054	0.074
	8	0.088	0.079	0.070	0.096
	10	0.105	0.095	0.084	0.116
	12	0.120	0.108	0.096	0.132
	14	0.135	0.122	0.108	0.149
	16	0.150	0.135	0.120	0.165
	18	0.165	0.149	0.132	0.182
	20	0.183	0.164	0.146	0.201
ap x ae	**D1**	1.5D x 0.1D	1.5D x 0.1D	1.5D x 0.1D	1.5D x 0.1D
ap x ae	**≤ D3**	1.5D x 0.1D	1.5D x 0.1D	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 HF840 PARAMETERS.

HF850

cylindrical shank, 45° chamfer

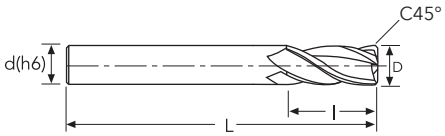
OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | C45° | Z4 UP



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	26		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

CUTTING PARAMETERS

HF850

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.012	0.011	0.009	0.008
	4	0.016	0.014	0.012	0.011
	5	0.020	0.018	0.015	0.014
	6	0.023	0.021	0.017	0.016
	8	0.030	0.027	0.022	0.021
	10	0.036	0.032	0.027	0.025
	12	0.041	0.037	0.031	0.029
	14	0.046	0.041	0.034	0.032
	16	0.051	0.046	0.038	0.036
	20	0.062	0.056	0.047	0.043
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 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	**100÷120**	**70÷90**	**50÷70**	**40÷60**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.014	0.013	0.011	0.016
	4	0.019	0.017	0.015	0.021
	5	0.023	0.021	0.019	0.026
	6	0.028	0.025	0.022	0.030
	8	0.036	0.032	0.029	0.039
	10	0.043	0.039	0.034	0.047
	12	0.049	0.044	0.039	0.054
	14	0.055	0.050	0.044	0.061
	16	0.061	0.055	0.049	0.067
	20	0.074	0.067	0.060	0.082
ap x ae	**≤ D5**	1.2D x 0.2D	1.2D x 0.1D	D x 0.1D	D x 0.05D

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.009	0.008	0.007	0.008
	4	0.011	0.011	0.009	0.010
	5	0.014	0.013	0.012	0.012
	6	0.017	0.016	0.014	0.015
	8	0.022	0.020	0.018	0.019
	10	0.026	0.024	0.021	0.023
	12	0.030	0.028	0.024	0.026
	14	0.033	0.031	0.028	0.029
	16	0.037	0.035	0.031	0.032
	20	0.045	0.042	0.037	0.039
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF850

RAMPING	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.020	0.019	0.018	0.027
	8	0.026	0.024	0.023	0.035
	10	0.031	0.029	0.027	0.043
	12	0.036	0.033	0.031	0.049
	14	0.040	0.037	0.035	0.055
	16	0.045	0.042	0.039	0.061
	20	0.054	0.051	0.048	0.074

VERTICAL	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.023	0.021	0.017	0.016
	8	0.030	0.027	0.022	0.021
	10	0.036	0.032	0.027	0.025
	12	0.041	0.037	0.031	0.029
	14	0.046	0.041	0.034	0.032
	16	0.051	0.046	0.038	0.036
	20	0.062	0.056	0.047	0.043

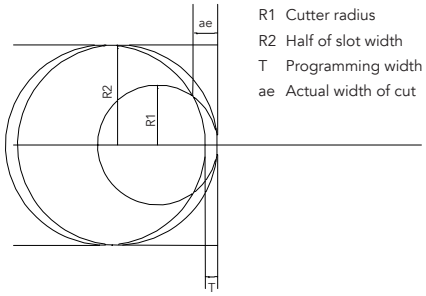
PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

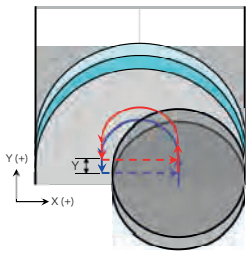
HF850

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	**130÷150**	**100÷120**	**60÷80**	**50÷70**
TROCHOIDAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.027	0.024	0.021	0.029
	4	0.035	0.032	0.028	0.039
	5	0.044	0.040	0.035	0.048
	6	0.052	0.046	0.041	0.057
	8	0.067	0.060	0.054	0.074
	10	0.080	0.072	0.064	0.088
	12	0.092	0.083	0.073	0.101
	14	0.103	0.093	0.083	0.114
	16	0.115	0.103	0.092	0.126
	20	0.140	0.126	0.112	0.154

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

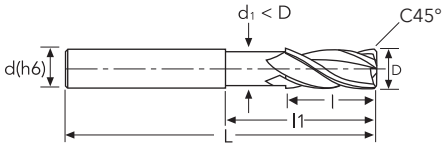
OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | C45° | Z4 UP



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

CUTTING PARAMETERS

HF450

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.011	0.010	0.008	0.007
	4	0.014	0.013	0.011	0.010
	5	0.018	0.016	0.013	0.012
	6	0.021	0.019	0.015	0.014
	8	0.027	0.024	0.020	0.019
	10	0.032	0.029	0.024	0.022
	12	0.037	0.033	0.028	0.026
	14	0.041	0.037	0.031	0.029
	16	0.046	0.041	0.034	0.032
	20	0.056	0.050	0.042	0.039
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 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.013	0.012	0.010	0.014
	4	0.017	0.015	0.014	0.019
	5	0.021	0.019	0.017	0.023
	6	0.025	0.022	0.020	0.027
	8	0.032	0.029	0.026	0.035
	10	0.039	0.035	0.031	0.042
	12	0.044	0.040	0.035	0.048
	14	0.050	0.045	0.040	0.055
	16	0.055	0.050	0.044	0.061
	20	0.067	0.060	0.054	0.074
ap x ae	**≤ D5**	1.2D x 0.2D	1.2D x 0.2D	D x 0.1D	D x 0.05D

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
HELICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.008	0.007	0.006	0.007
	4	0.010	0.010	0.008	0.009
	5	0.013	0.012	0.011	0.011
	6	0.015	0.014	0.012	0.013
	8	0.019	0.018	0.016	0.017
	10	0.023	0.022	0.019	0.020
	12	0.027	0.025	0.022	0.023
	14	0.030	0.028	0.025	0.026
	16	0.033	0.031	0.028	0.029
	20	0.041	0.038	0.034	0.035
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF450

RAMPING

Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.018	0.017	0.016	0.025
8	0.023	0.022	0.021	0.032
10	0.028	0.026	0.025	0.038
12	0.032	0.030	0.028	0.044
14	0.036	0.034	0.032	0.049
16	0.040	0.037	0.035	0.055
20	0.049	0.045	0.043	0.067

VERTICAL

Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	0.021	0.019	0.015	0.014
8	0.027	0.024	0.020	0.019
10	0.032	0.029	0.024	0.022
12	0.037	0.033	0.028	0.026
14	0.041	0.037	0.031	0.029
16	0.046	0.041	0.034	0.032
20	0.056	0.050	0.042	0.039

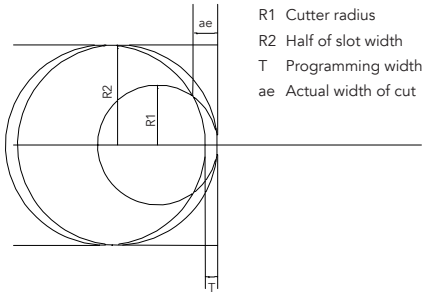
PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

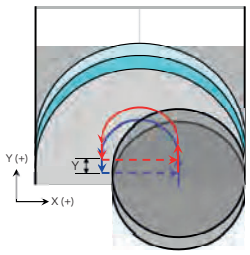
HF450

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.027	0.024	0.021	0.029
	4	0.035	0.032	0.028	0.039
	5	0.044	0.040	0.035	0.048
	6	0.052	0.046	0.041	0.057
	8	0.067	0.060	0.054	0.074
	10	0.080	0.072	0.064	0.088
	12	0.092	0.083	0.073	0.101
	14	0.103	0.093	0.083	0.114
	16	0.115	0.103	0.092	0.126
	20	0.140	0.126	0.112	0.154

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

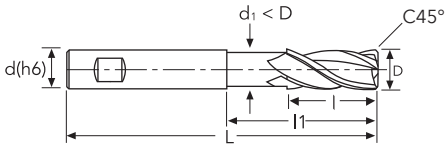
OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | C45° | Z4 UP



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

CUTTING PARAMETERS

HF451

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.011	0.010	0.008	0.007
	4	0.014	0.013	0.011	0.010
	5	0.018	0.016	0.013	0.012
	6	0.021	0.019	0.015	0.014
	8	0.027	0.024	0.020	0.019
	10	0.032	0.029	0.024	0.022
	12	0.037	0.033	0.028	0.026
	14	0.041	0.037	0.031	0.029
	16	0.046	0.041	0.034	0.032
	20	0.056	0.050	0.042	0.039
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 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.013	0.012	0.010	0.014
	4	0.017	0.015	0.014	0.019
	5	0.021	0.019	0.017	0.023
	6	0.025	0.022	0.020	0.027
	8	0.032	0.029	0.026	0.035
	10	0.039	0.035	0.031	0.042
	12	0.044	0.040	0.035	0.048
	14	0.050	0.045	0.040	0.055
	16	0.055	0.050	0.044	0.061
	20	0.067	0.060	0.054	0.074
ap x ae	**≤ D5**	1.2D x 0.2D	1.2D x 0.1D	D x 0.1D	D x 0.05D

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
HELICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.008	0.007	0.006	0.007
	4	0.010	0.010	0.008	0.009
	5	0.013	0.012	0.011	0.011
	6	0.015	0.014	0.012	0.013
	8	0.019	0.018	0.016	0.017
	10	0.023	0.022	0.019	0.020
	12	0.027	0.025	0.022	0.023
	14	0.030	0.028	0.025	0.026
	16	0.033	0.031	0.028	0.029
	20	0.041	0.038	0.034	0.035
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

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 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.017	0.016	0.025
	8	0.023	0.022	0.021	0.032
	10	0.028	0.026	0.025	0.038
	12	0.032	0.030	0.028	0.044
	14	0.036	0.034	0.032	0.049
	16	0.040	0.037	0.035	0.055
	20	0.049	0.045	0.043	0.067

VERTICAL	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.021	0.019	0.015	0.014
	8	0.027	0.024	0.020	0.019
	10	0.032	0.029	0.024	0.022
	12	0.037	0.033	0.028	0.026
	14	0.041	0.037	0.031	0.029
	16	0.046	0.041	0.034	0.032
	20	0.056	0.050	0.042	0.039

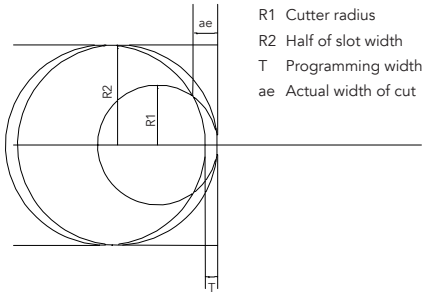
PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF450 PARAMETERS.

CUTTING PARAMETERS

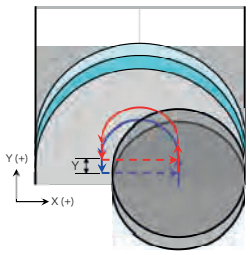
HF451

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.027	0.024	0.021	0.029
	4	0.035	0.032	0.028	0.039
	5	0.044	0.040	0.035	0.048
	6	0.052	0.046	0.041	0.057
	8	0.067	0.060	0.054	0.074
	10	0.080	0.072	0.064	0.088
	12	0.092	0.083	0.073	0.101
	14	0.103	0.093	0.083	0.114
	16	0.115	0.103	0.092	0.126
	20	0.140	0.126	0.112	0.154

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

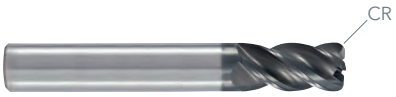


PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF450 PARAMETERS.

HF852

cylindrical shank, corner radius

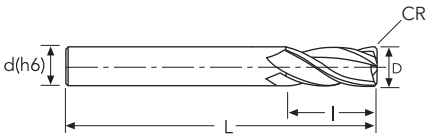
OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | RADIUS | Z4 UP



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/-0.020	0.30	+/-0.015	6	12		57	4	HF85203040	●
4	0/-0.020	0.50	+/-0.015	6	12		57	4	HF85205040	●
5	0/-0.020	0.30	+/-0.015	6	15		57	4	HF85203050	●
5	0/-0.020	0.50	+/-0.015	6	15		57	4	HF85205050	●
6	0/-0.020	0.30	+/-0.015	6	16		57	4	HF85203060	●
6	0/-0.020	0.50	+/-0.015	6	16		57	4	HF85205060	●
6	0/-0.020	1.00	+/-0.015	6	16		57	4	HF85210060	●
8	0/-0.020	0.50	+/-0.015	8	20		64	4	HF85205080	●
8	0/-0.020	1.00	+/-0.015	8	20		64	4	HF85210080	●
10	0/-0.020	0.50	+/-0.020	10	22		72	4	HF85205100	●
10	0/-0.020	1.00	+/-0.020	10	22		72	4	HF85210100	●
12	0/-0.020	0.50	+/-0.020	12	26		83	4	HF85205120	●
12	0/-0.020	1.00	+/-0.020	12	26		83	4	HF85210120	●
12	0/-0.020	2.00	+/-0.020	12	26		83	4	HF85220120	●
12	0/-0.020	3.00	+/-0.020	12	26		83	4	HF85230120	●
14	0/-0.020	1.00	+/-0.020	14	32		83	4	HF85210140	●
16	0/-0.020	1.00	+/-0.020	16	32		92	4	HF85210160	●
16	0/-0.020	2.00	+/-0.020	16	32		92	4	HF85220160	●
20	0/-0.020	1.00	+/-0.020	20	38		104	4	HF85210200	●
20	0/-0.020	2.00	+/-0.020	20	38		104	4	HF85220200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HF852

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.012	0.011	0.009	0.008
	4	0.016	0.014	0.012	0.011
	5	0.020	0.018	0.015	0.014
	6	0.023	0.021	0.017	0.016
	8	0.030	0.027	0.022	0.021
	10	0.036	0.032	0.027	0.025
	12	0.041	0.037	0.031	0.029
	14	0.046	0.041	0.034	0.032
	16	0.051	0.046	0.038	0.036
	20	0.062	0.056	0.047	0.043
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 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	**100÷120**	**70÷90**	**50÷70**	**40÷60**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.014	0.013	0.011	0.016
	4	0.019	0.017	0.015	0.021
	5	0.023	0.021	0.019	0.026
	6	0.028	0.025	0.022	0.030
	8	0.036	0.032	0.029	0.039
	10	0.043	0.039	0.034	0.047
	12	0.049	0.044	0.039	0.054
	14	0.055	0.050	0.044	0.061
	16	0.061	0.055	0.049	0.067
	20	0.074	0.067	0.060	0.082
ap x ae	**≤ D5**	1.2D x 0.2D	1.2D x 0.2D	D x 0.1D	D x 0.05D

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.009	0.008	0.007	0.008
	4	0.011	0.011	0.009	0.010
	5	0.014	0.013	0.012	0.012
	6	0.017	0.016	0.014	0.015
	8	0.022	0.020	0.018	0.019
	10	0.026	0.024	0.021	0.023
	12	0.030	0.028	0.024	0.026
	14	0.033	0.031	0.028	0.029
	16	0.037	0.035	0.031	0.032
	20	0.045	0.042	0.037	0.039
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF852

RAMPING	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.020	0.019	0.018	0.027
	8	0.026	0.024	0.023	0.035
	10	0.031	0.029	0.027	0.043
	12	0.036	0.033	0.031	0.049
	14	0.040	0.037	0.035	0.055
	16	0.045	0.042	0.039	0.061
	20	0.054	0.051	0.048	0.074

VERTICAL	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.023	0.021	0.017	0.016
	8	0.030	0.027	0.022	0.021
	10	0.036	0.032	0.027	0.025
	12	0.041	0.037	0.031	0.029
	14	0.046	0.041	0.034	0.032
	16	0.051	0.046	0.038	0.036
	20	0.062	0.056	0.047	0.043

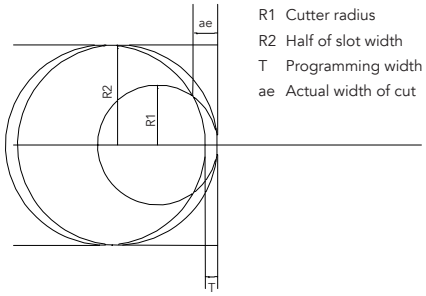
PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

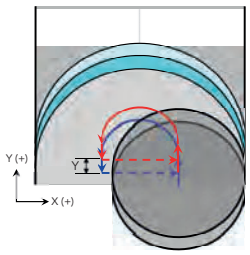
HF852

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	**130÷150**	**100÷120**	**60÷80**	**50÷70**
TROCHOIDAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.027	0.024	0.021	0.029
	4	0.035	0.032	0.028	0.039
	5	0.044	0.040	0.035	0.048
	6	0.052	0.046	0.041	0.057
	8	0.067	0.060	0.054	0.074
	10	0.080	0.072	0.064	0.088
	12	0.092	0.083	0.073	0.101
	14	0.103	0.093	0.083	0.114
	16	0.115	0.103	0.092	0.126
	20	0.140	0.126	0.112	0.154

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

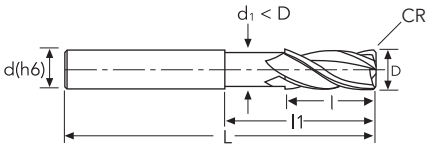
OSAWA NORM | MG PV300 | 30÷55 HRC | 40° | RADIUS | Z4 UP



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

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.011	0.010	0.008	0.007
	4	0.014	0.013	0.011	0.010
	5	0.018	0.016	0.013	0.012
	6	0.021	0.019	0.015	0.014
	8	0.027	0.024	0.020	0.019
	10	0.032	0.029	0.024	0.022
	12	0.037	0.033	0.028	0.026
	14	0.041	0.037	0.031	0.029
	16	0.046	0.041	0.034	0.032
	20	0.056	0.050	0.042	0.039
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 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.013	0.012	0.010	0.014
	4	0.017	0.015	0.014	0.019
	5	0.021	0.019	0.017	0.023
	6	0.025	0.022	0.020	0.027
	8	0.032	0.029	0.026	0.035
	10	0.039	0.035	0.031	0.042
	12	0.044	0.040	0.035	0.048
	14	0.050	0.045	0.040	0.055
	16	0.055	0.050	0.044	0.061
	20	0.067	0.060	0.054	0.074
ap x ae	**≤ D5**	1.2D x 0.2D	1.2D x 0.1D	D x 0.1D	D x 0.05D

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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**
HELICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.008	0.007	0.006	0.007
	4	0.010	0.010	0.008	0.009
	5	0.013	0.012	0.011	0.011
	6	0.015	0.014	0.012	0.013
	8	0.019	0.018	0.016	0.017
	10	0.023	0.022	0.019	0.020
	12	0.027	0.025	0.022	0.023
	14	0.030	0.028	0.025	0.026
	16	0.033	0.031	0.028	0.029
	20	0.041	0.038	0.034	0.035
α° x ae	**≤ D5**	2° x 0.4D	2° x 0.4D	1° x 0.4D	1° x 0.4D

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HF452

RAMPING	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.017	0.016	0.025
	8	0.023	0.022	0.021	0.032
	10	0.028	0.026	0.025	0.038
	12	0.032	0.030	0.028	0.044
	14	0.036	0.034	0.032	0.049
	16	0.040	0.037	0.035	0.055
	20	0.049	0.045	0.043	0.067

VERTICAL	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.021	0.019	0.015	0.014
	8	0.027	0.024	0.020	0.019
	10	0.032	0.029	0.024	0.022
	12	0.037	0.033	0.028	0.026
	14	0.041	0.037	0.031	0.029
	16	0.046	0.041	0.034	0.032
	20	0.056	0.050	0.042	0.039

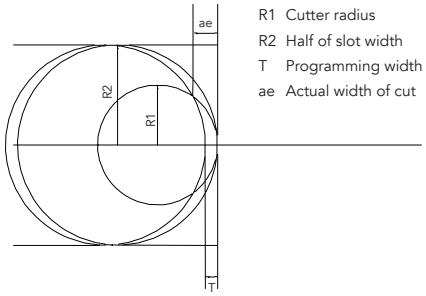
PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

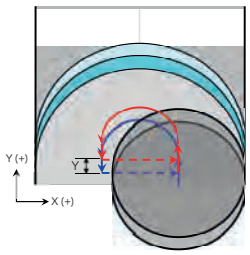
HF452

	Material Group ISO 513	P4 M3 K4	P4 P5 P8 M3 K4 S1	P5 P8 P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.027	0.024	0.021	0.029
	4	0.035	0.032	0.028	0.039
	5	0.044	0.040	0.035	0.048
	6	0.052	0.046	0.041	0.057
	8	0.067	0.060	0.054	0.074
	10	0.080	0.072	0.064	0.088
	12	0.092	0.083	0.073	0.101
	14	0.103	0.093	0.083	0.114
	16	0.115	0.103	0.092	0.126
	20	0.140	0.126	0.112	0.154

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 wird 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.

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

MEFCS2

cylindrical shank, 2 flutes

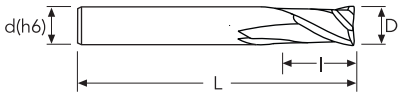
OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 35° | SQUARE | Z2



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 P7 M1	P5 M2 M3 S1 S2 S4	P8 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**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.005	0.004	0.004	0.004
	2	0.009	0.008	0.007	0.007
	3	0.012	0.010	0.009	0.009
	4	0.017	0.015	0.014	0.014
	5	0.023	0.020	0.018	0.018
	6	0.029	0.024	0.023	0.023
	8	0.035	0.029	0.028	0.028
	10	0.040	0.034	0.032	0.032
	12	0.046	0.039	0.037	0.037
	14	0.052	0.044	0.041	0.041
	16	0.058	0.049	0.046	0.046

< D3 mm: ap = 0.1D ÷ 0.2D

	Material Group ISO 513	P1 P2 P3	P4 P7 M1	P5 M2 M3 S1 S2 S4	P8 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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.006	0.005	0.004	0.004
	2	0.011	0.009	0.009	0.009
	3	0.014	0.012	0.011	0.011
	4	0.021	0.018	0.017	0.017
	5	0.028	0.023	0.022	0.022
	6	0.035	0.029	0.028	0.028
	8	0.041	0.035	0.033	0.033
	10	0.048	0.041	0.039	0.039
	12	0.055	0.047	0.044	0.044
	14	0.062	0.053	0.050	0.050
	16	0.069	0.059	0.055	0.055

< D3 mm: ap = 0.1D ÷ 0.2D

	Material Group ISO 513	P1 P2 P3	P4 P7 M1	P5 M2 M3 S1 S2 S4	P8 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**
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.003	0.002	0.002	0.002
	2	0.006	0.005	0.004	0.004
	3	0.007	0.006	0.006	0.006
	4	0.010	0.009	0.008	0.008
	5	0.014	0.012	0.011	0.011
	6	0.017	0.015	0.014	0.014
	8	0.021	0.018	0.017	0.017
	10	0.024	0.021	0.019	0.019
	12	0.028	0.023	0.022	0.022
	14	0.031	0.026	0.025	0.025
	16	0.035	0.029	0.028	0.028

< D3 mm: ap = 0.1D ÷ 0.2D

MEFCSH3

cylindrical shank, 3 flutes

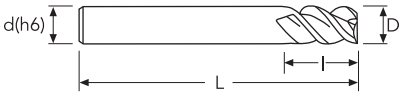
OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 50° | SQUARE | Z3 ≤ Ø18 | Z4 > Ø18



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

MEFCSH3

SLOTTING	Material Group ISO 513	P1 P2 P3	P4 P7 M1	P5 M2 M3 S1 S2 S4	P8 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**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.022	0.013	0.012	0.012
	8	0.029	0.017	0.015	0.016
	10	0.036	0.021	0.019	0.020
	12	0.046	0.027	0.024	0.026
	14	0.053	0.031	0.028	0.030
	16	0.065	0.038	0.034	0.036
	18	0.075	0.044	0.039	0.042
	20	0.086	0.051	0.045	0.048

SIDE MILLING	Material Group ISO 513	P1 P2 P3	P4 P7 M1	P5 M2 M3 S1 S2 S4	P8 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**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.026	0.015	0.014	0.014
	8	0.035	0.020	0.019	0.019
	10	0.043	0.026	0.024	0.024
	12	0.055	0.033	0.031	0.031
	14	0.064	0.038	0.036	0.036
	16	0.078	0.046	0.043	0.043
	18	0.090	0.053	0.050	0.050
	20	0.104	0.061	0.058	0.058

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

MEFCS4

cylindrical shank, 4 flutes

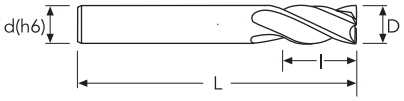
OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 35° | SQUARE | Z4



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

MEFCS4

	Material Group ISO 513	P1 P2 P3	P4 P7 M1	P5 M2 M3 S1 S2 S4	P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.012	0.010	0.010	0.010
	4	0.015	0.013	0.012	0.012
	5	0.018	0.015	0.014	0.014
	6	0.023	0.020	0.018	0.018
	8	0.030	0.026	0.024	0.024
	10	0.038	0.032	0.030	0.030
	12	0.045	0.038	0.036	0.036
	14	0.052	0.044	0.042	0.042
	16	0.058	0.049	0.046	0.046
	18	0.066	0.056	0.053	0.053
	20	0.075	0.064	0.060	0.060

MEF600

cylindrical shank, multi flute

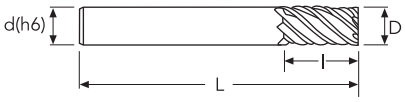
OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 50° | SQUARE | Z6~Z8



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

MEF600

	Material Group ISO 513	P1 P2 P3	P4 P7 M1	P5 M2 M3 S1 S2 S4	P8 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**	**D x 0.1D**	**D x 0.05D**
	Vc (m/min)	**100÷140**	**70÷110**	**50÷80**	**40÷60**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.015	0.013	0.012	0.012
	8	0.020	0.017	0.016	0.016
	10	0.025	0.021	0.020	0.020
	12	0.030	0.026	0.024	0.024
	14	0.035	0.030	0.028	0.028
	16	0.040	0.034	0.032	0.032
	20	0.050	0.043	0.040	0.040

MEF901

cylindrical shank, roughing

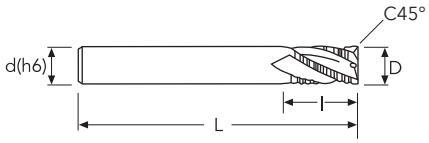
OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 45° | C45° | HR FINE | Z3~Z6



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
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

MEF901

	Material Group ISO 513	P1 P2 P3	P4 P7 M1	P5 M2 M3 S1 S2 S4	P8 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	0.018	0.015	0.014	0.014
	5	0.022	0.019	0.018	0.018
	6	0.028	0.024	0.022	0.022
	8	0.035	0.030	0.028	0.028
	10	0.040	0.034	0.032	0.032
	12	0.045	0.038	0.036	0.036
	14	0.050	0.043	0.040	0.040
	16	0.057	0.048	0.046	0.046
	20	0.073	0.062	0.058	0.058

MEF902

cylindrical shank, reduced neck, roughing

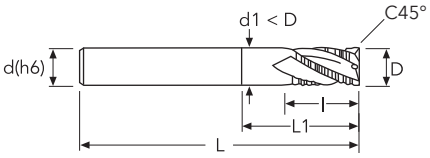
OSAWA NORM | VA | UMG ENDLESS | <45 HRC | 45° | C45° | HR FINE | Z4~Z6



P	M	K	N	S	H
★	★			★	

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C45°	C45° 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

	Material Group ISO 513	P1 P2 P3	P4 P7 M1	P5 M2 M3 S1 S2 S4	P8 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**	**45÷65**	**35÷45**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.027	0.023	0.021	0.021
	8	0.033	0.028	0.027	0.027
	10	0.038	0.032	0.030	0.030
	12	0.043	0.036	0.034	0.034
	14	0.048	0.040	0.038	0.038
	16	0.054	0.046	0.043	0.043
	20	0.069	0.059	0.055	0.055



ALU

NON-FERROUS MATERIALS

Uncoated micrograin carbide and cutting geometry specifically developed for non-ferrous machining. Lapped cutting edges and ad-hoc profile of the chip pocket for low cutting forces and outstanding finishing quality. Also available in the HF ALU version with unequal pitch (UP) with a specific design allowing mirror finishing and DxD machining, even in the 4-flutes version.

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 géométrie de coupe développée spécifiquement pour l'usinage de matériaux non ferreux. Arêtes de coupe polies et profil particulier de la goujure pour de faibles efforts de coupe et une excellente finition superficielle. Également disponible la version HF Alu à pas décalé(UP), avec un design particulier qui permet des finitions glacées et des usinages DxD,aussi dans la version à 4 arêtes de coupe.

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.

Мелкозернистый твердый сплав без покрытия со специально разработанной геометрией для обработки цветных металлов. Доведенные режущие кромки и специальный профиль стружечных канавок снижают силы резания и улучшают качество обработанной поверхности. Также доступна версия HF Alu с неравномерным шагом (UP) и специальной геометрией, позволяющая получать зеркальную поверхность и работать в режиме DxD, в том числе для версии с 4-мя зубьями.

HFAL4

cylindrical shank, 4 flutes

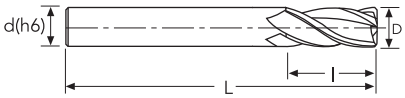
OSAWA NORM | ALU | MG / BR | 40° | SQUARE | Z4 UP



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

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.030	0.025	0.021	0.033
	4	0.040	0.034	0.028	0.044
	5	0.050	0.042	0.035	0.054
	6	0.059	0.050	0.041	0.064
	8	0.077	0.066	0.054	0.085
	10	0.095	0.080	0.066	0.104
	12	0.108	0.092	0.076	0.119
	14	0.126	0.107	0.088	0.139
	16	0.144	0.122	0.101	0.158
	18	0.158	0.135	0.111	0.174
	20	0.176	0.149	0.123	0.193

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.036	0.032	0.029	0.039
	4	0.048	0.043	0.038	0.052
	5	0.059	0.053	0.048	0.065
	6	0.070	0.063	0.056	0.077
	8	0.093	0.084	0.074	0.102
	10	0.113	0.102	0.091	0.125
	12	0.130	0.117	0.104	0.143
	14	0.151	0.136	0.121	0.166
	16	0.173	0.156	0.138	0.190
	18	0.190	0.171	0.152	0.209
	20	0.211	0.190	0.168	0.232

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap 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
HELICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.021	0.018	0.015	0.023
	4	0.027	0.025	0.020	0.030
	5	0.034	0.031	0.025	0.038
	6	0.040	0.036	0.030	0.044
	8	0.054	0.048	0.039	0.059
	10	0.065	0.058	0.048	0.072
	12	0.075	0.067	0.055	0.082
	14	0.087	0.078	0.064	0.096
	16	0.100	0.089	0.073	0.110
	18	0.110	0.098	0.081	0.120
	20	0.121	0.109	0.089	0.133

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HFAL4

RAMPING

Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
ap x ae	15° x D	10° x D	7° x D	15° x D
Vc (m/min)	300÷500	200÷400	200÷300	600÷1000
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
3	0.020	0.017	0.015	0.022
4	0.026	0.023	0.019	0.029
5	0.033	0.029	0.024	0.036
6	0.039	0.034	0.029	0.043
8	0.051	0.045	0.038	0.057
10	0.063	0.055	0.046	0.069
12	0.072	0.062	0.053	0.079
14	0.084	0.073	0.062	0.092
16	0.096	0.083	0.071	0.105
18	0.105	0.092	0.078	0.116
20	0.117	0.101	0.086	0.128

VERTICAL

Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
3	0.030	0.027	0.024	0.033
4	0.040	0.036	0.032	0.044
5	0.050	0.045	0.040	0.054
6	0.059	0.053	0.047	0.064
8	0.077	0.070	0.062	0.085
10	0.095	0.085	0.076	0.104
12	0.108	0.097	0.086	0.119
14	0.126	0.113	0.101	0.139
16	0.144	0.130	0.115	0.158
18	0.158	0.143	0.127	0.174
20	0.176	0.158	0.140	0.193

DRILLING

Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
ap x ae	D x D	D x D	0.5D x D	0.5D x D
Vc (m/min)	300÷500	200÷400	150÷350	600÷1000
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
3	0.015	0.013	0.012	0.016
4	0.020	0.018	0.016	0.022
5	0.025	0.022	0.020	0.027
6	0.029	0.026	0.023	0.032
8	0.039	0.035	0.031	0.043
10	0.047	0.043	0.038	0.052
12	0.054	0.049	0.043	0.059
14	0.063	0.057	0.050	0.069
16	0.072	0.065	0.058	0.079
18	0.079	0.071	0.063	0.087
20	0.088	0.079	0.070	0.097

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HFAL3

cylindrical shank, 3 flutes, corner radius

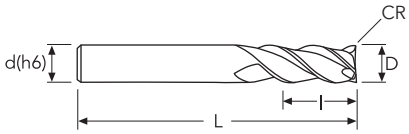
OSAWA NORM | ALU | MG POLISHED | 30° | RADIUS | Z3 UP



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
1	0/-0.015	0.10	0/-0.01	6	3		50	3	HFAL301010030	●
1	0/-0.015	0,10	0/-0.01	6	5		50	3	HFAL301010050	●
1.5	0/-0.015	0.10	0/-0.01	6	4,5		50	3	HFAL301015045	●
1.5	0/-0.015	0.10	0/-0.01	6	6		50	3	HFAL301015060	●
1.5	0/-0.015	0.10	0/-0.01	6	8		50	3	HFAL301015080	●
2	0/-0.020	0.10	+/-0.020	6	3		50	3	HFAL301020030	●
2	0/-0.020	0.10	+/-0.020	6	5		50	3	HFAL301020050	●
2	0/-0.020	0.10	+/-0.020	6	6.5		50	3	HFAL301020	●
2	0/-0.020	0.10	+/-0.020	6	8		50	3	HFAL301020080	●
2	0/-0.020	0.10	+/-0.020	6	10		50	3	HFAL301020100	●
3	0/-0.020	0.10	+/-0.020	6	6		50	3	HFAL301030060	●
3	0/-0.020	0.10	+/-0.020	6	9		50	3	HFAL301030	●
3	0/-0.020	0.10	+/-0.020	6	12		50	3	HFAL301030120	●
4	0/-0.020	0.10	+/-0.020	6	12		50	3	HFAL301040	●
5	0/-0.020	0.10	+/-0.020	6	15		50	3	HFAL301050	●
6	0/-0.020	0.10	+/-0.020	6	20		60	3	HFAL301060	●
8	0/-0.020	0.10	+/-0.020	8	20		64	3	HFAL301080	●
10	0/-0.020	0.10	+/-0.020	10	22		75	3	HFAL301100	●
12	0/-0.020	0.10	+/-0.020	12	25		75	3	HFAL301120	●
14	0/-0.020	0.10	+/-0.020	14	32		90	3	HFAL301140	●
16	0/-0.020	0.10	+/-0.020	16	32		90	3	HFAL301160	●
20	0/-0.020	0.10	+/-0.020	20	38		100	3	HFAL301200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

HFAL3



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.011	0.009	0.008	0.012
2	0.022	0.019	0.015	0.024
3	0.033	0.028	0.023	0.036
4	0.044	0.037	0.031	0.048
5	0.055	0.047	0.039	0.061
6	0.065	0.055	0.046	0.072
8	0.086	0.073	0.060	0.095
10	0.105	0.089	0.074	0.116
12	0.120	0.102	0.084	0.132
14	0.140	0.119	0.098	0.154
16	0.160	0.136	0.112	0.176
18	0.176	0.150	0.123	0.194
20	0.195	0.166	0.137	0.215



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.013	0.012	0.011	0.015
2	0.026	0.024	0.021	0.029
3	0.040	0.036	0.032	0.044
4	0.053	0.048	0.042	0.058
5	0.066	0.059	0.053	0.073
6	0.078	0.070	0.062	0.086
8	0.103	0.093	0.083	0.114
10	0.126	0.113	0.101	0.139
12	0.144	0.130	0.115	0.158
14	0.168	0.151	0.134	0.185
16	0.192	0.173	0.154	0.211
18	0.211	0.190	0.169	0.232
20	0.234	0.211	0.187	0.257



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
ap 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.008	0.007	0.006	0.008
2	0.015	0.014	0.011	0.017
3	0.023	0.020	0.017	0.025
4	0.030	0.027	0.022	0.033
5	0.038	0.034	0.028	0.042
6	0.045	0.040	0.033	0.049
8	0.059	0.053	0.044	0.065
10	0.073	0.065	0.054	0.080
12	0.083	0.074	0.061	0.091
14	0.097	0.087	0.071	0.106
16	0.111	0.099	0.082	0.122
18	0.122	0.109	0.090	0.134
20	0.135	0.121	0.099	0.148

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HFAL3



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
ap x ae	15° x D	10° x D	7° x D	15° x D
Vc (m/min)	300÷500	200÷400	150÷350	600÷900
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.007	0.006	0.005	0.008
2	0.015	0.013	0.011	0.016
3	0.022	0.019	0.016	0.024
4	0.029	0.025	0.022	0.032
5	0.037	0.032	0.027	0.040
6	0.043	0.038	0.032	0.048
8	0.057	0.050	0.042	0.063
10	0.070	0.061	0.051	0.077
12	0.080	0.069	0.059	0.088
14	0.093	0.081	0.069	0.102
16	0.106	0.092	0.078	0.117
18	0.117	0.102	0.086	0.129
20	0.130	0.113	0.096	0.143



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
2	0.011	0.010	0.009	0.012
4	0.022	0.020	0.018	0.024
3	0.033	0.030	0.026	0.036
4	0.044	0.040	0.035	0.048
5	0.055	0.050	0.044	0.061
6	0.065	0.059	0.052	0.072
8	0.086	0.077	0.069	0.095
10	0.105	0.095	0.084	0.116
12	0.120	0.108	0.096	0.132
14	0.140	0.126	0.112	0.154
16	0.160	0.144	0.128	0.176
18	0.176	0.158	0.141	0.194
20	0.195	0.176	0.156	0.215



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
2	0.011	0.010	0.009	0.012
4	0.022	0.020	0.018	0.024
3	0.017	0.015	0.013	0.018
4	0.022	0.020	0.018	0.024
5	0.028	0.025	0.022	0.030
6	0.033	0.029	0.026	0.036
8	0.043	0.039	0.034	0.047
10	0.053	0.047	0.042	0.058
12	0.060	0.054	0.048	0.066
14	0.070	0.063	0.056	0.077
16	0.080	0.072	0.064	0.088
18	0.088	0.079	0.070	0.097
20	0.098	0.088	0.078	0.107

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HFA3D

cylindrical shank, 3 flutes, corner radius

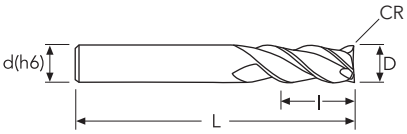
OSAWA NORM | ALU | MG DLC | 30° | RADIUS | Z3 UP



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
1	0/-0.020	0.10	+/-0.020	6	3		50	3	HFA3D01010030	●
1	0/-0.020	0,10	+/-0.020	6	5		50	3	HFA3D01010050	●
1.5	0/-0.020	0.10	+/-0.020	6	4.5		50	3	HFA3D01015045	●
1.5	0/-0.020	0.10	+/-0.020	6	6		50	3	HFA3D01015060	●
1.5	0/-0.020	0.10	+/-0.020	6	8		50	3	HFA3D01015080	●
2	0/-0.020	0.10	+/-0.020	6	5		50	3	HFA3D01020050	●
2	0/-0.020	0.10	+/-0.020	6	6.5		50	3	HFA3D01020065	●
2	0/-0.020	0.10	+/-0.020	6	8		50	3	HFA3D01020080	●
3	0/-0.020	0.10	+/-0.020	6	6		50	3	HFA3D01030060	●
3	0/-0.020	0.10	+/-0.020	6	9		50	3	HFA3D01030090	●
3	0/-0.020	0.10	+/-0.020	6	12		50	3	HFA3D01030120	●
4	0/-0.020	0.10	+/-0.020	6	12		50	3	HFA3D01040120	●
6	0/-0.020	0.10	+/-0.020	6	20		60	3	HFA3D01060	●
8	0/-0.020	0.10	+/-0.020	8	20		64	3	HFA3D01080	●
10	0/-0.020	0.10	+/-0.020	10	22		75	3	HFA3D01100	●

HFA3D

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	D x D	D x D	D x D	D x D
	Vc (m/min)	350÷600	250÷480	180÷400	700÷1000
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.011	0.009	0.008	0.012
	2	0.022	0.019	0.015	0.024
	3	0.033	0.028	0.023	0.036
	4	0.044	0.037	0.031	0.048
	5	0.055	0.047	0.039	0.061
	6	0.065	0.055	0.046	0.072
	8	0.086	0.073	0.060	0.095
	10	0.105	0.089	0.074	0.116

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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)	350÷600	250÷600	250÷480	700÷1200
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.013	0.012	0.011	0.015
	2	0.026	0.024	0.021	0.029
	3	0.040	0.036	0.032	0.044
	4	0.053	0.048	0.042	0.058
	5	0.066	0.059	0.053	0.073
	6	0.078	0.070	0.062	0.086
	8	0.103	0.093	0.083	0.114
	10	0.126	0.113	0.101	0.139

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	8° x 0.5D	5° x 0.5D	5° x 0.5D	8° x 0.5D
	Vc (m/min)	350÷600	250÷480	180÷400	700÷1000
HELICAL	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.007	0.006	0.005	0.008
	2	0.015	0.013	0.011	0.016
	3	0.022	0.019	0.016	0.024
	4	0.029	0.025	0.022	0.032
	5	0.037	0.032	0.027	0.040
	6	0.043	0.038	0.032	0.048
	8	0.057	0.050	0.042	0.063
	10	0.070	0.061	0.051	0.077

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

CUTTING PARAMETERS

HFA3D



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
ap x ae	15° x D	10° x D	7° x D	15° x D
Vc (m/min)	350÷600	250÷480	180÷400	700÷1000
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.011	0.010	0.009	0.012
2	0.022	0.020	0.018	0.024
3	0.033	0.030	0.026	0.036
4	0.044	0.040	0.035	0.048
5	0.055	0.050	0.044	0.061
6	0.065	0.059	0.052	0.072
8	0.086	0.077	0.069	0.095
10	0.105	0.095	0.084	0.116



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
ap x ae	D x 0.4D	D x 0.4D	D x 0.4D	D x 0.4D
Vc (m/min)	350÷600	250÷480	180÷400	700÷1000
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.011	0.010	0.009	0.012
2	0.022	0.020	0.018	0.024
3	0.033	0.030	0.026	0.036
4	0.044	0.040	0.035	0.048
5	0.055	0.050	0.044	0.061
6	0.065	0.059	0.052	0.072
8	0.086	0.077	0.069	0.095
10	0.105	0.095	0.084	0.116



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
ap x ae	D x D	D x D	0.5D x D	0.5D x D
Vc (m/min)	300÷400	220÷350	180÷300	600÷800
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.006	0.005	0.004	0.006
2	0.011	0.010	0.009	0.012
3	0.017	0.015	0.013	0.018
4	0.022	0.020	0.018	0.024
5	0.028	0.025	0.022	0.030
6	0.033	0.029	0.026	0.036
8	0.043	0.039	0.034	0.047
10	0.053	0.047	0.042	0.058

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HFA53

cylincrical shank, reduced neck, 3 flutes, long reach, corner radius

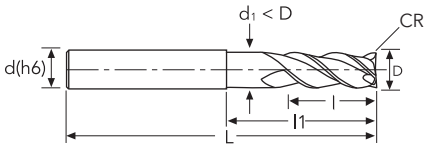
OSAWA NORM | ALU | MG / BR | 30° | RADIUS | Z3 UP



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

CUTTING PARAMETERS

HFA53

SLOTTING	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.026	0.022	0.018	0.029
	4	0.035	0.030	0.025	0.039
	5	0.044	0.037	0.031	0.048
	6	0.052	0.044	0.036	0.057
	8	0.069	0.058	0.048	0.076
	10	0.084	0.071	0.059	0.092
	12	0.096	0.082	0.067	0.106
	14	0.112	0.095	0.078	0.123
	16	0.128	0.109	0.090	0.141
	18	0.141	0.120	0.099	0.155
	20	0.156	0.133	0.109	0.172

SIDE MILLING	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.032	0.029	0.025	0.035
	4	0.042	0.038	0.034	0.046
	5	0.053	0.048	0.042	0.058
	6	0.062	0.056	0.050	0.069
	8	0.083	0.074	0.066	0.091
	10	0.101	0.091	0.081	0.111
	12	0.115	0.104	0.092	0.127
	14	0.134	0.121	0.108	0.148
	16	0.154	0.138	0.123	0.169
	18	0.169	0.152	0.135	0.186
	20	0.187	0.168	0.150	0.206

HELICAL	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.018	0.016	0.013	0.020
	4	0.024	0.022	0.018	0.027
	5	0.030	0.027	0.022	0.033
	6	0.036	0.032	0.027	0.040
	8	0.048	0.043	0.035	0.052
	10	0.058	0.052	0.043	0.064
	12	0.066	0.059	0.049	0.073
	14	0.077	0.069	0.057	0.085
	16	0.088	0.079	0.065	0.097
	18	0.097	0.087	0.072	0.107
	20	0.108	0.097	0.080	0.119

