OSAWA

DRILLS & END MILLS

CATALOGUE 2011

CATALOGUE 2011

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 secure maximum useful 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. The 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 whose cutting edges are worn-out or chipped severely.
- Grinding operations may produce potentially hazardous dust particles or vapour. Adequate ventilation equipment should be provided

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.

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.

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.

DRILLS

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DRILLS

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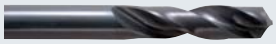
EXTRA SHORT DIN1897 - DIN6539	TA	MG PV200	140°	30°	343TA	
	TA	MG BR	140°	30°	318N	
	LF	HSS/CO PV10	130°	35~40°	218LFTA	
	SU	HSSE PV10	120°	38°	980SUTA	
	N	HSS OX	118°	25~30°	118N	
	NH	HSS/CO HT	130°	30°	218NVA	
SHORT DIN338 - DIN6537K DIN6537L - DIN345	TA	MG PV200	140°	30°	353TA 3xD	
	TA	MG PV200	140°	30°	355TA 5xD	
	HTA	MG PV200	140°	30°	353HTA 3xD	
	HTA	MG PV200	140°	30°	355HTA 5xD	
	SUH	MG PV300	140°	30°	353SUH 3xD	
	SUH	MG PV300	140°	30°	355SUH 5xD	
	ALH	MG LAPPED	140°	30°	353ALH 3xD	
	ALH	MG LAPPED	140°	30°	355ALH 5xD	
	LF	HSS/CO PV10	130°	35~40°	238LFTA	
	SU	HSSE PV10	120°	38°	990SUTA	
	N	HSS OX	118°	25~30°	138N	
	N	HSS TiN	118°	25~30°	138NTI	
	SPLIT POINT	HSS TiN	118°	30°	1386STI	
	W	HSS BR	130°	35~40°	138WB	

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	BRASS OTTONE MESSING LAITON
1~16	18	◉	◉		○			◉		
1~13	18	◉	○		○		○	◉	○	
2~20	38	◉	○		○			○	○	
2~13	46	◉	○		◉		◉		◉	
1~16	58	◉	○		○		○	○	○	○
1~20	58	◉	○		◉		○	○	○	○
3~20	24	◉	◉		○			◉		
3~20	28	◉	◉		○			◉		
3~20	24	◉	◉		○			◉		
3~20	28	◉	◉		○			◉		
3~20	24	◉	○		◉			○	○	
3~20	28	◉	○		◉			○	○	
3~16	24								◉	
3~16	28								◉	
2~16	42	◉	○		○			○	○	
2~20	50	◉	○		◉		◉		◉	
0.2~20	63	◉	○		○		○	○	○	○
1~16	63	◉	○		○		○	○	○	○
1~13	63	◉	