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

HFA53



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
ap 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
3	0.018	0.014	0.013	0.019
4	0.023	0.018	0.017	0.026
5	0.029	0.023	0.022	0.032
6	0.035	0.027	0.025	0.038
8	0.046	0.036	0.034	0.050
10	0.056	0.044	0.041	0.061
12	0.064	0.050	0.047	0.070
14	0.074	0.058	0.055	0.082
16	0.085	0.067	0.063	0.094
18	0.094	0.073	0.069	0.103
20	0.104	0.081	0.076	0.114



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
3	0.026	0.024	0.021	0.029
4	0.035	0.032	0.028	0.039
5	0.044	0.040	0.035	0.048
6	0.052	0.047	0.042	0.057
8	0.069	0.062	0.055	0.076
10	0.084	0.076	0.067	0.092
12	0.096	0.086	0.077	0.106
14	0.112	0.101	0.090	0.123
16	0.128	0.115	0.102	0.141
18	0.141	0.127	0.113	0.155
20	0.156	0.140	0.125	0.172



Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
3	0.013	0.012	0.011	0.015
4	0.018	0.016	0.014	0.019
5	0.022	0.020	0.018	0.024
6	0.026	0.023	0.021	0.029
8	0.034	0.031	0.028	0.038
10	0.042	0.038	0.034	0.046
12	0.048	0.043	0.038	0.053
14	0.056	0.050	0.045	0.062
16	0.064	0.058	0.051	0.070
18	0.070	0.063	0.056	0.077
20	0.078	0.070	0.062	0.086

PARAMETERS SUGGESTED WITH HIGH POWER MILLING CHUCK AND STABLE MACHINING CONDITION

MDCSA1

cylindrical shank, 1 flute, polished

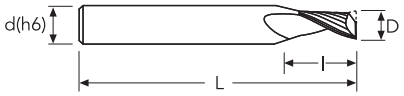
OSAWA NORM | ALU | MG POLISHED | 25° | SQUARE | Z1



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/-0.015			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

MDCSA1

SLOTTING	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.023	0.019	0.016	0.023
	3	0.030	0.026	0.021	0.030
	4	0.039	0.033	0.027	0.039
	5	0.049	0.041	0.034	0.049
	6	0.058	0.049	0.040	0.058
	8	0.079	0.067	0.055	0.079
	10	0.098	0.083	0.068	0.098
	12	0.116	0.099	0.081	0.116

< D3 ap x ae D x 0.25D

SIDE MILLING	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.030	0.026	0.021	0.030
	3	0.040	0.034	0.028	0.040
	4	0.052	0.044	0.036	0.052
	5	0.065	0.055	0.046	0.065
	6	0.077	0.065	0.054	0.077
	8	0.105	0.089	0.074	0.105
	10	0.130	0.111	0.091	0.130
	12	0.155	0.132	0.109	0.155

< D3 ap x ae D x 0.25D

DRILLING	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	D x D	D x D	D x D	0.5D x D
	Vc (m/min)	300÷400	150÷350	100÷300	300÷500
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.011	0.010	0.008	0.011
	3	0.015	0.013	0.011	0.015
	4	0.020	0.017	0.014	0.020
	5	0.024	0.021	0.017	0.024
	6	0.029	0.025	0.020	0.029
	8	0.039	0.033	0.028	0.039
	10	0.049	0.041	0.034	0.049
	12	0.058	0.049	0.041	0.058

< D3 ap x ae 0.5D x D

MDCSA2

cylindrical shank, 2 flutes, polished

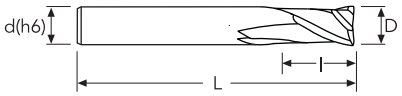
OSAWA NORM | ALU | MG POLISHED | 45° | SQUARE | Z2



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/-0.015			4	3		40	2	MDCSA2010	●
1.5	0/-0.015			4	4.5		40	2	MDCSA2015	●
2	0/-0.015			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
	Hardness/Rm				
	ap x ae	0.5D x D	0.5D x D	0.5D x D	0.5D x D
	Vc (m/min)	300÷600	150÷350	150÷250	500÷900
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.011	0.010	0.008	0.011
	1.5	0.017	0.014	0.012	0.017
	2	0.022	0.019	0.016	0.022
	3	0.028	0.024	0.020	0.028
	4	0.038	0.032	0.026	0.038
	5	0.047	0.040	0.033	0.047
	6	0.056	0.048	0.039	0.056
	8	0.075	0.064	0.052	0.075
	10	0.094	0.080	0.066	0.094
	12	0.112	0.095	0.078	0.112
	14	0.130	0.111	0.091	0.130
	16	0.148	0.126	0.103	0.148
	18	0.166	0.141	0.116	0.166
	20	0.185	0.157	0.129	0.185

< D3 ap x ae 0.25D x D

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.013	0.011	0.009	0.013
	1.5	0.020	0.017	0.014	0.020
	2	0.027	0.023	0.019	0.027
	3	0.034	0.029	0.024	0.034
	4	0.045	0.038	0.032	0.045
	5	0.056	0.048	0.040	0.056
	6	0.068	0.057	0.047	0.068
	8	0.090	0.076	0.063	0.090
	10	0.112	0.096	0.079	0.112
	12	0.134	0.114	0.094	0.134
	14	0.157	0.133	0.110	0.157
	16	0.177	0.151	0.124	0.177
	18	0.200	0.170	0.140	0.200
	20	0.222	0.188	0.155	0.222

< D3 ap x ae D x 0.25D

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

MDCSA2

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.006	0.005	0.004	0.006
	1.5	0.008	0.007	0.006	0.008
	2	0.011	0.010	0.008	0.011
	3	0.014	0.012	0.010	0.014
	4	0.019	0.016	0.013	0.019
	5	0.024	0.020	0.016	0.024
	6	0.028	0.024	0.020	0.028
	8	0.037	0.032	0.026	0.037
	10	0.047	0.040	0.033	0.047
	12	0.056	0.048	0.039	0.056
	14	0.065	0.055	0.046	0.065
	16	0.074	0.063	0.052	0.074
	18	0.083	0.071	0.058	0.083
	20	0.092	0.079	0.065	0.092

< D3 ap x ae 0.25D x D

MDCSA3

cylindrical shank, 3 flutes, polished

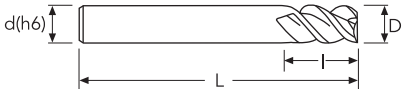
OSAWA NORM | ALU | MG POLISHED | 55° | SQUARE | Z3



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	●

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

MDCSA3

SLOTTING

Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.010	0.009	0.007	0.010
1.5	0.015	0.013	0.011	0.015
2	0.020	0.017	0.014	0.020
3	0.025	0.022	0.018	0.025
4	0.034	0.029	0.024	0.034
5	0.042	0.036	0.030	0.042
6	0.051	0.043	0.035	0.051
8	0.067	0.057	0.047	0.067
10	0.084	0.072	0.059	0.084
12	0.101	0.086	0.071	0.101
14	0.117	0.100	0.082	0.117
16	0.133	0.113	0.093	0.133
18	0.150	0.127	0.105	0.150
20	0.166	0.141	0.116	0.166

< D3 ap x ae 0.25D x D

SIDE MILLING

Material Group ISO 513	N1	N2 N3	N4	N5
Hardness/Rm				
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
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.012	0.010	0.008	0.012
1.5	0.018	0.015	0.013	0.018
2	0.024	0.021	0.017	0.024
3	0.030	0.026	0.021	0.030
4	0.041	0.034	0.028	0.041
5	0.051	0.043	0.036	0.051
6	0.061	0.052	0.043	0.061
8	0.081	0.069	0.057	0.081
10	0.101	0.086	0.071	0.101
12	0.121	0.103	0.085	0.121
14	0.141	0.120	0.099	0.141
16	0.160	0.136	0.112	0.160
18	0.180	0.153	0.126	0.180
20	0.200	0.170	0.140	0.200

< D3 ap x ae D x 0.1D

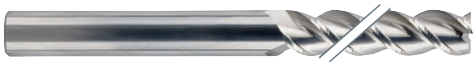
MDA310-11-12

cylindrical shank, 3 flutes polished, long

OSAWA NORM | ALU | MG POLISHED | 55° | SQUARE | Z3



MDA310

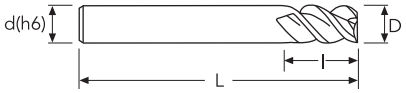


MDA311 - MDA312

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

MDA310

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
SLOTTING	ap x ae	0.3D x D	0.3D x D	0.3D x D	0.3D x D
	Vc (m/min)	220÷340	150÷250	100÷200	400÷700
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.023	0.019	0.016	0.023
	4	0.030	0.026	0.021	0.030
	5	0.038	0.032	0.027	0.038
	6	0.046	0.039	0.032	0.046

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
SIDE MILLING	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)	270÷370	200÷300	150÷250	500÷800
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.027	0.023	0.019	0.027
	4	0.036	0.031	0.026	0.036
	5	0.046	0.039	0.032	0.046
	6	0.055	0.047	0.038	0.055

MDA311

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	0.3D x D	0.3D x D	0.3D x D	0.3D x D
	Vc (m/min)	180÷280	110÷210	100÷160	350÷550
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.019	0.016	0.013	0.019
	4	0.025	0.022	0.018	0.025
	5	0.032	0.027	0.022	0.032
	6	0.038	0.032	0.027	0.038
	8	0.051	0.043	0.035	0.051
	10	0.063	0.054	0.044	0.063
	12	0.076	0.064	0.053	0.076

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	2D x0.05D	2D x0.05D	2D x0.05D	2D x0.05D
	Vc (m/min)	210÷310	150÷250	110÷210	420÷620
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.023	0.019	0.016	0.023
	4	0.030	0.026	0.021	0.030
	5	0.038	0.032	0.027	0.038
	6	0.046	0.039	0.032	0.046
	8	0.061	0.052	0.042	0.061
	10	0.076	0.064	0.053	0.076
	12	0.091	0.077	0.064	0.091

CUTTING PARAMETERS

MDA312

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	0.1D x D	0.1D x D	0.1D x D	0.1D x D
SLOTTING	Vc (m/min)	130÷230	100÷160	80÷120	250÷450
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	8	0.040	0.034	0.028	0.040
	10	0.051	0.043	0.035	0.051
	12	0.060	0.051	0.042	0.060
	16	0.080	0.068	0.056	0.080
	20	0.100	0.085	0.070	0.100

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	2.5D x 0.05D	2.5D x 0.05D	2.5D x 0.05D	2.5D x 0.05D
SIDE MILLING	Vc (m/min)	150÷250	100÷200	100÷160	300÷500
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	8	0.048	0.041	0.034	0.048
	10	0.061	0.052	0.042	0.061
	12	0.073	0.062	0.051	0.073
	16	0.096	0.081	0.067	0.096
	20	0.120	0.102	0.084	0.120

MDCSAM

cylindrical shank, 6F, polished

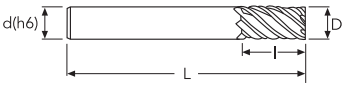
OSAWA NORM | ALU | MG POLISHED | 50° | SQUARE | Z6



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/-0.020			6	15		57	6	MDCSAM060	●
8	0/-0.020			8	20		64	6	MDCSAM080	●
10	0/-0.020			10	22		75	6	MDCSAM100	●
12	0/-0.020			12	25		75	6	MDCSAM120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MDCSAM

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	1.5D x 0.05D	1.5D x 0.05D	1.5D x 0.05D	1.5D x 0.05D
SIDE MILLING	Vc (m/min)	600÷1000	400÷800	300÷700	900÷1300
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.050	0.043	0.035	0.050
	8	0.067	0.057	0.047	0.067
	10	0.084	0.071	0.059	0.084
	12	0.100	0.085	0.070	0.100
	20	0.120	0.102	0.084	0.120

MCA212R

cylindrical shank, 2 flutes, corner radius

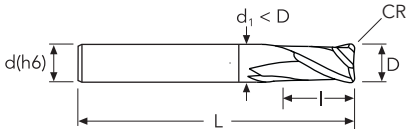
OSAWA NORM | ALU | MG PV200 | 25° | RADIUS | Z2



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

MCA212R

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	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÷1000
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.030	0.025	0.021	0.033
	3	0.040	0.034	0.028	0.044
	4	0.050	0.042	0.035	0.054
	5	0.059	0.050	0.041	0.064
	6	0.077	0.066	0.054	0.085
	8	0.095	0.080	0.066	0.104
	10	0.108	0.092	0.076	0.119
	12	0.126	0.107	0.088	0.139

< D3 ap x ae 0.25D x D

	Material Group ISO 513	N1	N2 N3	N4	N5
	Hardness/Rm				
	ap x ae	D x 0.5D	D x 0.5D	D x 0.5D	D x 0.5D
	Vc (m/min)	300÷600	250÷450	200÷400	600÷1000
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.027	0.023	0.019	0.027
	3	0.034	0.029	0.024	0.034
	4	0.045	0.038	0.032	0.045
	5	0.056	0.048	0.040	0.056
	6	0.068	0.057	0.047	0.068
	8	0.090	0.076	0.063	0.090
	10	0.112	0.096	0.079	0.112
	12	0.134	0.114	0.094	0.134

< D3 ap x ae D x 0.25D

MDCAB2

cylindrical shank, 2 flutes ball nose, polished

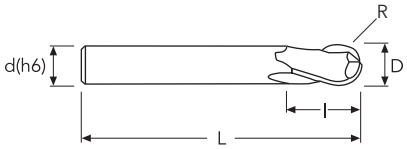
OSAWA NORM | ALU | MG POLISHED | 40° | BALL NOSE | Z2 BALL



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

MDCAB2



Material Group ISO 513		N1	N2 N3	N4	N5
Hardness/Rm					
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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.80	0.013	0.011	0.010	0.013
1.5	1.20	0.017	0.015	0.013	0.017
2	1.60	0.017	0.015	0.013	0.017
2.5	2.00	0.021	0.019	0.017	0.021
3	2.40	0.025	0.023	0.020	0.025
4	3.20	0.035	0.032	0.028	0.035
5	4.00	0.045	0.040	0.036	0.045
6	4.80	0.053	0.048	0.043	0.053
8	6.40	0.067	0.060	0.054	0.067
10	8.00	0.080	0.072	0.064	0.080
12	9.60	0.094	0.084	0.075	0.094



MEX AND MH

STEEL AND HARDENED STEEL
30÷55 HRC (MEX) AND 30÷70 HRC (MH)

MEX: Ultra-fine micrograin and Endless Orange coating for high perfromance machining on 30÷55 HRC materials.
MH: Wide range of tools available for general milling, copying and super finishing (30÷70 HRC).

MEX: Micrograna ultrafine e rivestimento Endless Orange per lavorazione ad alto rendimento di materiali con durezza compresa tra 30÷55 HRC.
MH: Ampia gamma per soddisfare applicazioni di copiatura e super finitura (30÷70 HRC).

MEX: Besonders feine Mikrokörnung und Beschichtung Endless Orange für Hochleistungsbearbeitungen von Materialien mit einer Härte zwischen 30 und 55 HRC.
MH: Große Produktpalette für Anwendungen zum Fräsen im Allgemeinen, Kopierfräsen und Schlichtbearbeitung (30÷70 HRC).

MEX: Ultra Micrograin et revêtement Endless Orange pour un usinage à rendement élevé de matériaux ayant une dureté comprise entre 30÷55 HRC.
MH: Une large gamme pour satisfaire les applications de fraisage général, copiage et super finition (30÷70 HRC).

MEX: Micrograno ultrafino y revestimiento Endless Orange para el mecanizado a alto rendimiento de materiales con una dureza comprendida entre 30 y 55 HRC.
MH: Amplia gama para satisfacer aplicaciones de fresado general, copiado y súper acabado (30÷70 HRC).

MEX: Микрозернистая структура твердого сплава и покрытие Endless Orange служат для высокоэффективной обработки материалов с твёрдостью 30÷55 HRC.
MH: Широкий ассортимент для профилированной и суперфинишной обработки (30 ÷ 70 HRC).

MEXM2

cylindrical shank, 2 flutes, miniature

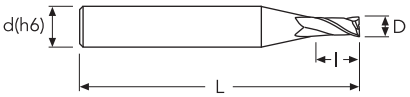
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.3	0/-0.010			4	0.6		40	2	MEXM20030	●
0.4	0/-0.010			4	0.8		40	2	MEXM20040	●
0.5	0/-0.010			4	1		40	2	MEXM20050	●
0.6	0/-0.010			4	1.2		40	2	MEXM20060	●
0.7	0/-0.010			4	1.4		40	2	MEXM20070	●
0.8	0/-0.010			4	1.6		40	2	MEXM20080	●
0.9	0/-0.010			4	1.8		40	2	MEXM20090	●
1	0/-0.015			3	2		40	2	MEXM20100	●
1.1	0/-0.015			3	2.2		40	2	MEXM20110	●
1.2	0/-0.015			3	2.4		40	2	MEXM20120	●
1.3	0/-0.015			3	2.6		40	2	MEXM20130	●
1.4	0/-0.015			3	2.8		40	2	MEXM20140	●
1.5	0/-0.015			3	3		40	2	MEXM20150	●
1.6	0/-0.015			3	3.2		40	2	MEXM20160	●
1.7	0/-0.015			3	3.4		40	2	MEXM20170	●
1.8	0/-0.015			3	3.6		40	2	MEXM20180	●
1.9	0/-0.015			3	3.8		40	2	MEXM20190	●
2	0/-0.015			3	4		40	2	MEXM20200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

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÷90**	**50÷70**	**30÷50**	**20÷40**
SLOTTING	D (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.3	0.02	0.004	0.004	0.003	0.003
	0.4	0.02	0.006	0.005	0.005	0.004
	0.5	0.03	0.007	0.006	0.006	0.005
	0.6	0.03	0.008	0.007	0.006	0.006
	0.8	0.04	0.010	0.009	0.008	0.007
	1	0.05	0.012	0.011	0.010	0.008
	1.2	0.06	0.022	0.020	0.018	0.015
	1.4	0.07	0.024	0.022	0.019	0.017
	1.5	0.08	0.025	0.023	0.020	0.018
	1.6	0.08	0.026	0.023	0.021	0.018
	1.8	0.09	0.028	0.025	0.022	0.020
	2	0.10	0.030	0.027	0.024	0.021

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

MEXM2SC

cylindrical shank, 2 flutes, short cutting length, miniature

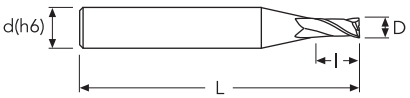
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.2	0/-0.010			4	0.3		50	2	MEXM2SC0020	●
0.3	0/-0.010			4	0.4		50	2	MEXM2SC0030	●
0.4	0/-0.010			4	0.6		50	2	MEXM2SC0040	●
0.5	0/-0.010			4	0.7		50	2	MEXM2SC0050	●
0.6	0/-0.010			4	0.9		50	2	MEXM2SC0060	●
0.7	0/-0.010			4	1		50	2	MEXM2SC0070	●
0.8	0/-0.010			4	1.2		50	2	MEXM2SC0080	●
0.9	0/-0.010			4	1.4		50	2	MEXM2SC0090	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXM2SC

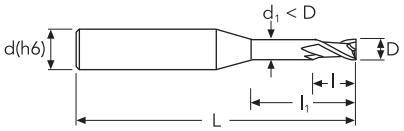
	Material Group ISO 513		P2 P3 P4 K1 K2	P4 P5 K3	P6 K4	H1 H4 H5
	Hardness/Rm		≤1000 N/mm²	≤35 HRC	35÷45 HRC	45÷55 HRC
	ap x ae		**ap x D**	**ap x D**	**ap x D**	**ap x D**
	Vc (m/min)		**70÷110**	**50÷90**	**40÷60**	**20÷40**
SLOTTING	D (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.2	0.01	0.003	0.003	0.002	0.002
	0.3	0.02	0.004	0.004	0.003	0.003
	0.4	0.02	0.006	0.005	0.005	0.004
	0.5	0.03	0.007	0.006	0.006	0.005
	0.6	0.03	0.008	0.007	0.006	0.006
	0.8	0.04	0.010	0.009	0.008	0.007
	0.9	0.05	0.012	0.011	0.010	0.008

MEXLN2

cylindrical shank, 2 flutes, extended and reduced neck

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2

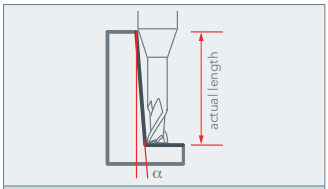




P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	C	C Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.2	0/-0.010			4	0.3	0.5	0.16	50	2	0.57	0.59	0.61	0.63	0.68	MEXLN2002005	●
0.2	0/-0.010			4	0.3	1	0.16	50	2	1.09	1.12	1.16	1.21	1.30	MEXLN200201	●
0.2	0/-0.010			4	0.3	1.5	0.16	50	2	1.60	1.66	1.72	1.78	1.91	MEXLN2002015	●
0.3	0/-0.010			4	0.4	1	0.26	50	2	1.09	1.12	1.16	1.21	1.30	MEXLN200301	●
0.3	0/-0.010			4	0.4	2	0.26	50	2	2.12	2.19	2.27	2.35	2.53	MEXLN200302	●
0.3	0/-0.010			4	0.4	3	0.26	50	2	3.15	3.26	3.38	3.50	3.76	MEXLN200303	●
0.4	0/-0.010			4	0.6	2	0.37	50	2	2.12	2.19	2.27	2.35	2.53	MEXLN200402	●
0.4	0/-0.010			4	0.6	3	0.37	50	2	3.15	3.26	3.38	3.50	3.76	MEXLN200403	●
0.4	0/-0.010			4	0.6	4	0.37	50	2	4.19	4.33	4.49	4.65	5.00	MEXLN200404	●
0.4	0/-0.010			4	0.6	5	0.37	50	2	5.22	5.40	5.59	5.79	6.23	MEXLN200405	●
0.5	0/-0.010			4	0.7	2	0.45	50	2	2.16	2.23	2.31	2.40	2.57	MEXLN200502	●
0.5	0/-0.010			4	0.7	4	0.45	50	2	4.23	4.37	4.53	4.69	5.04	MEXLN200504	●
0.5	0/-0.010			4	0.7	6	0.45	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200506	●
0.5	0/-0.010			4	0.7	8	0.45	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200508	●
0.6	0/-0.010			4	0.9	2	0.55	50	2	2.16	2.23	2.31	2.40	2.57	MEXLN200602	●
0.6	0/-0.010			4	0.9	4	0.55	50	2	4.23	4.37	4.53	4.69	5.04	MEXLN200604	●
0.6	0/-0.010			4	0.9	6	0.55	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200606	●
0.6	0/-0.010			4	0.9	8	0.55	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200608	●
0.6	0/-0.010			4	0.9	10	0.55	50	2	10.43	10.79	11.17	11.57	12.44	MEXLN200610	●
0.7	0/-0.010			4	1.0	2	0.65	50	2	2.16	2.23	2.31	2.40	2.57	MEXLN200702	●
0.7	0/-0.010			4	1.0	4	0.65	50	2	4.23	4.37	4.53	4.69	5.04	MEXLN200704	●
0.7	0/-0.010			4	1.0	6	0.65	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200706	●
0.7	0/-0.010			4	1.0	8	0.65	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200708	●
0.7	0/-0.010			4	1.0	10	0.65	50	2	10.43	10.79	11.17	11.57	12.44	MEXLN200710	●
0.8	0/-0.010			4	1.2	4	0.75	50	2	4.23	4.37	4.53	4.69	5.04	MEXLN200804	●
0.8	0/-0.010			4	1.2	6	0.75	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200806	●
0.8	0/-0.010			4	1.2	8	0.75	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200808	●
0.8	0/-0.010			4	1.2	10	0.75	50	2	10.43	10.79	11.17	11.57	12.44	MEXLN200810	●
0.8	0/-0.010			4	1.2	12	0.75	50	2	12.49	12.93	13.38	13.87	14.91	MEXLN200812	●
0.9	0/-0.010			4	1.4	6	0.85	50	2	6.29	6.51	6.74	6.98	7.51	MEXLN200906	●
0.9	0/-0.010			4	1.4	8	0.85	50	2	8.36	8.65	8.96	9.28	9.98	MEXLN200908	●
0.9	0/-0.010			4	1.4	10	0.85	50	2	10.43	10.79	11.17	11.57	12.44	MEXLN200910	●
0.9	0/-0.010			4	1.4	15	0.85	50	2	15.6	16.14	16.71	17.31	18.61	MEXLN200915	●
1.0	0/-0.015			4	1.5	6	0.95	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201006	●
1.0	0/-0.015			4	1.5	8	0.95	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201008	●
1.0	0/-0.015			4	1.5	10	0.95	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201010	●
1.0	0/-0.015			4	1.5	12	0.95	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201012	●
1.0	0/-0.015			4	1.5	14	0.95	50	2	14.66	15.17	15.70	16.27	17.49	MEXLN201014	●
1.0	0/-0.015			4	1.5	16	0.95	50	2	16.73	17.3	17.92	18.56	19.96	MEXLN201016	●

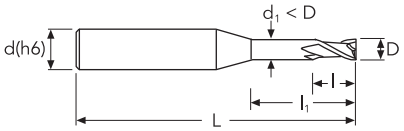
● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2

cylindrical shank, 2 flutes, extended and reduced neck

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2

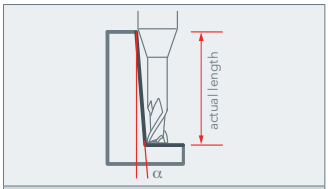




P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	C	C Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1.2	0/-0.015			4	1.8	6	1.15	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201206	●
1.2	0/-0.015			4	1.8	8	1.15	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201208	●
1.2	0/-0.015			4	1.8	10	1.15	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201210	●
1.2	0/-0.015			4	1.8	12	1.15	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201212	●
1.4	0/-0.015			4	2.1	6	1.35	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201406	●
1.4	0/-0.015			4	2.1	8	1.35	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201408	●
1.4	0/-0.015			4	2.1	10	1.35	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201410	●
1.4	0/-0.015			4	2.1	12	1.35	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201412	●
1.4	0/-0.015			4	2.1	16	1.35	50	2	16.73	17.3	17.92	18.56	19.96	MEXLN201416	●
1.5	0/-0.015			4	2.3	6	1.45	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201506	●
1.5	0/-0.015			4	2.3	8	1.45	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201508	●
1.5	0/-0.015			4	2.3	10	1.45	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201510	●
1.5	0/-0.015			4	2.3	12	1.45	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201512	●
1.5	0/-0.015			4	2.3	14	1.45	50	2	14.66	15.17	15.70	16.27	17.49	MEXLN201514	●
1.5	0/-0.015			4	2.3	16	1.45	50	2	16.73	17.30	17.92	18.56	19.96	MEXLN201516	●
1.5	0/-0.015			4	2.3	18	1.45	60	2	18.79	19.44	20.13	20.86	22.43	MEXLN201518	●
1.5	0/-0.015			4	2.3	20	1.45	60	2	20.86	21.58	22.35	23.15	-	MEXLN201520	●
1.6	0/-0.015			4	2.4	6	1.55	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201606	●
1.6	0/-0.015			4	2.4	8	1.55	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201608	●
1.6	0/-0.015			4	2.4	10	1.55	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201610	●
1.6	0/-0.015			4	2.4	12	1.55	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201612	●
1.6	0/-0.015			4	2.4	14	1.55	50	2	14.66	15.17	15.70	16.27	17.49	MEXLN201614	●
1.6	0/-0.015			4	2.4	16	1.55	50	2	16.73	17.30	17.92	18.56	19.96	MEXLN201616	●
1.6	0/-0.015			4	2.4	18	1.55	60	2	18.79	19.44	20.13	20.86	22.43	MEXLN201618	●
1.6	0/-0.015			4	2.4	20	1.55	60	2	20.86	21.58	22.35	23.15	-	MEXLN201620	●
1.8	0/-0.015			4	2.7	6	1.75	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN201806	●
1.8	0/-0.015			4	2.7	8	1.75	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN201808	●
1.8	0/-0.015			4	2.7	10	1.75	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN201810	●
1.8	0/-0.015			4	2.7	12	1.75	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN201812	●
1.8	0/-0.015			4	2.7	16	1.75	50	2	16.73	17.30	17.92	18.56	19.96	MEXLN201816	●
1.8	0/-0.015			4	2.7	20	1.75	60	2	20.86	21.58	22.35	23.15	-	MEXLN201820	●
2	0/-0.015			4	3	6	1.95	50	2	6.39	6.61	6.84	7.09	7.62	MEXLN202006	●
2	0/-0.015			4	3	8	1.95	50	2	8.46	8.75	9.06	9.38	10.09	MEXLN202008	●
2	0/-0.015			4	3	10	1.95	50	2	10.52	10.89	11.27	11.68	12.56	MEXLN202010	●
2	0/-0.015			4	3	12	1.95	50	2	12.59	13.03	13.49	13.97	15.02	MEXLN202012	●
2	0/-0.015			4	3	14	1.95	50	2	14.66	15.17	15.70	16.27	17.49	MEXLN202014	●
2	0/-0.015			4	3	16	1.95	50	2	16.73	17.30	17.92	18.56	-	MEXLN202016	●
2	0/-0.015			4	3	18	1.95	60	2	18.79	19.44	20.13	20.86	-	MEXLN202018	●
2	0/-0.015			4	3	20	1.95	60	2	20.86	21.58	22.35	23.15	-	MEXLN202020	●

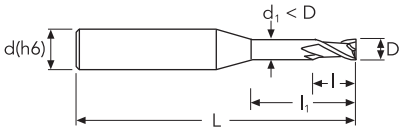
● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2

cylindrical shank, 2 flutes, extended and reduced neck

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2

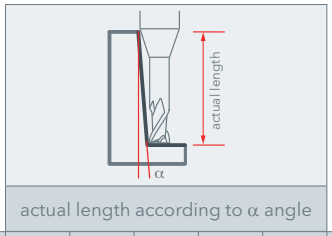




P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	C	C Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
2	0/-0.015			4	3	25	1.95	75	2	26.03	26.93	27.88	-	-	MEXLN202025	●
2	0/-0.015			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**	**40÷60**	**20÷40**
	D (mm)	l1 (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
SQUARE RIB	0.2	≤ 6D	0.01	0.003	0.003	0.002	0.002
		≤ 8D	0.01	0.003	0.002	0.002	0.002
		≤ 10D	0.01	0.002	0.002	0.002	0.001
		≤ 12D	0.01	0.002	0.001	0.001	0.001
	0.3	≤ 6D	0.02	0.004	0.004	0.003	0.003
		≤ 8D	0.01	0.004	0.003	0.003	0.003
		≤ 10D	0.01	0.003	0.003	0.003	0.002
		≤ 12D	0.01	0.003	0.003	0.002	0.002
	0.4	≤ 6D	0.02	0.006	0.005	0.005	0.004
		≤ 8D	0.02	0.005	0.005	0.004	0.004
		≤ 10D	0.01	0.005	0.004	0.004	0.003
		≤ 12D	0.01	0.004	0.004	0.003	0.003
	0.5	≤ 6D	0.03	0.007	0.006	0.006	0.005
		≤ 8D	0.02	0.006	0.006	0.005	0.004
		≤ 10D	0.02	0.006	0.005	0.004	0.004
		≤ 12D	0.01	0.005	0.004	0.004	0.003
	0.6	≤ 6D	0.03	0.008	0.007	0.006	0.006
		≤ 8D	0.03	0.007	0.006	0.006	0.005
		≤ 10D	0.02	0.006	0.006	0.005	0.004
		≤ 12D	0.02	0.006	0.005	0.004	0.004
	0.8	≤ 6D	0.04	0.010	0.009	0.008	0.007
		≤ 8D	0.03	0.009	0.008	0.007	0.006
		≤ 10D	0.03	0.008	0.007	0.006	0.006
		≤ 12D	0.02	0.007	0.006	0.006	0.005
	1	≤ 6D	0.05	0.012	0.011	0.010	0.008
		≤ 8D	0.04	0.011	0.010	0.009	0.008
		≤ 10D	0.04	0.010	0.009	0.008	0.007
		≤ 12D	0.03	0.008	0.008	0.007	0.006
	1.2	≤ 6D	0.06	0.022	0.020	0.018	0.015
		≤ 8D	0.05	0.020	0.018	0.016	0.014
		≤ 10D	0.04	0.018	0.016	0.014	0.012
		≤ 12D	0.03	0.015	0.014	0.012	0.011
	1.4	≤ 6D	0.07	0.024	0.022	0.019	0.017
		≤ 8D	0.06	0.022	0.019	0.017	0.015
		≤ 10D	0.05	0.019	0.017	0.015	0.013
		≤ 12D	0.04	0.017	0.015	0.013	0.012
		≤ 15D	0.03	0.014	0.013	0.012	0.010
		≥ 15D	0.02	0.012	0.011	0.010	0.008
	1.5	≤ 6D	0.08	0.025	0.023	0.020	0.018
		≤ 8D	0.06	0.023	0.020	0.018	0.016
		≤ 10D	0.05	0.020	0.018	0.016	0.014
		≤ 12D	0.04	0.018	0.016	0.014	0.012
		≤ 15D	0.03	0.015	0.014	0.012	0.011
		≥ 15D	0.02	0.013	0.011	0.010	0.009
	1.6	≤ 6D	0.08	0.026	0.023	0.021	0.018
		≤ 8D	0.07	0.023	0.021	0.019	0.016
		≤ 10D	0.06	0.021	0.019	0.017	0.015
		≤ 12D	0.04	0.018	0.016	0.015	0.013
		≤ 15D	0.04	0.016	0.014	0.012	0.011
		≥ 15D	0.02	0.013	0.012	0.010	0.009

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

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**	**40÷60**	**20÷40**
D (mm)	l1 (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1.8	≤ 6D	0.09	0.028	0.025	0.022	0.020
	≤ 8D	0.08	0.025	0.023	0.020	0.018
	≤ 10D	0.06	0.022	0.020	0.018	0.016
	≤ 12D	0.05	0.020	0.018	0.016	0.014
	≤ 15D	0.04	0.017	0.015	0.013	0.012
	≥ 15D	0.03	0.014	0.013	0.011	0.010
2	≤ 6D	0.10	0.030	0.027	0.024	0.021
	≤ 8D	0.09	0.027	0.024	0.022	0.019
	≤ 10D	0.07	0.024	0.022	0.019	0.017
	≤ 12D	0.06	0.021	0.019	0.017	0.015
	≤ 15D	0.05	0.018	0.016	0.014	0.013
	≥ 15D	0.03	0.018	0.016	0.014	0.013
2.5	≤ 6D	0.13	0.035	0.032	0.028	0.025
	≤ 8D	0.11	0.032	0.028	0.025	0.022
	≤ 10D	0.09	0.028	0.025	0.022	0.020
	≤ 12D	0.07	0.025	0.022	0.020	0.017
	≤ 15D	0.06	0.021	0.019	0.017	0.015
	≥ 15D	0.04	0.021	0.019	0.017	0.015
3	≤ 6D	0.15	0.040	0.036	0.032	0.028
	≤ 8D	0.13	0.036	0.032	0.029	0.025
	≤ 10D	0.11	0.032	0.029	0.026	0.022
	≤ 12D	0.08	0.028	0.025	0.022	0.020
	≤ 15D	0.07	0.024	0.022	0.019	0.017
	≥ 15D	0.05	0.024	0.022	0.019	0.017
4	≤ 6D	0.20	0.050	0.045	0.040	0.035
	≤ 8D	0.17	0.045	0.041	0.036	0.032
	≤ 10D	0.14	0.040	0.036	0.032	0.028
	≤ 12D	0.11	0.035	0.032	0.028	0.025
	≤ 15D	0.09	0.030	0.027	0.024	0.021
	≥ 15D	0.06	0.030	0.027	0.024	0.021

MEXCS2

cylindrical shank, 2 flutes

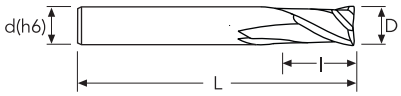
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z2



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/-0.012			4	2.5		40	2	MEXCS2010	●
1.5	0/-0.012			4	4		40	2	MEXCS2015	●
2	0/-0.012			4	6		40	2	MEXCS2020	●
2.5	0/-0.012			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/-0.015			6	15		60	2	MEXCS2060	●
6.5	0/-0.015			8	17		65	2	MEXCS2065	●
7	0/-0.015			8	18		65	2	MEXCS2070	●
8	0/-0.015			8	20		70	2	MEXCS2080	●
8.5	0/-0.015			10	21		70	2	MEXCS2085	●
9	0/-0.015			10	23		70	2	MEXCS2090	●
10	0/-0.015			10	22		75	2	MEXCS2100	●
11	0/-0.015			12	28		75	2	MEXCS2110	●
12	0/-0.015			12	26		80	2	MEXCS2120	●
14	0/-0.020			14	32		90	2	MEXCS2140	●
16	0/-0.020			16	32		90	2	MEXCS2160	●
18	0/-0.020			18	38		100	2	MEXCS2180	●
20	0/-0.020			20	38		100	2	MEXCS2200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCS2

	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**	**40÷60**	**20÷40**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.006	0.005	0.005	0.004
	2	0.010	0.009	0.008	0.007
	3	0.014	0.013	0.012	0.010
	4	0.020	0.018	0.016	0.014
	5	0.026	0.023	0.020	0.018
	6	0.032	0.029	0.026	0.023
	8	0.038	0.034	0.031	0.027
	10	0.046	0.041	0.037	0.032
	12	0.055	0.050	0.044	0.039
	14	0.064	0.057	0.051	0.045
	16	0.072	0.065	0.058	0.051
	18	0.082	0.074	0.066	0.058
	20	0.094	0.084	0.075	0.065

< D3 mm: ap = 0.1D ÷ 0.2D

MEXCL2

cylindrical shank, 2 flutes, long

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | 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

	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**	**40÷60**	**20÷40**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.005	0.005	0.004	0.004
	1.5	0.006	0.005	0.005	0.004
	2	0.009	0.008	0.007	0.006
	3	0.012	0.011	0.010	0.008
	4	0.018	0.016	0.014	0.013
	5	0.024	0.022	0.019	0.017
	6	0.029	0.026	0.023	0.020
	8	0.035	0.032	0.028	0.025
	10	0.041	0.037	0.033	0.029
	12	0.050	0.045	0.040	0.035

≤ D3 mm: ap = 0.4 mm

MEX400

cylindrical shank, 4 flutes unequal pitch

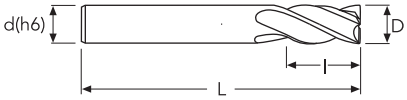
OSAWA NORM | MEX | NMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z4 UP



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/-0.010			4	3		50	4	MEX400010	●
1.5	0/-0.010			4	4.5		50	4	MEX400015	●
2	0/-0.015			4	6		40	4	MEX400020	●
2.5	0/-0.015			4	8		40	4	MEX400025	●
3	0/-0.015			6	8		55	4	MEX400030	●
3.5	0/-0.020			6	10		55	4	MEX400035	●
4	0/-0.020			6	11		55	4	MEX400040	●
4.5	0/-0.020			6	11		45	4	MEX400045	●
5	0/-0.020			6	13		55	4	MEX400050	●
5.5	0/-0.020			6	13		55	4	MEX400055	●
6	0/-0.020			6	15		60	4	MEX400060	●
6.5	0/-0.020			8	17		65	4	MEX400065	●
7	0/-0.020			8	18		65	4	MEX400070	●
8	0/-0.020			8	20		70	4	MEX400080	●
9	0/-0.020			10	23		70	4	MEX400090	●
10	0/-0.020			10	22		75	4	MEX400100	●
11	0/-0.020			12	28		75	4	MEX400110	●
12	-0.005/-0.025			12	26		80	4	MEX400120	●
14	-0.010/-0.025			14	35		90	4	MEX400140	●
16	-0.010/-0.025			16	32		100	4	MEX400160	●
20	-0.010/-0.025			20	40		100	4	MEX400200	●
25	-0.010/-0.025			25	40		100	4	MEX400250	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEX400

	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)	**120÷160**	**100÷140**	**90÷120**	**80÷100**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.007	0.006		0.006
	2	0.010	0.010	0.010	0.010
	3	0.016	0.016	0.016	0.016
	4	0.027	0.027	0.027	0.027
	5	0.036	0.036	0.036	0.036
	6	0.043	0.043	0.043	0.043
	8	0.060	0.060	0.060	0.060
	10	0.085	0.085	0.085	0.085
	12	0.100	0.100	0.100	0.100
	14	0.120	0.120	0.120	0.120
	16	0.150	0.150	0.150	0.150
	18	0.175	0.175	0.175	0.175
	20	0.200	0.200	0.200	0.200
	22	0.215	0.215	0.215	0.215
	25	0.225	0.225	0.225	0.225

MEXCL4

cylindrical shank, 4 flutes, long

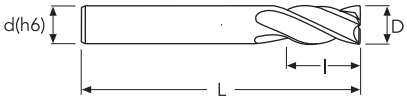
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z4



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/-0.020			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/-0.030			6	25		100	4	MEXCL4030100	●
4	0/-0.030			6	31		100	4	MEXCL4040100	●
5	0/-0.030			6	31		100	4	MEXCL4050100	●
6	0/-0.030			6	38		100	4	MEXCL4060100	●
8	0/-0.030			8	41		100	4	MEXCL4080100	●
10	0/-0.035			10	57		125	4	MEXCL4100125	●
12	0/-0.035			12	75		150	4	MEXCL4120150	●
14	0/-0.035			14	75		150	4	MEXCL4140150	●
16	0/-0.035			16	75		150	4	MEXCL4160150	●
20	0/-0.035			20	75		150	4	MEXCL4200150	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCL4

	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 0.05D**	**1.5D x 0.05D**	**1.5D x 0.05D**
	Vc (m/min)	**60÷100**	**50÷70**	**30÷50**	**20÷40**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.014	0.013	0.012	0.010
	3	0.022	0.020	0.017	0.015
	4	0.029	0.026	0.023	0.020
	5	0.033	0.029	0.026	0.023
	6	0.036	0.033	0.029	0.025
	8	0.047	0.042	0.038	0.033
	10	0.060	0.054	0.048	0.042
	12	0.072	0.065	0.058	0.051
	14	0.083	0.075	0.066	0.058
	16	0.094	0.084	0.075	0.065
	20	0.119	0.107	0.095	0.083
	25	0.150	0.135	0.120	0.105

MEXCSHM

cylindrical shank, multi flute

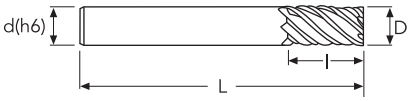
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 50° | SQUARE | Z6~Z8



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.020			6	8		50	6	MEXCSHM030	●
4	0/-0.020			6	11		50	6	MEXCSHM040	●
5	0/-0.020			6	13		50	6	MEXCSHM050	●
6	0/-0.020			6	15		60	6	MEXCSHM060	●
8	0/-0.020			8	20		70	6	MEXCSHM080	●
10	0/-0.020			10	25		80	6	MEXCSHM100	●
12	0/-0.020			12	30		80	6	MEXCSHM120	●
14	0/-0.020			14	30		90	6	MEXCSHM140	●
16	0/-0.020			16	40		100	6	MEXCSHM160	●
18	0/-0.020			18	35		100	8	MEXCSHM180	●
20	0/-0.020			20	50		100	8	MEXCSHM200	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXCSHM

	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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.008	0.008	0.007	0.006
	4	0.012	0.011	0.010	0.008
	5	0.014	0.013	0.012	0.010
	6	0.018	0.016	0.014	0.013
	8	0.028	0.025	0.022	0.019
	10	0.034	0.030	0.027	0.024
	12	0.041	0.037	0.033	0.029
	14	0.048	0.043	0.038	0.034
	16	0.056	0.051	0.045	0.039
	18	0.065	0.059	0.052	0.046
	20	0.073	0.066	0.058	0.051

MEXCLHM

cylindrical shank, multi flute, long

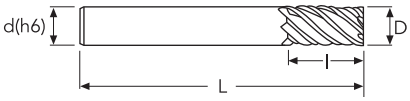
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 50° | SQUARE | Z6~Z8



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.030			6	19		75	6	MEXCLHM030	●
4	0/-0.030			6	19		75	6	MEXCLHM040	●
5	0/-0.030			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

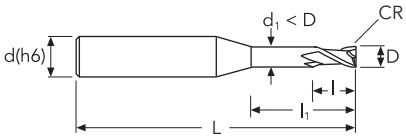
	Material Group ISO 513	P2 P3 P4 K1 K2	P4 P5 K3	P6 K4	H1 H4 H5
	Hardness/Rm	≤1000 N/mm²	≤35 HRC	35÷45 HRC	45÷55 HRC
	ap x ae	**1.5D x 0.05D**	**1.5D x 0.05D**	**1.5D x 0.05D**	**1.5D x 0.05D**
	Vc (m/min)	**80÷120**	**50÷90**	**40÷60**	**20÷40**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.007	0.006	0.006	0.005
	4	0.010	0.009	0.008	0.007
	5	0.012	0.011	0.010	0.009
	6	0.015	0.014	0.012	0.011
	8	0.023	0.021	0.019	0.016
	10	0.029	0.026	0.023	0.020
	12	0.035	0.031	0.028	0.024
	14	0.041	0.037	0.033	0.029
	16	0.048	0.043	0.038	0.034
	18	0.055	0.050	0.044	0.039
	20	0.063	0.057	0.050	0.044

MEXLN2R

cylindrical shank, 2 flutes, extended and reduced neck, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2

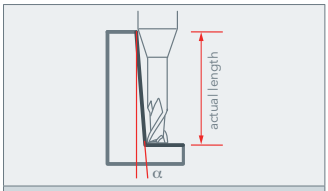




P	M	K	N	S	H
★		★			★

★ 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/-0.010	0.05	0/-0.010	4	0.4	1	0.26	50	2	1.08	1.12	1.15	1.19	1.25	MEXLN20030001	●
0.3	0/-0.010	0.05	0/-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/-0.010	0.05	0/-0.010	4	0.4	2	0.26	50	2	2.12	2.19	2.25	2.32	2.46	MEXLN20030002	●
0.3	0/-0.010	0.05	0/-0.010	4	0.4	3	0.26	50	2	3.15	3.25	3.35	3.46	3.66	MEXLN20030003	●
0.3	0/-0.010	0.10	0/-0.010	4	0.4	1	0.26	50	2	1.08	1.12	1.15	1.18	1.24	MEXLN20030101	●
0.3	0/-0.010	0.10	0/-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/-0.010	0.10	0/-0.010	4	0.4	2	0.26	50	2	2.12	2.18	2.25	2.31	2.45	MEXLN20030102	●
0.3	0/-0.010	0.10	0/-0.010	4	0.4	3	0.26	50	2	3.15	3.25	3.35	3.45	3.65	MEXLN20030103	●
0.4	0/-0.010	0.05	0/-0.010	4	0.6	1	0.37	50	2	1.08	1.12	1.15	1.19	1.25	MEXLN20040001	●
0.4	0/-0.010	0.05	0/-0.010	4	0.6	2	0.37	50	2	2.12	2.19	2.25	2.32	2.46	MEXLN20040006	●
0.4	0/-0.010	0.05	0/-0.010	4	0.6	3	0.37	50	2	3.15	3.25	3.35	3.46	3.66	MEXLN20040003	●
0.4	0/-0.010	0.05	0/-0.010	4	0.6	4	0.37	50	2	4.19	4.32	4.46	4.59	4.86	MEXLN20040004	●
0.4	0/-0.010	0.10	0/-0.010	4	0.6	1	0.37	50	2	1.08	1.12	1.15	1.18	1.24	MEXLN20040101	●
0.4	0/-0.010	0.10	0/-0.010	4	0.6	2	0.37	50	2	2.12	2.18	2.25	2.31	2.45	MEXLN20040102	●
0.4	0/-0.010	0.10	0/-0.010	4	0.6	3	0.37	50	2	3.15	3.25	3.35	3.45	3.65	MEXLN20040103	●
0.4	0/-0.010	0.10	0/-0.010	4	0.6	4	0.37	50	2	4.18	4.32	4.45	4.58	4.85	MEXLN20040104	●
0.5	0/-0.010	0.05	0/-0.010	4	0.7	2	0.45	50	2	2.16	2.23	2.29	2.36	2.50	MEXLN20050002	●
0.5	0/-0.010	0.05	0/-0.010	4	0.7	4	0.45	50	2	4.22	4.36	4.50	4.63	4.90	MEXLN20050004	●
0.5	0/-0.010	0.05	0/-0.010	4	0.7	6	0.45	50	2	6.29	6.49	6.70	6.90	7.31	MEXLN20050006	●
0.5	0/-0.010	0.10	0/-0.010	4	0.7	2	0.45	50	2	2.16	2.22	2.29	2.36	2.49	MEXLN20050102	●
0.5	0/-0.010	0.10	0/-0.010	4	0.7	4	0.45	50	2	4.22	4.36	4.49	4.63	4.89	MEXLN20050104	●
0.5	0/-0.010	0.10	0/-0.010	4	0.7	6	0.45	50	2	6.29	6.49	6.69	6.89	7.30	MEXLN20050106	●
0.6	0/-0.010	0.10	0/-0.010	4	0.9	2	0.55	50	2	2.16	2.22	2.29	2.36	2.49	MEXLN20060102	●
0.6	0/-0.010	0.10	0/-0.010	4	0.9	4	0.55	50	2	4.22	4.36	4.49	4.63	4.89	MEXLN20060104	●
0.6	0/-0.010	0.10	0/-0.010	4	0.9	6	0.55	50	2	6.29	6.49	6.69	6.89	7.30	MEXLN20060106	●
0.7	0/-0.010	0.10	0/-0.010	4	1.0	4	0.65	50	2	4.22	4.36	4.49	4.63	4.89	MEXLN20070104	●
0.7	0/-0.010	0.10	0/-0.010	4	1.0	6	0.65	50	2	6.29	6.49	6.69	6.89	7.30	MEXLN20070106	●
0.8	0/-0.010	0.05	0/-0.010	4	1.2	4	0.75	50	2	4.22	4.36	4.50	4.63	4.90	MEXLN20080004	●
0.8	0/-0.010	0.05	0/-0.010	4	1.2	6	0.75	50	2	6.29	6.49	6.70	6.90	7.31	MEXLN20080006	●
0.8	0/-0.010	0.05	0/-0.010	4	1.2	8	0.75	50	2	8.36	8.63	8.90	9.17	9.71	MEXLN20080008	●
0.8	0/-0.010	0.10	0/-0.010	4	1.2	4	0.75	50	2	4.22	4.36	4.49	4.63	4.89	MEXLN20080104	●
0.8	0/-0.010	0.10	0/-0.010	4	1.2	6	0.75	50	2	6.29	6.49	6.69	6.89	7.30	MEXLN20080106	●
0.8	0/-0.010	0.10	0/-0.010	4	1.2	8	0.75	50	2	8.36	8.63	8.89	9.16	9.70	MEXLN20080108	●
0.9	0/-0.010	0.10	0/-0.010	4	1.4	8	0.85	50	2	8.36	8.63	8.89	9.16	9.70	MEXLN20090108	●
0.9	0/-0.010	0.10	0/-0.010	4	1.4	15	0.85	50	2	15.59	16.10	16.60	17.11	18.12	MEXLN20090115	●
1	0/-0.015	0.10	0/-0.010	4	1.5	4	0.95	50	2	4.32	4.46	4.59	4.73	5.01	MEXLN20100104	●
1	0/-0.015	0.10	0/-0.010	4	1.5	6	0.95	50	2	6.39	6.59	6.80	7.00	7.41	MEXLN20100106	●
1	0/-0.015	0.10	0/-0.010	4	1.5	8	0.95	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20100108	●
1	0/-0.015	0.10	0/-0.010	4	1.5	10	0.95	50	2	10.52	10.86	11.20	11.54	12.22	MEXLN20100110	●

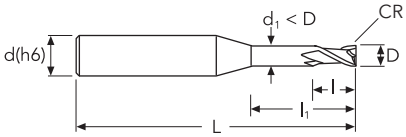
● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2R

cylindrical shank, 2 flutes, extended and reduced neck, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2

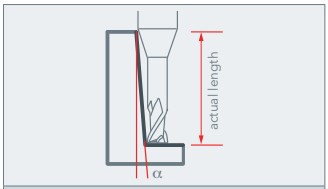




P	M	K	N	S	H
★		★			★

★ 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/-0.015	0.10	0/-0.010	4	1.5	12	0.95	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20100112	●
1	0/-0.015	0.10	0/-0.010	4	1.5	16	0.95	50	2	16.72	17.26	17.80	18.35	19.43	MEXLN20100116	●
1	0/-0.015	0.10	0/-0.010	4	1.5	20	0.95	50	2	20.86	21.53	22.21	22.88	24.24	MEXLN20100120	●
1	0/-0.015	0.20	0/-0.010	4	1.5	4	0.95	50	2	4.32	4.45	4.58	4.72	4.99	MEXLN20100204	●
1	0/-0.015	0.20	0/-0.010	4	1.5	6	0.95	50	2	6.38	6.58	6.79	6.99	7.39	MEXLN20100206	●
1	0/-0.015	0.20	0/-0.010	4	1.5	8	0.95	50	2	8.45	8.72	8.99	9.26	9.79	MEXLN20100208	●
1	0/-0.015	0.20	0/-0.010	4	1.5	10	0.95	50	2	10.52	10.85	11.19	11.52	12.20	MEXLN20100210	●
1	0/-0.015	0.20	0/-0.010	4	1.5	12	0.95	50	2	12.58	12.99	13.39	13.79	14.60	MEXLN20100212	●
1	0/-0.015	0.20	0/-0.010	4	1.5	16	0.95	50	2	16.72	17.26	17.79	18.33	19.41	MEXLN20100216	●
1	0/-0.015	0.20	0/-0.010	4	1.5	20	0.95	50	2	20.85	21.53	22.20	22.87	24.22	MEXLN20100220	●
1	0/-0.015	0.30	0/-0.010	4	1.5	6	0.95	50	2	6.38	6.58	6.78	6.97	7.37	MEXLN20100306	●
1	0/-0.015	0.30	0/-0.010	4	1.5	10	0.95	50	2	10.51	10.85	11.18	11.51	12.18	MEXLN20100310	●
1	0/-0.015	0.30	0/-0.010	4	1.5	16	0.95	50	2	16.72	17.25	17.78	18.32	19.39	MEXLN20100316	●
1	0/-0.015	0.30	0/-0.010	4	1.5	20	0.95	50	2	20.85	21.52	22.19	22.86	24.20	MEXLN20100320	●
1.2	0/-0.015	0.10	0/-0.010	4	1.8	6	1.15	50	2	6.39	6.59	6.80	7.00	7.41	MEXLN20120106	●
1.2	0/-0.015	0.10	0/-0.010	4	1.8	8	1.15	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20120108	●
1.2	0/-0.015	0.10	0/-0.010	4	1.8	10	1.15	50	2	10.52	10.86	11.20	11.54	12.22	MEXLN20120110	●
1.2	0/-0.015	0.10	0/-0.010	4	1.8	12	1.15	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20120112	●
1.4	0/-0.015	0.10	0/-0.010	4	2.1	6	1.35	50	2	6.39	6.59	6.80	7.00	7.41	MEXLN20140106	●
1.4	0/-0.015	0.10	0/-0.010	4	2.1	8	1.35	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20140108	●
1.4	0/-0.015	0.10	0/-0.010	4	2.1	10	1.35	50	2	10.52	10.86	11.20	11.54	12.22	MEXLN20140110	●
1.4	0/-0.015	0.10	0/-0.010	4	2.1	12	1.35	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20140112	●
1.4	0/-0.015	0.10	0/-0.010	4	2.1	16	1.35	50	2	16.72	17.26	17.80	18.35	19.43	MEXLN20140116	●
1.5	0/-0.015	0.10	0/-0.010	4	2.3	4	1.45	50	2	4.32	4.46	4.59	4.73	5.01	MEXLN20150104	●
1.5	0/-0.015	0.10	0/-0.010	4	2.3	8	1.45	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20150108	●
1.5	0/-0.015	0.10	0/-0.010	4	2.3	12	1.45	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20150112	●
1.5	0/-0.015	0.10	0/-0.010	4	2.3	16	1.45	50	2	16.72	17.26	17.80	18.35	19.43	MEXLN20150116	●
1.5	0/-0.015	0.10	0/-0.010	4	2.3	20	1.45	60	2	20.86	21.53	22.21	22.88	24.24	MEXLN20150120	●
1.5	0/-0.015	0.20	0/-0.010	4	2.3	8	1.45	50	2	8.45	8.72	8.99	9.26	9.79	MEXLN20150208	●
1.5	0/-0.015	0.20	0/-0.010	4	2.3	10	1.45	50	2	10.52	10.85	11.19	11.52	12.20	MEXLN20150210	●
1.5	0/-0.015	0.20	0/-0.010	4	2.3	12	1.45	50	2	12.58	12.99	13.39	13.79	14.60	MEXLN20150212	●
1.5	0/-0.015	0.20	0/-0.010	4	2.3	16	1.45	50	2	16.72	17.26	17.79	18.33	19.41	MEXLN20150216	●
1.5	0/-0.015	0.20	0/-0.010	4	2.3	20	1.45	60	2	20.85	21.53	22.20	22.87	24.22	MEXLN20150220	●
1.5	0/-0.015	0.30	0/-0.010	4	2.3	8	1.45	50	2	8.45	8.71	8.98	9.24	9.77	MEXLN20150308	●
1.5	0/-0.015	0.30	0/-0.010	4	2.3	16	1.45	50	2	16.72	17.25	17.78	18.32	19.39	MEXLN20150316	●
1.5	0/-0.015	0.30	0/-0.010	4	2.3	20	1.45	60	2	20.85	21.52	22.19	22.86	24.20	MEXLN20150320	●
1.6	0/-0.015	0.10	0/-0.010	4	2.4	8	1.55	50	2	8.45	8.73	9.00	9.27	9.81	MEXLN20160108	●
1.6	0/-0.015	0.10	0/-0.010	4	2.4	12	1.55	50	2	12.59	12.99	13.40	13.81	14.62	MEXLN20160112	●
1.6	0/-0.015	0.10	0/-0.010	4	2.4	16	1.55	50	2	16.72	17.26	17.80	18.35	19.43	MEXLN20160116	●

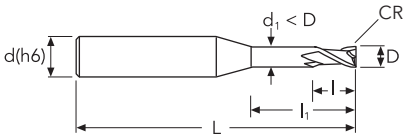
● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2R

cylindrical shank, 2 flutes, extended and reduced neck, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2

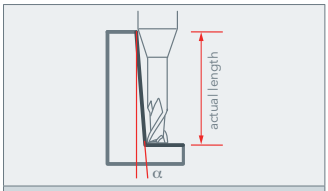




P	M	K	N	S	H
★		★			★

★ 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/-0.015	0.20	0/-0.010	4	2.7	8	1.75	50	2	8.45	8.72	8.99	9.26	9.79	MEXLN20180208	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	12	1.75	50	2	12.58	12.99	13.39	13.79	14.60	MEXLN20180212	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	16	1.75	50	2	16.72	17.26	17.79	18.33	19.41	MEXLN20180216	●
2	0/-0.015	0.20	0/-0.010	4	3	6	1.95	50	2	6.38	6.58	6.79	6.99	7.39	MEXLN20200206	●
2	0/-0.015	0.20	0/-0.010	4	3	8	1.95	50	2	8.45	8.72	8.99	9.26	9.79	MEXLN20200208	●
2	0/-0.015	0.20	0/-0.010	4	3	10	1.95	50	2	10.52	10.85	11.19	11.52	12.20	MEXLN20200210	●
2	0/-0.015	0.20	0/-0.010	4	3	12	1.95	50	2	12.58	12.99	13.39	13.79	14.60	MEXLN20200212	●
2	0/-0.015	0.20	0/-0.010	4	3	14	1.95	50	2	14.65	15.12	15.59	16.06	17.01	MEXLN20200214	●
2	0/-0.015	0.20	0/-0.010	4	3	16	1.95	50	2	16.72	17.26	17.79	18.33	19.41	MEXLN20200216	●
2	0/-0.015	0.20	0/-0.010	4	3	20	1.95	60	2	20.85	21.53	22.20	22.87	-	MEXLN20200220	●
2	0/-0.015	0.20	0/-0.010	4	3	25	1.95	75	2	26.02	26.86	27.70	28.54	-	MEXLN20200225	●
2	0/-0.015	0.20	0/-0.010	4	3	30	1.95	75	2	31.19	32.20	33.21	-	-	MEXLN20200230	●
2	0/-0.015	0.50	0/-0.010	4	3	6	1.95	50	2	6.37	6.56	6.75	6.95	7.33	MEXLN20200506	●
2	0/-0.015	0.50	0/-0.010	4	3	8	1.95	50	2	8.44	8.70	8.96	9.22	9.73	MEXLN20200508	●
2	0/-0.015	0.50	0/-0.010	4	3	12	1.95	50	2	12.57	12.97	13.36	13.75	14.54	MEXLN20200512	●
2	0/-0.015	0.50	0/-0.010	4	3	16	1.95	50	2	16.71	17.24	17.76	18.29	19.35	MEXLN20200516	●
2	0/-0.015	0.50	0/-0.010	4	3	20	1.95	60	2	20.84	21.51	22.17	22.83	-	MEXLN20200520	●
2	0/-0.015	0.50	0/-0.010	4	3	25	1.95	75	2	26.01	26.84	27.67	28.50	-	MEXLN20200525	●
2	0/-0.015	0.50	0/-0.010	4	3	30	1.95	75	2	31.18	32.18	33.18	-	-	MEXLN20200530	●
2.5	0/-0.020	0.30	0/-0.015	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/-0.015	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/-0.015	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/-0.015	4	3.7	20	2.40	60	2	20.85	21.52	22.19	-	-	MEXLN20250320	●
2.5	0/-0.020	0.30	0/-0.015	4	3.7	25	2.40	60	2	26.02	26.86	27.69	-	-	MEXLN20250325	●
2.5	0/-0.020	0.30	0/-0.015	4	3.7	30	2.40	75	2	31.19	32.19	-	-	-	MEXLN20250330	●
2.5	0/-0.020	0.50	0/-0.015	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/-0.015	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/-0.015	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/-0.015	4	3.7	20	2.40	60	2	20.84	21.51	22.17	-	-	MEXLN20250520	●
2.5	0/-0.020	0.50	0/-0.015	4	3.7	25	2.40	60	2	26.01	26.84	27.67	-	-	MEXLN20250525	●
2.5	0/-0.020	0.50	0/-0.015	4	3.7	30	2.40	75	2	31.18	32.18	-	-	-	MEXLN20250530	●
3	0/-0.025	0.20	0/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	6	4.5	16	2.85	60	2	16.91	17.45	17.99	18.53	19.61	MEXLN20300316	●

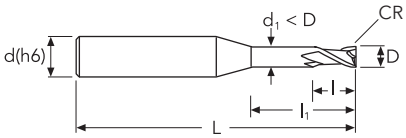
● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2R

cylindrical shank, 2 flutes, extended and reduced neck, corner radius

OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2

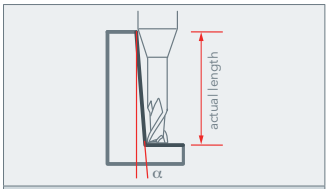




P	M	K	N	S	H
★		★			★

★ 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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	6	4.5	20	3.85	60	2	21.24	21.92	22.60	23.28	-	MEXLN20400320	●
4	0/-0.025	0.30	0/-0.015	6	4.5	25	3.85	75	2	26.40	27.25	28.10	28.95	-	MEXLN20400325	●
4	0/-0.025	0.30	0/-0.015	6	4.5	30	3.85	75	2	31.57	32.59	33.61	-	-	MEXLN20400330	●
4	0/-0.025	0.30	0/-0.015	6	4.5	40	3.85	75	2	41.91	43.26	-	-	-	MEXLN20400340	●
4	0/-0.025	0.50	0/-0.015	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/-0.015	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/-0.015	6	4.5	20	3.85	60	2	21.23	21.90	22.58	23.25	-	MEXLN20400520	●
4	0/-0.025	0.50	0/-0.015	6	4.5	25	3.85	75	2	26.40	27.24	28.08	28.92	-	MEXLN20400525	●
4	0/-0.025	0.50	0/-0.015	6	4.5	30	3.85	75	2	31.57	32.58	33.59	-	-	MEXLN20400530	●
4	0/-0.025	0.50	0/-0.015	6	4.5	40	3.85	75	2	41.90	43.25	-	-	-	MEXLN20400540	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXLN2R

	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**	**40÷60**	**20÷40**
	D (mm)	l1 (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
SQUARE RIB	**0.3**	≤ 6D	0.02	0.004	0.004	0.003	0.003
		≤ 8D	0.01	0.004	0.003	0.003	0.003
		≤ 10D	0.01	0.003	0.003	0.003	0.002
		≤ 12D	0.01	0.003	0.003	0.002	0.002
	0.4	≤ 6D	0.02	0.006	0.005	0.005	0.004
		≤ 8D	0.02	0.005	0.005	0.004	0.004
		≤ 10D	0.01	0.005	0.004	0.004	0.003
		≤ 12D	0.01	0.004	0.004	0.003	0.003
	0.5	≤ 6D	0.03	0.007	0.006	0.006	0.005
		≤ 8D	0.02	0.006	0.006	0.005	0.004
		≤ 10D	0.02	0.006	0.005	0.004	0.004
		≤ 12D	0.01	0.005	0.004	0.004	0.003
	0.6	≤ 6D	0.03	0.008	0.007	0.006	0.006
		≤ 8D	0.03	0.007	0.006	0.006	0.005
		≤ 10D	0.02	0.006	0.006	0.005	0.004
		≤ 12D	0.02	0.006	0.005	0.004	0.004
	0.8	≤ 6D	0.04	0.010	0.009	0.008	0.007
		≤ 8D	0.03	0.009	0.008	0.007	0.006
		≤ 10D	0.03	0.008	0.007	0.006	0.006
		≤ 12D	0.02	0.007	0.006	0.006	0.005
	1	≤ 6D	0.05	0.012	0.011	0.010	0.008
		≤ 8D	0.04	0.011	0.010	0.009	0.008
		≤ 10D	0.04	0.010	0.009	0.008	0.007
		≤ 12D	0.03	0.008	0.008	0.007	0.006
	1.2	≤ 6D	0.06	0.022	0.020	0.018	0.015
		≤ 8D	0.05	0.020	0.018	0.016	0.014
		≤ 10D	0.04	0.018	0.016	0.014	0.012
		≤ 12D	0.03	0.015	0.014	0.012	0.011
	1.4	≤ 6D	0.07	0.024	0.022	0.019	0.017
		≤ 8D	0.06	0.022	0.019	0.017	0.015
		≤ 10D	0.05	0.019	0.017	0.015	0.013
		≤ 12D	0.04	0.017	0.015	0.013	0.012
		≤ 15D	0.03	0.014	0.013	0.012	0.010
		≥ 15D	0.02	0.012	0.011	0.010	0.008
	1.5	≤ 6D	0.08	0.025	0.023	0.020	0.018
		≤ 8D	0.06	0.023	0.020	0.018	0.016
		≤ 10D	0.05	0.020	0.018	0.016	0.014
		≤ 12D	0.04	0.018	0.016	0.014	0.012
		≤ 15D	0.03	0.015	0.014	0.012	0.011
		≥ 15D	0.02	0.013	0.011	0.010	0.009
	1.6	≤ 6D	0.08	0.026	0.023	0.021	0.018
		≤ 8D	0.07	0.023	0.021	0.019	0.016
		≤ 10D	0.06	0.021	0.019	0.017	0.015
		≤ 12D	0.04	0.018	0.016	0.015	0.013
		≤ 15D	0.04	0.016	0.014	0.012	0.011
		≥ 15D	0.02	0.013	0.012	0.010	0.009

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

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**	**40÷60**	**20÷40**
D (mm)	l1 (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1.8	≤ 6D	0.09	0.028	0.025	0.022	0.020
	≤ 8D	0.08	0.025	0.023	0.020	0.018
	≤ 10D	0.06	0.022	0.020	0.018	0.016
	≤ 12D	0.05	0.020	0.018	0.016	0.014
	≤ 15D	0.04	0.017	0.015	0.013	0.012
	≥ 15D	0.03	0.014	0.013	0.011	0.010
2	≤ 6D	0.10	0.030	0.027	0.024	0.021
	≤ 8D	0.09	0.027	0.024	0.022	0.019
	≤ 10D	0.07	0.024	0.022	0.019	0.017
	≤ 12D	0.06	0.021	0.019	0.017	0.015
	≤ 15D	0.05	0.018	0.016	0.014	0.013
	≥ 15D	0.03	0.018	0.016	0.014	0.013
2.5	≤ 6D	0.13	0.035	0.032	0.028	0.025
	≤ 8D	0.11	0.032	0.028	0.025	0.022
	≤ 10D	0.09	0.028	0.025	0.022	0.020
	≤ 12D	0.07	0.025	0.022	0.020	0.017
	≤ 15D	0.06	0.021	0.019	0.017	0.015
	≥ 15D	0.04	0.021	0.019	0.017	0.015
3	≤ 6D	0.15	0.040	0.036	0.032	0.028
	≤ 8D	0.13	0.036	0.032	0.029	0.025
	≤ 10D	0.11	0.032	0.029	0.026	0.022
	≤ 12D	0.08	0.028	0.025	0.022	0.020
	≤ 15D	0.07	0.024	0.022	0.019	0.017
	≥ 15D	0.05	0.024	0.022	0.019	0.017
4	≤ 6D	0.20	0.050	0.045	0.040	0.035
	≤ 8D	0.17	0.045	0.041	0.036	0.032
	≤ 10D	0.14	0.040	0.036	0.032	0.028
	≤ 12D	0.11	0.035	0.032	0.028	0.025
	≤ 15D	0.09	0.030	0.027	0.024	0.021
	≥ 15D	0.06	0.030	0.027	0.024	0.021

MEXLS2R

cylindrical shank, 2 flutes, long, corner radius

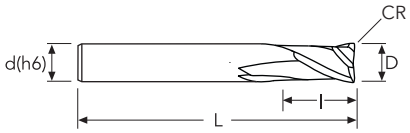
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z2



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/-0.015	0.30	0/-0.010	6	4		75	2	MEXLS2R03020	●
3	0/-0.020	0.30	0/-0.015	6	5		75	2	MEXLS2R03030	●
3	0/-0.020	0.50	0/-0.015	6	5		75	2	MEXLS2R05030	●
4	0/-0.020	0.30	0/-0.015	6	8		75	2	MEXLS2R03040	●
4	0/-0.020	0.50	0/-0.015	6	8		75	2	MEXLS2R05040	●
5	0/-0.020	0.30	0/-0.015	6	9		75	2	MEXLS2R03050	●
5	0/-0.020	0.50	0/-0.015	6	9		75	2	MEXLS2R05050	●
6	0/-0.020	0.30	0/-0.015	6	10		75	2	MEXLS2R03060	●
6	0/-0.020	0.50	0/-0.015	6	10		75	2	MEXLS2R05060	●
6	0/-0.020	1.00	0/-0.015	6	10		75	2	MEXLS2R10060	●
8	0/-0.020	0.30	0/-0.015	8	12		75	2	MEXLS2R03080	●
8	0/-0.020	0.50	0/-0.015	8	12		75	2	MEXLS2R05080	●
8	0/-0.020	1.00	0/-0.015	8	12		75	2	MEXLS2R10080	●
10	0/-0.020	0.50	0/-0.020	10	14		100	2	MEXLS2R05100	●
10	0/-0.020	1.00	0/-0.020	10	14		100	2	MEXLS2R10100	●
12	0/-0.020	0.50	0/-0.020	12	16		100	2	MEXLS2R05120	●
12	0/-0.020	1.00	0/-0.020	12	16		100	2	MEXLS2R10120	●
16	0/-0.020	0.50	0/-0.020	16	22		125	2	MEXLS2R05160	●
16	0/-0.020	1.00	0/-0.020	16	22		125	2	MEXLS2R10160	●

● stock standard ○ non-stock standard ▽ stock exhaustion

CUTTING PARAMETERS

MEXLS2R

	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**	**40÷60**	**20÷40**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.005	0.005	0.004	0.004
	3	0.006	0.005	0.005	0.004
	4	0.009	0.008	0.007	0.006
	5	0.012	0.011	0.010	0.008
	6	0.018	0.016	0.014	0.013
	8	0.024	0.022	0.019	0.017
	10	0.029	0.026	0.023	0.020
	12	0.035	0.032	0.028	0.025
	16	0.041	0.037	0.033	0.029

≤ D3 mm: ap = 0.4 mm

MEXCS4R

cylindrical shank, 4 flutes, corner radius

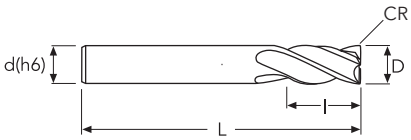
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z4



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/-0.015	0.20	0/-0.010	4	3		50	4	MEXCS4R01002	●
1.5	0/-0.015	0.20	0/-0.010	4	4.5		50	4	MEXCS4R01502	●
2	0/-0.015	0.20	0/-0.010	4	6.5		50	4	MEXCS4R02002	●
2	0/-0.015	0.30	0/-0.010	4	6.5		50	4	MEXCS4R02003	●
2.5	0/-0.020	0.20	0/-0.015	4	6.5		50	4	MEXCS4R02502	●
2.5	0/-0.020	0.50	0/-0.015	4	6.5		50	4	MEXCS4R02505	●
3	0/-0.020	0.20	0/-0.015	4	9		50	4	MEXCS4R03002	●
3	0/-0.020	0.30	0/-0.015	4	9		50	4	MEXCS4R03003	●
3	0/-0.020	0.50	0/-0.015	4	9		50	4	MEXCS4R03005	●
4	0/-0.020	0.30	0/-0.015	4	12		50	4	MEXCS4R04003	●
4	0/-0.020	0.50	0/-0.015	4	12		50	4	MEXCS4R04005	●
4	0/-0.020	1.00	0/-0.015	4	12		50	4	MEXCS4R04010	●
5	0/-0.020	0.30	0/-0.015	5	15		50	4	MEXCS4R05003	●
5	0/-0.020	0.50	0/-0.015	5	15		50	4	MEXCS4R05005	●
5	0/-0.020	1.00	0/-0.015	5	15		50	4	MEXCS4R05010	●
6	0/-0.020	0.30	0/-0.015	6	16		50	4	MEXCS4R06003	●
6	0/-0.020	0.50	0/-0.015	6	16		50	4	MEXCS4R06005	●
6	0/-0.020	1.00	0/-0.015	6	16		50	4	MEXCS4R06010	●
8	0/-0.020	0.30	0/-0.015	8	20		64	4	MEXCS4R08003	●
8	0/-0.020	0.50	0/-0.015	8	20		64	4	MEXCS4R08005	●
8	0/-0.020	1.00	0/-0.015	8	20		64	4	MEXCS4R08010	●
8	0/-0.020	1.50	0/-0.015	8	20		64	4	MEXCS4R08015	●
8	0/-0.020	2.00	0/-0.015	8	20		64	4	MEXCS4R08020	●
10	0/-0.020	0.30	0/-0.020	10	22		75	4	MEXCS4R10003	●
10	0/-0.020	0.50	0/-0.020	10	22		75	4	MEXCS4R10005	●
10	0/-0.020	1.00	0/-0.020	10	22		75	4	MEXCS4R10010	●
10	0/-0.020	1.50	0/-0.020	10	22		75	4	MEXCS4R10015	●
10	0/-0.020	2.00	0/-0.020	10	22		75	4	MEXCS4R10020	●
12	0/-0.020	0.30	0/-0.020	12	25		75	4	MEXCS4R12003	●
12	0/-0.020	0.50	0/-0.020	12	25		75	4	MEXCS4R12005	●
12	0/-0.020	1.00	0/-0.020	12	25		75	4	MEXCS4R12010	●
12	0/-0.020	1.50	0/-0.020	12	25		75	4	MEXCS4R12015	●
12	0/-0.020	2.00	0/-0.020	12	25		75	4	MEXCS4R12020	●
12	0/-0.020	3.00	0/-0.020	12	25		75	4	MEXCS4R12030	●
14	0/-0.020	0.50	0/-0.020	14	32		90	4	MEXCS4R14005	○
14	0/-0.020	1.00	0/-0.020	14	32		90	4	MEXCS4R14010	●
14	0/-0.020	2.00	0/-0.020	14	32		90	4	MEXCS4R14020	○
16	0/-0.020	0.50	0/-0.020	16	32		90	4	MEXCS4R16005	●
16	0/-0.020	1.00	0/-0.020	16	32		90	4	MEXCS4R16010	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEXCS4R

cylindrical shank, 4 flutes, corner radius

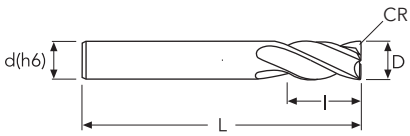
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z4



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/-0.020	2.00	0/-0.020	16	32		90	4	MEXCS4R16020	●
16	0/-0.020	3.00	0/-0.020	16	32		90	4	MEXCS4R16030	●
18	0/-0.020	0.50	0/-0.020	18	38		100	4	MEXCS4R18005	●
18	0/-0.020	1.00	0/-0.020	18	38		100	4	MEXCS4R18010	●
20	0/-0.020	0.50	0/-0.020	20	38		100	4	MEXCS4R20005	●
20	0/-0.020	1.00	0/-0.020	20	38		100	4	MEXCS4R20010	●
20	0/-0.020	2.00	0/-0.020	20	38		100	4	MEXCS4R20020	●
20	0/-0.020	3.00	0/-0.020	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.009	0.008	0.007	0.006
	2	0.017	0.015	0.014	0.012
	3	0.026	0.023	0.020	0.018
	4	0.034	0.031	0.027	0.024
	5	0.038	0.034	0.031	0.027
	6	0.043	0.038	0.034	0.030
	8	0.055	0.050	0.044	0.039
	10	0.071	0.064	0.057	0.050
	12	0.085	0.077	0.068	0.060
	14	0.098	0.088	0.078	0.068
	16	0.110	0.099	0.088	0.077
	18	0.125	0.113	0.100	0.088
	20	0.140	0.126	0.112	0.098

MEX410R

cylindrical shank, 4 flutes, short, corner radius

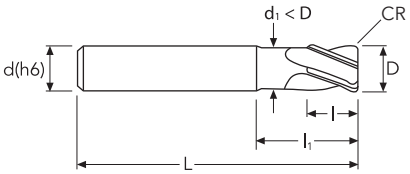
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z4



P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	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	2.85	50	4	MEX410R03030	●
4	0/-0.012	0.50	+/-0.020	6	5	9	3.85	50	4	MEX410R05040	●
5	0/-0.015	0.50	+/-0.020	6	6	12	4.85	50	4	MEX410R05050	●
6	0/-0.015	0.50	+/-0.020	6	7	14	5.80	60	4	MEX410R05060	●
8	0/-0.015	1.00	+/-0.020	8	10	18	7.80	70	4	MEX410R10080	●
10	0/-0.015	1.00	+/-0.020	10	12	25	9.80	75	4	MEX410R10100	●
12	0/-0.015	1.00	+/-0.020	12	15	30	11.80	80	4	MEX410R10120	●

● stock standard ○ non-stock standard ▽ stock exhaustion

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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.015	0.014	0.012	0.011
	3	0.023	0.021	0.018	0.016
	4	0.031	0.028	0.024	0.021
	5	0.034	0.031	0.028	0.024
	6	0.038	0.034	0.031	0.027
	8	0.050	0.045	0.040	0.035
	10	0.065	0.059	0.052	0.046
	12	0.077	0.069	0.061	0.054

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

MEXLS4R

cylindrical shank, 4 flutes, long, corner radius

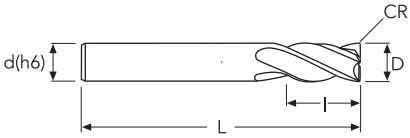
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 40° | RADIUS | Z4



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/-0.015	0.30	0/-0.010	6	4		75	4	MEXLS4R03020	●
3	0/-0.020	0.30	0/-0.015	6	5		75	4	MEXLS4R03030	●
3	0/-0.020	0.50	0/-0.015	6	5		75	4	MEXLS4R05030	●
4	0/-0.020	0.30	0/-0.015	6	8		75	4	MEXLS4R03040	●
4	0/-0.020	0.50	0/-0.015	6	8		75	4	MEXLS4R05040	●
5	0/-0.020	0.30	0/-0.015	6	9		75	4	MEXLS4R03050	●
5	0/-0.020	0.50	0/-0.015	6	9		75	4	MEXLS4R05050	●
6	0/-0.020	0.30	0/-0.015	6	10		75	4	MEXLS4R03060	●
6	0/-0.020	0.50	0/-0.015	6	10		75	4	MEXLS4R05060	●
6	0/-0.020	1.00	0/-0.015	6	10		75	4	MEXLS4R10060	●
8	0/-0.020	0.30	0/-0.015	8	12		75	4	MEXLS4R03080	●
8	0/-0.020	0.50	0/-0.015	8	12		75	4	MEXLS4R05080	●
8	0/-0.020	1.00	0/-0.015	8	12		75	4	MEXLS4R10080	●
10	0/-0.020	0.50	0/-0.020	10	14		100	4	MEXLS4R05100	●
10	0/-0.020	1.00	0/-0.020	10	14		100	4	MEXLS4R10100	●
12	0/-0.020	0.50	0/-0.020	12	16		100	4	MEXLS4R05120	●
12	0/-0.020	1.00	0/-0.020	12	16		100	4	MEXLS4R10120	●
16	0/-0.020	0.50	0/-0.020	16	22		125	4	MEXLS4R05160	●
16	0/-0.020	1.00	0/-0.020	16	22		125	4	MEXLS4R10160	●

● stock standard ○ non-stock standard ▽ stock exhaustion

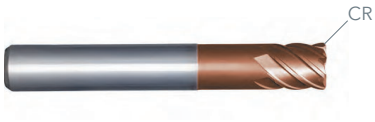
MEXLS4R

	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 0.1D**	**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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.014	0.013	0.012	0.010
	3	0.022	0.020	0.017	0.015
	4	0.029	0.026	0.023	0.020
	5	0.033	0.029	0.026	0.023
	6	0.036	0.033	0.029	0.025
	8	0.047	0.042	0.038	0.033
	10	0.060	0.054	0.048	0.042
	12	0.072	0.065	0.058	0.051
	16	0.094	0.084	0.075	0.065

MEX610R

cylindrical shank, multi flute, short, corner radius

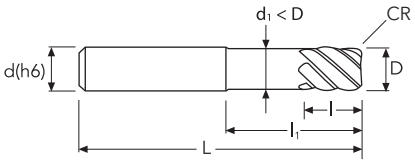
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 45° | RADIUS | Z6



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	5.80	50	6	MEX610R05060	●
8	0/-0.030	0.50	+/-0.020	8	8	24	7.80	60	6	MEX610R05080	●
10	0/-0.030	1.00	+/-0.020	10	10	30	9.80	70	6	MEX610R10100	●
12	0/-0.030	1.00	+/-0.020	12	12	30	11.80	75	6	MEX610R10120	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEX610R

	Material Group ISO 513	P2 P3 P4 K1 K2	P4 P5 K3	P6 K4	H1 H4 H5
SIDE MILLING	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.016	0.014	0.013
	8	0.028	0.025	0.022	0.019
	10	0.034	0.030	0.027	0.024
	12	0.041	0.037	0.033	0.029

MEX611R

cylindrical shank, multi flute, long, corner radius

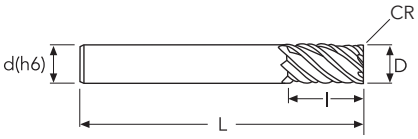
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 45° | RADIUS | Z6



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

MEX611R

	Material Group ISO 513	P2 P3 P4 K1 K2	P4 P5 K3	P6 K4	H1 H4 H5
SIDE MILLING	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**	**50÷70**	**30÷50**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.015	0.014	0.012	0.011
	8	0.023	0.021	0.019	0.016
	10	0.029	0.026	0.023	0.020
	12	0.035	0.031	0.028	0.024

MHMB204

cylindrical shank, 2 flutes ball nose, miniature

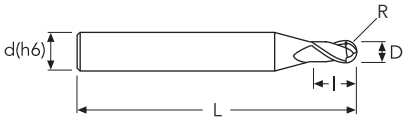
OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL



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
0.2	0/-0.015	0.10	0/-0.020	4	0.2			50	2	MHMB200204	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3			50	2	MHMB200304	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4			50	2	MHMB200404	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4			50	2	MHMB200504	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5			50	2	MHMB200604	●
0.7	0/-0.015	0.35	0/-0.020	4	0.6			50	2	MHMB200704	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6			50	2	MHMB200804	●
0.9	0/-0.015	0.45	0/-0.020	4	0.8			50	2	MHMB200904	●
1.0	0/-0.015	0.50	0/-0.020	4	0.8			50	2	MHMB201004	●
1.5	0/-0.015	0.75	0/-0.020	4	1.35			50	2	MHMB201504	●
2	0/-0.015	1	0/-0.020	4	1.7			50	2	MHMB202004	●

● stock standard ○ non-standard stock ∇ stock exhaustion

MHMB204

	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**	**40÷80**	**20÷60**
COPYING	D (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.1	0.04	0.004	0.004	0.003	0.003
	0.2	0.09	0.006	0.005	0.005	0.004
	0.3	0.13	0.008	0.007	0.006	0.006
	0.4	0.17	0.010	0.009	0.008	0.007
	0.5	0.22	0.012	0.011	0.010	0.008
	0.6	0.26	0.015	0.014	0.012	0.011
	0.7	0.31	0.018	0.016	0.014	0.013
	0.8	0.35	0.020	0.018	0.016	0.014
	0.9	0.39	0.023	0.021	0.018	0.016
	1	0.44	0.026	0.023	0.020	0.017
	1.5	0.79	0.040	0.036	0.030	0.026
	2	1.20	0.055	0.050	0.041	0.036

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

MHMB206

cylindrical shank, 2 flutes ball nose, miniature, 6 mm. shank

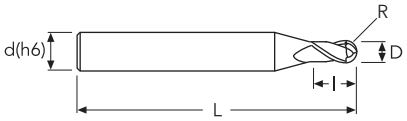
OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL



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
0.4	0/-0.010	0.20	0/-0.010	6	0.4	-	0.35	50	2	MHMB200406	●
0.5	0/-0.010	0.25	0/-0.010	6	0.5	-	0.45	50	2	MHMB200506	●
0.6	0/-0.010	0.30	0/-0.010	6	0.6	-	0.55	50	2	MHMB200606	●
0.8	0/-0.010	0.40	0/-0.010	6	0.8	-	0.75	50	2	MHMB200806	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MHMB206

	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**
COPYING	Vc (m/min)		**80÷120**	**60÷100**	**40÷80**	**20÷60**
	D (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.4	0.17	0.010	0.009	0.008	0.007
	0.5	0.22	0.012	0.011	0.010	0.008
	0.6	0.26	0.015	0.014	0.012	0.011
	0.8	0.35	0.020	0.018	0.016	0.014

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

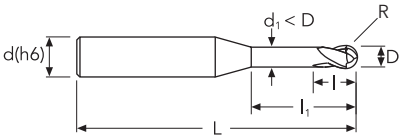
CARBIDE BURRS

MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL

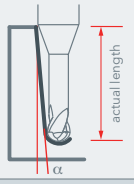




P	M	K	N	S	H
★		★			★

★ 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/-0.015	0.10	0/-0.020	4	0.2	0.5	0.17	50	2	0.57	0.58	0.60	0.62	0.66	MHLNB2002005	●
0.2	0/-0.015	0.10	0/-0.020	4	0.2	1	0.17	50	2	1.08	1.12	1.15	1.19	1.27	MHLNB200201	●
0.2	0/-0.015	0.10	0/-0.020	4	0.2	1.5	0.17	50	2	1.60	1.65	1.71	1.76	1.89	MHLNB2002015	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	1	0.27	50	2	1.08	1.11	1.15	1.18	1.26	MHLNB200301	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	2	0.27	50	2	2.12	2.18	2.25	2.33	2.49	MHLNB200302	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	3	0.27	50	2	3.15	3.25	3.36	3.48	3.73	MHLNB200303	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	1	0.37	50	2	1.08	1.11	1.14	1.18	1.25	MHLNB200401	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	2	0.37	50	2	2.11	2.18	2.25	2.32	2.48	MHLNB200402	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	3	0.37	50	2	3.15	3.25	3.36	3.47	3.72	MHLNB200403	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	4	0.37	50	2	4.18	4.32	4.46	4.62	4.95	MHLNB200404	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	5	0.37	50	2	5.21	5.39	5.57	5.77	6.18	MHLNB200405	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	2	0.45	50	2	2.15	2.22	2.29	2.36	2.52	MHLNB200502	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	3	0.45	50	2	3.18	3.29	3.39	3.51	3.75	MHLNB200503	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	4	0.45	50	2	4.22	4.35	4.50	4.65	4.98	MHLNB200504	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	5	0.45	50	2	5.25	5.42	5.61	5.80	6.22	MHLNB200505	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	6	0.45	50	2	6.28	6.49	6.71	6.95	7.45	MHLNB200506	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	8	0.45	50	2	8.35	8.63	8.93	9.24	9.92	MHLNB200508	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	2	0.55	50	2	2.15	2.21	2.28	2.35	2.50	MHLNB200602	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	3	0.55	50	2	3.18	3.28	3.39	3.50	3.74	MHLNB200603	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	4	0.55	50	2	4.22	4.35	4.49	4.65	4.97	MHLNB200604	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	5	0.55	50	2	5.25	5.42	5.60	5.79	6.21	MHLNB200605	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	6	0.55	50	2	6.28	6.49	6.71	6.94	7.44	MHLNB200606	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	8	0.55	50	2	8.35	8.63	8.92	9.23	9.91	MHLNB200608	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	2	0.75	50	2	2.15	2.21	2.27	2.34	2.48	MHLNB200802	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	4	0.75	50	2	4.21	4.34	4.48	4.63	4.95	MHLNB200804	●
0,8	0/-0.015	0.40	0/-0.020	4	0.6	5	0.75	50	2	5.25	5.41	5.59	5.78	6.18	MHLNB200805	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	6	0.75	50	2	6.28	6.48	6.70	6.93	7.42	MHLNB200806	●
0,8	0/-0.015	0.40	0/-0.020	4	0.6	7	0.75	50	2	7.31	7.55	7.81	8.07	8.65	MHLNB200807	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	8	0.75	50	2	8.35	8.62	8.91	9.22	9.88	MHLNB200808	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	10	0.75	50	2	10.41	10.76	11.13	11.51	12.35	MHLNB200810	●
1	0/-0.015	0.50	0/-0.020	4	0.8	3	0.9	50	2	3.27	3.37	3.47	3.57	3.80	MHLNB201003	●
1	0/-0.015	0.50	0/-0.020	4	0.8	4	0.9	50	2	4.31	4.44	4.58	4.72	5.04	MHLNB201004	●
1	0/-0.015	0.50	0/-0.020	4	0.8	5	0.9	50	2	5.34	5.51	5.68	5.87	6.27	MHLNB201005	●
1	0/-0.015	0.50	0/-0.020	4	0.8	6	0.9	50	2	6.37	6.58	6.79	7.02	7.50	MHLNB201006	●
1	0/-0.015	0.50	0/-0.020	4	0.8	7	0.9	50	2	7.41	7.64	7.90	8.16	8.74	MHLNB201007	●
1	0/-0.015	0.50	0/-0.020	4	0.8	8	0.9	50	2	8.44	8.71	9.00	9.31	9.97	MHLNB201008	●
1	0/-0.015	0.50	0/-0.020	4	0.8	9	0.9	50	2	9.47	9.78	10.11	10.46	11.21	MHLNB201009	●
1	0/-0.015	0.50	0/-0.020	4	0.8	10	0.9	50	2	10.51	10.85	11.22	11.61	12.44	MHLNB201010	●
1	0/-0.015	0.50	0/-0.020	4	0.8	12	0.9	50	2	12.57	12.99	13.43	13.90	14.91	MHLNB201012	●

● stock standard ○ non-standard stock ▽ stock exhaustion

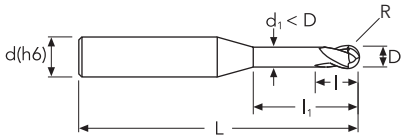
MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL



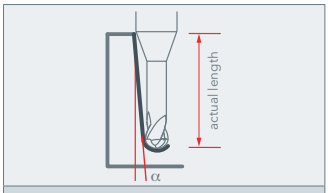




P	M	K	N	S	H
★		★			★

★ 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	0/-0.015	0.50	0/-0.020	4	0.8	14	0.9	50	2	14.64	15.13	15.65	16.19	17.37	MHLNB201014	●
1	0/-0.015	0.50	0/-0.020	4	0.8	16	0.9	50	2	16.71	17.27	17.86	18.49	19.84	MHLNB201016	●
1	0/-0.015	0.50	0/-0.020	4	0.8	20	0.9	60	2	20.84	21.55	22.29	23.08	24.78	MHLNB201020	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	6	1.1	50	2	6.37	6.57	6.78	7.00	7.48	MHLNB201206	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	8	1.1	50	2	8.44	8.71	8.99	9.30	9.95	MHLNB201208	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	10	1.1	50	2	10.50	10.85	11.21	11.59	12.42	MHLNB201210	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	12	1.1	50	2	12.57	12.98	13.42	13.89	14.88	MHLNB201212	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	8	1.3	50	2	8.43	8.70	8.98	9.28	9.93	MHLNB201408	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	12	1.3	50	2	12.57	12.98	13.41	13.87	14.86	MHLNB201412	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	16	1.3	50	2	16.70	17.26	17.84	18.46	19.80	MHLNB201416	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	8	1.4	50	2	8.43	8.70	8.98	9.27	9.91	MHLNB201508	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	12	1.4	50	2	12.57	12.97	13.41	13.86	14.85	MHLNB201512	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	16	1.4	50	2	16.70	17.25	17.84	18.45	19.78	MHLNB201516	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	18	1.4	60	2	18.77	19.39	20.05	20.75	22.25	MHLNB201518	●
1.5	0/-0.015	0.75	0/-0.020	6	2.4	20	1.4	50	2	20.84	21.53	22.26	23.04	24.72	MHLNB201520	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	8	1.5	50	2	8.43	8.69	8.97	9.27	9.90	MHLNB201608	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	12	1.5	50	2	12.56	12.97	13.40	13.86	14.84	MHLNB201612	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	16	1.5	50	2	16.70	17.25	17.83	18.45	19.77	MHLNB201616	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	20	1.5	60	2	20.83	21.53	22.26	23.03	-	MHLNB201620	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	8	1.7	50	2	8.43	8.69	8.96	9.25	9.88	MHLNB201808	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	12	1.7	50	2	12.56	12.96	13.39	13.84	14.81	MHLNB201812	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	16	1.7	50	2	16.70	17.24	17.82	18.43	19.75	MHLNB201816	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	20	1.7	60	2	20.83	21.52	22.25	23.02	-	MHLNB201820	●
2	0/-0.015	1.00	0/-0.020	4	1.6	4	1.9	50	2	4.29	4.40	4.52	4.65	4.92	MHLNB202004	●
2	0/-0.015	1.00	0/-0.020	4	1.6	6	1.9	50	2	6.36	6.54	6.74	6.94	7.39	MHLNB202006	●
2	0/-0.015	1.00	0/-0.020	4	1.6	8	1.9	50	2	8.42	8.68	8.95	9.24	9.86	MHLNB202008	●
2	0/-0.015	1.00	0/-0.020	4	1.6	10	1.9	50	2	10.49	10.82	11.17	11.53	12.32	MHLNB202010	●
2	0/-0.015	1.00	0/-0.020	4	1.6	12	1.9	50	2	12.56	12.96	13.38	13.83	14.79	MHLNB202012	●
2	0/-0.015	1.00	0/-0.020	4	1.6	14	1.9	50	2	14.62	15.10	15.59	16.12	17.26	MHLNB202014	●
2	0/-0.015	1.00	0/-0.020	4	1.6	16	1.9	50	2	16.69	17.23	17.81	18.42	19.73	MHLNB202016	●
2	0/-0.015	1.00	0/-0.020	4	1.6	18	1.9	60	2	18.76	19.37	20.02	20.71	-	MHLNB202018	●
2	0/-0.015	1.00	0/-0.020	4	1.6	20	1.9	60	2	20.83	21.51	22.24	23.00	-	MHLNB202020	●
2	0/-0.015	1.00	0/-0.020	4	1.6	22	1.9	60	2	22.89	23.65	24.45	25.30	-	MHLNB202022	●
2	0/-0.015	1.00	0/-0.020	4	1.6	25	1.9	75	2	25.99	26.86	27.77	28.74	-	MHLNB202025	●
2	0/-0.015	1.00	0/-0.020	4	1.6	30	1.9	75	2	31.16	32.21	33.31	-	-	MHLNB202030	●
3	0/-0.020	1.50	0/-0.020	6	2.4	8	2.8	50	2	8.60	8.84	9.10	9.37	9.96	MHLNB203008	●
3	0/-0.020	1.50	0/-0.020	6	2.4	10	2.8	50	2	10.67	10.98	11.32	11.67	12.43	MHLNB203010	●
3	0/-0.020	1.50	0/-0.020	6	2.4	12	2.8	50	2	12.73	13.12	13.53	13.96	14.90	MHLNB203012	●
3	0/-0.020	1.50	0/-0.020	6	2.4	16	2.8	60	2	16.87	17.40	17.96	18.55	19.83	MHLNB203016	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

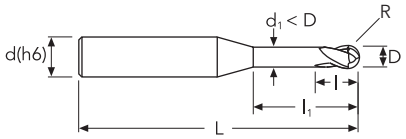
CARBIDE BURRS

MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL

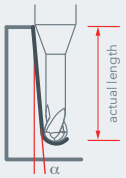




P	M	K	N	S	H
★		★			★

★ 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
3	0/-0.020	1.50	0/-0.020	6	2.4	20	2.8	60	2	21.00	21.68	22.39	23.14	24.77	MHLNB203020	●
3	0/-0.020	1.50	0/-0.020	6	2.4	25	2.8	75	2	26.17	27.02	27.93	28.88	-	MHLNB203025	●
3	0/-0.020	1.50	0/-0.020	6	2.4	30	2.8	75	2	31.34	32.37	33.46	34.62	-	MHLNB203030	●
3	0/-0.020	1.50	0/-0.020	6	2.4	35	2.8	75	2	36.51	37.72	39.00	40.35	-	MHLNB203035	●
4	0/-0.020	2.00	0/-0.020	6	3.2	10	3.7	50	2	10.84	11.15	11.47	11.81	12.54	MHLNB204010	●
4	0/-0.020	2.00	0/-0.020	6	3.2	16	3.7	60	2	17.04	17.56	18.11	18.69	19.94	MHLNB204016	●
4	0/-0.020	2.00	0/-0.020	6	3.2	20	3.7	60	2	21.18	21.84	22.54	23.28	-	MHLNB204020	●
4	0/-0.020	2.00	0/-0.020	6	3.2	25	3.7	75	2	26.35	27.19	28.08	29.02	-	MHLNB204025	●
4	0/-0.020	2.00	0/-0.020	6	3.2	30	3.7	75	2	31.51	32.53	33.61	-	-	MHLNB204030	●
4	0/-0.020	2.00	0/-0.020	6	3.2	35	3.7	75	2	36.68	37.88	39.15	-	-	MHLNB204035	●
4	0/-0.020	2.00	0/-0.020	6	3.2	40	3.7	100	2	41.85	43.23	-	-	-	MHLNB204040	●
4	0/-0.020	2.00	0/-0.020	6	3.2	45	3.7	100	2	47.02	48.57	-	-	-	MHLNB204045	●
4	0/-0.020	2.00	0/-0.020	6	3.2	50	3.7	100	2	52.19	53.92	-	-	-	MHLNB204050	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MHLNB2

	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
ROUND RIB	**0.2**	≤ 6D	0.01	0.09	0.008	0.007	0.006	0.006
		≤ 8D	0.01	0.08	0.007	0.006	0.005	0.005
		≤ 10D	0.01	0.07	0.006	0.005	0.004	0.004
	0.3	≤ 6D	0.02	0.13	0.010	0.009	0.008	0.007
		≤ 8D	0.01	0.12	0.009	0.007	0.006	0.006
		≤ 10D	0.01	0.11	0.008	0.006	0.005	0.004
	0.4	≤ 6D	0.02	0.17	0.013	0.012	0.010	0.009
		≤ 8D	0.02	0.16	0.012	0.009	0.008	0.007
		≤ 10D	0.01	0.15	0.010	0.007	0.007	0.006
	0.5	≤ 6D	0.03	0.22	0.017	0.015	0.014	0.012
		≤ 8D	0.02	0.20	0.015	0.012	0.011	0.010
		≤ 10D	0.02	0.18	0.014	0.010	0.009	0.008
	0.6	≤ 6D	0.03	0.26	0.021	0.019	0.017	0.015
		≤ 8D	0.03	0.24	0.019	0.015	0.014	0.012
		≤ 10D	0.02	0.22	0.017	0.012	0.011	0.009
	0.8	≤ 6D	0.04	0.35	0.025	0.023	0.020	0.018
		≤ 8D	0.03	0.32	0.023	0.018	0.016	0.014
		≤ 10D	0.03	0.29	0.020	0.014	0.013	0.011
	1	≤ 6D	0.05	0.44	0.030	0.027	0.024	0.021
		≤ 8D	0.04	0.40	0.027	0.022	0.019	0.017
		≤ 10D	0.04	0.37	0.024	0.017	0.015	0.013
		≤ 12D	0.03	0.33	0.021	0.013	0.012	0.010
		>12D	0.02	0.30	0.018	0.010	0.009	0.008
	1.2	≤ 6D	0.06	0.52	0.035	0.032	0.028	0.025
		≤ 8D	0.05	0.48	0.032	0.026	0.023	0.020
		≤ 10D	0.04	0.44	0.028	0.020	0.018	0.016
		≤ 12D	0.03	0.39	0.025	0.015	0.014	0.012
		>12D	0.03	0.36	0.021	0.011	0.010	0.009
	1.5	≤ 6D	0.08	0.65	0.045	0.041	0.036	0.032
		≤ 8D	0.06	0.61	0.041	0.033	0.029	0.026
		≤ 10D	0.05	0.55	0.036	0.026	0.023	0.020
		≤ 12D	0.04	0.49	0.032	0.020	0.018	0.015
		>12D	0.03	0.44	0.027	0.015	0.013	0.011
	2	≤ 6D	0.10	0.87	0.060	0.054	0.048	0.042
		≤ 8D	0.09	0.81	0.054	0.044	0.039	0.034
		≤ 10D	0.07	0.74	0.048	0.035	0.031	0.027
		≤ 12D	0.06	0.65	0.042	0.026	0.024	0.021
		>12D	0.05	0.59	0.036	0.019	0.017	0.015
	2.5	≤ 6D	0.13	1.09	0.060	0.054	0.048	0.042
		≤ 8D	0.11	1.01	0.054	0.044	0.039	0.034
		≤ 10D	0.09	0.92	0.048	0.035	0.031	0.027
		≤ 12D	0.07	0.82	0.042	0.026	0.024	0.021
		>12D	0.06	0.74	0.036	0.019	0.017	0.015
	3	≤ 6D	0.15	1.31	0.075	0.068	0.060	0.053
		≤ 8D	0.13	1.21	0.068	0.055	0.049	0.043
		≤ 10D	0.11	1.10	0.060	0.043	0.038	0.034
		≤ 12D	0.08	0.98	0.053	0.033	0.029	0.026
		>12D	0.07	0.89	0.045	0.024	0.022	0.019

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

MHLNB2

ROUND 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 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	≤ 6D	0.20	1.74	0.095	0.086	0.076	0.067
		≤ 8D	0.17	1.61	0.086	0.069	0.062	0.054
		≤ 10D	0.14	1.47	0.076	0.055	0.049	0.043
		≤ 12D	0.11	1.31	0.067	0.042	0.037	0.033
		>12D	0.09	1.19	0.057	0.031	0.027	0.024

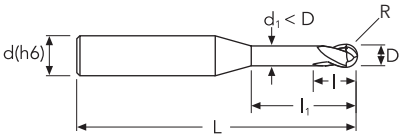
α	α	n (rpm)	Vf (mm/min)
	45°	x 1.65	x 1.65
	30°	x 1.30	x 1.30
	15°	x 1.15	x 1.15

MHCRB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature, 6 mm. shank

OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL

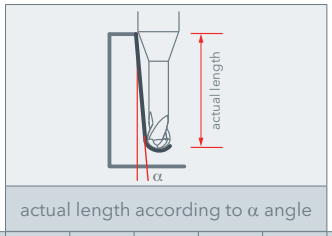




P	M	K	N	S	H
★		★			★

★ 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	MHCRB20050206	●
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	MHCRB20050406	●
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	MHCRB20060206	●
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	MHCRB20060406	●
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	MHCRB20060606	●
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	MHCRB20080206	●
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	MHCRB20080406	●
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	MHCRB20080606	●
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	MHCRB20100306	●
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	MHCRB20100606	●
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	MHCRB20100806	●
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	MHCRB20101006	●
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	MHCRB20120606	●
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	MHCRB20120806	●
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	MHCRB20121006	●
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	MHCRB20150406	●
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	MHCRB20150806	●
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	MHCRB20151006	●
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	MHCRB20151206	●
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	MHCRB20151606	●
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	MHCRB20200606	●
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	MHCRB20200806	●
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	MHCRB20201006	●
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	MHCRB20201206	●
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	MHCRB20201606	●
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	MHCRB20202006	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MHCRB2

	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
ROUND RIB	**0.5**	≤ 6D	0.03	0.22	0.020	0.018	0.016	0.014
		≤ 8D	0.02	0.20	0.018	0.015	0.013	0.011
		≤ 10D	0.02	0.18	0.016	0.012	0.010	0.009
	0.6	≤ 6D	0.03	0.26	0.022	0.020	0.018	0.015
		≤ 8D	0.03	0.24	0.020	0.016	0.014	0.012
		≤ 10D	0.02	0.22	0.018	0.013	0.011	0.010
	0.8	≤ 6D	0.04	0.35	0.025	0.023	0.020	0.018
		≤ 8D	0.03	0.32	0.023	0.018	0.016	0.014
		≤ 10D	0.03	0.29	0.020	0.014	0.013	0.011
	1	≤ 6D	0.05	0.44	0.030	0.027	0.024	0.021
		≤ 8D	0.04	0.40	0.027	0.022	0.019	0.017
		≤ 10D	0.04	0.37	0.024	0.017	0.015	0.013
		≤ 12D	0.03	0.33	0.021	0.013	0.012	0.010
		>12D	0.02	0.30	0.018	0.010	0.009	0.008
	1.2	≤ 6D	0.06	0.52	0.035	0.032	0.028	0.025
		≤ 8D	0.05	0.48	0.032	0.026	0.023	0.020
		≤ 10D	0.04	0.44	0.028	0.020	0.018	0.016
		≤ 12D	0.03	0.39	0.025	0.015	0.014	0.012
		>12D	0.03	0.36	0.021	0.011	0.010	0.009
	1.5	≤ 6D	0.08	0.65	0.045	0.041	0.036	0.032
		≤ 8D	0.06	0.61	0.041	0.033	0.029	0.026
		≤ 10D	0.05	0.55	0.036	0.026	0.023	0.020
		≤ 12D	0.04	0.49	0.032	0.020	0.018	0.015
		>12D	0.03	0.44	0.027	0.015	0.013	0.011
	2	≤ 6D	0.10	0.87	0.060	0.054	0.048	0.042
		≤ 8D	0.09	0.81	0.054	0.044	0.039	0.034
		≤ 10D	0.07	0.74	0.048	0.035	0.031	0.027
		≤ 12D	0.06	0.65	0.042	0.026	0.024	0.021
		>12D	0.05	0.59	0.036	0.019	0.017	0.015
		≥ 15D	0.06	0.06	0.030	0.027	0.024	0.021

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

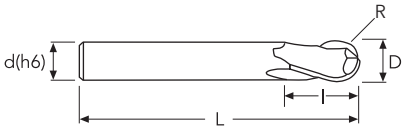
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL



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/-0.020	0.50	0/-0.010	3	3		38	2	MEXCSB2010	●
1.5	0/-0.020	0.75	0/-0.010	3	3		38	2	MEXCSB2015	●
2	0/-0.020	1.00	0/-0.010	6	3		50	2	MEXCSB2020	●
2.5	0/-0.020	1.25	0/-0.015	4	4		50	2	MEXCSB202550	●
3	0/-0.020	1.50	0/-0.010	6	4		50	2	MEXCSB2030	●
4	0/-0.020	2.00	0/-0.010	6	5		54	2	MEXCSB2040	●
5	0/-0.020	2.50	0/-0.010	6	6		54	2	MEXCSB2050	●
6	0/-0.020	3.00	0/-0.010	6	12		60	2	MEXCSB2060	●
8	0/-0.020	4.00	0/-0.010	8	14		60	2	MEXCSB2080	●
10	0/-0.020	5.00	0/-0.010	10	18		70	2	MEXCSB2100	●
12	0/-0.020	6.00	0/-0.010	12	22		80	2	MEXCSB2120	●
14	0/-0.020	7.00	0/-0.020	14	32		90	2	MEXCSB2140	●
16	0/-0.020	8.00	0/-0.020	16	32		90	2	MEXCSB2160	●
18	0/-0.020	9.00	0/-0.020	18	38		100	2	MEXCSB2180	●
20	0/-0.020	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 0.2D**	**0.05D x 0.2D**	**0.05D x 0.2D**
Vc (m/min)		**120÷160**	**80÷120**	**60÷100**	**50÷70**
D (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.44	0.009	0.008	0.007	0.006
1.5	0.79	0.012	0.011	0.010	0.008
2	1.20	0.012	0.011	0.010	0.008
2.5	1.65	0.015	0.014	0.012	0.011
3	2.14	0.018	0.016	0.014	0.013
4	3.20	0.025	0.023	0.020	0.018
5	4.33	0.032	0.029	0.026	0.022
6	5.50	0.038	0.034	0.030	0.027
8	7.84	0.048	0.043	0.038	0.034
10	10.00	0.057	0.051	0.046	0.040
12	11.76	0.067	0.060	0.054	0.047
14	12.83	0.080	0.072	0.064	0.056
16	12.80	0.095	0.086	0.076	0.067
18	10.80	0.108	0.097	0.086	0.076
20	12.00	0.108	0.097	0.086	0.076



α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

MEXCLSB2

cylindrical shank, 2 flutes ball nose, long reach

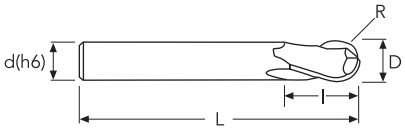
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL



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/-0.010	4	2.5		50	2	MEXCLSB2010	●
1.2	0/-0.012	0.60	0/-0.010	4	3		50	2	MEXCLSB2012	●
1.5	0/-0.012	0.75	0/-0.010	4	4		50	2	MEXCLSB2015	●
2	0/-0.012	1.00	0/-0.010	6	5		50	2	MEXCLSB2020	●
2.5	0/-0.012	1.25	0/-0.010	6	6		60	2	MEXCLSB2025	●
3	0/-0.012	1.50	0/-0.010	6	8		60	2	MEXCLSB2030	●
4	0/-0.012	2.00	0/-0.010	6	8		70	2	MEXCLSB2040	●
5	0/-0.012	2.50	0/-0.010	6	10		80	2	MEXCLSB2050	●
6	0/-0.015	3.00	0/-0.010	6	12		90	2	MEXCLSB2060	●
8	0/-0.015	4.00	0/-0.010	8	14		100	2	MEXCLSB2080	●
10	0/-0.015	5.00	0/-0.010	10	18		100	2	MEXCLSB2100	●
12	0/-0.015	6.00	0/-0.010	12	22		110	2	MEXCLSB2120	●
14	0/-0.035	7.00	0/-0.020	14	32		125	2	MEXCLSB2140	●
16	0/-0.035	8.00	0/-0.020	16	32		150	2	MEXCLSB2160	●
20	0/-0.035	10.00	0/-0.020	20	38		150	2	MEXCLSB2200	●

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

● 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)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.44	0.015	0.014	0.012	0.011
2	0.87	0.021	0.019	0.017	0.015
3	1.31	0.027	0.024	0.022	0.019
4	1.74	0.037	0.033	0.029	0.026
5	2.18	0.045	0.041	0.036	0.032
6	2.62	0.051	0.046	0.041	0.036
8	3.49	0.060	0.054	0.048	0.042
10	4.36	0.068	0.061	0.054	0.048
12	5.23	0.077	0.069	0.061	0.054
14	6.10	0.089	0.080	0.071	0.062
16	6.97	0.102	0.092	0.082	0.071
18	7.85	0.115	0.103	0.092	0.080
20	8.72	0.132	0.119	0.106	0.092



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

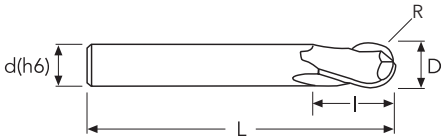
OSAWA NORM | MEX | UMG ENDLESS ORANGE | <55 HRC | 30° | BALL NOSE | Z2 BALL



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/-0.010	4	3		75	2	MEX25301075	●
1	0/-0.020	0.50	0/-0.010	4	3		100	2	MEX253010100	●
1.5	0/-0.020	0.75	0/-0.010	4	3		75	2	MEX25301575	●
1.5	0/-0.020	0.75	0/-0.010	4	3		100	2	MEX253015100	●
2	0/-0.020	1.00	0/-0.010	4	4		75	2	MEX25302075	●
2	0/-0.020	1.00	0/-0.010	4	4		100	2	MEX253020100	●
3	0/-0.030	1.50	0/-0.015	6	5		75	2	MEX25303075	●
3	0/-0.030	1.50	0/-0.015	6	5		100	2	MEX253030	●
4	0/-0.030	2.00	0/-0.015	6	8		100	2	MEX253040	●
5	0/-0.030	2.50	0/-0.015	6	9		100	2	MEX253050100	●
6	0/-0.030	3.00	0/-0.015	6	10		150	2	MEX253060150	●
8	0/-0.030	4.00	0/-0.015	8	12		150	2	MEX253080	●
10	0/-0.035	5.00	0/-0.020	10	14		150	2	MEX25310150	●
12	0/-0.035	6.00	0/-0.020	12	16		150	2	MEX25312150	●
16	0/-0.035	8.00	0/-0.020	16	32		200	2	MEX253160	●
20	0/-0.035	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)	**ap (mm)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**
1	0.44	0.015	0.014	0.012	0.011
2	0.87	0.021	0.019	0.017	0.015
3	1.31	0.027	0.024	0.022	0.019
4	1.74	0.037	0.033	0.029	0.026
5	2.18	0.045	0.041	0.036	0.032
6	2.62	0.051	0.046	0.041	0.036
8	3.49	0.060	0.054	0.048	0.042
10	4.36	0.068	0.061	0.054	0.048
12	5.23	0.077	0.069	0.061	0.054
14	6.10	0.089	0.080	0.071	0.062
16	6.97	0.102	0.092	0.082	0.071
18	7.85	0.115	0.103	0.092	0.080
20	8.72	0.132	0.119	0.106	0.092



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 AND MH

STEEL AND HARDENED STEEL
< 70 HRC (UH) AND 30÷ 70 HRC (MH)

Nano micrograin and UH RED and MH, 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 e MH, 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 und MH 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 et MH 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 e MH 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.

Нано-микрозернистость и покрытие UH RED и MH на основе TiSi для фрезерования материалов с твердостью до 70 HRC. Высокая надежность и долговечность при использовании стратегий обработки с высокой скоростью или высокой подачей и с возможностью без использования СОЖ. Особая геометрия резания гарантирует высокую точность и отличное качество обработанной поверхности.

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

UHM204

cylindrical shank, 2F, miniature

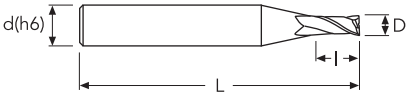
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | Z2



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SLOTTING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
0.1	0/-0.010			4	0.2		40	2	UHM200104	●
0.2	0/-0.010			4	0.3		50	2	UHM200204	●
0.3	0/-0.010			4	0.4		50	2	UHM200304	●
0.4	0/-0.010			4	0.6		50	2	UHM200404	●
0.5	0/-0.010			4	0.7		50	2	UHM200504	●
0.6	0/-0.010			4	0.9		50	2	UHM200604	●
0.7	0/-0.010			4	1		50	2	UHM200704	●
0.8	0/-0.010			4	1.2		50	2	UHM200804	●
0.9	0/-0.010			4	1.4		50	2	UHM200904	●

● stock standard ○ non-standard stock ▽ stock exhaustion

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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.1	0.01	0.002	0.002	0.002	0.001
	0.2	0.01	0.003	0.003	0.002	0.002
	0.3	0.02	0.004	0.004	0.003	0.003
	0.4	0.02	0.006	0.005	0.005	0.004
	0.5	0.03	0.007	0.006	0.006	0.005
	0.6	0.03	0.008	0.007	0.006	0.006
	0.8	0.04	0.010	0.009	0.008	0.007
	0.9	0.05	0.012	0.011	0.010	0.008

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

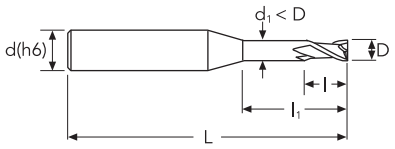
CARBIDE BURRS

UHLN2

cylindrical shank, 2F, extended and reduced neck

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | Z2

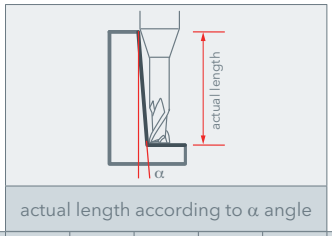




P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	C	C Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.2	0/-0.010			4	0.3	0.5	0.16	50	2	0.57	0.59	0.61	0.63	0.68	UHLN2002005	●
0.2	0/-0.010			4	0.3	1	0.16	50	2	1.09	1.12	1.16	1.21	1.30	UHLN200201	●
0.2	0/-0.010			4	0.3	1.5	0.16	50	2	1.60	1.66	1.72	1.78	1.91	UHLN2002015	●
0.3	0/-0.010			4	0.4	1	0.26	50	2	1.09	1.12	1.16	1.21	1.30	UHLN200301	●
0.3	0/-0.010			4	0.4	2	0.26	50	2	2.12	2.19	2.27	2.35	2.53	UHLN200302	●
0.3	0/-0.010			4	0.4	3	0.26	50	2	3.15	3.26	3.38	3.50	3.76	UHLN200303	●
0.4	0/-0.010			4	0.6	2	0.37	50	2	2.12	2.19	2.27	2.35	2.53	UHLN200402	●
0.4	0/-0.010			4	0.6	3	0.37	50	2	3.15	3.26	3.38	3.50	3.76	UHLN200403	●
0.4	0/-0.010			4	0.6	4	0.37	50	2	4.19	4.33	4.49	4.65	5.00	UHLN200404	●
0.4	0/-0.010			4	0.6	5	0.37	50	2	5.22	5.40	5.59	5.79	6.23	UHLN200405	●
0.5	0/-0.010			4	0.7	2	0.45	50	2	2.16	2.23	2.31	2.40	2.57	UHLN200502	●
0.5	0/-0.010			4	0.7	4	0.45	50	2	4.23	4.37	4.53	4.69	5.04	UHLN200504	●
0.5	0/-0.010			4	0.7	6	0.45	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200506	●
0.5	0/-0.010			4	0.7	8	0.45	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200508	●
0.6	0/-0.010			4	0.9	2	0.55	50	2	2.16	2.23	2.31	2.40	2.57	UHLN200602	●
0.6	0/-0.010			4	0.9	4	0.55	50	2	4.23	4.37	4.53	4.69	5.04	UHLN200604	●
0.6	0/-0.010			4	0.9	6	0.55	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200606	●
0.6	0/-0.010			4	0.9	8	0.55	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200608	●
0.6	0/-0.010			4	0.9	10	0.55	50	2	10.43	10.79	11.17	11.57	12.44	UHLN200610	●
0.7	0/-0.010			4	1.0	2	0.65	50	2	2.16	2.23	2.31	2.40	2.57	UHLN200702	●
0.7	0/-0.010			4	1.0	4	0.65	50	2	4.23	4.37	4.53	4.69	5.04	UHLN200704	●
0.7	0/-0.010			4	1.0	6	0.65	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200706	●
0.7	0/-0.010			4	1.0	8	0.65	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200708	●
0.7	0/-0.010			4	1.0	10	0.65	50	2	10.43	10.79	11.17	11.57	12.44	UHLN200710	●
0.8	0/-0.010			4	1.2	4	0.75	50	2	4.23	4.37	4.53	4.69	5.04	UHLN200804	●
0.8	0/-0.010			4	1.2	6	0.75	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200806	●
0.8	0/-0.010			4	1.2	8	0.75	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200808	●
0.8	0/-0.010			4	1.2	10	0.75	50	2	10.43	10.79	11.17	11.57	12.44	UHLN200810	●
0.8	0/-0.010			4	1.2	12	0.75	50	2	12.49	12.93	13.38	13.87	14.91	UHLN200812	●
0.9	0/-0.010			4	1.4	6	0.85	50	2	6.29	6.51	6.74	6.98	7.51	UHLN200906	●
0.9	0/-0.010			4	1.4	8	0.85	50	2	8.36	8.65	8.96	9.28	9.98	UHLN200908	●
0.9	0/-0.010			4	1.4	10	0.85	50	2	10.43	10.79	11.17	11.57	12.44	UHLN200910	●
0.9	0/-0.010			4	1.4	15	0.85	50	2	15.6	16.14	16.71	17.31	18.61	UHLN200915	●
1	0/-0.015			4	1.5	6	0.95	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201006	●
1	0/-0.015			4	1.5	8	0.95	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201008	●
1	0/-0.015			4	1.5	10	0.95	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201010	●
1	0/-0.015			4	1.5	12	0.95	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201012	●
1	0/-0.015			4	1.5	14	0.95	50	2	14.66	15.17	15.70	16.27	17.49	UHLN201014	●
1	0/-0.015			4	1.5	16	0.95	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201016	●

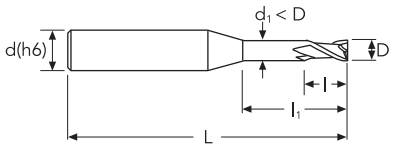
● stock standard ○ non-standard stock ▽ stock exhaustion

UHLN2

cylindrical shank, 2F, extended and reduced neck

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | Z2

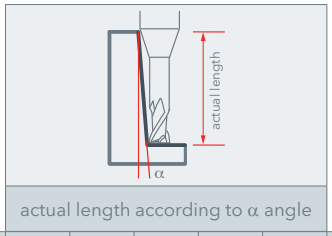




P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	C	C Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1.2	0/-0.015			4	1.8	6	1.15	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201206	●
1.2	0/-0.015			4	1.8	8	1.15	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201208	●
1.2	0/-0.015			4	1.8	10	1.15	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201210	●
1.2	0/-0.015			4	1.8	12	1.15	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201212	●
1.4	0/-0.015			4	2.1	6	1.35	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201406	●
1.4	0/-0.015			4	2.1	8	1.35	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201408	●
1.4	0/-0.015			4	2.1	10	1.35	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201410	●
1.4	0/-0.015			4	2.1	12	1.35	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201412	●
1.4	0/-0.015			4	2.1	14	1.35	50	2	14.66	15.17	15.70	16.27	17.49	UHLN201414	●
1.4	0/-0.015			4	2.1	16	1.35	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201416	●
1.5	0/-0.015			4	2.3	6	1.45	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201506	●
1.5	0/-0.015			4	2.3	8	1.45	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201508	●
1.5	0/-0.015			4	2.3	10	1.45	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201510	●
1.5	0/-0.015			4	2.3	12	1.45	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201512	●
1.5	0/-0.015			4	2.3	14	1.45	50	2	14.66	15.17	15.7	16.27	17.49	UHLN201514	●
1.5	0/-0.015			4	2.3	16	1.45	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201516	●
1.5	0/-0.015			4	2.3	18	1.45	60	2	18.79	19.44	20.13	20.86	22.43	UHLN201518	●
1.5	0/-0.015			4	2.3	20	1.45	60	2	20.86	21.58	22.35	23.15	-	UHLN201520	●
1.6	0/-0.015			4	2.4	6	1.55	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201606	●
1.6	0/-0.015			4	2.4	8	1.55	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201608	●
1.6	0/-0.015			4	2.4	10	1.55	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201610	●
1.6	0/-0.015			4	2.4	12	1.55	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201612	●
1.6	0/-0.015			4	2.4	14	1.55	50	2	14.66	15.17	15.70	16.27	17.49	UHLN201614	●
1.6	0/-0.015			4	2.4	16	1.55	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201616	●
1.6	0/-0.015			4	2.4	18	1.55	60	2	18.79	19.44	20.13	20.86	22.43	UHLN201618	●
1.6	0/-0.015			4	2.4	20	1.55	60	2	20.86	21.58	22.35	23.15	-	UHLN201620	●
1.8	0/-0.015			4	2.7	6	1.75	50	2	6.39	6.61	6.84	7.09	7.62	UHLN201806	●
1.8	0/-0.015			4	2.7	8	1.75	50	2	8.46	8.75	9.06	9.38	10.09	UHLN201808	●
1.8	0/-0.015			4	2.7	10	1.75	50	2	10.52	10.89	11.27	11.68	12.56	UHLN201810	●
1.8	0/-0.015			4	2.7	12	1.75	50	2	12.59	13.03	13.49	13.97	15.02	UHLN201812	●
1.8	0/-0.015			4	2.7	14	1.75	50	2	14.66	15.17	15.70	16.27	17.49	UHLN201814	●
1.8	0/-0.015			4	2.7	16	1.75	50	2	16.73	17.30	17.92	18.56	19.96	UHLN201816	●
1.8	0/-0.015			4	2.7	18	1.75	60	2	18.79	19.44	20.13	20.86	-	UHLN201818	●
1.8	0/-0.015			4	2.7	20	1.75	60	2	20.86	21.58	22.35	23.15	-	UHLN201820	●
2	0/-0.015			4	3	6	1.95	50	2	6.39	6.61	6.84	7.09	7.62	UHLN202006	●
2	0/-0.015			4	3	8	1.95	50	2	8.46	8.75	9.06	9.38	10.09	UHLN202008	●
2	0/-0.015			4	3	10	1.95	50	2	10.52	10.89	11.27	11.68	12.56	UHLN202010	●
2	0/-0.015			4	3	12	1.95	50	2	12.59	13.03	13.49	13.97	15.02	UHLN202012	●
2	0/-0.015			4	3	14	1.95	50	2	14.66	15.17	15.70	16.27	17.49	UHLN202014	●

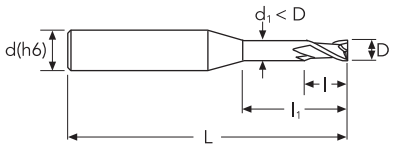
● stock standard ○ non-standard stock ▽ stock exhaustion

UHLN2

cylindrical shank, 2F, extended and reduced neck

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | Z2

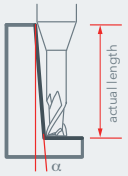




P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SQUARE RIB



actual length according to α angle

D	D Tol.	C	C Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
2	0/-0.015			4	3	16	1.95	50	2	16.73	17.30	17.92	18.56	-	UHLN202016	●
2	0/-0.015			4	3	18	1.95	60	2	18.79	19.44	20.13	20.86	-	UHLN202018	●
2	0/-0.015			4	3	20	1.95	60	2	20.86	21.58	22.35	23.15	-	UHLN202020	●
2	0/-0.015			4	3	25	1.95	75	2	26.03	26.93	27.88	-	-	UHLN202025	●
2	0/-0.015			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/-0.020			6	4.5	8	2.85	50	2	8.65	8.95	9.26	9.60	10.31	UHLN203008	●
3	0/-0.020			6	4.5	10	2.85	50	2	10.72	11.09	11.48	11.89	12.78	UHLN203010	●
3	0/-0.020			6	4.5	12	2.85	50	2	12.78	13.23	13.69	14.18	15.25	UHLN203012	●
3	0/-0.020			6	4.5	14	2.85	50	2	14.85	15.36	15.91	16.48	17.72	UHLN203014	●
3	0/-0.020			6	4.5	16	2.85	60	2	16.92	17.50	18.12	18.77	20.18	UHLN203016	●
3	0/-0.020			6	4.5	18	2.85	60	2	18.99	19.64	20.34	21.07	22.65	UHLN203018	●
3	0/-0.020			6	4.5	20	2.85	60	2	21.05	21.78	22.55	23.36	25.12	UHLN203020	●
3	0/-0.020			6	4.5	25	2.85	75	2	26.22	27.13	28.09	29.10	-	UHLN203025	●
4	0/-0.020			6	4.5	10	3.85	60	2	10.91	11.29	11.68	12.10	13.00	UHLN204010	●
4	0/-0.020			6	4.5	15	3.85	60	2	16.08	16.63	17.22	17.84	19.17	UHLN204015	●
4	0/-0.020			6	4.5	20	3.85	60	2	21.25	21.98	22.76	23.57	-	UHLN204020	●
4	0/-0.020			6	4.5	25	3.85	75	2	26.41	27.33	28.29	-	-	UHLN204025	●
4	0/-0.020			6	4.5	30	3.85	75	2	31.58	32.67	33.83	-	-	UHLN204030	●
4	0/-0.020			6	4.5	40	3.85	75	2	41.92	43.37	-	-	-	UHLN204040	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UHLN2

	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
SQUARE RIB	**0.2**	≤ 6D	0.01	0.003	0.003	0.002	0.002
		≤ 8D	0.01	0.003	0.002	0.002	0.002
		≤ 10D	0.01	0.002	0.002	0.002	0.001
		≤ 12D	0.01	0.002	0.001	0.001	0.001
	0.3	≤ 6D	0.02	0.004	0.004	0.003	0.003
		≤ 8D	0.01	0.003	0.003	0.003	0.002
		≤ 10D	0.01	0.003	0.003	0.002	0.002
		≤ 12D	0.01	0.002	0.002	0.002	0.002
	0.4	≤ 6D	0.02	0.006	0.005	0.005	0.004
		≤ 8D	0.02	0.005	0.005	0.004	0.004
		≤ 10D	0.01	0.004	0.004	0.003	0.003
		≤ 12D	0.01	0.003	0.003	0.003	0.002
	0.5	≤ 6D	0.03	0.007	0.006	0.006	0.005
		≤ 8D	0.02	0.006	0.005	0.005	0.004
		≤ 10D	0.02	0.005	0.004	0.004	0.003
		≤ 12D	0.01	0.004	0.003	0.003	0.003
	0.6	≤ 6D	0.03	0.008	0.007	0.006	0.006
		≤ 8D	0.03	0.007	0.006	0.005	0.005
		≤ 10D	0.02	0.006	0.005	0.004	0.004
		≤ 12D	0.02	0.004	0.004	0.004	0.003
	0.8	≤ 6D	0.04	0.010	0.009	0.008	0.007
		≤ 8D	0.03	0.009	0.008	0.007	0.006
		≤ 10D	0.03	0.007	0.006	0.006	0.005
		≤ 12D	0.02	0.006	0.005	0.004	0.004
	1	≤ 6D	0.05	0.012	0.011	0.010	0.008
		≤ 8D	0.04	0.010	0.009	0.008	0.007
		≤ 10D	0.04	0.008	0.008	0.007	0.006
		≤ 12D	0.03	0.007	0.006	0.005	0.005
	1.2	≤ 6D	0.06	0.022	0.020	0.018	0.015
		≤ 8D	0.05	0.019	0.017	0.015	0.013
		≤ 10D	0.04	0.015	0.014	0.012	0.011
		≤ 12D	0.03	0.012	0.011	0.010	0.008
	1.4	≤ 6D	0.07	0.024	0.022	0.019	0.017
		≤ 8D	0.06	0.020	0.018	0.016	0.014
		≤ 10D	0.05	0.017	0.015	0.013	0.012
		≤ 12D	0.04	0.013	0.012	0.011	0.009
		≤ 15D	0.03	0.011	0.010	0.009	0.008
		> 15D	0.02	0.007	0.006	0.006	0.005
	1.5	≤ 6D	0.08	0.025	0.023	0.020	0.018
		≤ 8D	0.06	0.021	0.019	0.017	0.015
		≤ 10D	0.05	0.018	0.016	0.014	0.012
		≤ 12D	0.04	0.014	0.012	0.011	0.010
		≤ 15D	0.03	0.011	0.010	0.009	0.008
		> 15D	0.02	0.008	0.007	0.006	0.005
	1.6	≤ 6D	0.08	0.026	0.023	0.021	0.018
		≤ 8D	0.07	0.022	0.020	0.018	0.015
		≤ 10D	0.06	0.018	0.016	0.015	0.013
		≤ 12D	0.04	0.014	0.013	0.011	0.010
		≤ 15D	0.04	0.012	0.011	0.009	0.008
		> 15D	0.02	0.008	0.007	0.006	0.005

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

UHLN2



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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1.8	≤ 6D	0.09	0.028	0.025	0.022	0.020
	≤ 8D	0.08	0.024	0.021	0.019	0.017
	≤ 10D	0.06	0.020	0.018	0.016	0.014
	≤ 12D	0.05	0.015	0.014	0.012	0.011
	≤ 15D	0.04	0.013	0.011	0.010	0.009
	> 15D	0.03	0.008	0.008	0.007	0.006
2	≤ 6D	0.10	0.030	0.027	0.024	0.021
	≤ 8D	0.09	0.026	0.023	0.020	0.018
	≤ 10D	0.07	0.021	0.019	0.017	0.015
	≤ 12D	0.06	0.017	0.015	0.013	0.012
	≤ 15D	0.05	0.014	0.012	0.011	0.009
	> 15D	0.03	0.009	0.008	0.007	0.006
2.5	≤ 6D	0.13	0.035	0.032	0.028	0.025
	≤ 8D	0.11	0.030	0.027	0.024	0.021
	≤ 10D	0.09	0.025	0.022	0.020	0.017
	≤ 12D	0.07	0.019	0.017	0.015	0.013
	≤ 15D	0.06	0.016	0.014	0.013	0.011
	> 15D	0.04	0.011	0.009	0.008	0.007
3	≤ 6D	0.15	0.040	0.036	0.032	0.028
	≤ 8D	0.13	0.034	0.031	0.027	0.024
	≤ 10D	0.11	0.028	0.025	0.022	0.020
	≤ 12D	0.08	0.022	0.020	0.018	0.015
	≤ 15D	0.07	0.018	0.016	0.014	0.013
	> 15D	0.05	0.012	0.011	0.010	0.008
4	≤ 6D	0.20	0.050	0.045	0.040	0.035
	≤ 8D	0.17	0.043	0.038	0.034	0.030
	≤ 10D	0.14	0.035	0.032	0.028	0.025
	≤ 12D	0.11	0.028	0.025	0.022	0.019
	≤ 15D	0.09	0.023	0.020	0.018	0.016
	> 15D	0.06	0.015	0.014	0.012	0.011

UH600

cylindrical shank, multi flute

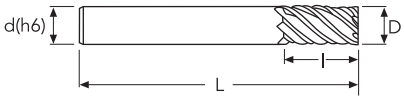
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 50° | SQUARE | Z6~Z8



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	0/-0.020			6	8		50	6	UH600030	●
4	0/-0.020			6	11		50	6	UH600040	●
5	0/-0.020			6	13		50	6	UH600050	●
6	0/-0.020			6	20		60	6	UH600060	●
8	0/-0.020			8	20		64	6	UH600080	●
10	0/-0.020			10	22		70	6	UH600100	●
12	0/-0.020			12	25		75	6	UH600120	●
14	0/-0.020			14	30		90	6	UH600140	●
16	0/-0.020			16	30		90	8	UH600160	●
20	0/-0.020			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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.008	0.008	0.007	0.006
	4	0.012	0.011	0.010	0.008
	5	0.014	0.013	0.012	0.010
	6	0.018	0.016	0.014	0.013
	8	0.028	0.025	0.022	0.019
	10	0.034	0.030	0.027	0.024
	12	0.041	0.037	0.033	0.029
	14	0.048	0.043	0.038	0.034
	16	0.056	0.051	0.045	0.039
	18	0.066	0.059	0.053	0.046
	20	0.078	0.070	0.062	0.055

UH612

cylindrical shank, multi flute, long

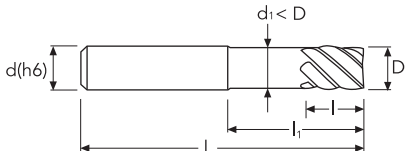
OSAWA NORM | UH | NMG UH RED | <70 HRC | 50° | SQUARE | Z6~Z8



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



D	D Tol.	C	C 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/-0.025			8	41	60	7.40	100	6	UH612080	●
10	0/-0.025			10	57	85	9.20	125	6	UH612100	●
12	0/-0.025			12	75	110	11.00	150	6	UH612120	●
16	0/-0.025			16	75	110	15.00	150	8	UH612160	●
20	0/-0.025			20	75	110	19.00	150	8	UH612200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH612

	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**	**30÷50**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.007	0.006	0.006	0.005
	4	0.010	0.009	0.008	0.007
	5	0.012	0.011	0.010	0.009
	6	0.015	0.014	0.012	0.011
	8	0.023	0.021	0.019	0.016
	10	0.029	0.026	0.023	0.020
	12	0.035	0.031	0.028	0.024
	14	0.041	0.037	0.033	0.029
	16	0.048	0.043	0.038	0.034
	20	0.066	0.060	0.053	0.046

UHM206

cylindrical shank, 2F, miniature, 6 mm. shank

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | SQUARE | RADIUS | Z2

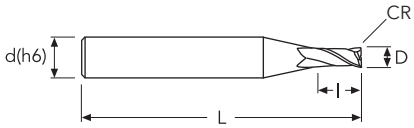
< Ø0.5 ≤ Ø0.5



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

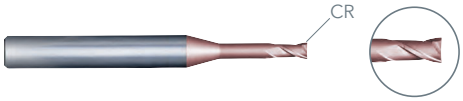
UHM206

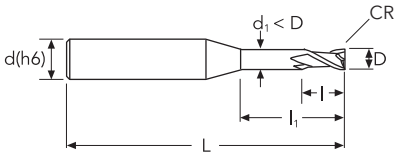
	Material Group ISO 513		P3 P4 P5 K2 K3	P6 K4 H1 H4 H5	H2	H3
	Hardness/Rm		≤45 HRC	45÷55 HRC	55÷60 HRC	60÷65 HRC
	ap x ae		**ap x D**	**ap x D**	**ap x D**	**ap x D**
	Vc (m/min)		**80÷120**	**60÷100**	**50÷70**	**30÷50**
SLOTTING	D (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.3	0.02	0.004	0.004	0.003	0.003
	0.4	0.02	0.006	0.005	0.005	0.004
	0.5	0.03	0.007	0.006	0.006	0.005
	0.6	0.03	0.008	0.007	0.006	0.006
	0.8	0.04	0.010	0.009	0.008	0.007
	1	0.05	0.012	0.011	0.010	0.008
	1.5	0.08	0.025	0.023	0.020	0.018
	2	0.10	0.030	0.027	0.024	0.021

UH211

cylindrical shank, 2F, extended and reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2

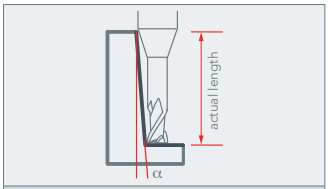




P	M	K	N	S	H
☆		☆			★

★ 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	0/-0.012	0.10	0/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-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/-0.010	6	9	15	5.85	60	2	-	-	-	-	-	UH2110600520	●
6	0/-0.015	1.00	0/-0.010	6	9	15	5.85	60	2	-	-	-	-	-	UH2110601020	●
6	0/-0.015	2.00	0/-0.010	6	9	15	5.85	60	2	-	-	-	-	-	UH2110602020	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH211

SQUARE RIB

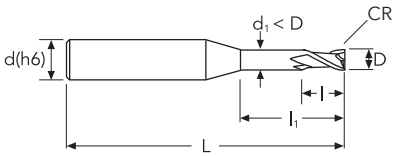
Material Group ISO 513			P3 P4 P5 K2 K3	P6 K4 H1 H4 H5	H2	H3
Hardness/Rm			≤45 HRC	45÷55 HRC	55÷60 HRC	60÷65 HRC
ap x ae			**ap x D**	**ap x D**	**ap x D**	**ap x D**
Vc (m/min)			**80÷120**	**60÷100**	**50÷70**	**30÷50**
D (mm)	**l1 (mm)**	**ap (mm)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**
1	≤ 6D	0.05	0.012	0.011	0.010	0.008
	≤ 8D	0.04	0.010	0.009	0.008	0.007
	≤ 10D	0.04	0.008	0.008	0.007	0.006
	≤ 12D	0.03	0.007	0.006	0.005	0.005
1.5	≤ 6D	0.08	0.025	0.023	0.020	0.018
	≤ 8D	0.06	0.021	0.019	0.017	0.015
	≤ 10D	0.05	0.018	0.016	0.014	0.012
	≤ 12D	0.04	0.014	0.012	0.011	0.010
	≤ 15D	0.03	0.011	0.010	0.009	0.008
	> 15D	0.02	0.008	0.007	0.006	0.005
2	≤ 6D	0.10	0.030	0.027	0.024	0.021
	≤ 8D	0.09	0.026	0.023	0.020	0.018
	≤ 10D	0.07	0.021	0.019	0.017	0.015
	≤ 12D	0.06	0.017	0.015	0.013	0.012
	≤ 15D	0.05	0.014	0.012	0.011	0.009
	> 15D	0.03	0.009	0.008	0.007	0.006
2.5	≤ 6D	0.13	0.035	0.032	0.028	0.025
	≤ 8D	0.11	0.030	0.027	0.024	0.021
	≤ 10D	0.09	0.025	0.022	0.020	0.017
	≤ 12D	0.07	0.019	0.017	0.015	0.013
	≤ 15D	0.06	0.016	0.014	0.013	0.011
	> 15D	0.04	0.011	0.009	0.008	0.007
3	≤ 6D	0.15	0.040	0.036	0.032	0.028
	≤ 8D	0.13	0.034	0.031	0.027	0.024
	≤ 10D	0.11	0.028	0.025	0.022	0.020
	≤ 12D	0.08	0.022	0.020	0.018	0.015
	≤ 15D	0.07	0.018	0.016	0.014	0.013
	> 15D	0.05	0.012	0.011	0.010	0.008
4	≤ 6D	0.20	0.050	0.045	0.040	0.035
	≤ 8D	0.17	0.043	0.038	0.034	0.030
	≤ 10D	0.14	0.035	0.032	0.028	0.025
	≤ 12D	0.11	0.028	0.025	0.022	0.019
	≤ 15D	0.09	0.023	0.020	0.018	0.016
	> 15D	0.06	0.015	0.014	0.012	0.011
6	≤ 6D	0.30	0.070	0.063	0.056	0.049
	≤ 8D	0.26	0.060	0.054	0.048	0.042
	≤ 10D	0.21	0.049	0.044	0.039	0.034
	≤ 12D	0.17	0.039	0.035	0.031	0.027
	> 15D	0.14	0.032	0.028	0.025	0.022

UH212

cylindrical shank, 2F, extended and reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2

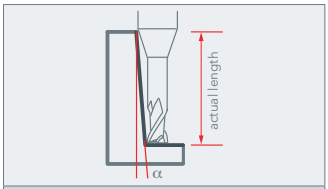




P	M	K	N	S	H
☆		☆			★

★ 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/-0.010	0.02	0/-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/-0.010	0.02	0/-0.010	4	0.3	1	0.16	50	2	1.09	1.12	1.16	1.19	1.26	UH2120020201	●
0.2	0/-0.010	0.02	0/-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/-0.010	0.03	0/-0.010	4	0.4	1	0.26	50	2	1.09	1.12	1.15	1.19	1.26	UH21200300301	▽
0.3	0/-0.010	0.05	0/-0.010	4	0.4	1	0.26	50	2	1.09	1.12	1.15	1.19	1.26	UH21200300501	●
0.3	0/-0.010	0.03	0/-0.010	4	0.4	2	0.26	50	2	2.12	2.19	2.26	2.32	2.46	UH21200300302	▽
0.3	0/-0.010	0.05	0/-0.010	4	0.4	2	0.26	50	2	2.12	2.19	2.26	2.32	2.46	UH21200300502	●
0.3	0/-0.010	0.03	0/-0.010	4	0.4	3	0.26	50	2	3.15	3.25	3.36	3.46	3.66	UH21200300303	▽
0.3	0/-0.010	0.05	0/-0.010	4	0.4	3	0.26	50	2	3.15	3.25	3.36	3.46	3.66	UH21200300503	●
0.4	0/-0.010	0.03	0/-0.010	4	0.6	2	0.37	50	2	2.12	2.19	2.26	2.32	2.46	UH21200400302	▽
0.4	0/-0.010	0.05	0/-0.010	4	0.6	2	0.37	50	2	2.12	2.19	2.26	2.32	2.46	UH21200400502	●
0.4	0/-0.010	0.03	0/-0.010	4	0.6	3	0.37	50	2	3.15	3.25	3.36	3.46	3.66	UH21200400303	▽
0.4	0/-0.010	0.05	0/-0.010	4	0.6	3	0.37	50	2	3.15	3.25	3.36	3.46	3.66	UH21200400503	●
0.4	0/-0.010	0.03	0/-0.010	4	0.6	4	0.37	50	2	4.19	4.32	4.46	4.59	4.86	UH21200400304	▽
0.4	0/-0.010	0.05	0/-0.010	4	0.6	4	0.37	50	2	4.19	4.32	4.46	4.59	4.86	UH21200400504	●
0.4	0/-0.010	0.03	0/-0.010	4	0.6	5	0.37	50	2	5.22	5.39	5.56	5.73	6.07	UH21200400305	▽
0.4	0/-0.010	0.05	0/-0.010	4	0.6	5	0.37	50	2	5.22	5.39	5.56	5.73	6.07	UH21200400505	●
0.5	0/-0.010	0.05	0/-0.010	4	0.7	2	0.45	50	2	2.16	2.23	2.29	2.36	2.50	UH21200500502	●
0.5	0/-0.010	0.05	0/-0.010	4	0.7	4	0.45	50	2	4.22	4.36	4.50	4.63	4.90	UH21200500504	●
0.5	0/-0.010	0.05	0/-0.010	4	0.7	6	0.45	50	2	6.29	6.49	6.70	6.90	7.31	UH21200500506	●
0.5	0/-0.010	0.05	0/-0.010	4	0.7	8	0.45	50	2	8.36	8.63	8.90	9.17	9.71	UH21200500508	●
0.6	0/-0.010	0.05	0/-0.010	4	0.9	2	0.55	50	2	2.16	2.23	2.29	2.36	2.50	UH21200600502	●
0.6	0/-0.010	0.05	0/-0.010	4	0.9	4	0.55	50	2	4.22	4.36	4.50	4.63	4.90	UH21200600504	●
0.6	0/-0.010	0.05	0/-0.010	4	0.9	6	0.55	50	2	6.29	6.49	6.70	6.90	7.31	UH21200600506	●
0.6	0/-0.010	0.05	0/-0.010	4	0.9	8	0.55	50	2	8.36	8.63	8.9	9.17	9.71	UH21200600508	●
0.6	0/-0.010	0.05	0/-0.010	4	0.9	10	0.55	50	2	10.43	10.76	11.10	11.44	12.12	UH21200600510	●
0.7	0/-0.010	0.08	0/-0.010	4	1.0	2	0.65	50	2	2.16	2.22	2.29	2.36	2.49	UH21200700802	▽
0.7	0/-0.010	0.10	0/-0.010	4	1.0	2	0.65	50	2	2.16	2.22	2.29	2.36	2.49	UH21200701002	●
0.7	0/-0.010	0.08	0/-0.010	4	1.0	4	0.65	50	2	4.22	4.36	4.49	4.63	4.90	UH21200700804	▽
0.7	0/-0.010	0.10	0/-0.010	4	1.0	4	0.65	50	2	4.22	4.36	4.49	4.63	4.90	UH21200701004	●
0.7	0/-0.010	0.08	0/-0.010	4	1.0	6	0.65	50	2	6.29	6.49	6.69	6.90	7.30	UH21200700806	▽
0.7	0/-0.010	0.10	0/-0.010	4	1.0	6	0.65	50	2	6.29	6.49	6.69	6.90	7.30	UH21200701006	●
0.7	0/-0.010	0.08	0/-0.010	4	1.0	8	0.65	50	2	8.36	8.63	8.90	9.17	9.71	UH21200700808	▽
0.7	0/-0.010	0.10	0/-0.010	4	1.0	8	0.65	50	2	8.36	8.63	8.90	9.17	9.71	UH21200701008	●
0.7	0/-0.010	0.08	0/-0.010	4	1.0	10	0.65	50	2	10.42	10.76	11.10	11.44	12.11	UH21200700810	▽
0.7	0/-0.010	0.10	0/-0.010	4	1.0	10	0.65	50	2	10.42	10.76	11.10	11.44	12.11	UH21200701010	●
0.8	0/-0.010	0.08	0/-0.010	4	1.2	4	0.75	50	2	4.22	4.36	4.49	4.63	4.90	UH21200800804	▽
0.8	0/-0.010	0.10	0/-0.010	4	1.2	4	0.75	50	2	4.22	4.36	4.49	4.63	4.90	UH21200801004	●
0.8	0/-0.010	0.08	0/-0.010	4	1.2	6	0.75	50	2	6.29	6.49	6.69	6.90	7.30	UH21200800806	▽

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

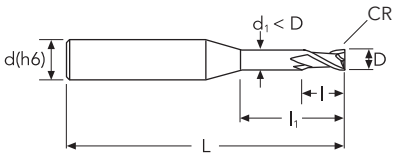
CARBIDE BURRS

UH212

cylindrical shank, 2F, extended and reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2

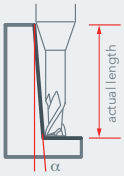




P	M	K	N	S	H
☆		☆			★

★ 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
0.8	0/-0.010	0.10	0/-0.010	4	1.2	6	0.75	50	2	6.29	6.49	6.69	6.90	7.30	UH21200801006	●
0.8	0/-0.010	0.08	0/-0.010	4	1.2	8	0.75	50	2	8.36	8.63	8.90	9.17	9.71	UH21200800808	▽
0.8	0/-0.010	0.10	0/-0.010	4	1.2	8	0.75	50	2	8.36	8.63	8.90	9.17	9.71	UH21200801008	●
0.8	0/-0.010	0.08	0/-0.010	4	1.2	10	0.75	50	2	10.42	10.76	11.10	11.44	12.11	UH21200800810	▽
0.8	0/-0.010	0.10	0/-0.010	4	1.2	10	0.75	50	2	10.42	10.76	11.10	11.44	12.11	UH21200801010	●
0.8	0/-0.010	0.08	0/-0.010	4	1.2	12	0.75	50	2	12.49	12.90	13.30	13.7	14.51	UH21200800812	▽
0.8	0/-0.010	0.10	0/-0.010	4	1.2	12	0.75	50	2	12.49	12.90	13.30	13.7	14.51	UH21200801012	●
0.9	0/-0.010	0.08	0/-0.010	4	1.4	6	0.85	50	2	6.29	6.49	6.69	6.90	7.30	UH21200900806	▽
0.9	0/-0.010	0.10	0/-0.010	4	1.4	6	0.85	50	2	6.29	6.49	6.69	6.90	7.30	UH21200901006	●
0.9	0/-0.010	0.08	0/-0.010	4	1.4	8	0.85	50	2	8.36	8.63	8.90	9.17	9.71	UH21200900808	▽
0.9	0/-0.010	0.10	0/-0.010	4	1.4	8	0.85	50	2	8.36	8.63	8.90	9.17	9.71	UH21200901008	●
0.9	0/-0.010	0.08	0/-0.010	4	1.4	10	0.85	50	2	10.42	10.76	11.10	11.44	12.11	UH21200900810	▽
0.9	0/-0.010	0.10	0/-0.010	4	1.4	10	0.85	50	2	10.42	10.76	11.10	11.44	12.11	UH21200901010	●
0.9	0/-0.010	0.08	0/-0.010	4	1.4	15	0.85	50	2	15.59	16.1	16.60	17.11	18.12	UH21200900815	▽
0.9	0/-0.010	0.10	0/-0.010	4	1.4	15	0.85	50	2	15.59	16.1	16.60	17.11	18.12	UH21200901015	●
1.0	0/-0.015	0.10	0/-0.010	4	1.5	6	0.95	50	2	6.39	6.59	6.80	7.00	7.41	UH2120100106	●
1.0	0/-0.015	0.10	0/-0.010	4	1.5	8	0.95	50	2	8.45	8.73	9.00	9.27	9.81	UH2120100108	●
1.0	0/-0.015	0.10	0/-0.010	4	1.5	10	0.95	50	2	10.52	10.86	11.20	11.54	12.22	UH2120100110	●
1.0	0/-0.015	0.10	0/-0.010	4	1.5	12	0.95	50	2	12.59	12.99	13.40	13.81	14.62	UH2120100112	●
1.0	0/-0.015	0.10	0/-0.010	4	1.5	14	0.95	50	2	14.66	15.13	15.60	16.08	17.03	UH2120100114	●
1.0	0/-0.015	0.10	0/-0.010	4	1.5	16	0.95	50	2	16.72	17.26	17.80	18.35	19.43	UH2120100116	●
1.2	0/-0.015	0.10	0/-0.010	4	1.8	6	1.15	50	2	6.39	6.59	6.80	7.00	7.41	UH2120120106	●
1.2	0/-0.015	0.10	0/-0.010	4	1.8	8	1.15	50	2	8.45	8.73	9.00	9.27	9.81	UH2120120108	●
1.2	0/-0.015	0.10	0/-0.010	4	1.8	10	1.15	50	2	10.52	10.86	11.20	11.54	12.22	UH2120120110	●
1.2	0/-0.015	0.10	0/-0.010	4	1.8	12	1.15	50	2	12.59	12.99	13.40	13.81	14.62	UH2120120112	●
1.4	0/-0.015	0.15	0/-0.010	4	2.1	6	1.35	50	2	6.38	6.59	6.79	6.99	7.40	UH21201401506	▽
1.4	0/-0.015	0.10	0/-0.010	4	2.1	6	1.35	50	2	6.38	6.59	6.79	6.99	7.40	UH21201401006	●
1.4	0/-0.015	0.15	0/-0.010	4	2.1	8	1.35	50	2	8.45	8.72	8.99	9.26	9.80	UH21201401508	▽
1.4	0/-0.015	0.10	0/-0.010	4	2.1	8	1.35	50	2	8.45	8.72	8.99	9.26	9.80	UH21201401008	●
1.4	0/-0.015	0.15	0/-0.010	4	2.1	10	1.35	50	2	10.52	10.86	11.19	11.53	12.21	UH21201401510	▽
1.4	0/-0.015	0.10	0/-0.010	4	2.1	10	1.35	50	2	10.52	10.86	11.19	11.53	12.21	UH21201401010	●
1.4	0/-0.015	0.15	0/-0.010	4	2.1	12	1.35	50	2	12.59	12.99	13.40	13.80	14.61	UH21201401512	▽
1.4	0/-0.015	0.10	0/-0.010	4	2.1	12	1.35	50	2	12.59	12.99	13.40	13.80	14.61	UH21201401012	●
1.4	0/-0.015	0.15	0/-0.010	4	2.1	14	1.35	50	2	14.65	15.13	15.60	16.07	17.02	UH21201401514	▽
1.4	0/-0.015	0.10	0/-0.010	4	2.1	14	1.35	50	2	14.65	15.13	15.60	16.07	17.02	UH21201401014	●
1.4	0/-0.015	0.15	0/-0.010	4	2.1	16	1.35	50	2	16.72	17.26	17.80	18.34	19.42	UH21201401516	▽
1.4	0/-0.015	0.10	0/-0.010	4	2.1	16	1.35	50	2	16.72	17.26	17.80	18.34	19.42	UH21201401016	●
1.5	0/-0.015	0.15	0/-0.010	4	2.3	6	1.45	50	2	6.38	6.59	6.79	6.99	7.40	UH21201501506	●
1.5	0/-0.015	0.15	0/-0.010	4	2.3	8	1.45	50	2	8.45	8.72	8.99	9.26	9.80	UH21201501508	●

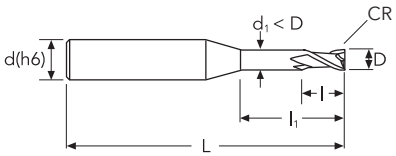
● stock standard ○ non-standard stock ▽ stock exhaustion

UH212

cylindrical shank, 2F, extended and reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2

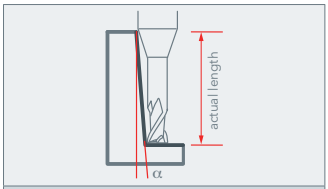




P	M	K	N	S	H
☆		☆			★

★ 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
1.5	0/-0.015	0.15	0/-0.010	4	2.3	10	1.45	50	2	10.52	10.86	11.19	11.53	12.21	UH21201501510	●
1.5	0/-0.015	0.15	0/-0.010	4	2.3	12	1.45	50	2	12.59	12.99	13.40	13.80	14.61	UH21201501512	●
1.5	0/-0.015	0.15	0/-0.010	4	2.3	14	1.45	50	2	14.65	15.13	15.60	16.07	17.02	UH21201501514	●
1.5	0/-0.015	0.15	0/-0.010	4	2.3	16	1.45	50	2	16.72	17.26	17.80	18.34	19.42	UH21201501516	●
1.5	0/-0.015	0.15	0/-0.010	4	2.3	18	1.45	60	2	18.79	19.39	20.00	20.61	21.82	UH21201501518	●
1.5	0/-0.015	0.15	0/-0.010	4	2.3	20	1.45	60	2	20.86	21.53	22.20	22.88	24.23	UH21201501520	●
1.6	0/-0.015	0.15	0/-0.010	4	2.4	6	1.55	50	2	6.38	6.59	6.79	6.99	7.40	UH21201601506	▽
1.6	0/-0.015	0.20	0/-0.010	4	2.4	6	1.55	50	2	6.38	6.59	6.79	6.99	7.40	UH21201602006	●
1.6	0/-0.015	0.15	0/-0.010	4	2.4	8	1.55	50	2	8.45	8.72	8.99	9.26	9.80	UH21201601508	▽
1.6	0/-0.015	0.20	0/-0.010	4	2.4	8	1.55	50	2	8.45	8.72	8.99	9.26	9.80	UH21201602008	●
1.6	0/-0.015	0.15	0/-0.010	4	2.4	10	1.55	50	2	10.52	10.86	11.19	11.53	12.21	UH21201601510	▽
1.6	0/-0.015	0.20	0/-0.010	4	2.4	10	1.55	50	2	10.52	10.86	11.19	11.53	12.21	UH21201602010	●
1.6	0/-0.015	0.15	0/-0.010	4	2.4	12	1.55	50	2	12.59	12.99	13.40	13.80	14.61	UH21201601512	▽
1.6	0/-0.015	0.20	0/-0.010	4	2.4	12	1.55	50	2	12.59	12.99	13.40	13.80	14.61	UH21201602012	●
1.6	0/-0.015	0.15	0/-0.010	4	2.4	14	1.55	50	2	14.65	15.13	15.60	16.07	17.02	UH21201601514	▽
1.6	0/-0.015	0.20	0/-0.010	4	2.4	14	1.55	50	2	14.65	15.13	15.60	16.07	17.02	UH21201602014	●
1.6	0/-0.015	0.15	0/-0.010	4	2.4	16	1.55	50	2	16.72	17.26	17.80	18.34	19.42	UH21201601516	▽
1.6	0/-0.015	0.20	0/-0.010	4	2.4	16	1.55	50	2	16.72	17.26	17.80	18.34	19.42	UH21201602016	●
1.6	0/-0.015	0.15	0/-0.010	4	2.4	18	1.55	60	2	18.79	19.39	20.00	20.61	21.82	UH21201601518	▽
1.6	0/-0.015	0.20	0/-0.010	4	2.4	18	1.55	60	2	18.79	19.39	20.00	20.61	21.82	UH21201602018	●
1.6	0/-0.015	0.15	0/-0.010	4	2.4	20	1.55	60	2	20.86	21.53	22.20	22.88	24.23	UH21201601520	▽
1.6	0/-0.015	0.20	0/-0.010	4	2.4	20	1.55	60	2	20.86	21.53	22.20	22.88	24.23	UH21201602020	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	6	1.75	50	2	6.38	6.58	6.79	6.99	7.39	UH2120180206	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	8	1.75	50	2	8.45	8.72	8.99	9.26	9.79	UH2120180208	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	10	1.75	50	2	10.52	10.85	11.19	11.52	12.20	UH2120180210	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	12	1.75	50	2	12.58	12.99	13.39	13.79	14.60	UH2120180212	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	14	1.75	50	2	14.65	15.12	15.59	16.06	17.01	UH2120180214	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	16	1.75	50	2	16.72	17.26	17.79	18.33	19.41	UH2120180216	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	18	1.75	60	2	18.79	19.39	20.00	20.6	21.81	UH2120180218	●
1.8	0/-0.015	0.20	0/-0.010	4	2.7	20	1.75	60	2	20.85	21.53	22.20	22.87	24.22	UH2120180220	●
2	0/-0.015	0.20	0/-0.010	4	3	6	1.95	50	2	6.38	6.58	6.79	6.99	7.39	UH2120200206	●
2	0/-0.015	0.20	0/-0.010	4	3	8	1.95	50	2	8.45	8.72	8.99	9.26	9.79	UH2120200208	●
2	0/-0.015	0.20	0/-0.010	4	3	10	1.95	50	2	10.52	10.85	11.19	11.52	12.20	UH2120200210	●
2	0/-0.015	0.20	0/-0.010	4	3	12	1.95	50	2	12.58	12.99	13.39	13.79	14.60	UH2120200212	●
2	0/-0.015	0.20	0/-0.010	4	3	14	1.95	50	2	14.65	15.12	15.59	16.06	17.01	UH2120200214	●
2	0/-0.015	0.20	0/-0.010	4	3	16	1.95	50	2	16.72	17.26	17.79	18.33	19.41	UH2120200216	●
2	0/-0.015	0.20	0/-0.010	4	3	18	1.95	60	2	18.79	19.39	20.00	20.60	21.81	UH2120200218	●
2	0/-0.015	0.20	0/-0.010	4	3	20	1.95	60	2	20.85	21.53	22.20	22.87	-	UH2120200220	●
2	0/-0.015	0.20	0/-0.010	4	3	25	1.95	75	2	26.02	26.86	27.70	28.54	-	UH2120200225	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

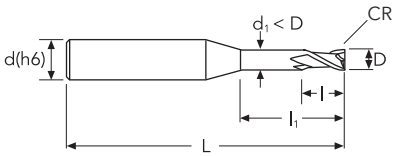
CARBIDE BURRS

UH212

cylindrical shank, 2F, extended and reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2

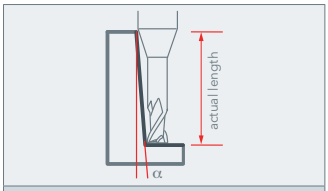




P	M	K	N	S	H
☆		☆			★

★ 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/-0.015	0.20	0/-0.010	4	3	30	1.95	75	2	31.19	32.20	33.21	-	-	UH2120200230	●
2.5	0/-0.020	0.30	0/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	4	3.7	25	2.40	60	2	26.02	26.86	27.69	-	-	UH2120250325	●
2.5	0/-0.020	0.30	0/-0.015	4	3.7	30	2.40	75	2	31.19	32.19	-	-	-	UH2120250330	●
3	0/-0.025	0.30	0/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	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/-0.015	6	4.5	20	3.85	60	2	21.23	21.91	22.59	23.27	-	UH2120400420	●
4	0/-0.025	0.40	0/-0.015	6	4.5	25	3.85	75	2	26.40	27.25	28.09	28.94	-	UH2120400425	●
4	0/-0.025	0.40	0/-0.015	6	4.5	30	3.85	75	2	31.57	32.58	33.60	-	-	UH2120400430	●
4	0/-0.025	0.40	0/-0.015	6	4.5	40	3.85	75	2	41.90	43.25	-	-	-	UH2120400440	●

● stock standard ○ non-standard stock ▽ stock exhaustion

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**
SQUARE RIB	D (mm)	l1 (mm)	ap (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.2	≤ 6D	0.01	0.003	0.003	0.002	0.002
		≤ 8D	0.01	0.003	0.002	0.002	0.002
		≤ 10D	0.01	0.002	0.002	0.002	0.001
		≤ 12D	0.01	0.002	0.001	0.001	0.001
	0.3	≤ 6D	0.02	0.004	0.004	0.003	0.003
		≤ 8D	0.01	0.003	0.003	0.003	0.002
		≤ 10D	0.01	0.003	0.003	0.002	0.002
		≤ 12D	0.01	0.002	0.002	0.002	0.002
	0.4	≤ 6D	0.02	0.006	0.005	0.005	0.004
		≤ 8D	0.02	0.005	0.005	0.004	0.004
		≤ 10D	0.01	0.004	0.004	0.003	0.003
		≤ 12D	0.01	0.003	0.003	0.003	0.002
	0.5	≤ 6D	0.03	0.007	0.006	0.006	0.005
		≤ 8D	0.02	0.006	0.005	0.005	0.004
		≤ 10D	0.02	0.005	0.004	0.004	0.003
		≤ 12D	0.01	0.004	0.003	0.003	0.003
	0.6	≤ 6D	0.03	0.008	0.007	0.006	0.006
		≤ 8D	0.03	0.007	0.006	0.005	0.005
		≤ 10D	0.02	0.006	0.005	0.004	0.004
		≤ 12D	0.02	0.004	0.004	0.004	0.003
	0.8	≤ 6D	0.04	0.010	0.009	0.008	0.007
		≤ 8D	0.03	0.009	0.008	0.007	0.006
		≤ 10D	0.03	0.007	0.006	0.006	0.005
		≤ 12D	0.02	0.006	0.005	0.004	0.004
	1	≤ 6D	0.05	0.012	0.011	0.010	0.008
		≤ 8D	0.04	0.010	0.009	0.008	0.007
		≤ 10D	0.04	0.008	0.008	0.007	0.006
		≤ 12D	0.03	0.007	0.006	0.005	0.005
	1.2	≤ 6D	0.06	0.022	0.020	0.018	0.015
		≤ 8D	0.05	0.019	0.017	0.015	0.013
		≤ 10D	0.04	0.015	0.014	0.012	0.011
		≤ 12D	0.03	0.012	0.011	0.010	0.008
	1.4	≤ 6D	0.07	0.024	0.022	0.019	0.017
		≤ 8D	0.06	0.020	0.018	0.016	0.014
		≤ 10D	0.05	0.017	0.015	0.013	0.012
		≤ 12D	0.04	0.013	0.012	0.011	0.009
		≤ 15D	0.03	0.011	0.010	0.009	0.008
		> 15D	0.02	0.007	0.006	0.006	0.005
	1.5	≤ 6D	0.08	0.025	0.023	0.020	0.018
		≤ 8D	0.06	0.021	0.019	0.017	0.015
		≤ 10D	0.05	0.018	0.016	0.014	0.012
		≤ 12D	0.04	0.014	0.012	0.011	0.010
		≤ 15D	0.03	0.011	0.010	0.009	0.008
		≥ 15D	0.02	0.008	0.007	0.006	0.005
	1.6	≤ 6D	0.08	0.026	0.023	0.021	0.018
		≤ 8D	0.07	0.022	0.020	0.018	0.015
		≤ 10D	0.06	0.018	0.016	0.015	0.013
		≤ 12D	0.04	0.014	0.013	0.011	0.010
		≤ 15D	0.04	0.012	0.011	0.009	0.008
		> 15D	0.02	0.008	0.007	0.006	0.005

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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1.8	≤ 6D	0.09	0.028	0.025	0.022	0.020
	≤ 8D	0.08	0.024	0.021	0.019	0.017
	≤ 10D	0.06	0.020	0.018	0.016	0.014
	≤ 12D	0.05	0.015	0.014	0.012	0.011
	≤ 15D	0.04	0.013	0.011	0.010	0.009
	> 15D	0.03	0.008	0.008	0.007	0.006
2	≤ 6D	0.10	0.030	0.027	0.024	0.021
	≤ 8D	0.09	0.026	0.023	0.020	0.018
	≤ 10D	0.07	0.021	0.019	0.017	0.015
	≤ 12D	0.06	0.017	0.015	0.013	0.012
	≤ 15D	0.05	0.014	0.012	0.011	0.009
	> 15D	0.03	0.009	0.008	0.007	0.006
2.5	≤ 6D	0.13	0.035	0.032	0.028	0.025
	≤ 8D	0.11	0.030	0.027	0.024	0.021
	≤ 10D	0.09	0.025	0.022	0.020	0.017
	≤ 12D	0.07	0.019	0.017	0.015	0.013
	≤ 15D	0.06	0.016	0.014	0.013	0.011
	> 15D	0.04	0.011	0.009	0.008	0.007
3	≤ 6D	0.15	0.040	0.036	0.032	0.028
	≤ 8D	0.13	0.034	0.031	0.027	0.024
	≤ 10D	0.11	0.028	0.025	0.022	0.020
	≤ 12D	0.08	0.022	0.020	0.018	0.015
	≤ 15D	0.07	0.018	0.016	0.014	0.013
	> 15D	0.05	0.012	0.011	0.010	0.008
4	≤ 6D	0.20	0.050	0.045	0.040	0.035
	≤ 8D	0.17	0.043	0.038	0.034	0.030
	≤ 10D	0.14	0.035	0.032	0.028	0.025
	≤ 12D	0.11	0.028	0.025	0.022	0.019
	≤ 15D	0.09	0.023	0.020	0.018	0.016
	> 15D	0.06	0.015	0.014	0.012	0.011

UHCS2

cylindrical shank, 2F, reduced neck, corner radius

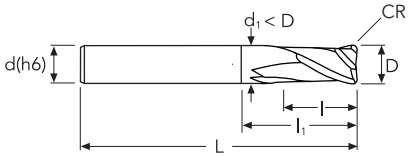
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z2



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/-0.015	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

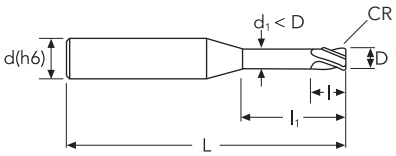
	Material Group ISO 513	P3 P4 P5 K2 K3	P6 K4 H1 H4 H5	H2	H3
	Hardness/Rm	≤45 HRC	45÷55 HRC	55÷60 HRC	60÷65 HRC
	ap x ae	**0.3D x D**	**0.2D x D**	**0.2D x D**	**0.1D x D**
	Vc (m/min)	**80÷120**	**60÷100**	**50÷70**	**30÷50**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.007	0.006	0.006	0.005
	2	0.012	0.011	0.010	0.008
	3	0.017	0.015	0.014	0.012
	4	0.023	0.021	0.018	0.016
	5	0.030	0.027	0.024	0.021
	6	0.038	0.034	0.030	0.027
	8	0.050	0.045	0.040	0.035
	10	0.065	0.059	0.052	0.046
	12	0.080	0.072	0.064	0.056

UHF4LN

cylindrical shank, 4F Unequal Pitch,
extended and reduced neck, corner radius

OSAWA NORM | UH | NMG UH RED | <70 HRC | 25° | RADIUS | Z4 UP

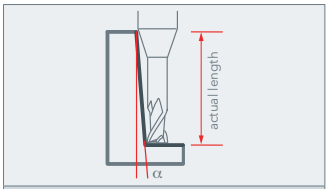




P	M	K	N	S	H
☆		☆			★

★ 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/-0.010	0.10	+/-0.005	4	1	4	0.90	50	4	4.32	4.46	4.62	4.78	5.13	UHF4LN0100104	●
1	0/-0.010	0.10	+/-0.005	4	1	6	0.90	50	4	6.39	6.60	6.83	7.08	7.60	UHF4LN0100106	●
1	0/-0.010	0.10	+/-0.005	4	1	8	0.90	50	4	8.45	8.74	9.05	9.37	10.07	UHF4LN0100108	●
1	0/-0.010	0.10	+/-0.005	4	1	10	0.90	50	4	10.52	10.88	11.26	11.66	12.53	UHF4LN0100110	●
1	0/-0.010	0.10	+/-0.005	4	1	12	0.90	50	4	12.59	13.02	13.48	13.96	15.00	UHF4LN0100112	●
1	0/-0.010	0.10	+/-0.005	4	1	14	0.90	50	4	14.66	15.16	15.69	16.25	17.47	UHF4LN0100114	●
1	0/-0.010	0.10	+/-0.005	4	1	16	0.90	50	4	16.72	17.30	17.91	18.55	19.94	UHF4LN0100116	●
1	0/-0.010	0.10	+/-0.005	4	1	20	0.90	75	4	20.86	21.57	22.33	23.14	24.87	UHF4LN0100120	●
1	0/-0.010	0.20	+/-0.005	4	1	4	0.90	50	4	4.32	4.46	4.61	4.77	5.11	UHF4LN0100204	●
1	0/-0.010	0.20	+/-0.005	4	1	6	0.90	50	4	6.38	6.60	6.82	7.06	7.57	UHF4LN0100206	●
1	0/-0.010	0.20	+/-0.005	4	1	8	0.90	50	4	8.45	8.73	9.04	9.35	10.04	UHF4LN0100208	●
1	0/-0.010	0.20	+/-0.005	4	1	10	0.90	50	4	10.52	10.87	11.25	11.65	12.51	UHF4LN0100210	●
1	0/-0.010	0.20	+/-0.005	4	1	12	0.90	50	4	12.58	13.01	13.47	13.94	14.98	UHF4LN0100212	●
1	0/-0.010	0.20	+/-0.005	4	1	14	0.90	50	4	14.65	15.15	15.68	16.24	17.45	UHF4LN0100214	●
1	0/-0.010	0.20	+/-0.005	4	1	16	0.90	50	4	16.72	17.29	17.89	18.53	19.91	UHF4LN0100216	●
1	0/-0.010	0.20	+/-0.005	4	1	20	0.90	60	4	20.85	21.57	22.32	23.12	24.85	UHF4LN0100220	●
1	0/-0.010	0.30	+/-0.005	4	1	6	0.90	50	4	6.38	6.59	6.81	7.05	7.55	UHF4LN0100306	●
1	0/-0.010	0.30	+/-0.005	4	1	10	0.90	50	4	10.51	10.87	11.24	11.63	12.49	UHF4LN0100310	●
1	0/-0.010	0.30	+/-0.005	4	1	16	0.90	50	4	16.72	17.28	17.88	18.52	19.89	UHF4LN0100316	●
1	0/-0.010	0.30	+/-0.005	4	1	20	0.90	60	4	20.85	21.56	22.31	23.11	24.82	UHF4LN0100320	●
1.5	0/-0.010	0.10	+/-0.005	4	1.5	6	1.40	50	4	6.39	6.60	6.83	7.08	7.60	UHF4LN0150106	●
1.5	0/-0.010	0.10	+/-0.005	4	1.5	8	1.40	50	4	8.45	8.74	9.05	9.37	10.07	UHF4LN0150108	●
1.5	0/-0.010	0.10	+/-0.005	4	1.5	12	1.40	50	4	12.59	13.02	13.48	13.96	15.00	UHF4LN0150112	●
1.5	0/-0.010	0.10	+/-0.005	4	1.5	16	1.40	50	4	16.72	17.3	17.91	18.55	19.94	UHF4LN0150116	●
1.5	0/-0.010	0.10	+/-0.005	4	1.5	20	1.40	60	4	20.86	21.57	22.33	23.14	-	UHF4LN0150120	●
1.5	0/-0.010	0.20	+/-0.005	4	1.5	6	1.40	50	4	6.38	6.60	6.82	7.06	7.57	UHF4LN0150206	●
1.5	0/-0.010	0.20	+/-0.005	4	1.5	8	1.40	50	4	8.45	8.73	9.04	9.35	10.04	UHF4LN0150208	●
1.5	0/-0.010	0.20	+/-0.005	4	1.5	10	1.40	50	4	10.52	10.87	11.25	11.65	12.51	UHF4LN0150210	●
1.5	0/-0.010	0.20	+/-0.005	4	1.5	12	1.40	50	4	12.58	13.01	13.47	13.94	14.98	UHF4LN0150212	●
1.5	0/-0.010	0.20	+/-0.005	4	1.5	14	1.40	50	4	14.65	15.15	15.68	16.24	17.45	UHF4LN0150214	●
1.5	0/-0.010	0.20	+/-0.005	4	1.5	16	1.40	50	4	16.72	17.29	17.89	18.53	19.91	UHF4LN0150216	●
1.5	0/-0.010	0.20	+/-0.005	4	1.5	18	1.40	60	4	18.79	19.43	20.11	20.83	22.38	UHF4LN0150218	●
1.5	0/-0.010	0.20	+/-0.005	4	1.5	20	1.40	60	4	20.85	21.57	22.32	23.12	-	UHF4LN0150220	●
1.5	0/-0.010	0.30	+/-0.005	4	1.5	8	1.40	50	4	8.45	8.73	9.03	9.34	10.02	UHF4LN0150308	●
1.5	0/-0.010	0.30	+/-0.005	4	1.5	16	1.40	50	4	16.72	17.28	17.88	18.52	19.89	UHF4LN0150316	●
1.5	0/-0.010	0.30	+/-0.005	4	1.5	20	1.40	60	4	20.85	21.56	22.31	23.11	-	UHF4LN0150320	●
2	0/-0.010	0.20	+/-0.005	4	2	6	1.90	50	4	6.38	6.60	6.82	7.06	7.57	UHF4LN0200206	●
2	0/-0.010	0.20	+/-0.005	4	2	8	1.90	50	4	8.45	8.73	9.04	9.35	10.04	UHF4LN0200208	●
2	0/-0.010	0.20	+/-0.005	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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

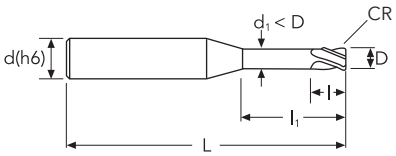
CARBIDE BURRS

UHF4LN

cylindrical shank, 4F Unequal Pitch,
extended and reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 25° | RADIUS | Z4 UP

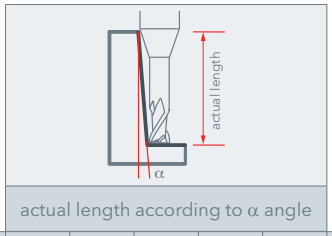




P	M	K	N	S	H
☆		☆			★

★ 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/-0.010	0.20	+/-0.005	4	2	12	1.90	50	4	12.58	13.01	13.47	13.94	14.98	UHF4LN0200212	●
2	0/-0.010	0.20	+/-0.005	4	2	14	1.90	50	4	14.65	15.15	15.68	16.24	17.45	UHF4LN0200214	●
2	0/-0.010	0.20	+/-0.005	4	2	16	1.90	50	4	16.72	17.29	17.89	18.53	-	UHF4LN0200216	●
2	0/-0.010	0.20	+/-0.005	4	2	18	1.90	60	4	18.79	19.43	20.11	20.83	-	UHF4LN0200218	●
2	0/-0.010	0.20	+/-0.005	4	2	20	1.90	60	4	20.85	21.57	22.32	23.12	-	UHF4LN0200220	●
2	0/-0.010	0.20	+/-0.005	4	2	25	1.90	75	4	26.02	26.91	27.86	-	-	UHF4LN0200225	●
2	0/-0.010	0.20	+/-0.005	4	2	30	1.90	75	4	31.19	32.26	33.40	-	-	UHF4LN0200230	●
2	0/-0.010	0.30	+/-0.005	4	2	8	1.90	50	4	8.45	8.73	9.03	9.34	10.02	UHF4LN0200308	●
2	0/-0.010	0.30	+/-0.005	4	2	16	1.90	50	4	16.72	17.28	17.88	18.52	-	UHF4LN0200316	●
2	0/-0.010	0.30	+/-0.005	4	2	20	1.90	60	4	20.85	21.56	22.31	23.11	-	UHF4LN0200320	●
2	0/-0.010	0.50	+/-0.005	4	2	6	1.90	50	4	6.37	6.58	6.79	7.02	7.50	UHF4LN0200506	●
2	0/-0.010	0.50	+/-0.005	4	2	8	1.90	50	4	8.44	8.71	9.00	9.31	9.97	UHF4LN0200508	●
2	0/-0.010	0.50	+/-0.005	4	2	12	1.90	50	4	12.57	12.99	13.43	13.9	14.91	UHF4LN0200512	●
2	0/-0.010	0.50	+/-0.005	4	2	16	1.90	50	4	16.71	17.27	17.86	18.49	-	UHF4LN0200516	●
2	0/-0.010	0.50	+/-0.005	4	2	20	1.90	60	4	20.84	21.55	22.29	23.08	-	UHF4LN0200520	●
2	0/-0.010	0.50	+/-0.005	4	2	25	1.90	75	4	26.01	26.89	27.83	28.82	-	UHF4LN0200525	●
2	0/-0.010	0.50	+/-0.005	4	2	30	1.90	75	4	31.18	32.24	33.36	-	-	UHF4LN0200530	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	8	2.40	50	4	8.45	8.73	9.03	9.34	10.02	UHF4LN0250308	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	10	2.40	50	4	10.51	10.87	11.24	11.63	12.49	UHF4LN0250310	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	12	2.40	50	4	12.58	13.01	13.45	13.93	-	UHF4LN0250312	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	14	2.40	50	4	14.65	15.14	15.67	16.22	-	UHF4LN0250314	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	16	2.40	50	4	16.72	17.28	17.88	18.52	-	UHF4LN0250316	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	18	2.40	60	4	18.78	19.42	20.10	20.81	-	UHF4LN0250318	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	20	2.40	60	4	20.85	21.56	22.31	-	-	UHF4LN0250320	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	25	2.40	60	4	26.02	26.91	27.85	-	-	UHF4LN0250325	●
2.5	0/-0.015	0.30	+/-0.005	4	2.5	30	2.40	75	4	31.19	32.25	-	-	-	UHF4LN0250330	●
2.5	0/-0.015	0.50	+/-0.005	4	2.5	8	2.40	50	4	8.44	8.71	9.00	9.31	9.97	UHF4LN0250508	●
2.5	0/-0.015	0.50	+/-0.005	4	2.5	12	2.40	50	4	12.57	12.99	13.43	13.90	-	UHF4LN0250512	●
2.5	0/-0.015	0.50	+/-0.005	4	2.5	16	2.40	50	4	16.71	17.27	17.86	18.49	-	UHF4LN0250516	●
2.5	0/-0.015	0.50	+/-0.005	4	2.5	20	2.40	60	4	20.84	21.55	22.29	-	-	UHF4LN0250520	●
2.5	0/-0.015	0.50	+/-0.005	4	2.5	25	2.40	60	4	26.01	26.89	27.83	-	-	UHF4LN0250525	●
2.5	0/-0.015	0.50	+/-0.005	4	2.5	30	2.40	75	4	31.18	32.24	-	-	-	UHF4LN0250530	●
3	0/-0.015	0.20	+/-0.010	6	3	8	2.80	50	4	8.64	8.93	9.24	9.57	10.27	UHF4LN0300208	●
3	0/-0.015	0.20	+/-0.010	6	3	10	2.80	50	4	10.71	11.07	11.46	11.86	12.73	UHF4LN0300210	●
3	0/-0.015	0.20	+/-0.010	6	3	12	2.80	50	4	12.78	13.21	13.67	14.16	15.20	UHF4LN0300212	●
3	0/-0.015	0.20	+/-0.010	6	3	14	2.80	50	4	14.84	15.35	15.89	16.45	17.67	UHF4LN0300214	●
3	0/-0.015	0.20	+/-0.010	6	3	16	2.80	60	4	16.91	17.49	18.10	18.74	20.14	UHF4LN0300216	●
3	0/-0.015	0.20	+/-0.010	6	3	18	2.80	60	4	18.98	19.63	20.31	21.04	22.60	UHF4LN0300218	●
3	0/-0.015	0.20	+/-0.010	6	3	20	2.80	60	4	21.05	21.77	22.53	23.33	25.07	UHF4LN0300220	●

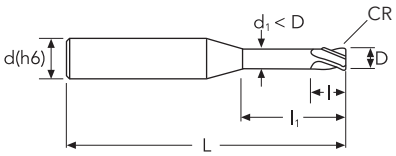
● stock standard ○ non-standard stock ▽ stock exhaustion

UHF4LN

cylindrical shank, 4F Unequal Pitch,
extended and reduced neck, corner radius

OSAWA NORM | UH | NMG / UH RED | <70 HRC | 25° | RADIUS | Z4 UP

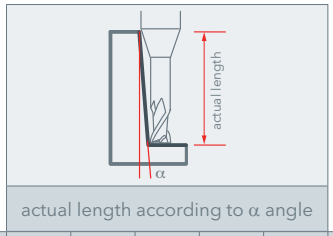




P	M	K	N	S	H
☆		☆			★

★ 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/-0.015	0.20	+/-0.010	6	3	25	2.80	75	4	26.21	27.11	28.07	29.07	-	UHF4LN0300225	●
3	0/-0.015	0.30	+/-0.010	6	3	8	2.80	50	4	8.64	8.93	9.23	9.55	10.24	UHF4LN0300308	●
3	0/-0.015	0.30	+/-0.010	6	3	10	2.80	50	4	10.71	11.07	11.45	11.85	12.71	UHF4LN0300310	●
3	0/-0.015	0.30	+/-0.010	6	3	12	2.80	50	4	12.77	13.20	13.66	14.14	15.18	UHF4LN0300312	●
3	0/-0.015	0.30	+/-0.010	6	3	14	2.80	50	4	14.84	15.34	15.87	16.44	17.64	UHF4LN0300314	●
3	0/-0.015	0.30	+/-0.010	6	3	16	2.80	60	4	16.91	17.48	18.09	18.73	20.11	UHF4LN0300316	●
3	0/-0.015	0.30	+/-0.010	6	3	18	2.80	60	4	18.98	19.62	20.30	21.02	22.58	UHF4LN0300318	●
3	0/-0.015	0.30	+/-0.010	6	3	20	2.80	60	4	21.04	21.76	22.52	23.32	25.05	UHF4LN0300320	●
3	0/-0.015	0.30	+/-0.010	6	3	30	2.80	75	4	31.38	32.45	33.59	34.79	-	UHF4LN0300330	●
3	0/-0.015	0.50	+/-0.010	6	3	8	2.80	50	4	8.63	8.91	9.21	9.52	10.20	UHF4LN0300508	●
3	0/-0.015	0.50	+/-0.010	6	3	10	2.80	50	4	10.7	11.05	11.42	11.82	12.66	UHF4LN0300510	●
3	0/-0.015	0.50	+/-0.010	6	3	12	2.80	50	4	12.77	13.19	13.64	14.11	15.13	UHF4LN0300512	●
3	0/-0.015	0.50	+/-0.010	6	3	14	2.80	50	4	14.83	15.33	15.85	16.41	17.60	UHF4LN0300514	●
3	0/-0.015	0.50	+/-0.010	6	3	16	2.80	60	4	16.9	17.47	18.07	18.70	20.07	UHF4LN0300516	●
3	0/-0.015	0.50	+/-0.010	6	3	18	2.80	60	4	18.97	19.61	20.28	20.99	22.53	UHF4LN0300518	●
3	0/-0.015	0.50	+/-0.010	6	3	20	2.80	60	4	21.04	21.75	22.50	23.29	25.00	UHF4LN0300520	●
3	0/-0.015	0.50	+/-0.010	6	3	30	2.80	75	4	31.37	32.44	33.57	34.76	-	UHF4LN0300530	●
4	0/-0.015	0.30	+/-0.010	6	4	10	3.70	60	4	10.90	11.26	11.65	12.06	12.93	UHF4LN0400310	●
4	0/-0.015	0.30	+/-0.010	6	4	15	3.70	60	4	16.07	16.61	17.19	17.79	19.10	UHF4LN0400315	●
4	0/-0.015	0.30	+/-0.010	6	4	20	3.70	60	4	21.24	21.96	22.72	23.53	-	UHF4LN0400320	●
4	0/-0.015	0.30	+/-0.010	6	4	25	3.70	75	4	26.4	27.31	28.26	-	-	UHF4LN0400325	●
4	0/-0.015	0.30	+/-0.010	6	4	32	3.70	75	4	33.64	34.79	36.01	-	-	UHF4LN0400332	●
4	0/-0.015	0.30	+/-0.010	6	4	40	3.70	75	4	41.91	43.35	-	-	-	UHF4LN0400340	●
4	0/-0.015	0.50	+/-0.010	6	4	10	3.70	60	4	10.89	11.25	11.63	12.03	12.89	UHF4LN0400510	●
4	0/-0.015	0.50	+/-0.010	6	4	15	3.70	60	4	16.06	16.60	17.17	17.76	19.06	UHF4LN0400515	●
4	0/-0.015	0.50	+/-0.010	6	4	20	3.70	60	4	21.23	21.94	22.7	23.50	-	UHF4LN0400520	●
4	0/-0.015	0.50	+/-0.010	6	4	25	3.70	75	4	26.4	27.29	28.24	-	-	UHF4LN0400525	●
4	0/-0.015	0.50	+/-0.010	6	4	32	3.70	75	4	33.63	34.78	35.99	-	-	UHF4LN0400532	●
4	0/-0.015	0.50	+/-0.010	6	4	40	3.70	75	4	41.9	43.33	-	-	-	UHF4LN0400540	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

UHF4LN

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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	≤ 6D	0.05	0.010	0.009	0.008	0.007
	≤ 8D	0.04	0.009	0.008	0.007	0.006
	≤ 10D	0.04	0.007	0.006	0.006	0.005
	≤ 12D	0.03	0.006	0.005	0.004	0.004
1.5	≤ 6D	0.08	0.021	0.019	0.017	0.015
	≤ 8D	0.06	0.018	0.016	0.014	0.013
	≤ 10D	0.05	0.015	0.013	0.012	0.010
	≤ 12D	0.04	0.012	0.011	0.009	0.008
	≤ 15D	0.03	0.010	0.009	0.008	0.007
	> 15D	0.02	0.006	0.006	0.005	0.004
2	≤ 6D	0.10	0.026	0.023	0.020	0.018
	≤ 8D	0.09	0.022	0.020	0.017	0.015
	≤ 10D	0.07	0.018	0.016	0.014	0.012
	≤ 12D	0.06	0.014	0.013	0.011	0.010
	≤ 15D	0.05	0.011	0.010	0.009	0.008
	> 15D	0.03	0.008	0.007	0.006	0.005
2.5	≤ 6D	0.13	0.030	0.027	0.024	0.021
	≤ 8D	0.11	0.025	0.023	0.020	0.018
	≤ 10D	0.09	0.021	0.019	0.017	0.015
	≤ 12D	0.07	0.016	0.015	0.013	0.011
	≤ 15D	0.06	0.013	0.012	0.011	0.009
	> 15D	0.04	0.009	0.008	0.007	0.006
3	≤ 6D	0.15	0.034	0.031	0.027	0.024
	≤ 8D	0.13	0.029	0.026	0.023	0.020
	≤ 10D	0.11	0.024	0.021	0.019	0.017
	≤ 12D	0.08	0.019	0.017	0.015	0.013
	≤ 15D	0.07	0.015	0.014	0.012	0.011
	> 15D	0.05	0.010	0.009	0.008	0.007
4	≤ 6D	0.20	0.043	0.038	0.034	0.030
	≤ 8D	0.17	0.036	0.033	0.029	0.025
	≤ 10D	0.14	0.030	0.027	0.024	0.021
	≤ 12D	0.11	0.023	0.021	0.019	0.016
	≤ 15D	0.09	0.019	0.017	0.015	0.013
	> 15D	0.06	0.013	0.011	0.010	0.009

UHF-RT

cylindrical shank, multiflutes radius type
for high feed machining

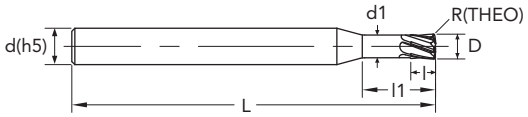
OSAWA NORM | UH | NMG UH RED | <70 HRC | 20° | HIGH FEED | Z4 | Z6



P	M	K	N	S	H
☆					★

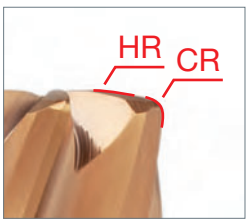
★ 1st choice ☆ suitable

3D MACHINING



D	D Tol.	R(Theo)	d(h5)	l	l1	d1	L	Z	EDP No.	Stock
2	-0.014/-0.038	0.13	6	2	6	1.9	50	4	UHF470RT020	●
3	-0.014/-0.038	0.19	6	3	9	2.9	60	4	UHF470RT030	●
4	-0.014/-0.038	0.25	6	4	12	3.9	60	6	UHF670RT040	●
5	-0.014/-0.038	0.31	6	5	15	4.7	60	6	UHF670RT050	●
6	-0.014/-0.038	0.38	6	5	18	5.5	60	6	UHF670RT060	●
8	-0.014/-0.038	0.50	8	7	24	7.5	75	6	UHF670RT080	●
10	-0.014/-0.038	0.63	10	8	30	9.5	90	6	UHF670RT100	●
12	-0.014/-0.038	0.75	12	10	36	11.5	100	6	UHF670RT120	●

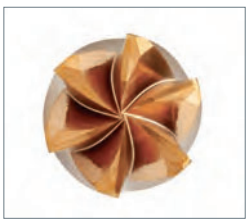
● stock standard ○ non-standard stock



The geometry with combined radius (corner radius + head radius) create thinner chips in comparison with conventional full radius, allowing a great reduction of cutting forces.



Special "no-contact" area in the end mill center, together with low helix geometry, reduce drastically the vibration, even when machining at corners.



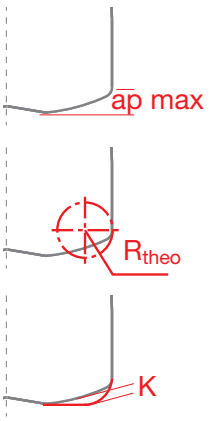
Curved cutting edges reduce chattering and improve the chips flow.

CUTTING PARAMETERS

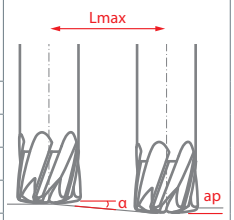
UHF-RT

	Material Group ISO 513	P6 H1 H4 H5	H2	H3	
	Hardness/Rm	45÷55 HRC	55÷60 HRC	60÷65 HRC	
	ap x ae	**0.03D x 0.55D**	**0.03D x 0.55D**	**0.03D x 0.55D**	
	Vc (m/min)	**100÷120**	**80÷100**	**50÷70**	
3D MACHINING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	
	2	0.070	0.050	0.040	
	3	0.100	0.080	0.060	
	4	0.150	0.100	0.080	
	5	0.200	0.120	0.100	
	6	0.250	0.200	0.150	
	8	0.350	0.250	0.200	
	10	0.400	0.300	0.250	
	12	0.450	0.350	0.300	

D	ap max	CAM input			Circular interpolation			Cutting length for linear ramping Lmax (αmax=5°)	
		Rtheo	max unmachined part K		Ø min	Ø max		EXAMPLE α=0.5°	EXAMPLE α=5°
2	0.07	0.189	0.051		2.9	3.8		8.02	0.80
3	0.10	0.283	0.076		4.3	5.8		11.46	1.14
4	0.13	0.378	0.102		5.7	7.8		14.90	1.49
5	0.17	0.472	0.127		7.1	9.8		19.48	1.94
6	0.20	0.567	0.152		8.6	11.8		22.92	2.29
8	0.27	0.756	0.203		11.4	15.8		30.94	3.09
10	0.33	0.945	0.254		14.2	19.8		37.81	3.77
12	0.40	1.134	0.305		17.1	23.8		45.84	4.57







$$Lmax = \frac{ap}{\tan \alpha}$$

(mm)

UHF4

cylindrical shank, 4F corner radius

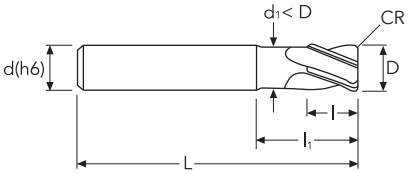
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 25° | RADIUS | Z4



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 0.3D**	**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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.033	0.029	0.026	0.023
	3	0.050	0.045	0.040	0.035
	4	0.068	0.061	0.054	0.047
	5	0.086	0.077	0.068	0.060
	6	0.104	0.093	0.083	0.072
	8	0.122	0.109	0.097	0.085
	10	0.140	0.126	0.112	0.098
	12	0.158	0.142	0.126	0.110
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

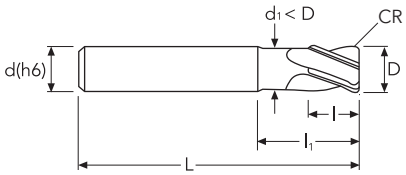
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4



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
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/-0.015	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	**D x 0.1D**	**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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.010	0.009	0.008	0.007
	2	0.020	0.018	0.016	0.014
	3	0.030	0.027	0.024	0.021
	4	0.040	0.036	0.032	0.028
	5	0.045	0.041	0.036	0.032
	6	0.050	0.045	0.040	0.035
	8	0.065	0.059	0.052	0.046
	10	0.085	0.077	0.068	0.060
	12	0.100	0.090	0.080	0.070

UH410

cylindrical shank, 4F, corner radius

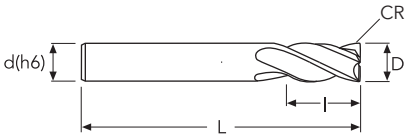
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4



P	M	K	N	S	H
☆		☆			★

★ 1st choice ☆ suitable

SIDE MILLING



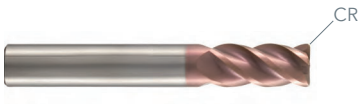
D	D Tol.	CR	CR Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
1	0/-0.015	0.20	0/-0.010	6	3		50	4	UH41001002	●
1.5	0/-0.015	0.20	0/-0.010	6	4.5		50	4	UH41001502	●
2	0/-0.015	0.30	0/-0.010	6	6.5		50	4	UH41002003	●
2.5	0/-0.020	0.30	0/-0.015	6	6.5		50	4	UH41002503	●
2.5	0/-0.020	0.50	0/-0.015	6	6.5		50	4	UH41002505	●
3	0/-0.020	0.20	0/-0.015	6	9		50	4	UH41003002	●
3	0/-0.020	0.30	0/-0.015	6	9		50	4	UH41003003	●
3	0/-0.020	0.50	0/-0.015	6	9		50	4	UH41003005	●
4	0/-0.020	0.30	0/-0.015	6	12		50	4	UH41004003	●
4	0/-0.020	0.50	0/-0.015	6	12		50	4	UH41004005	●
4	0/-0.020	1.00	0/-0.015	6	12		50	4	UH41004010	●
5	0/-0.020	0.30	0/-0.015	6	15		50	4	UH41005003	●
5	0/-0.020	0.50	0/-0.015	6	15		50	4	UH41005005	●
5	0/-0.020	1.00	0/-0.015	6	15		50	4	UH41005010	●
6	0/-0.020	0.30	0/-0.015	6	16		50	4	UH41006003	●
6	0/-0.020	0.50	0/-0.015	6	16		50	4	UH41006005	●
6	0/-0.020	1.00	0/-0.015	6	16		50	4	UH41006010	●
8	0/-0.020	0.30	0/-0.015	8	20		64	4	UH41008003	●
8	0/-0.020	0.50	0/-0.015	8	20		64	4	UH41008005	●
8	0/-0.020	1.00	0/-0.015	8	20		64	4	UH41008010	●
8	0/-0.020	1.50	0/-0.015	8	20		64	4	UH41008015	●
8	0/-0.020	2.00	0/-0.015	8	20		64	4	UH41008020	●
10	0/-0.020	0.30	0/-0.020	10	22		70	4	UH41010003	●
10	0/-0.020	0.50	0/-0.020	10	22		70	4	UH41010005	●
10	0/-0.020	1.00	0/-0.020	10	22		70	4	UH41010010	●
10	0/-0.020	1.50	0/-0.020	10	22		70	4	UH41010015	●
10	0/-0.020	2.00	0/-0.020	10	22		70	4	UH41010020	●
12	0/-0.020	0.30	0/-0.020	12	25		75	4	UH41012003	●
12	0/-0.020	0.50	0/-0.020	12	25		75	4	UH41012005	●
12	0/-0.020	1.00	0/-0.020	12	25		75	4	UH41012010	●
12	0/-0.020	1.50	0/-0.020	12	25		75	4	UH41012015	●
12	0/-0.020	2.00	0/-0.020	12	25		75	4	UH41012020	●
12	0/-0.020	3.00	0/-0.020	12	25		75	4	UH41012030	●
14	0/-0.020	0.50	0/-0.020	14	32		90	4	UH41014005	●
14	0/-0.020	1.00	0/-0.020	14	32		90	4	UH41014010	●
16	0/-0.020	0.50	0/-0.020	16	32		90	4	UH41016005	●
16	0/-0.020	1.00	0/-0.020	16	32		90	4	UH41016010	●
16	0/-0.020	2.00	0/-0.020	16	32		90	4	UH41016020	●
18	0/-0.020	1.00	0/-0.020	18	38		100	4	UH41018010	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UH410

cylindrical shank, 4F, corner radius

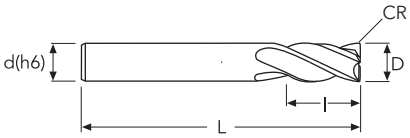
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4



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
20	0/-0.020	0.50	0/-0.020	20	38		100	4	UH41020005	●
20	0/-0.020	1.00	0/-0.020	20	38		100	4	UH41020010	●
20	0/-0.020	2.00	0/-0.020	20	38		100	4	UH41020020	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UH410

	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)	**90÷130**	**60÷100**	**50÷70**	**30÷50**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.010	0.009	0.008	0.007
	2	0.018	0.016	0.014	0.013
	3	0.027	0.024	0.022	0.019
	4	0.036	0.032	0.029	0.025
	5	0.041	0.036	0.032	0.028
	6	0.045	0.041	0.036	0.032
	8	0.059	0.053	0.047	0.041
	10	0.077	0.069	0.061	0.054
	12	0.090	0.081	0.072	0.063
	14	0.102	0.092	0.082	0.071
	16	0.114	0.103	0.091	0.080
	18	0.126	0.113	0.101	0.088
	20	0.138	0.124	0.110	0.097

UH411

cylindrical shank, 4F, reduced neck, corner radius, long

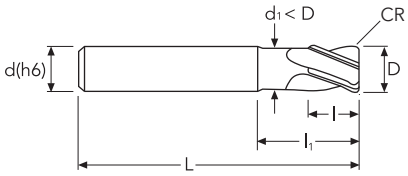
OSAWA NORM | UH | NMG UH RED | <70 HRC | 40° | RADIUS | Z4



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
3	0/-0.012	0.30	0/-0.010	6	4	12	2.85	55	4	UH4110300312	●
3	0/-0.012	0.30	0/-0.010	6	4	20	2.85	60	4	UH4110300320	●
3	0/-0.012	0.50	0/-0.010	6	4	10	2.85	55	4	UH4110300510	●
3	0/-0.012	0.50	0/-0.010	6	4	20	2.85	60	4	UH4110300520	●
4	0/-0.012	0.30	0/-0.010	6	6	12	3.85	55	4	UH4110400312	●
4	0/-0.012	0.30	0/-0.010	6	6	20	3.85	60	4	UH4110400320	●
4	0/-0.012	0.50	0/-0.010	6	6	12	3.85	55	4	UH4110400512	●
4	0/-0.012	0.50	0/-0.010	6	6	20	3.85	60	4	UH4110400520	●
4	0/-0.012	1.00	0/-0.010	6	6	12	3.85	55	4	UH4110401012	●
6	0/-0.015	0.50	0/-0.010	6	9	15	5.85	60	4	UH4110600520	●
6	0/-0.015	1.00	0/-0.010	6	9	15	5.85	60	4	UH4110601020	●
8	0/-0.015	0.50	0/-0.015	8	12	20	7.70	70	4	UH4110800525	●
8	0/-0.015	1.00	0/-0.015	8	12	20	7.70	70	4	UH4110801025	●
8	0/-0.015	2.00	0/-0.015	8	12	20	7.70	70	4	UH4110802025	●
10	0/-0.015	0.50	0/-0.015	10	15	25	9.70	70	4	UH4111000532	●
10	0/-0.015	1.00	0/-0.015	10	15	25	9.70	70	4	UH4111001032	●
10	0/-0.015	2.00	0/-0.015	10	15	25	9.70	70	4	UH4111002032	●
12	0/-0.015	0.50	0/-0.015	12	18	30	11.70	80	4	UH4111200538	●
12	0/-0.015	1.00	0/-0.015	12	18	30	11.70	80	4	UH4111201038	●
12	0/-0.015	2.00	0/-0.015	12	18	30	11.70	80	4	UH4111202038	●

● stock standard ○ non-standard stock ▽ stock exhaustion

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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.027	0.024	0.022	0.019
	4	0.036	0.032	0.029	0.025
	5	0.041	0.036	0.032	0.028
	6	0.045	0.041	0.036	0.032
	8	0.059	0.053	0.047	0.041
	10	0.077	0.069	0.061	0.054
	12	0.090	0.081	0.072	0.063

UH412

cylindrical shank, 4F, reduced neck, corner radius, long

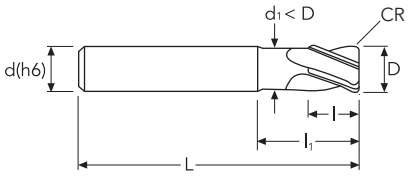
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4



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/-0.010	6	4	30	1.90	75	4	UH4120200330	●
2	0/-0.020	0.30	0/-0.010	6	4	60	1.90	100	4	UH4120200360	●
3	0/-0.020	0.30	0/-0.010	6	5	30	2.80	75	4	UH4120300330	●
3	0/-0.020	0.30	0/-0.010	6	5	60	2.80	100	4	UH4120300360	●
3	0/-0.020	0.50	0/-0.010	6	5	30	2.80	75	4	UH4120300530	●
3	0/-0.020	0.50	0/-0.010	6	5	60	2.80	100	4	UH4120300560	●
4	0/-0.020	0.30	0/-0.010	6	8	32	3.70	75	4	UH4120400332	●
4	0/-0.020	0.30	0/-0.010	6	8	60	3.70	100	4	UH4120400360	●
4	0/-0.020	0.50	0/-0.010	6	8	32	3.70	75	4	UH4120400532	●
4	0/-0.020	0.50	0/-0.010	6	8	60	3.70	100	4	UH4120400560	●
6	0/-0.020	0.50	0/-0.010	6	9	40	5.85	90	4	UH4120600520	●
6	0/-0.020	1.00	0/-0.010	6	9	40	5.85	90	4	UH4120601020	●
8	0/-0.020	0.50	0/-0.015	8	12	45	7.70	100	4	UH4120800525	●
8	0/-0.020	1.00	0/-0.015	8	12	45	7.70	100	4	UH4120801025	●
10	0/-0.020	0.50	0/-0.015	10	15	50	9.70	100	4	UH4121000532	●
10	0/-0.020	1.00	0/-0.015	10	15	50	9.70	100	4	UH4121001032	●
10	0/-0.020	2.00	0/-0.015	10	15	50	9.70	100	4	UH4121002032	●
12	0/-0.020	0.50	0/-0.015	12	18	60	11.70	110	4	UH4121200538	●
12	0/-0.020	1.00	0/-0.015	12	18	60	11.70	110	4	UH4121201038	●
12	0/-0.020	2.00	0/-0.015	12	18	60	11.70	110	4	UH4121202038	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UH412

	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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.016	0.015	0.013	0.011
	3	0.024	0.022	0.019	0.017
	4	0.032	0.029	0.026	0.023
	5	0.036	0.033	0.029	0.026
	6	0.041	0.036	0.032	0.028
	8	0.053	0.047	0.042	0.037
	10	0.069	0.062	0.055	0.048
	12	0.081	0.073	0.065	0.057

UH413

cylindrical shank, 4F, reduced neck, corner radius, long

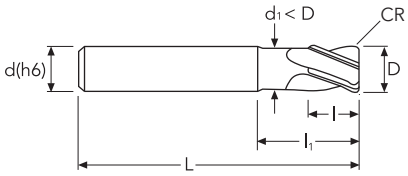
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 40° | RADIUS | Z4



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/-0.020	0.30	0/-0.015	6	10	60	5.50	125	4	UH4130600360	●
6	0/-0.020	0.50	0/-0.015	6	10	60	5.50	125	4	UH4130600560	●
6	0/-0.020	1.00	0/-0.015	6	10	60	5.50	125	4	UH4130601060	●
8	0/-0.020	0.30	0/-0.015	8	12	60	7.40	125	4	UH4130800360	●
8	0/-0.020	0.50	0/-0.015	8	12	60	7.40	125	4	UH4130800560	●
8	0/-0.020	1.00	0/-0.015	8	12	60	7.40	125	4	UH4130801060	●
8	0/-0.020	2.00	0/-0.015	8	12	60	7.40	125	4	UH4130802060	●
10	0/-0.020	0.30	0/-0.020	10	14	85	9.20	125	4	UH4131000385	●
10	0/-0.020	0.50	0/-0.020	10	14	85	9.20	125	4	UH4131000585	●
10	0/-0.020	1.00	0/-0.020	10	14	85	9.20	125	4	UH4131001085	●
10	0/-0.020	2.00	0/-0.020	10	14	85	9.20	125	4	UH4131002085	●
12	0/-0.020	0.50	0/-0.020	12	16	110	11.00	150	4	UH41312005110	●
12	0/-0.020	1.00	0/-0.020	12	16	110	11.00	150	4	UH41312010110	●
12	0/-0.020	2.00	0/-0.020	12	16	110	11.00	150	4	UH41312020110	●
16	0/-0.020	0.50	0/-0.020	16	22	110	15.00	150	4	UH41316005110	●
16	0/-0.020	1.00	0/-0.020	16	22	110	15.00	150	4	UH41316010110	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

UH413

	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**
SIDE MILLING	Vc (m/min)	**70÷110**	**60÷80**	**40÷60**	**30÷50**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.041	0.036	0.032	0.028
	8	0.053	0.047	0.042	0.037
	10	0.069	0.062	0.055	0.048
	12	0.081	0.073	0.065	0.057
	16	0.095	0.086	0.076	0.067

UH610R

cylindrical shank, multi flute, reduced neck, corner radius

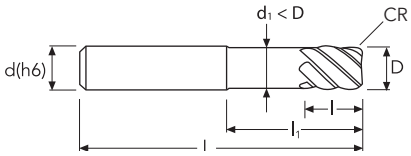
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 50° | RADIUS | Z6



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	5.80	50	6	UH610R05060	●
8	0/-0.030	0.50	+/-0.015	8	8	25	7.80	60	6	UH610R05080	●
10	0/-0.030	1.00	+/-0.015	10	10	30	9.80	70	6	UH610R10100	●
12	0/-0.030	1.00	+/-0.015	12	12	30	11.80	75	6	UH610R10120	●

● stock standard ○ non-standard stock ▽ stock exhaustion

UH610R

	Material Group ISO 513	P3 P4 P5 K2 K3	P6 K4 H1 H4 H5	H2	H3
SIDE MILLING	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.016	0.014	0.013
	8	0.028	0.025	0.022	0.019
	10	0.034	0.030	0.027	0.024
	12	0.041	0.037	0.033	0.029

UH611R

cylindrical shank, multi flute, long, corner radius

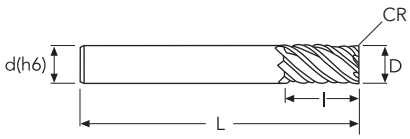
OSAWA NORM | UH | NMG / UH RED | 30÷70 HRC | 50° | RADIUS | Z6



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

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**
SIDE MILLING	Vc (m/min)	**110÷150**	**90÷130**	**60÷80**	**40÷60**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.015	0.014	0.012	0.011
	8	0.023	0.021	0.019	0.016
	10	0.029	0.026	0.023	0.020
	12	0.035	0.031	0.028	0.024
	16	0.048	0.043	0.038	0.034
	20	0.066	0.060	0.053	0.046

MHMB204

cylindrical shank, 2 flutes ball nose, miniature

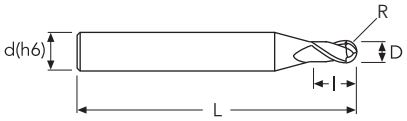
OSAWA NORM | MH | NMG MH COAT | <70 HRC | 30° | BALL NOSE | Z2 BALL



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
0.2	0/-0.015	0.10	0/-0.020	4	0.2			50	2	MHMB200204	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3			50	2	MHMB200304	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4			50	2	MHMB200404	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4			50	2	MHMB200504	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5			50	2	MHMB200604	●
0.7	0/-0.015	0.35	0/-0.020	4	0.6			50	2	MHMB200704	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6			50	2	MHMB200804	●
0.9	0/-0.015	0.45	0/-0.020	4	0.8			50	2	MHMB200904	●
1.0	0/-0.015	0.50	0/-0.020	4	0.8			50	2	MHMB201004	●
1.5	0/-0.015	0.75	0/-0.020	4	1.35			50	2	MHMB201504	●
2	0/-0.015	1	0/-0.020	4	1.7			50	2	MHMB202004	●

● stock standard ○ non-standard stock ∇ stock exhaustion

MHMB204

	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**	**40÷80**	**20÷60**
COPYING	D (mm)	D(eff.) (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.1	0.04	0.004	0.004	0.003	0.003
	0.2	0.09	0.006	0.005	0.005	0.004
	0.3	0.13	0.008	0.007	0.006	0.006
	0.4	0.17	0.010	0.009	0.008	0.007
	0.5	0.22	0.012	0.011	0.010	0.008
	0.6	0.26	0.015	0.014	0.012	0.011
	0.7	0.31	0.018	0.016	0.014	0.013
	0.8	0.35	0.020	0.018	0.016	0.014
	0.9	0.39	0.023	0.021	0.018	0.016
	1	0.44	0.026	0.023	0.020	0.017
	1.5	0.79	0.040	0.036	0.030	0.026
	2	1.20	0.055	0.050	0.041	0.036

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

INFO
CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA
HSS DRILLS
LFTA
SUTA
HSS-HSS/CO
CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH
HSS END-MILLS
CARBIDE BURRS

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

MHMB206

cylindrical shank, 2 flutes ball nose, miniature, 6 mm. shank

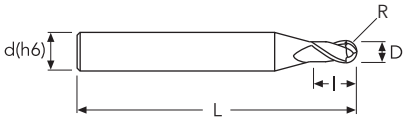
OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL



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
0.4	0/-0.010	0.20	0/-0.010	6	0.4	-	0.35	50	2	MHMB200406	●
0.5	0/-0.010	0.25	0/-0.010	6	0.5	-	0.45	50	2	MHMB200506	●
0.6	0/-0.010	0.30	0/-0.010	6	0.6	-	0.55	50	2	MHMB200606	●
0.8	0/-0.010	0.40	0/-0.010	6	0.8	-	0.75	50	2	MHMB200806	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MHMB206

	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**
COPYING	Vc (m/min)		**80÷120**	**60÷100**	**40÷80**	**20÷60**
	D (mm)	D(eff.) (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	0.4	0.17	0.010	0.009	0.008	0.007
	0.5	0.22	0.012	0.011	0.010	0.008
	0.6	0.26	0.015	0.014	0.012	0.011
	0.8	0.35	0.020	0.018	0.016	0.014

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

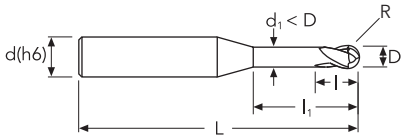
MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL



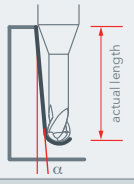




P	M	K	N	S	H
★		★			★

★ 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/-0.015	0.10	0/-0.020	4	0.2	0.5	0.17	50	2	0.57	0.58	0.60	0.62	0.66	MHLNB2002005	●
0.2	0/-0.015	0.10	0/-0.020	4	0.2	1	0.17	50	2	1.08	1.12	1.15	1.19	1.27	MHLNB200201	●
0.2	0/-0.015	0.10	0/-0.020	4	0.2	1.5	0.17	50	2	1.60	1.65	1.71	1.76	1.89	MHLNB2002015	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	1	0.27	50	2	1.08	1.11	1.15	1.18	1.26	MHLNB200301	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	2	0.27	50	2	2.12	2.18	2.25	2.33	2.49	MHLNB200302	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	3	0.27	50	2	3.15	3.25	3.36	3.48	3.73	MHLNB200303	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	1	0.37	50	2	1.08	1.11	1.14	1.18	1.25	MHLNB200401	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	2	0.37	50	2	2.11	2.18	2.25	2.32	2.48	MHLNB200402	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	3	0.37	50	2	3.15	3.25	3.36	3.47	3.72	MHLNB200403	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	4	0.37	50	2	4.18	4.32	4.46	4.62	4.95	MHLNB200404	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	5	0.37	50	2	5.21	5.39	5.57	5.77	6.18	MHLNB200405	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	2	0.45	50	2	2.15	2.22	2.29	2.36	2.52	MHLNB200502	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	3	0.45	50	2	3.18	3.29	3.39	3.51	3.75	MHLNB200503	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	4	0.45	50	2	4.22	4.35	4.50	4.65	4.98	MHLNB200504	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	5	0.45	50	2	5.25	5.42	5.61	5.80	6.22	MHLNB200505	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	6	0.45	50	2	6.28	6.49	6.71	6.95	7.45	MHLNB200506	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	8	0.45	50	2	8.35	8.63	8.93	9.24	9.92	MHLNB200508	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	2	0.55	50	2	2.15	2.21	2.28	2.35	2.50	MHLNB200602	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	3	0.55	50	2	3.18	3.28	3.39	3.50	3.74	MHLNB200603	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	4	0.55	50	2	4.22	4.35	4.49	4.65	4.97	MHLNB200604	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	5	0.55	50	2	5.25	5.42	5.60	5.79	6.21	MHLNB200605	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	6	0.55	50	2	6.28	6.49	6.71	6.94	7.44	MHLNB200606	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	8	0.55	50	2	8.35	8.63	8.92	9.23	9.91	MHLNB200608	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	2	0.75	50	2	2.15	2.21	2.27	2.34	2.48	MHLNB200802	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	4	0.75	50	2	4.21	4.34	4.48	4.63	4.95	MHLNB200804	●
0,8	0/-0.015	0.40	0/-0.020	4	0.6	5	0.75	50	2	5.25	5.41	5.59	5.78	6.18	MHLNB200805	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	6	0.75	50	2	6.28	6.48	6.70	6.93	7.42	MHLNB200806	●
0,8	0/-0.015	0.40	0/-0.020	4	0.6	7	0.75	50	2	7.31	7.55	7.81	8.07	8.65	MHLNB200807	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	8	0.75	50	2	8.35	8.62	8.91	9.22	9.88	MHLNB200808	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	10	0.75	50	2	10.41	10.76	11.13	11.51	12.35	MHLNB200810	●
1	0/-0.015	0.50	0/-0.020	4	0.8	3	0.9	50	2	3.27	3.37	3.47	3.57	3.80	MHLNB201003	●
1	0/-0.015	0.50	0/-0.020	4	0.8	4	0.9	50	2	4.31	4.44	4.58	4.72	5.04	MHLNB201004	●
1	0/-0.015	0.50	0/-0.020	4	0.8	5	0.9	50	2	5.34	5.51	5.68	5.87	6.27	MHLNB201005	●
1	0/-0.015	0.50	0/-0.020	4	0.8	6	0.9	50	2	6.37	6.58	6.79	7.02	7.50	MHLNB201006	●
1	0/-0.015	0.50	0/-0.020	4	0.8	7	0.9	50	2	7.41	7.64	7.90	8.16	8.74	MHLNB201007	●
1	0/-0.015	0.50	0/-0.020	4	0.8	8	0.9	50	2	8.44	8.71	9.00	9.31	9.97	MHLNB201008	●
1	0/-0.015	0.50	0/-0.020	4	0.8	9	0.9	50	2	9.47	9.78	10.11	10.46	11.21	MHLNB201009	●
1	0/-0.015	0.50	0/-0.020	4	0.8	10	0.9	50	2	10.51	10.85	11.22	11.61	12.44	MHLNB201010	●
1	0/-0.015	0.50	0/-0.020	4	0.8	12	0.9	50	2	12.57	12.99	13.43	13.90	14.91	MHLNB201012	●

● stock standard ○ non-standard stock ▽ stock exhaustion

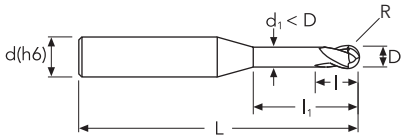
MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL



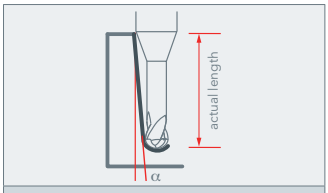




P	M	K	N	S	H
★		★			★

★ 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	0/-0.015	0.50	0/-0.020	4	0.8	14	0.9	50	2	14.64	15.13	15.65	16.19	17.37	MHLNB201014	●
1	0/-0.015	0.50	0/-0.020	4	0.8	16	0.9	50	2	16.71	17.27	17.86	18.49	19.84	MHLNB201016	●
1	0/-0.015	0.50	0/-0.020	4	0.8	20	0.9	60	2	20.84	21.55	22.29	23.08	24.78	MHLNB201020	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	6	1.1	50	2	6.37	6.57	6.78	7.00	7.48	MHLNB201206	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	8	1.1	50	2	8.44	8.71	8.99	9.30	9.95	MHLNB201208	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	10	1.1	50	2	10.50	10.85	11.21	11.59	12.42	MHLNB201210	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	12	1.1	50	2	12.57	12.98	13.42	13.89	14.88	MHLNB201212	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	8	1.3	50	2	8.43	8.70	8.98	9.28	9.93	MHLNB201408	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	12	1.3	50	2	12.57	12.98	13.41	13.87	14.86	MHLNB201412	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	16	1.3	50	2	16.70	17.26	17.84	18.46	19.80	MHLNB201416	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	8	1.4	50	2	8.43	8.70	8.98	9.27	9.91	MHLNB201508	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	12	1.4	50	2	12.57	12.97	13.41	13.86	14.85	MHLNB201512	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	16	1.4	50	2	16.70	17.25	17.84	18.45	19.78	MHLNB201516	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	18	1.4	60	2	18.77	19.39	20.05	20.75	22.25	MHLNB201518	●
1.5	0/-0.015	0.75	0/-0.020	6	2.4	20	1.4	50	2	20.84	21.53	22.26	23.04	24.72	MHLNB201520	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	8	1.5	50	2	8.43	8.69	8.97	9.27	9.90	MHLNB201608	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	12	1.5	50	2	12.56	12.97	13.40	13.86	14.84	MHLNB201612	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	16	1.5	50	2	16.70	17.25	17.83	18.45	19.77	MHLNB201616	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	20	1.5	60	2	20.83	21.53	22.26	23.03	-	MHLNB201620	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	8	1.7	50	2	8.43	8.69	8.96	9.25	9.88	MHLNB201808	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	12	1.7	50	2	12.56	12.96	13.39	13.84	14.81	MHLNB201812	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	16	1.7	50	2	16.70	17.24	17.82	18.43	19.75	MHLNB201816	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	20	1.7	60	2	20.83	21.52	22.25	23.02	-	MHLNB201820	●
2	0/-0.015	1.00	0/-0.020	4	1.6	4	1.9	50	2	4.29	4.40	4.52	4.65	4.92	MHLNB202004	●
2	0/-0.015	1.00	0/-0.020	4	1.6	6	1.9	50	2	6.36	6.54	6.74	6.94	7.39	MHLNB202006	●
2	0/-0.015	1.00	0/-0.020	4	1.6	8	1.9	50	2	8.42	8.68	8.95	9.24	9.86	MHLNB202008	●
2	0/-0.015	1.00	0/-0.020	4	1.6	10	1.9	50	2	10.49	10.82	11.17	11.53	12.32	MHLNB202010	●
2	0/-0.015	1.00	0/-0.020	4	1.6	12	1.9	50	2	12.56	12.96	13.38	13.83	14.79	MHLNB202012	●
2	0/-0.015	1.00	0/-0.020	4	1.6	14	1.9	50	2	14.62	15.10	15.59	16.12	17.26	MHLNB202014	●
2	0/-0.015	1.00	0/-0.020	4	1.6	16	1.9	50	2	16.69	17.23	17.81	18.42	19.73	MHLNB202016	●
2	0/-0.015	1.00	0/-0.020	4	1.6	18	1.9	60	2	18.76	19.37	20.02	20.71	-	MHLNB202018	●
2	0/-0.015	1.00	0/-0.020	4	1.6	20	1.9	60	2	20.83	21.51	22.24	23.00	-	MHLNB202020	●
2	0/-0.015	1.00	0/-0.020	4	1.6	22	1.9	60	2	22.89	23.65	24.45	25.30	-	MHLNB202022	●
2	0/-0.015	1.00	0/-0.020	4	1.6	25	1.9	75	2	25.99	26.86	27.77	28.74	-	MHLNB202025	●
2	0/-0.015	1.00	0/-0.020	4	1.6	30	1.9	75	2	31.16	32.21	33.31	-	-	MHLNB202030	●
3	0/-0.020	1.50	0/-0.020	6	2.4	8	2.8	50	2	8.60	8.84	9.10	9.37	9.96	MHLNB203008	●
3	0/-0.020	1.50	0/-0.020	6	2.4	10	2.8	50	2	10.67	10.98	11.32	11.67	12.43	MHLNB203010	●
3	0/-0.020	1.50	0/-0.020	6	2.4	12	2.8	50	2	12.73	13.12	13.53	13.96	14.90	MHLNB203012	●
3	0/-0.020	1.50	0/-0.020	6	2.4	16	2.8	60	2	16.87	17.40	17.96	18.55	19.83	MHLNB203016	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

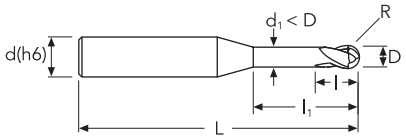
CARBIDE BURRS

MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL

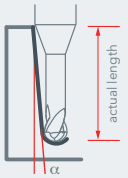




P	M	K	N	S	H
★		★			★

★ 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
3	0/-0.020	1.50	0/-0.020	6	2.4	20	2.8	60	2	21.00	21.68	22.39	23.14	24.77	MHLNB203020	●
3	0/-0.020	1.50	0/-0.020	6	2.4	25	2.8	75	2	26.17	27.02	27.93	28.88	-	MHLNB203025	●
3	0/-0.020	1.50	0/-0.020	6	2.4	30	2.8	75	2	31.34	32.37	33.46	34.62	-	MHLNB203030	●
3	0/-0.020	1.50	0/-0.020	6	2.4	35	2.8	75	2	36.51	37.72	39.00	40.35	-	MHLNB203035	●
4	0/-0.020	2.00	0/-0.020	6	3.2	10	3.7	50	2	10.84	11.15	11.47	11.81	12.54	MHLNB204010	●
4	0/-0.020	2.00	0/-0.020	6	3.2	16	3.7	60	2	17.04	17.56	18.11	18.69	19.94	MHLNB204016	●
4	0/-0.020	2.00	0/-0.020	6	3.2	20	3.7	60	2	21.18	21.84	22.54	23.28	-	MHLNB204020	●
4	0/-0.020	2.00	0/-0.020	6	3.2	25	3.7	75	2	26.35	27.19	28.08	29.02	-	MHLNB204025	●
4	0/-0.020	2.00	0/-0.020	6	3.2	30	3.7	75	2	31.51	32.53	33.61	-	-	MHLNB204030	●
4	0/-0.020	2.00	0/-0.020	6	3.2	35	3.7	75	2	36.68	37.88	39.15	-	-	MHLNB204035	●
4	0/-0.020	2.00	0/-0.020	6	3.2	40	3.7	100	2	41.85	43.23	-	-	-	MHLNB204040	●
4	0/-0.020	2.00	0/-0.020	6	3.2	45	3.7	100	2	47.02	48.57	-	-	-	MHLNB204045	●
4	0/-0.020	2.00	0/-0.020	6	3.2	50	3.7	100	2	52.19	53.92	-	-	-	MHLNB204050	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MHLNB2

	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
ROUND RIB	**0.2**	≤ 6D	0.01	0.09	0.008	0.007	0.006	0.006
		≤ 8D	0.01	0.08	0.007	0.006	0.005	0.005
		≤ 10D	0.01	0.07	0.006	0.005	0.004	0.004
	0.3	≤ 6D	0.02	0.13	0.010	0.009	0.008	0.007
		≤ 8D	0.01	0.12	0.009	0.007	0.006	0.006
		≤ 10D	0.01	0.11	0.008	0.006	0.005	0.004
	0.4	≤ 6D	0.02	0.17	0.013	0.012	0.010	0.009
		≤ 8D	0.02	0.16	0.012	0.009	0.008	0.007
		≤ 10D	0.01	0.15	0.010	0.007	0.007	0.006
	0.5	≤ 6D	0.03	0.22	0.017	0.015	0.014	0.012
		≤ 8D	0.02	0.20	0.015	0.012	0.011	0.010
		≤ 10D	0.02	0.18	0.014	0.010	0.009	0.008
	0.6	≤ 6D	0.03	0.26	0.021	0.019	0.017	0.015
		≤ 8D	0.03	0.24	0.019	0.015	0.014	0.012
		≤ 10D	0.02	0.22	0.017	0.012	0.011	0.009
	0.8	≤ 6D	0.04	0.35	0.025	0.023	0.020	0.018
		≤ 8D	0.03	0.32	0.023	0.018	0.016	0.014
		≤ 10D	0.03	0.29	0.020	0.014	0.013	0.011
	1	≤ 6D	0.05	0.44	0.030	0.027	0.024	0.021
		≤ 8D	0.04	0.40	0.027	0.022	0.019	0.017
		≤ 10D	0.04	0.37	0.024	0.017	0.015	0.013
		≤ 12D	0.03	0.33	0.021	0.013	0.012	0.010
		>12D	0.02	0.30	0.018	0.010	0.009	0.008
	1.2	≤ 6D	0.06	0.52	0.035	0.032	0.028	0.025
		≤ 8D	0.05	0.48	0.032	0.026	0.023	0.020
		≤ 10D	0.04	0.44	0.028	0.020	0.018	0.016
		≤ 12D	0.03	0.39	0.025	0.015	0.014	0.012
		>12D	0.03	0.36	0.021	0.011	0.010	0.009
	1.5	≤ 6D	0.08	0.65	0.045	0.041	0.036	0.032
		≤ 8D	0.06	0.61	0.041	0.033	0.029	0.026
		≤ 10D	0.05	0.55	0.036	0.026	0.023	0.020
		≤ 12D	0.04	0.49	0.032	0.020	0.018	0.015
		>12D	0.03	0.44	0.027	0.015	0.013	0.011
	2	≤ 6D	0.10	0.87	0.060	0.054	0.048	0.042
		≤ 8D	0.09	0.81	0.054	0.044	0.039	0.034
		≤ 10D	0.07	0.74	0.048	0.035	0.031	0.027
		≤ 12D	0.06	0.65	0.042	0.026	0.024	0.021
		>12D	0.05	0.59	0.036	0.019	0.017	0.015
	2.5	≤ 6D	0.13	1.09	0.060	0.054	0.048	0.042
		≤ 8D	0.11	1.01	0.054	0.044	0.039	0.034
		≤ 10D	0.09	0.92	0.048	0.035	0.031	0.027
		≤ 12D	0.07	0.82	0.042	0.026	0.024	0.021
		>12D	0.06	0.74	0.036	0.019	0.017	0.015
	3	≤ 6D	0.15	1.31	0.075	0.068	0.060	0.053
		≤ 8D	0.13	1.21	0.068	0.055	0.049	0.043
		≤ 10D	0.11	1.10	0.060	0.043	0.038	0.034
		≤ 12D	0.08	0.98	0.053	0.033	0.029	0.026
		>12D	0.07	0.89	0.045	0.024	0.022	0.019

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

MHLNB2

ROUND 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 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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	4	≤ 6D	0.20	1.74	0.095	0.086	0.076	0.067
		≤ 8D	0.17	1.61	0.086	0.069	0.062	0.054
		≤ 10D	0.14	1.47	0.076	0.055	0.049	0.043
		≤ 12D	0.11	1.31	0.067	0.042	0.037	0.033
		>12D	0.09	1.19	0.057	0.031	0.027	0.024

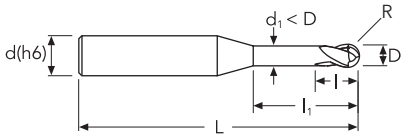
α	α	n (rpm)	Vf (mm/min)
	45°	x 1.65	x 1.65
	30°	x 1.30	x 1.30
	15°	x 1.15	x 1.15

MHCRB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature, 6 mm. shank

OSAWA NORM | MH | NMG MH COAT | 30÷70 HRC | 30° | BALL NOSE | Z2 BALL

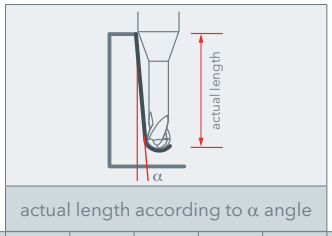




P	M	K	N	S	H
★		★			★

★ 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	MHCRB20050206	●
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	MHCRB20050406	●
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	MHCRB20060206	●
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	MHCRB20060406	●
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	MHCRB20060606	●
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	MHCRB20080206	●
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	MHCRB20080406	●
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	MHCRB20080606	●
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	MHCRB20100306	●
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	MHCRB20100606	●
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	MHCRB20100806	●
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	MHCRB20101006	●
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	MHCRB20120606	●
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	MHCRB20120806	●
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	MHCRB20121006	●
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	MHCRB20150406	●
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	MHCRB20150806	●
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	MHCRB20151006	●
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	MHCRB20151206	●
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	MHCRB20151606	●
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	MHCRB20200606	●
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	MHCRB20200806	●
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	MHCRB20201006	●
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	MHCRB20201206	●
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	MHCRB20201606	●
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	MHCRB20202006	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

MHCRB2

	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
ROUND RIB	**0.5**	≤ 6D	0.03	0.22	0.020	0.018	0.016	0.014
		≤ 8D	0.02	0.20	0.018	0.015	0.013	0.011
		≤ 10D	0.02	0.18	0.016	0.012	0.010	0.009
	0.6	≤ 6D	0.03	0.26	0.022	0.020	0.018	0.015
		≤ 8D	0.03	0.24	0.020	0.016	0.014	0.012
		≤ 10D	0.02	0.22	0.018	0.013	0.011	0.010
	0.8	≤ 6D	0.04	0.35	0.025	0.023	0.020	0.018
		≤ 8D	0.03	0.32	0.023	0.018	0.016	0.014
		≤ 10D	0.03	0.29	0.020	0.014	0.013	0.011
	1	≤ 6D	0.05	0.44	0.030	0.027	0.024	0.021
		≤ 8D	0.04	0.40	0.027	0.022	0.019	0.017
		≤ 10D	0.04	0.37	0.024	0.017	0.015	0.013
		≤ 12D	0.03	0.33	0.021	0.013	0.012	0.010
		>12D	0.02	0.30	0.018	0.010	0.009	0.008
	1.2	≤ 6D	0.06	0.52	0.035	0.032	0.028	0.025
		≤ 8D	0.05	0.48	0.032	0.026	0.023	0.020
		≤ 10D	0.04	0.44	0.028	0.020	0.018	0.016
		≤ 12D	0.03	0.39	0.025	0.015	0.014	0.012
		>12D	0.03	0.36	0.021	0.011	0.010	0.009
	1.5	≤ 6D	0.08	0.65	0.045	0.041	0.036	0.032
		≤ 8D	0.06	0.61	0.041	0.033	0.029	0.026
		≤ 10D	0.05	0.55	0.036	0.026	0.023	0.020
		≤ 12D	0.04	0.49	0.032	0.020	0.018	0.015
		>12D	0.03	0.44	0.027	0.015	0.013	0.011
	2	≤ 6D	0.10	0.87	0.060	0.054	0.048	0.042
		≤ 8D	0.09	0.81	0.054	0.044	0.039	0.034
		≤ 10D	0.07	0.74	0.048	0.035	0.031	0.027
		≤ 12D	0.06	0.65	0.042	0.026	0.024	0.021
		>12D	0.05	0.59	0.036	0.019	0.017	0.015

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

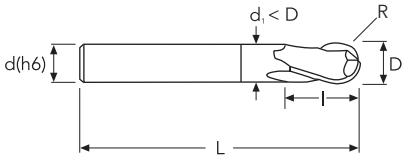
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL



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/-0.010	6	1.5		40	2	UHCSB2010	●
1.5	0/-0.012	0.75	0/-0.010	6	2.5		40	2	UHCSB2015	●
2	0/-0.012	1.00	0/-0.010	6	3		40	2	UHCSB2020	●
2.5	0/-0.012	1.25	0/-0.010	6	3		50	2	UHCSB2025	●
3	0/-0.012	1.50	0/-0.010	6	4.5		50	2	UHCSB2030	●
4	0/-0.012	2.00	0/-0.010	6	6		50	2	UHCSB2040	●
5	0/-0.012	2.50	0/-0.010	6	7.5		50	2	UHCSB2050	●
6	0/-0.015	3.00	0/-0.010	6	9		50	2	UHCSB2060	●
8	0/-0.015	4.00	0/-0.010	8	12		50	2	UHCSB2080	●
10	0/-0.015	5.00	0/-0.010	10	15		60	2	UHCSB2100	●
12	0/-0.015	6.00	0/-0.010	12	18		60	2	UHCSB2120	●
14	0/-0.020	7.00	0/-0.020	14	32		90	2	UHCSB2140	●
16	0/-0.020	8.00	0/-0.020	16	32		90	2	UHCSB2160	●
18	0/-0.020	9.00	0/-0.020	18	38		100	2	UHCSB2180	●
20	0/-0.020	10.00	0/-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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.44	0.009	0.008	0.007	0.006
1.5	0.79	0.012	0.011	0.010	0.008
2	1.20	0.012	0.011	0.010	0.008
2.5	1.65	0.015	0.014	0.012	0.011
3	2.14	0.018	0.016	0.014	0.013
4	3.20	0.025	0.023	0.020	0.018
5	4.33	0.032	0.029	0.026	0.022
6	5.50	0.038	0.034	0.030	0.027
8	7.84	0.048	0.043	0.038	0.034
10	10.00	0.057	0.051	0.046	0.040
12	11.76	0.067	0.060	0.054	0.047
14	12.83	0.080	0.072	0.064	0.056
16	12.80	0.095	0.086	0.076	0.067
18	10.80	0.108	0.097	0.086	0.076
20	12.00	0.108	0.097	0.086	0.076



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

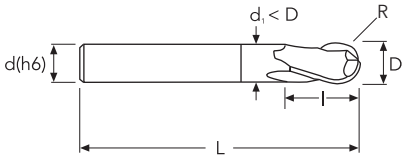
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL



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/-0.010	4	1	2.2	0.95	50	2	UH250010	●
1.5	0/-0.012	0.75	0/-0.010	4	1.5	3	1.45	50	2	UH250015	●
2	0/-0.012	1.00	0/-0.010	6	2	4	1.95	50	2	UH250020	●
2.5	0/-0.020	1.25	0/-0.015	6	4	10	2.40	50	2	UH250025	●
3	0/-0.012	1.50	0/-0.010	6	3	6	2.85	60	2	UH250030	●
4	0/-0.012	2.00	0/-0.010	6	4	8	3.85	70	2	UH250040	●
5	0/-0.012	2.50	0/-0.010	6	5	10	4.85	80	2	UH250050	●
6	0/-0.015	3.00	0/-0.010	6	6	12	5.85	90	2	UH250060	●
8	0/-0.015	4.00	0/-0.010	8	8	16	7.70	100	2	UH250080	●
10	0/-0.015	5.00	0/-0.010	10	10	20	9.70	100	2	UH250100	●
12	0/-0.015	6.00	0/-0.010	12	12	24	11.70	110	2	UH250120	●
14	0/-0.020	7.00	0/-0.020	14	32	80	13.00	125	2	UH250140	●
16	0/-0.020	8.00	0/-0.020	16	32	80	15.00	125	2	UH250160	●
18	0/-0.020	9.00	0/-0.020	18	38	80	17.00	125	2	UH250180	●
20	0/-0.020	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**	**100÷130**	**70÷90**	**50÷70**
D (mm)	D(eff.) (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.44	0.015	0.014	0.012	0.011
2	0.87	0.021	0.019	0.017	0.015
3	1.31	0.027	0.024	0.022	0.019
4	1.74	0.037	0.033	0.029	0.026
5	2.18	0.045	0.041	0.036	0.032
6	2.62	0.051	0.046	0.041	0.036
8	3.49	0.060	0.054	0.048	0.042
10	4.36	0.068	0.061	0.054	0.048
12	5.23	0.077	0.069	0.061	0.054
14	6.10	0.089	0.080	0.071	0.062
16	6.97	0.102	0.092	0.082	0.071
18	7.85	0.115	0.103	0.092	0.080
20	8.72	0.132	0.119	0.106	0.092



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

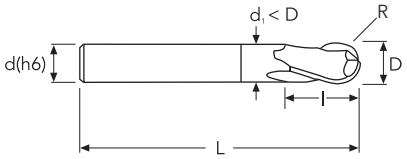
OSAWA NORM | UH | NMG / UH RED | <70 HRC | 30° | BALL NOSE | Z2 BALL



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/-0.010	6	3	7	0.90	75	2	UH25301075	●
1	0/-0.020	0.50	0/-0.010	6	3	10	0.90	100	2	UH253010100	●
1.5	0/-0.020	0.75	0/-0.010	6	3	10	1.40	75	2	UH25301575	●
1.5	0/-0.020	0.75	0/-0.010	6	3	15	1.40	100	2	UH253015100	●
2	0/-0.020	1.00	0/-0.010	6	4	14	1.90	75	2	UH25302075	●
2	0/-0.020	1.00	0/-0.010	6	4	20	1.90	100	2	UH253020100	●
2.5	0/-0.020	1.25	0/-0.015	6	4	18	2.40	75	2	UH25302575	●
3	0/-0.025	1.50	0/-0.015	6	5	21	2.80	75	2	UH25303075	●
3	0/-0.025	1.50	0/-0.015	6	5	30	2.80	100	2	UH253030100	●
4	0/-0.025	2.00	0/-0.015	6	8	28	3.70	75	2	UH25304075	●
4	0/-0.025	2.00	0/-0.015	6	8	40	3.70	100	2	UH253040100	●
5	0/-0.025	2.50	0/-0.015	6	9	50	4.60	100	2	UH253050100	●
6	0/-0.025	3.00	0/-0.015	6	10	60	5.50	100	2	UH253060100	●
6	0/-0.025	3.00	0/-0.015	6	10	60	5.50	150	2	UH253060150	●
8	0/-0.030	4.00	0/-0.015	8	12	60	7.40	100	2	UH253080100	●
8	0/-0.030	4.00	0/-0.015	8	12	80	7.40	150	2	UH253080150	●
10	0/-0.035	5.00	0/-0.020	10	14	85	9.20	125	2	UH253100125	●
10	0/-0.035	5.00	0/-0.020	10	14	100	9.20	150	2	UH253100150	●
12	0/-0.035	6.00	0/-0.020	12	16	85	11.00	125	2	UH253120125	●
12	0/-0.035	6.00	0/-0.020	12	16	110	11.00	150	2	UH253120150	●
14	0/-0.035	7.00	0/-0.020	14	32	110	13.00	150	2	UH253140150	●
14	0/-0.035	7.00	0/-0.020	14	32	150	13.00	200	2	UH253140200	●
16	0/-0.035	8.00	0/-0.020	16	32	110	15.00	150	2	UH253160150	●
16	0/-0.035	8.00	0/-0.020	16	32	150	15.00	200	2	UH253160200	●
20	0/-0.035	10.00	0/-0.020	20	38	110	19.00	150	2	UH253200150	●
20	0/-0.035	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**	**50÷90**	**40÷60**
D (mm)	D(eff.) (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
1	0.44	0.015	0.014	0.012	0.011
2	0.87	0.021	0.019	0.017	0.015
3	1.31	0.027	0.024	0.022	0.019
4	1.74	0.037	0.033	0.029	0.026
5	2.18	0.045	0.041	0.036	0.032
6	2.62	0.051	0.046	0.041	0.036
8	3.49	0.060	0.054	0.048	0.042
10	4.36	0.068	0.061	0.054	0.048
12	5.23	0.077	0.069	0.061	0.054
14	6.10	0.089	0.080	0.071	0.062
16	6.97	0.102	0.092	0.082	0.071
18	7.85	0.115	0.103	0.092	0.080
20	8.72	0.132	0.119	0.106	0.092



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

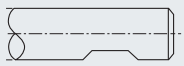


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4-6 FLUTES . 655
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SHELL . 669
CORNER ROUNDING . 673
DOVETAIL . 675
T-SLOT . 679
WOODRUFF . 681

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	rainurage 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

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Классификация склада продукции в этом каталоге может быть изменена без предварительного уведомления.

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**	642	
	TAWS2	642	
	UMWS2	642	
	WL2	645	
	TAWL2	645	
	WSA2	647	
	WS3	649	
	TAWS3	649	
	WL3	651	
	TAWL3	651	
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	WS4(6)	655	
	TAWS4(6)	655	
	UMWS4	655	
	WL4(6)	657	
	TAWL4(6)	657	
HSS/Co - HSSP general purpose, roughing	**TAWSR**	659	
	WSFR	661	
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	WLFR	663	
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HSS/Co general purpose, ball nose	**WSB2**	665	
	TAWSB2	665	
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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	★	☆	★	☆		
3-20	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	★	☆	★	☆		
2-25	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	★	☆	★	☆		
2-25	DIN 327	N	HSS/Co BR	30°	BALL NOSE	2	★	☆	★	☆		
3-20	DIN 327	N	HSS/Co PV200	30°	BALL NOSE	2	★	☆	★	☆		
3-20	DIN 1889	N	HSS/Co BR	30°	BALL NOSE	2	★	☆	★	☆		

★ 1st choice ☆ suitable

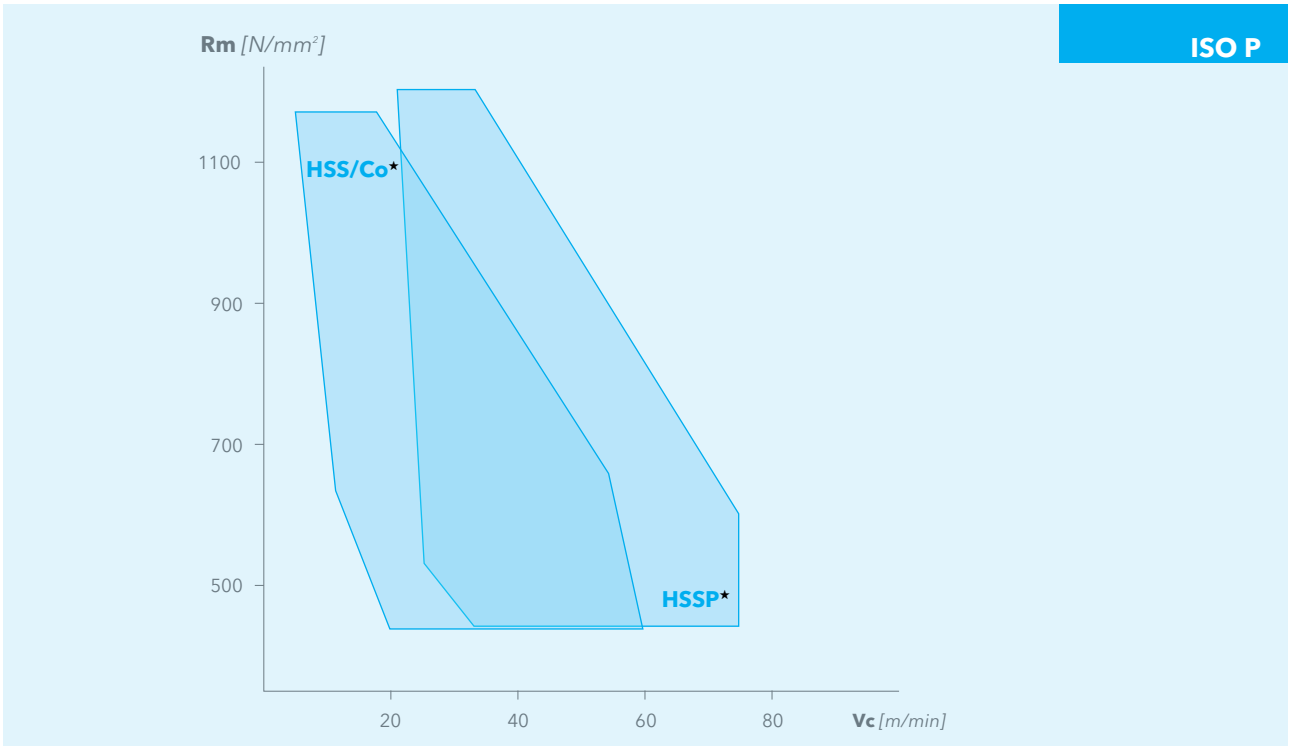
	ITEM No.	PAGE	
HSS/Co general purpose, shell	**FM**	669	
	TAFM	669	
	FFR	671	
	TAFFR	671	
HSS/Co general purpose, corner rounding	**WCR**	673	
HSS/Co general purpose, dovetail	**WDC**	675	
	WDD	677	
HSS/Co general purpose, T-slot	**WTM**	679	
HSS/Co general purpose, woodruff	**WWK**	681	

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
40-63	DIN 1880	N	HSS/Co BR	30°	SQUARE	8-10	★	☆	★	☆		
40-63	DIN 1880	N	HSS/Co PV200	30°	SQUARE	8-10	★	☆	★	☆		
40-63	DIN 1880	N - HR	HSS/Co BR	30°	SQUARE	6-10	★	☆	★	☆		
40-63	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	★	☆	★	☆		

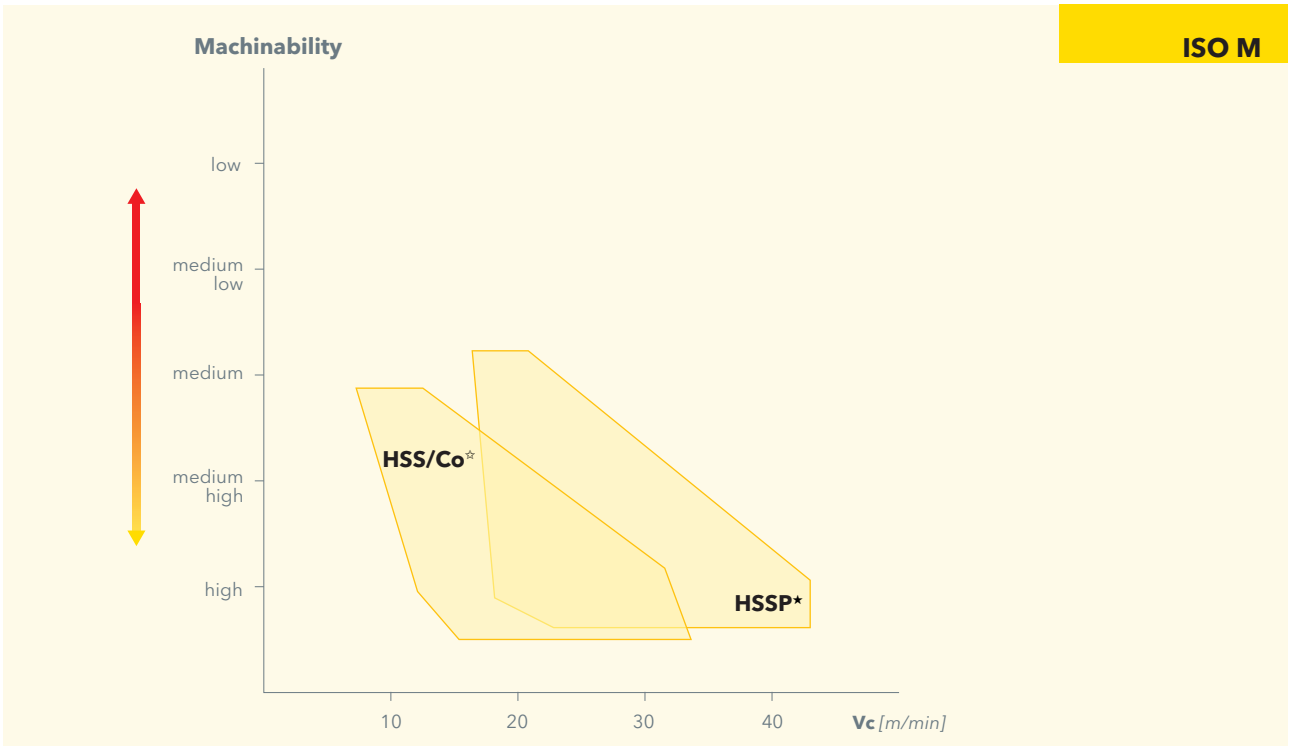
★ 1st choice ☆ suitable

STEEL APPLICATION



★ 1st choice ☆ suitable

STAINLESS STEEL APPLICATION

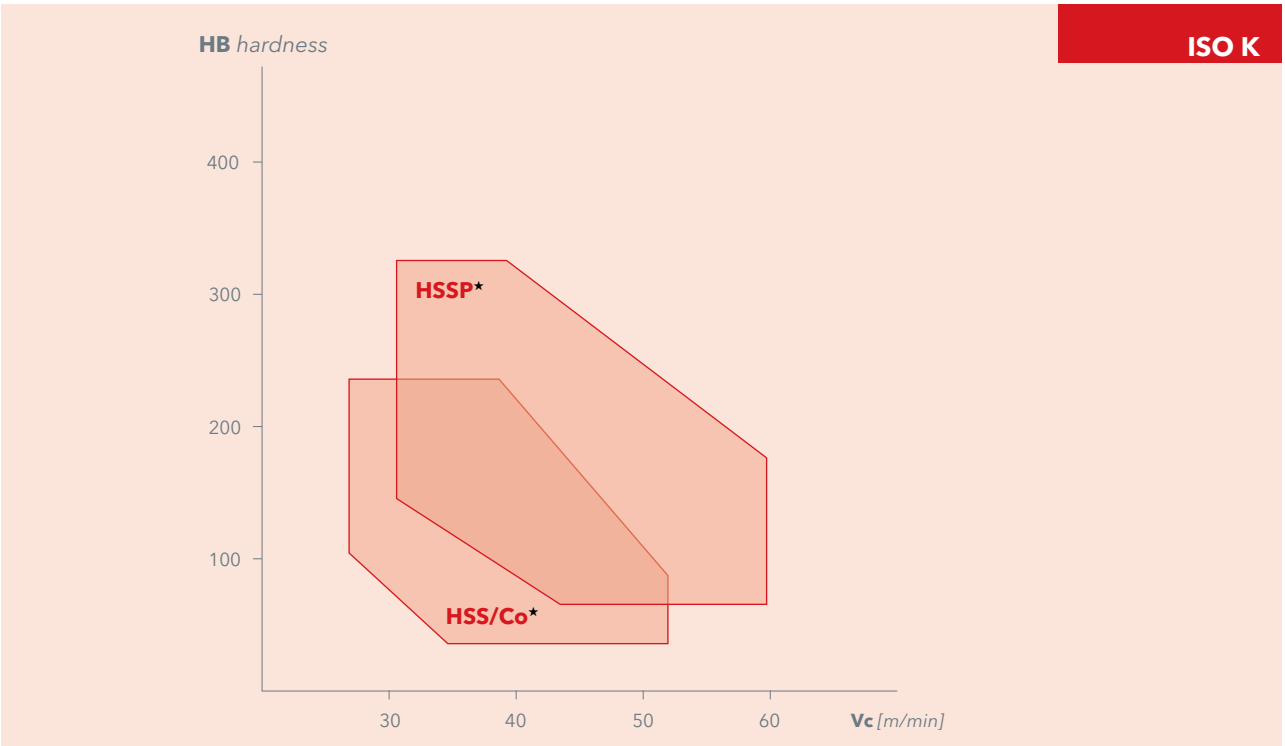


★ 1st choice ☆ suitable

HSS/Co : general purpose (page 641)
HSSP : high performance (page 641)

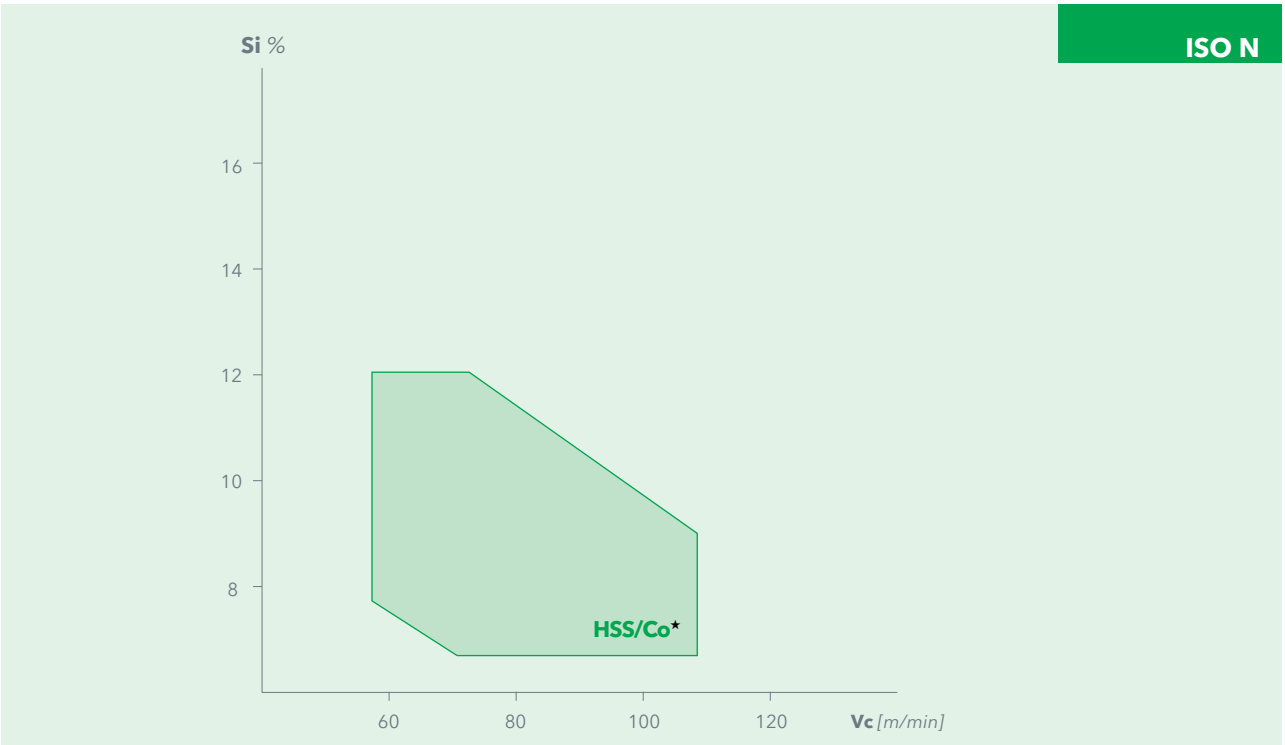
Grafici applicativi Anwendungsgrafiken Graphiques d'application Gráficos aplicativos Диаграммы

CAST IRON APPLICATION



★ 1st choice ☆ suitable

NON-FERROUS MATERIALS APPLICATION



★ 1st choice ☆ suitable

HSS/Co : general purpose (page 641)
HSSP : high performance (page 641)



INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

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.

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

WS2-TAWS2-UMWS2

weldon shank, 2 flutes

DIN 327 | 30° | SQUARE | Z2



WS2

N | HSS/Co | BR



TAWS2

N | HSS/Co | PV200



UMWS2

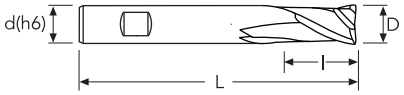
UM | HSS-P | PV200

P	M	K	N	S	H
★	☆	★	☆		
★	★	★			

WS2-TAWS2
UMWS2

SLOTTING | SIDE MILLING | DRILLING

★ 1st choice ☆ suitable



							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	●		
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 (Vc = +20%) - WS2 (Vc = -20% ÷ -30%)

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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**
	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
SLOTTING	**1**	0.003	0.003	0.002	0.002
	2	0.006	0.005	0.005	0.004
	3	0.009	0.008	0.007	0.006
	4	0.013	0.012	0.010	0.009
	5	0.017	0.015	0.013	0.012
	6	0.022	0.020	0.017	0.015
	8	0.032	0.029	0.024	0.022
	10	0.040	0.036	0.030	0.028
	12	0.048	0.043	0.036	0.034
	14	0.057	0.051	0.043	0.040
	16	0.067	0.060	0.050	0.047
	18	0.077	0.069	0.058	0.054
	20	0.088	0.079	0.066	0.062
	22	0.098	0.088	0.074	0.069
	24	0.105	0.095	0.079	0.074
	25	0.110	0.099	0.083	0.077
	26	0.116	0.104	0.087	0.081
	28	0.122	0.110	0.092	0.085
	30	0.128	0.115	0.096	0.090
ap x ae	**≤ D3**	0.25D x D			

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
SIDE MILLING	**1**	0.003	0.003	0.003	0.003
	2	0.007	0.006	0.006	0.004
	3	0.007	0.006	0.006	0.005
	4	0.011	0.010	0.009	0.008
	5	0.016	0.014	0.012	0.011
	6	0.020	0.018	0.016	0.014
	8	0.026	0.024	0.021	0.018
	10	0.038	0.035	0.031	0.027
	12	0.048	0.043	0.038	0.034
	14	0.058	0.052	0.046	0.040
	16	0.068	0.062	0.055	0.048
	18	0.080	0.072	0.064	0.056
	20	0.092	0.083	0.074	0.065
	22	0.106	0.095	0.084	0.074
	24	0.118	0.106	0.094	0.082
	25	0.126	0.113	0.101	0.088
	26	0.132	0.119	0.106	0.092
	28	0.139	0.125	0.111	0.097
	30	0.146	0.132	0.117	0.102
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 (Vc= +20%) - WS2 (Vc = -20% ÷ -30%)

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.005	0.003	0.002	0.002
	4	0.007	0.004	0.003	0.003
	5	0.009	0.006	0.005	0.005
	6	0.011	0.008	0.006	0.006
	8	0.016	0.010	0.008	0.008
	10	0.020	0.014	0.012	0.011
	12	0.024	0.018	0.015	0.014
	14	0.029	0.022	0.018	0.017
	16	0.034	0.026	0.021	0.020
	18	0.039	0.030	0.025	0.023
	20	0.044	0.035	0.029	0.027
	22	0.049	0.040	0.033	0.031
	24	0.053	0.044	0.037	0.034
	25	0.055	0.047	0.039	0.037
	26	0.058	0.050	0.041	0.039
	28	0.061	0.052	0.044	0.041
	30	0.064	0.055	0.046	0.043

WL2-TAWL2

weldon shank, 2 flutes, long

DIN 844 | N | HSS/Co BR | HSS/Co PV200 | 30° | SQUARE | Z2

WL2 TAWL2



WL2

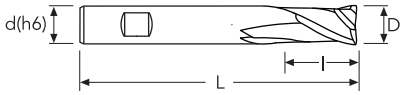


TAWL2

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

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

TAWL2

WL2 (Vc = -20% ÷ -30%)

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	**30÷50**	**25÷35**	**20÷30**	**12÷18**
SLOTTING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.006	0.005	0.005	0.004
	4	0.008	0.007	0.007	0.006
	5	0.011	0.010	0.009	0.008
	6	0.014	0.012	0.011	0.010
	8	0.020	0.018	0.016	0.015
	10	0.025	0.023	0.020	0.019
	12	0.030	0.027	0.024	0.023
	14	0.036	0.032	0.029	0.027
	16	0.042	0.038	0.034	0.032
	18	0.048	0.043	0.038	0.036
	20	0.053	0.048	0.043	0.040
	22	0.060	0.054	0.048	0.045
	25	0.070	0.063	0.056	0.053
	28	0.077	0.069	0.062	0.058
	30	0.084	0.076	0.067	0.063
ap x ae	**≤ D5**	0.25D x D			

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	Hardness/Rm	≤700 N/mm²	600÷800 N/mm²	800÷1000 N/mm²	900÷1200 N/mm²
	ap x ae	**0.2D x 0.1D**	**0.2D x 0.1D**	**0.2D x 0.1D**	**0.2D x 0.1D**
	Vc (m/min)	**35÷55**	**30÷40**	**25÷35**	**12÷20**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.006	0.006	0.005	0.005
	4	0.009	0.008	0.007	0.007
	5	0.012	0.011	0.009	0.009
	6	0.015	0.014	0.012	0.011
	8	0.022	0.020	0.018	0.017
	10	0.028	0.025	0.022	0.021
	12	0.033	0.030	0.027	0.025
	14	0.040	0.036	0.032	0.030
	16	0.046	0.042	0.037	0.035
	18	0.052	0.047	0.042	0.039
	20	0.059	0.053	0.047	0.044
	22	0.065	0.059	0.052	0.049
	25	0.077	0.069	0.062	0.058
	28	0.085	0.076	0.068	0.064
	30	0.092	0.083	0.074	0.069
ap x ae	**≤ D5**	1.5D x 0.05D			

WSA2

weldon shank, 2 flutes for aluminium

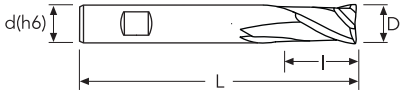
DIN 844 | ALU | HSS/Co BR | 42° | SQUARE | Z2



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
	Hardness/Rm				
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.015	0.014	0.012	0.018
	3	0.020	0.018	0.016	0.024
	4	0.030	0.027	0.024	0.036
	5	0.035	0.032	0.028	0.042
	6	0.042	0.038	0.034	0.050
	8	0.056	0.050	0.045	0.067
	10	0.073	0.066	0.058	0.088
	12	0.090	0.081	0.072	0.108
	14	0.106	0.095	0.085	0.127
	16	0.120	0.108	0.096	0.144
	18	0.135	0.122	0.108	0.162
	20	0.150	0.135	0.120	0.180
ap x ae	≤ D3	0.2D x D			

	Material Group ISO 513	N1	N2	N3 N4	N5
	Hardness/Rm				
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	0.018	0.016	0.014	0.020
	3	0.018	0.016	0.014	0.020
	4	0.024	0.022	0.019	0.027
	5	0.036	0.032	0.029	0.040
	6	0.042	0.038	0.034	0.047
	8	0.050	0.045	0.040	0.056
	10	0.067	0.060	0.054	0.075
	12	0.088	0.079	0.070	0.098
	14	0.108	0.097	0.086	0.121
	16	0.127	0.114	0.102	0.142
	18	0.144	0.130	0.115	0.161
	20	0.162	0.146	0.130	0.181
ap x ae	≤ D3	1.2D x 0.1D			

	Material Group ISO 513	N1	N2	N3 N4	N5
	Hardness/Rm				
	ap x ae	0.5D x 0.5D	0.5D x 0.5D	0.5D x 0.5D	0.5D x 0.5D
	Vc (m/min)	70÷90	55÷75	50÷60	90÷110
DRILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.010	0.007	0.006	0.009
	4	0.015	0.009	0.008	0.012
	5	0.018	0.014	0.012	0.018
	6	0.021	0.016	0.014	0.021
	8	0.028	0.019	0.017	0.025
	10	0.037	0.025	0.022	0.034
	12	0.045	0.033	0.029	0.044
	14	0.053	0.041	0.036	0.054
	16	0.060	0.048	0.042	0.064
	18	0.068	0.054	0.048	0.072
	20	0.075	0.061	0.054	0.081

WS3-TAWS3

weldon shank, 3 flutes

DIN 844 | N | HSS/Co BR | HSS/Co PV200 | 30° | SQUARE | Z3

WS3 TAWS3



WS3

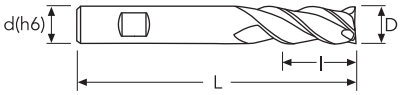


TAWS3

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	●		
1.5	-0.014/-0.028	6	7		51	3	WS3015	●		
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

TAWS3

WS3 (Vc = -20% ÷ -30%)

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.003	0.002	0.002	0.002
	2	0.005	0.005	0.004	0.004
	3	0.008	0.007	0.006	0.006
	4	0.012	0.011	0.009	0.008
	5	0.015	0.014	0.011	0.011
	6	0.020	0.018	0.015	0.014
	8	0.029	0.026	0.022	0.020
	10	0.036	0.032	0.027	0.025
	12	0.043	0.039	0.032	0.030
	14	0.051	0.046	0.038	0.036
	16	0.060	0.054	0.045	0.042
	18	0.069	0.062	0.052	0.049
	20	0.079	0.071	0.059	0.055
	22	0.088	0.079	0.066	0.062
	25	0.099	0.089	0.074	0.069
	28	0.122	0.110	0.090	0.085
	30	0.128	0.115	0.093	0.090
	32	0.136	0.116	0.095	0.093
ap x ae	**≤ D3**	0.25D x D			

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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**
SIDE MILLING	D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	1	0.003	0.003	0.002	0.002
	2	0.006	0.006	0.005	0.005
	3	0.006	0.006	0.005	0.005
	4	0.010	0.009	0.008	0.007
	5	0.014	0.013	0.011	0.010
	6	0.018	0.017	0.015	0.013
	8	0.024	0.021	0.019	0.017
	10	0.035	0.031	0.028	0.024
	12	0.043	0.039	0.035	0.030
	14	0.052	0.047	0.041	0.036
	16	0.062	0.055	0.049	0.043
	18	0.072	0.065	0.058	0.051
	20	0.083	0.075	0.067	0.058
	22	0.095	0.086	0.076	0.067
	25	0.113	0.102	0.091	0.079
	28	0.139	0.125	0.111	0.097
	30	0.143	0.130	0.115	0.100
	32	0.146	0.132	0.117	0.102
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 WL3 | HSS/Co PV200 TAWL3 | 30° | SQUARE | Z3



WL3

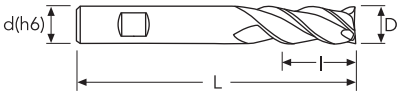


TAWL3

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 (Vc = -20% ÷ -30%)

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.006	0.005	0.005	0.004
	4	0.008	0.007	0.007	0.006
	5	0.011	0.010	0.009	0.008
	6	0.014	0.012	0.011	0.010
	8	0.020	0.018	0.016	0.015
	10	0.025	0.023	0.020	0.019
	12	0.030	0.027	0.024	0.023
	14	0.036	0.032	0.029	0.027
	16	0.042	0.038	0.034	0.032
	18	0.048	0.043	0.038	0.036
	20	0.053	0.048	0.043	0.040
	22	0.060	0.054	0.048	0.045
	25	0.070	0.063	0.056	0.053
ap x ae	**≤ D5**	0.25D x D			

	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	0.006	0.006	0.005	0.005
	4	0.009	0.008	0.007	0.007
	5	0.012	0.011	0.009	0.009
	6	0.015	0.014	0.012	0.011
	8	0.022	0.020	0.018	0.017
	10	0.028	0.025	0.022	0.021
	12	0.033	0.030	0.027	0.025
	14	0.040	0.036	0.032	0.030
	16	0.046	0.042	0.037	0.035
	18	0.052	0.047	0.042	0.039
	20	0.059	0.053	0.047	0.044
	22	0.065	0.059	0.052	0.049
	25	0.077	0.069	0.062	0.058
ap x ae	**≤ D5**	1.5D x 0.05D	1.5D x 0.05D	1.5D x 0.05D	1.5D x 0.05D

TAWSH3

weldon shank, 3 flutes

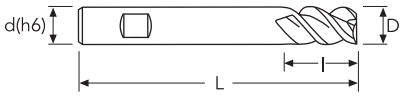
DIN 844 | N | HSS/Co PV200 | 50° | SQUARE | Z3



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

CUTTING PARAMETERS

TAWSH3

SLOTTING	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.020	0.018	0.015	0.014
	8	0.029	0.026	0.022	0.020
	10	0.036	0.032	0.027	0.025
	12	0.043	0.039	0.032	0.030
	14	0.051	0.046	0.038	0.036
	16	0.060	0.054	0.045	0.042
	18	0.069	0.062	0.052	0.049
	20	0.079	0.071	0.059	0.055

SIDE MILLING	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.018	0.017	0.015	0.013
	8	0.024	0.021	0.019	0.017
	10	0.035	0.031	0.028	0.024
	12	0.043	0.039	0.035	0.030
	14	0.052	0.047	0.041	0.036
	16	0.062	0.055	0.049	0.043
	18	0.072	0.065	0.058	0.051
	20	0.083	0.075	0.067	0.058

WS4(6)-TAWS4(6)-UMWS4

weldon shank, 4 flutes-6 flutes

DIN 844 | 30° | SQUARE | Z4~Z6



WS4(6)

N | HSS/Co | BR



TAWS4(6)

N | HSS/Co | PV200



UMWS4

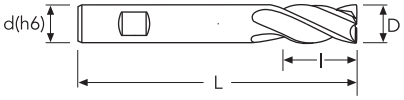
UM | HSS-P | PV200

P	M	K	N	S	H
★	☆	★	☆		
★	★	★			

WS4(6)-TAWS4(6)
UMWS4

SIDE MILLING

★ 1st choice ☆ suitable



							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	40	63		155	6			TAWS6400	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWS4

UMWS4 (Vc = +20%) - WS4 (Vc = -20% ÷ -30%)

	Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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**
SIDE MILLING	D (mm)	z	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	2	4	0.006	0.005	0.005	0.004
	3	4	0.006	0.005	0.005	0.004
	4	4	0.009	0.008	0.007	0.006
	5	4	0.012	0.011	0.010	0.009
	6	4	0.016	0.015	0.013	0.012
	8	4	0.021	0.019	0.017	0.016
	10	4	0.031	0.028	0.025	0.023
	12	4	0.038	0.035	0.031	0.029
	14	4	0.046	0.041	0.037	0.035
	16	4	0.055	0.049	0.044	0.041
	18	4	0.064	0.058	0.051	0.048
	20	4	0.074	0.067	0.059	0.055
	22	4	0.084	0.076	0.068	0.063
	24	6	0.088	0.079	0.071	0.066
	25	4	0.106	0.095	0.084	0.079
	28	6	0.102	0.092	0.082	0.077
	30	6	0.108	0.097	0.086	0.081
	32	6	0.113	0.102	0.091	0.085
	36	6	0.127	0.114	0.101	0.095
	40	6	0.139	0.125	0.111	0.104
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)

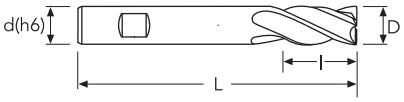


TAWL4(6)

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			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 (Vc = -20% ÷ -30%)

	Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
SIDE MILLING	**3**	4	0.004	0.004	0.003	0.003
	4	4	0.006	0.005	0.005	0.004
	5	4	0.009	0.008	0.007	0.006
	6	4	0.012	0.011	0.010	0.009
	8	4	0.015	0.013	0.012	0.011
	10	4	0.021	0.019	0.017	0.016
	12	4	0.027	0.024	0.021	0.020
	14	4	0.032	0.029	0.026	0.024
	16	4	0.038	0.034	0.030	0.028
	18	4	0.045	0.040	0.036	0.033
	20	4	0.050	0.045	0.040	0.038
	22	6	0.056	0.051	0.045	0.042
	25	6	0.068	0.061	0.054	0.051
	30	6	0.074	0.066	0.059	0.053
	32	6	0.077	0.069	0.062	0.054
	36	6	0.085	0.077	0.068	0.060
	40	6	0.095	0.086	0.076	0.067
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

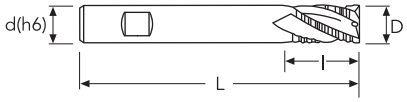
DIN 844 | N | HSS/Co PV200 | 30° | SQUARE | NR COARSE | Z3~Z4



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 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.022	0.020	0.018	0.017
	8	0.028	0.025	0.022	0.019
	10	0.035	0.032	0.028	0.025
	12	0.045	0.041	0.036	0.032
	14	0.055	0.050	0.044	0.039
	16	0.065	0.059	0.052	0.046
	18	0.075	0.068	0.060	0.053
	20	0.085	0.077	0.068	0.060

SIDE MILLING	Material Group ISO 513	P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	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)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	6	0.026	0.024	0.021	0.018
	8	0.033	0.030	0.026	0.023
	10	0.042	0.038	0.034	0.029
	12	0.054	0.049	0.043	0.038
	14	0.066	0.059	0.053	0.046
	16	0.078	0.070	0.062	0.055
	18	0.090	0.081	0.072	0.063
	20	0.102	0.092	0.082	0.071

WSFR-TAWSFR-UMWSFR

weldon shank, roughing HR

DIN 844 | 30° | SQUARE | HR FINE | Z3~Z6



WSFR

N | HSS/Co BR



TAWSFR

N | HSS/Co PV200



UMWSFR

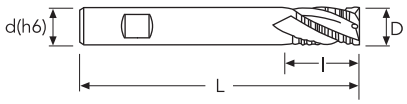
UM | HSS-P PV200

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 (Vc = +20%) - WSFR (Vc = -20% ÷ -30%)

SLOTTING

Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
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**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**
6	3	0.022	0.020	0.018	0.017
8	3	0.028	0.025	0.022	0.019
10	4	0.035	0.032	0.028	0.025
12	4	0.045	0.041	0.036	0.032
14	4	0.055	0.050	0.044	0.039
16	4	0.065	0.059	0.052	0.046
18	4	0.075	0.068	0.060	0.053
20	4	0.085	0.077	0.068	0.060
22	5	0.086	0.077	0.068	0.060
25	5	0.099	0.089	0.079	0.069
28	6	0.100	0.090	0.080	0.070
30	6	0.108	0.097	0.086	0.076
32	6	0.116	0.104	0.093	0.081
36	6	0.130	0.111	0.104	0.091
40	6	0.145	0.123	0.116	0.102

SIDE MILLING

Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
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**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**
6	3	0.026	0.024	0.021	0.018
8	3	0.033	0.030	0.026	0.023
10	4	0.042	0.038	0.034	0.029
12	4	0.054	0.049	0.043	0.038
14	4	0.066	0.059	0.053	0.046
16	4	0.078	0.070	0.062	0.055
18	4	0.090	0.081	0.072	0.063
20	4	0.102	0.092	0.082	0.071
22	5	0.103	0.092	0.082	0.072
25	5	0.119	0.107	0.095	0.083
28	6	0.120	0.108	0.096	0.084
30	6	0.130	0.117	0.104	0.091
32	6	0.139	0.125	0.111	0.097
36	6	0.156	0.140	0.125	0.109
40	6	0.174	0.157	0.139	0.122

WLFR-TAWLFR

weldon shank, roughing HR, long

DIN 844 | N | HSS/Co BR | HSS/Co PV200 | 30° | SQUARE | HR FINE | Z3~Z6

WLFR TAWLFR



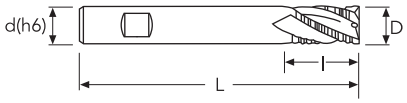
WLFR

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

CUTTING PARAMETERS

TAWLFR

WLFR (Vc = -20% ÷ -30%)

SLOTTING

Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
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	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	3	0.014	0.013	0.011	0.011
8	3	0.020	0.018	0.016	0.014
10	4	0.025	0.022	0.020	0.017
12	4	0.032	0.028	0.025	0.022
14	4	0.039	0.035	0.031	0.027
16	4	0.046	0.041	0.036	0.032
18	4	0.053	0.047	0.042	0.037
20	4	0.060	0.054	0.048	0.042
22	5	0.060	0.054	0.048	0.042
25	5	0.069	0.062	0.055	0.049
28	6	0.070	0.063	0.056	0.049
30	6	0.076	0.068	0.060	0.053
32	6	0.081	0.073	0.065	0.057
36	6	0.091	0.077	0.073	0.064
40	6	0.102	0.086	0.081	0.071

SIDE MILLING

Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
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)		**35÷45**	**25÷35**	**20÷30**	**10÷20**
D (mm)	z	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
6	3	0.017	0.015	0.013	0.012
8	3	0.024	0.022	0.019	0.017
10	4	0.029	0.026	0.024	0.021
12	4	0.038	0.034	0.030	0.026
14	4	0.046	0.042	0.037	0.032
16	4	0.055	0.049	0.044	0.038
18	4	0.063	0.057	0.050	0.044
20	4	0.071	0.064	0.057	0.050
22	5	0.072	0.065	0.057	0.050
25	5	0.083	0.075	0.067	0.058
28	6	0.084	0.076	0.067	0.059
30	6	0.091	0.082	0.073	0.064
32	6	0.097	0.088	0.078	0.068
36	6	0.109	0.098	0.087	0.076
40	6	0.122	0.110	0.097	0.085

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

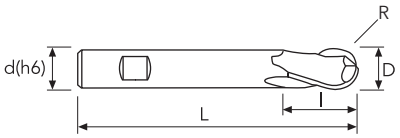


TAWSB2

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	●		
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	●		

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

TAWSB2

WSB2 (Vc = -20% ÷ -30%)



Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
Hardness/Rm		≤700 N/mm²	600÷800 N/mm²	800÷1000 N/mm²	900÷1200 N/mm²
ap x ae		**0.1D x 0.2D**	**0.1D x 0.2D**	**0.1D x 0.2D**	**0.1D x 0.2D**
Vc (m/min)		**40÷60**	**30÷50**	**25÷35**	**15÷25**
D (mm)	**D(eff.) (mm)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**
2	1.20	0.020	0.018	0.016	0.015
3	1.80	0.040	0.036	0.032	0.030
4	2.40	0.060	0.054	0.048	0.045
5	3.00	0.070	0.063	0.056	0.053
6	3.60	0.082	0.074	0.066	0.062
8	4.80	0.094	0.085	0.075	0.071
10	6.00	0.110	0.099	0.088	0.083
12	7.20	0.130	0.117	0.104	0.098
14	8.40	0.150	0.135	0.120	0.113
16	9.60	0.170	0.153	0.136	0.128
18	10.80	0.190	0.171	0.152	0.143
20	12.00	0.210	0.189	0.168	0.158
22	13.20	0.232	0.209	0.186	0.174
25	15.00	0.262	0.236	0.210	0.197



α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

WLB2

weldon shank, 2 flutes ball nose, long

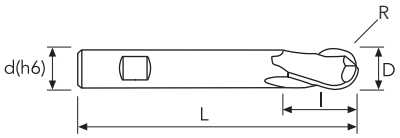
DIN 1889 | N | HSS/Co | BR | 30° | BALL NOSE | Z2 BALL



P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

COPYING



D(e8)	D(e8) Tol.	R	R Tol.	d(h6)	l	l1	L	z	EDP No.	Stock
3	-0.014/-0.028	1.50	+0.020/-0.020	6	8		56	2	WLB2030	●
4	-0.020/-0.038	2.00	+0.020/-0.020	6	11		63	2	WLB2040	●
5	-0.020/-0.038	2.50	+0.020/-0.020	6	13		68	2	WLB2050	●
6	-0.020/-0.038	3.00	+0.020/-0.020	6	13		68	2	WLB2060	●
8	-0.025/-0.047	4.00	+0.020/-0.020	10	19		88	2	WLB2080	●
10	-0.025/-0.047	5.00	+0.020/-0.020	10	22		95	2	WLB2100	●
12	-0.032/-0.059	6.00	+0.020/-0.020	12	26		110	2	WLB2120	●
14	-0.032/-0.059	7.00	+0.020/-0.020	12	26		110	2	WLB2140	●
16	-0.032/-0.059	8.00	+0.020/-0.020	16	32		123	2	WLB2160	●
18	-0.032/-0.059	9.00	+0.020/-0.020	16	32		123	2	WLB2180	●
20	-0.040/-0.073	10.00	+0.020/-0.020	20	38		141	2	WLB2200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

WLB2

	Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	Hardness/Rm		≤700 N/mm²	600÷800 N/mm²	800÷1000 N/mm²	900÷1200 N/mm²
	ap x ae		**0.1D x 0.2D**	**0.1D x 0.2D**	**0.1D x 0.2D**	**0.1D x 0.2D**
	Vc (m/min)		**25÷35**	**20÷30**	**15÷25**	**10÷15**
COPYING	D (mm)	D(eff.) (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	3	1.80	0.026	0.023	0.020	0.019
	4	2.40	0.038	0.034	0.031	0.029
	5	3.00	0.045	0.040	0.036	0.033
	6	3.60	0.052	0.047	0.042	0.039
	8	4.80	0.060	0.054	0.048	0.045
	10	6.00	0.070	0.063	0.056	0.053
	12	7.20	0.083	0.075	0.066	0.062
	14	8.40	0.096	0.086	0.077	0.072
	16	9.60	0.108	0.098	0.087	0.081
	18	10.80	0.121	0.109	0.097	0.091
	20	12.00	0.134	0.120	0.107	0.100

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

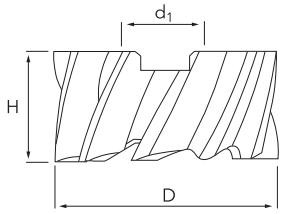


TAFM

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	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

TAFFM

FM (Vc = -20% ÷ -30%)

	Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
SIDE MILLING	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**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**
	40	8	0.060	0.054	0.048	0.045
	50	8	0.070	0.063	0.056	0.053
	63	8	0.080	0.072	0.064	0.060

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

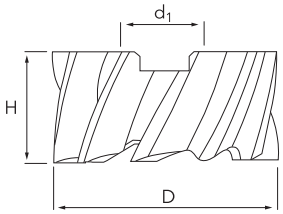


TAFFR

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	●

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

CARBIDE DRILLS

PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

TAFFR

FFR (Vc = -20% ÷ -30%)

	Material Group ISO 513		P1 P2	P3 P7 K1	P4 M1 K2	P5 M2
	Hardness/Rm		≤700 N/mm²	600÷800 N/mm²	800÷1000 N/mm²	900÷1200 N/mm²
SIDE MILLING	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	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	40	8	0.080	0.072	0.064	0.060
	50	8	0.100	0.090	0.080	0.075
	63	8	0.120	0.108	0.096	0.090

WCR

corner rounding

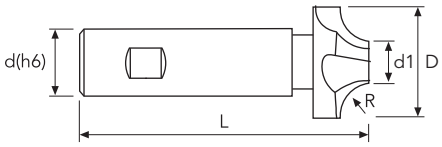
DIN 6518 | N | HSS/Co BR | 0° | Z4



P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

ROUNDING



D	R	R(H11) Tol.	d1	d(h6)	L	z	EDP No.	Stock
8	1.00	+0.060/0	6,00	10	60	4	WCR080	●
9	1.50	+0.060/0	6,00	10	60	4	WCR090	●
10	2.00	+0.060/0	6,00	10	60	4	WCR100	●
11	2.50	+0.060/0	6,00	10	60	4	WCR110	●
12	3.00	+0.060/0	6,00	12	60	4	WCR120	●
13	3.50	+0.075/0	6,00	12	60	4	WCR130	●
14	4.00	+0.075/0	6,00	12	60	4	WCR140	●
15	4.50	+0.075/0	6,00	12	60	4	WCR150	●
16	5.00	+0.075/0	6,00	12	60	4	WCR160	●
19	5.50	+0.075/0	8,00	16	67	4	WCR190	●
20	6.00	+0.075/0	8,00	16	67	4	WCR200	●
21	6.50	+0.090/0	8,00	16	71	4	WCR210	●
22	7.00	+0.090/0	8,00	16	71	4	WCR220	●
23	7.50	+0.090/0	8,00	16	71	4	WCR230	●
24	8.00	+0.090/0	8,00	16	71	4	WCR240	●
25	8.50	+0.090/0	8,00	25	85	4	WCR250	●
26	9.00	+0.090/0	8,00	25	85	4	WCR260	●
27	9.50	+0.090/0	8,00	25	85	4	WCR270	●
28	10.00	+0.090/0	8,00	25	85	4	WCR280	●
32	11.00	+0.110/0	10,00	25	90	4	WCR320	●

● stock standard ○ non-standard stock ▽ stock exhaustion

CUTTING PARAMETERS

WCR

ROUNDING

Material Group ISO 513	P1 P2 P3 P4	P7 M1	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**
D (mm)	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
8	0.006	0.004	0.005	0.007
9	0.008	0.006	0.007	0.009
10	0.010	0.007	0.009	0.011
11	0.012	0.008	0.010	0.013
12	0.015	0.010	0.012	0.016
13	0.017	0.012	0.014	0.019
14	0.020	0.014	0.017	0.021
15	0.023	0.016	0.019	0.025
16	0.025	0.018	0.021	0.028
17	0.026	0.018	0.022	0.029
18	0.027	0.019	0.023	0.030
19	0.029	0.020	0.024	0.031
20	0.030	0.021	0.026	0.033
21	0.033	0.023	0.028	0.036
22	0.035	0.025	0.030	0.039
23	0.038	0.026	0.032	0.041
24	0.040	0.028	0.034	0.044
25	0.042	0.029	0.035	0.046
26	0.043	0.030	0.037	0.047
27	0.045	0.031	0.038	0.049
28	0.046	0.032	0.039	0.051
32	0.050	0.035	0.043	0.055

WDC

Dovetail cutter

DIN 1833 | N | HSS/Co BR | α 45° | α 60° | Z6~Z12

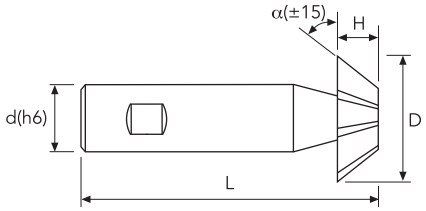
WDC 45 WDC 60



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°

DOVETAIL B 45°-60°	Material Group ISO 513		P1 P2 P3 P4	P7 M1	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	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
	16	6	0.015	0.011	0.013	0.017
	20	6	0.017	0.012	0.014	0.018
	22	6	0.018	0.013	0.015	0.020
	25	8	0.020	0.014	0.017	0.022
	28	8	0.023	0.016	0.019	0.025
	32	10	0.025	0.018	0.021	0.028
	38	12	0.028	0.020	0.024	0.031

WDD

Dovetail cutter

DIN 1833 | N | HSS/Co BR | α 45° | α 60° | Z6~Z12

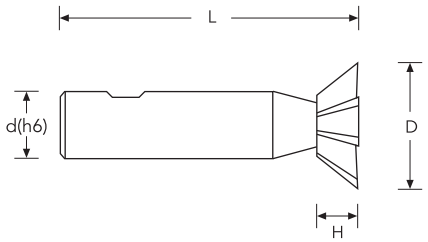
WDD 45 WDD 60



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	P7 M1	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**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**	**fz (mm/z)**
16	6	0.015	0.011	0.013	0.017
20	6	0.017	0.012	0.014	0.018
22	6	0.018	0.013	0.015	0.020
25	8	0.020	0.014	0.017	0.022
28	8	0.023	0.016	0.019	0.025
32	10	0.025	0.018	0.021	0.028
38	12	0.028	0.020	0.024	0.031

WTM

T-slot

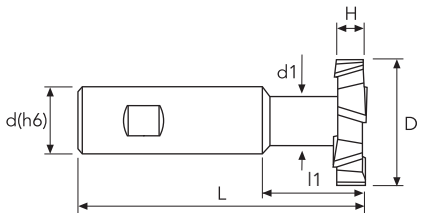
DIN 851 | N | HSS/Co BR | 15° | SQUARE | Z6~Z8



P	M	K	N	S	H
★	☆	★	☆		

★ 1st choice ☆ suitable

T SLOT



D(d11)	D(d11) Tol.	d(h6)	d1(h12)	d1 Tol.	l1	H(d11)	H Tol.	L	z	EDP No.	Stock
12.5	-0.050/-0.160	10	5	0/-0.012	13	6	-0-030/-0.105	57	6	WTM125	●
16	-0.050/-0.160	10	6.5	0/-0.015	19	8	-0-040/-0.130	62	6	WTM160	●
18	-0.050/-0.160	12	8	0/-0.015	22	8	-0-040/-0.130	70	6	WTM180	●
19	-0.065/-0.195	12	8	0/-0.015	23	9	-0-040/-0.130	71	6	WTM190	●
21	-0.065/-0.195	12	10	0/-0.015	26	9	-0-040/-0.130	74	6	WTM210	●
22	-0.065/-0.195	12	10	0/-0.015	27	10	-0-040/-0.130	75	6	WTM220	●
25	-0.065/-0.195	16	12	0/-0.018	31	11	-0-050/-0.160	82	6	WTM250	●
28	-0.065/-0.195	16	13	0/-0.018	32	12	-0-050/-0.160	83	6	WTM280	●
32	-0.080/-0.240	16	15	0/-0.018	41	14	-0-050/-0.160	90	8	WTM320	●
36	-0.080/-0.240	25	17	0/-0.018	42	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	P7 M1	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	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
12.5	6	0.010	0.007	0.009	0.011
16	6	0.025	0.018	0.021	0.028
18	6	0.030	0.021	0.026	0.033
19	6	0.035	0.025	0.030	0.039
21	6	0.040	0.028	0.034	0.044
22	6	0.043	0.030	0.036	0.047
25	6	0.045	0.032	0.038	0.050
28	6	0.050	0.035	0.043	0.055
32	8	0.057	0.040	0.048	0.063
36	8	0.065	0.046	0.055	0.072

WWK

Woodruff

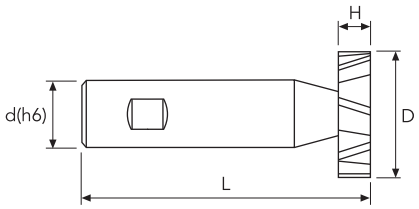
DIN 850 | N | HSS/Co BR | 10° | SQUARE | Z8~Z14



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	P7 M1	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	fz (mm/z)	fz (mm/z)	fz (mm/z)	fz (mm/z)
10.5	8	0.010	0.007	0.009	0.011
13.5	8	0.018	0.012	0.015	0.019
16.5	8	0.025	0.018	0.021	0.028
19.5	8	0.033	0.023	0.028	0.036
22.5	10	0.040	0.028	0.034	0.044
25.5	10	0.045	0.032	0.038	0.050
28.5	10	0.050	0.035	0.043	0.055
32.5	12	0.055	0.039	0.047	0.061

CARBIDE BURRS



SELECTION GUIDE . 684
CARBIDE BURRS . 685

Indice grafico Auswahlhilfe Indice graphique Índice gráfico Руководство по выбору

ITEM No.	PAGE	Ø3 mm	Ø6 mm
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SM	698		
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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-Rotierfräser. 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.

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

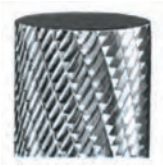
HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CARBIDE BURRS



M



MPC



MNF

M

Double cut
Doppio taglio
2 Schneiden

Coupe double
Doble corte
Двойная заточка

MPC

Plain cut
Taglio piano
Flachschneide

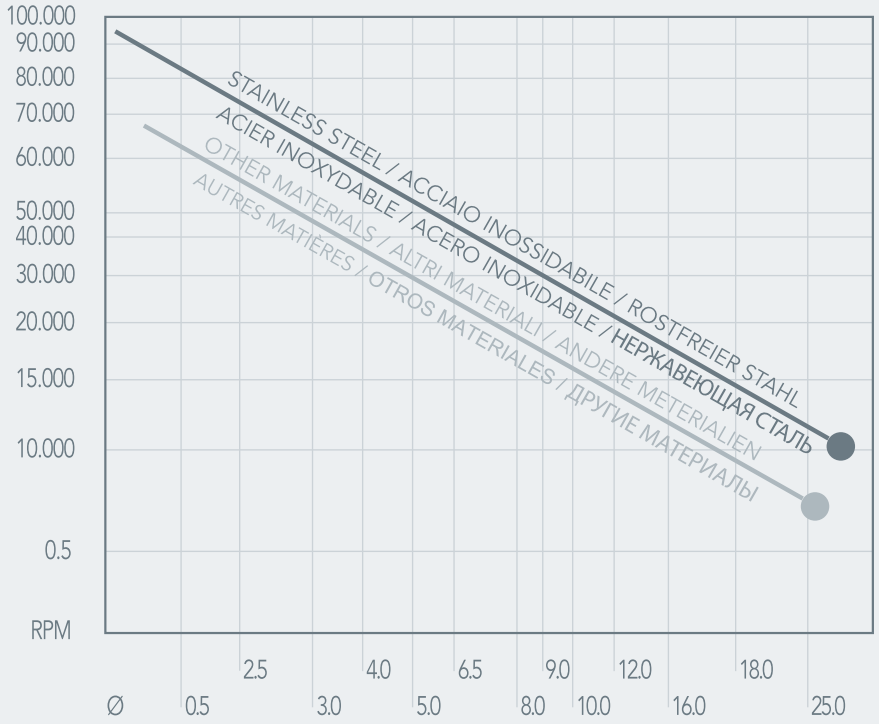
Coupe plane
Corte plano
Обычная заточка

MFN

Alucut

SPEED TABLE
TABELLA VELOCITÀ
GESCHWINDIGKEITSTABELLE

TABLEAU DE VITESSE
TABLA DE VELOCIDAD
ТАБЛИЦА СКОРОСТЕЙ

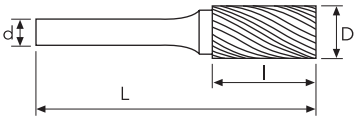


SA

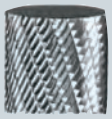
OSAWA NORM







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M


MPC

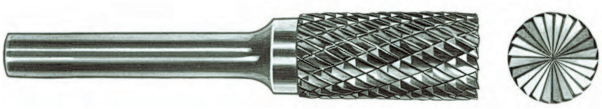

MNF

D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	type	Stock
1.5	3		6	38		5	SA41M	Solid	●	SA41MPC	Solid	●			
2.5	3		11	38		5	SA42M	Solid	●	SA42MPC	Solid	●			
3.0	3		14	38		5	SA43M	Solid	●	SA43MPC	Solid	●			
3.0		6	12	50		5	SA11M	Solid	●	SA11MPC	Solid	○			
4.0	3		12	38		5	SA52M	Solid	●	SA52MPC	Solid	●			
4.0		6	13	50		5	SA13M	Solid	●	SA13MPC	Solid	○			
5.0	3		12.7	38		5	SA53M	Solid	●	SA53MPC	Solid	●			
5.0		6	16	50		5	SA14M	Solid	●	SA14MPC	Solid	○			
6.0		6	18	50		5	SA1M	Solid	●	SA1MPC	Solid	○	SA1MNF	Solid	○
6.3	3		12.7	45		5	SA51M	Brazed	●	SA51MPC	Brazed	●			
8.0		6	19	64		5	SA2M	Brazed	●	SA2MPC	Brazed	○			
9.5		6	19	64		5	SA3M	Brazed	●	SA3MPC	Brazed	○	SA3MNF	Brazed	○
11.0		6	25	70		5	SA4M	Brazed	●	SA4MPC	Brazed	○			
12.7		6	25	70		5	SA5M	Brazed	●	SA5MPC	Brazed	○	SA5MNF	Brazed	○
16.0		6	25	70		5	SA6M	Brazed	●	SA6MPC	Brazed	○	SA6MNF	Brazed	○
19.0		6	25	70		5	SA7M	Brazed	●	SA7MPC	Brazed	○	SA7MNF	Brazed	○
25.0		6	25	70		5	SA9M	Brazed	●	SA9MPC	Brazed	○			

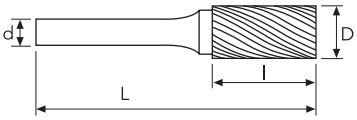
● stock standard ○ non-standard stock ▽ stock exhaustion

SB

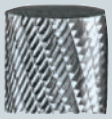
OSAWA NORM







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							M			MPC			MNF		
															
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	type	Stock
1.5	3		6	38		5	SB41M	Solid	●	SB41MPC	Solid	●			
2.5	3		11	38		5	SB42M	Solid	●	SB42MPC	Solid	●			
3.0	3		14	38		5	SB43M	Solid	●	SB43MPC	Solid	●			
3.0		6	12	50		5	SB11M	Solid	●	SB11MPC	Solid	○			
4.0		6	13	50		5	SB13M	Solid	●	SB13MPC	Solid	○			
5.0		6	16	50		5	SB14M	Solid	●	SB14MPC	Solid	○			
6.0		6	18	50		5	SB1M	Solid	●	SB1MPC	Solid	○	SB1MNF	Solid	○
6.3	3		4.7	37		5	SB51M	Brazed	●	SB51MPC	Brazed	●			
8.0		6	19	64		5	SB2M	Brazed	●	SB2MPC	Brazed	○			
9.5		6	19	64		5	SB3M	Brazed	●	SB3MPC	Brazed	○	SB3MNF	Brazed	○
11.0		6	25	70		5	SB4M	Brazed	●	SB4MPC	Brazed	○			
12.7		6	25	70		5	SB5M	Brazed	●	SB5MPC	Brazed	○	SB5MNF	Brazed	○
16.0		6	25	70		5	SB6M	Brazed	●	SB6MPC	Brazed	○	SB6MNF	Brazed	○
19.0		6	25	70		5	SB7M	Brazed	○	SB7MPC	Brazed	○	SB7MNF	Brazed	○
25.0		6	25	70		5	SB9M	Brazed	○	SB9MPC	Brazed	○			

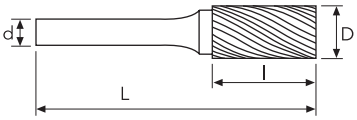
● stock standard ○ non-standard stock ∇ stock exhaustion

SC

OSAWA NORM







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							M			MPC			MNF		
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	type	Stock
2.5	3		11	38		5	SC41M	Solid	●	SC41MPC	Solid	●			
3.0	3		14	38		5	SC42M	Solid	●	SC42MPC	Solid	●			
3.0		6	12	50		5	SC11M	Solid	●	SC11MPC	Solid	○			
4.0		6	13	50		5	SC13M	Solid	●	SC13MPC	Solid	○			
5.0	3		12.7	38		5	SC53M	Solid	●	SC53MPC	Solid	●			
5.0		6	16	50		5	SC14M	Solid	●	SC14MPC	Solid	○			
6.0		6	18	50		5	SC1M	Solid	●	SC1MPC	Solid	○	SC1MNF	Solid	○
6.3	3		12.7	45		5	SC51M	Brazed	●	SC51MPC	Brazed	●			
8.0		6	19	63		5	SC2M	Brazed	●	SC2MPC	Brazed	○			
9.5		6	19	63		5	SC3M	Brazed	●	SC3MPC	Brazed	○	SC3MNF	Brazed	○
11.0		6	25	70		5	SC4M	Brazed	●	SC4MPC	Brazed	○			
12.7		6	25	70		5	SC5M	Brazed	●	SC5MPC	Brazed	○	SC5MNF	Brazed	○
16.0		6	25	70		5	SC6M	Brazed	●	SC6MPC	Brazed	○	SC6MNF	Brazed	○
19.0		6	25	70		5	SC7M	Brazed	○	SC7MPC	Brazed	○	SC7MNF	Brazed	○
25.0		6	25	70		5	SC9M	Brazed	○	SC9MPC	Brazed	○			

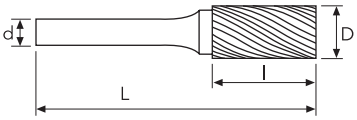
● stock standard ○ non-standard stock ▽ stock exhaustion

SD

OSAWA NORM







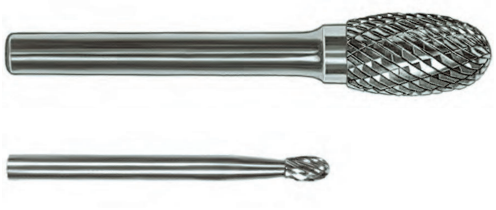
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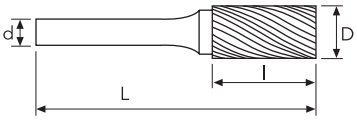
							M			MPC			MNF		
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	type	Stock
2.5	3		2.3	38		5	SD41M	Solid	●	SD41MPC	Solid	●			
3.0	3		2.5	38		5	SD42M	Solid	●	SD42MPC	Solid	●			
3.0		6	2.5	50		5	SD11M	Solid	●	SD11MPC	Solid	○			
5.0	3		4.7	38		5	SD53M	Solid	●	SD53MPC	Solid	●			
5.0		6	4	50		5	SD14M	Solid	●	SD14MPC	Solid	○			
6.0		6	4.7	50		5	SD1M	Solid	●	SD1MPC	Solid	○	SD1MNF	Solid	○
6.3	3		5	38		5	SD51M	Brazed	●	SD51MPC	Brazed	●			
8.0		6	6	52		5	SD2M	Brazed	●	SD2MPC	Brazed	○			
9.5		6	8	54		5	SD3M	Brazed	●	SD3MPC	Brazed	○	SD3MNF	Brazed	○
11.0		6	9.5	55		5	SD4M	Brazed	●	SD4MPC	Brazed	○			
12.7		6	11	56		5	SD5M	Brazed	●	SD5MPC	Brazed	○	SD5MNF	Brazed	○
16.0		6	14	60		5	SD6M	Brazed	●	SD6MPC	Brazed	○	SD6MNF	Brazed	○
19.0		6	16.5	62		5	SD7M	Brazed	●	SD7MPC	Brazed	○	SD7MNF	Brazed	○
25.0		6	22	68		5	SD9M	Brazed	●	SD9MPC	Brazed	○			

● 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.	type	Stock	EDP No.	type	Stock	EDP No.	type	Stock
3.0	3		5.5	38		5	SE41M	Solid	●	SE41MPC	Solid	●			
6.0		6	10	50		5	SE1M	Solid	●	SE1MPC	Solid	○			
5.0	3		7.1	38		5	SE53M	Solid	●	SE53MPC	Solid	●			
6.3	3		9.5	42		5	SE51M	Brazed	●	SE51MPC	Brazed	●			
9.5		6	16	60		5	SE3M	Brazed	●	SE3MPC	Brazed	○	SE3MNF	Brazed	○
12.7		6	22	67		5	SE5M	Brazed	●	SE5MPC	Brazed	○	SE5MNF	Brazed	○
16.0		6	25	70		5	SE6M	Brazed	●	SE6MPC	Brazed	○	SE6MNF	Brazed	○
19.0		6	25	70		5	SE7M	Brazed	○	SE7MPC	Brazed	○	SE7MNF	Brazed	○

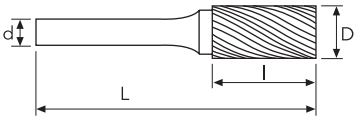
● stock standard ○ non-standard stock ▽ stock exhaustion

SF

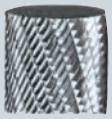
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D	d (3)	d (6)	l	L	ANGLE	PACKAGING	M EDP No.	M type	M Stock	MPC EDP No.	MPC type	MPC Stock	MNF EDP No.	MNF type	MNF Stock
3.0	3		6	38		5	SF41M	Solid	●	SF41MPC	Solid	●			
3.0	3		14	38		5	SF42M	Solid	●	SF42MPC	Solid	●			
3.0		6	12	50		5	SF11M	Solid	●	SF11MPC	Solid	○			
5.0	3		12.7	38		5	SF53M	Solid	●	SF53MPC	Solid	●			
6.0		6	18	50		5	SF1M	Solid	●	SF1MPC	Solid	○	SF1MNF	Solid	○
6.3	3		12.7	45		5	SF51M	Brazed	●	SF51MPC	Brazed	●			
9.6		6	19	64		5	SF3M	Brazed	●	SF3MPC	Brazed	○	SF3MNF	Brazed	○
11.0		6	25	70		5	SF4M	Brazed	●	SF4MPC	Brazed	○			
12.7		6	19	65		5	SF13M	Brazed	○	SF13MPC	Brazed	○			
12.7		6	25	70		5	SF5M	Brazed	●	SF5MPC	Brazed	○	SF5MNF	Brazed	○
16.0		6	25	70		5	SF6M	Brazed	●	SF6MPC	Brazed	○	SF6MNF	Brazed	○
19.0		6	25	70		5	SF7M	Brazed	○	SF7MPC	Brazed	○			

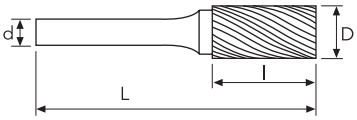
● stock standard ○ non-standard stock ∇ stock exhaustion

SG

OSAWA NORM







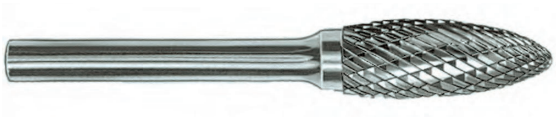
Always wear goggles when using the rotary burrs
Per l'uso delle lime rotative è obbligatorio indossare occhiali protettivi
Tragen Sie immer die Schutzbrille wenn Sie die Fräser benutzen
Toujours porter les lunettes de securité en utilisant les limes rotatives
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При работе с борфрезами всегда используйте защитные очки

							M			MPC			MNF	
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	Stock
3.0	3		6	38		5	SG41M	Solid	●	SG41MPC	Solid	●		
3.0	3		10	38		5	SG43M	Solid	●	SG43MPC	Solid	●		
3.0	3		14	38		5	SG44M	Solid	●	SG44MPC	Solid	●		
5.0	3		12.7	38		5	SG53M	Solid	●	SG53MPC	Solid	●		
6.0		6	18	50		5	SG1M	Solid	●	SG1MPC	Solid	○		
6.3	3		12.7	45		5	SG51M	Brazed	●	SG51MPC	Brazed	●		
8.0		6	19	64		5	SG2M	Brazed	●	SG2MPC	Brazed	○		
9.5		6	19	64		5	SG3M	Brazed	●	SG3MPC	Brazed	○		
12.7		6	19	64		5	SG13M	Brazed	○	SG13MPC	Brazed	○		
12.7		6	25	70		5	SG5M	Brazed	●	SG5MPC	Brazed	○		
16.0		6	25	70		5	SG6M	Brazed	●	SG6MPC	Brazed	○		
19.0		6	25	70		5	SG7M	Brazed	●	SG7MPC	Brazed	○		
19.0		6	38	83		5	SG15M	Brazed	○	SG15MPC	Brazed	○		

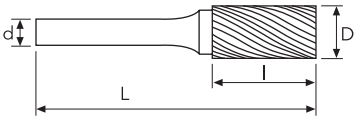
● stock standard ○ non-standard stock ∇ stock exhaustion

SH

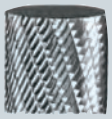
OSAWA NORM







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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.	type	Stock	EDP No.	type	Stock	EDP No.	Stock
3.0	3		6	38		5	SH41M	Solid	●	SH41MPC	Solid	●		
5.0	3		9.5	38		5	SH53M	Solid	●	SH53MPC	Solid	●		
8.0		6	19	64		5	SH2M	Brazed	●	SH2MPC	Brazed	○		
12.7		6	32	77		5	SH5M	Brazed	●	SH5MPC	Brazed	○		
16.0		6	36	80		5	SH6M	Brazed	○	SH6MPC	Brazed	○		

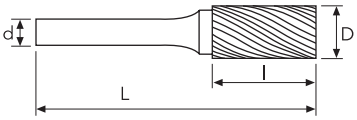
● stock standard ○ non-standard stock ∇ stock exhaustion

SJ

OSAWA NORM







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							M			MPC			MNF	
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	Stock
3.0	3		2.5	38	60°	5	SJ42M	Solid	●	SJ42MPC	Solid	●		
6.0		6	4	50	60°	5	SJ1M	Solid	○	SJ1MPC	Solid	○		
9.5		6	8	56	60°	5	SJ3M	Brazed	●	SJ3MPC	Brazed	○		
12.7		6	11	59	60°	5	SJ5M	Brazed	●	SJ5MPC	Brazed	○		
16.0		6	14.5	63	60°	5	SJ6M	Brazed	○	SJ6MPC	Brazed	○		
19.0		6	17.5	65	60°	5	SJ7M	Brazed	○	SJ7MPC	Brazed	○		
25.0		6	24.5	70	60°	5	SJ9M	Brazed	○	SJ9MPC	Brazed	○		

● stock standard ○ non-standard stock ∇ stock exhaustion

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

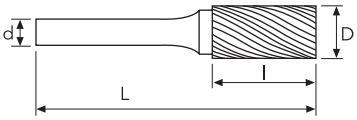
CARBIDE BURRS

SK

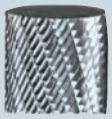
OSAWA NORM







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							M			MPC			MNF	
														
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	Stock
3.0	3		1.5	38	90°	5	SK42M	Solid	●	SK42MPC	Solid	●		
6.0		6	3	50	90°	5	SK1M	Solid	●	SK1MPC	Solid	○		
9.5		6	4.7	53	90°	5	SK3M	Brazed	●	SK3MPC	Brazed	○		
12.7		6	6.3	55	90°	5	SK5M	Brazed	●	SK5MPC	Brazed	○		
16.0		6	8	57	90°	5	SK6M	Brazed	●	SK6MPC	Brazed	○		
19.0		6	9.5	59	90°	5	SK7M	Brazed	○	SK7MPC	Brazed	○		
25.0		6	12.7	60	90°	5	SK9M	Brazed	○	SK9MPC	Brazed	○		

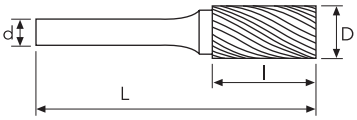
● stock standard ○ non-standard stock ∇ stock exhaustion

SL

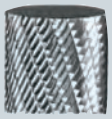
OSAWA NORM







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							M			MPC			MNF		
															
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	type	Stock
3.0	3		10	38	10°	5	SL41M	Solid	●	SL41MPC	Solid	●			
3.0	3		14	38	8°	5	SL42M	Solid	●	SL42MPC	Solid	●			
5.0	3		12.7	38	14°	5	SL53M	Solid	●	SL53MPC	Solid	●			
6.0		6	18	50	14°	5	SL1M	Solid	●	SL1MPC	Solid	○			
8.0		6	25.4	70	14°	5	SL2M	Brazed	●	SL2MPC	Brazed	○			
9.6		6	30.2	76	14°	5	SL3M	Brazed	●	SL3MPC	Brazed	○	SL3MNF	Brazed	○
12.7		6	32	77	14°	5	SL4M	Brazed	●	SL4MPC	Brazed	○	SL4MNF	Brazed	○
16.0		6	33.3	78	14°	5	SL5M	Brazed	●	SL5MPC	Brazed	○	SL5MNF	Brazed	○
19.0		6	41.3	86	14°	5	SL7M	Brazed	○	SL7MPC	Brazed	○			

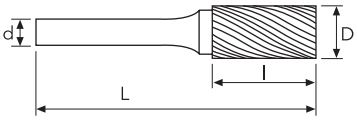
● stock standard ○ non-standard stock ▽ stock exhaustion

SM

OSAWA NORM







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							M			MPC			MNF	
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	Stock
3.0	3		8	38	18°	5	SM41M	Solid	●	SM41MPC	Solid	●		
3.0	3		11	38	14°	5	SM42M	Solid	●	SM42MPC	Solid	●		
3.0	3		15	38	10°	5	SM43M	Solid	●	SM43MPC	Solid	●		
6.0		6	12.7	50	22°	5	SM1M	Solid	●	SM1MPC	Solid	○		
6.0		6	20	50	14°	5	SM2M	Solid	●	SM2MPC	Solid	○		
6.0		6	25	50	10°	5	SM3M	Solid	●	SM3MPC	Solid	○		
6.3	3		12.7	51	22°	5	SM51M	Brazed	●	SM51MPC	Brazed	●		
9.5		6	16	64	28°	5	SM4M	Brazed	●	SM4MPC	Brazed	○		
12.7		6	22	71	28°	5	SM5M	Brazed	●	SM5MPC	Brazed	○		
16.0		6	25	74	31°	5	SM6M	Brazed	●	SM6MPC	Brazed	○		

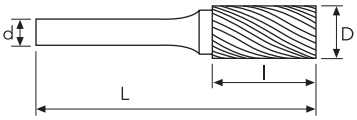
● stock standard ○ non-standard stock ∇ stock exhaustion

SN

OSAWA NORM







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							M			MPC			MNF	
D	d (3)	d (6)	l	L	ANGLE	PACKAGING	EDP No.	type	Stock	EDP No.	type	Stock	EDP No.	Stock
3.0	3		4	38	10°	5	SN42M	Solid	●	SN42MPC	Solid	●		
6.0		6	8	50	10°	5	SN1M	Solid	●	SN1MPC	Solid	○		
6.3	3		6	39	12°	5	SN51M	Brazed	○	SN51MPC	Brazed	○		
9.5		6	9.5	55	13°	5	SN2M	Brazed	●	SN2MPC	Brazed	○		
12.7		6	12.7	58	28°	5	SN4M	Brazed	●	SN4MPC	Brazed	○		
16.0		6	19	64	18°	5	SN6M	Brazed	○	SN6MPC	Brazed	○		
19.0		6	16	61	30°	5	SN7M	Brazed	○	SN7MPC	Brazed	○		

● stock standard ○ non-standard stock ∇ stock exhaustion

INFO

CARBIDE DRILLS
PU-HPU
4HTA
GA-HGA
CV
HVA
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS
LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS
G2
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS



M

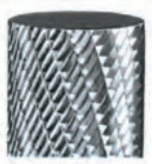
BUR10 M TYPE
Set 10pcs. - shank Ø6 mm
SA1 - SB1 - SC1 - SD1 - SE1 - SF1 - SG1 - SL1 - SM1 - SN1



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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SORMA
DIAMOND & CUTTING TOOLS

$OC

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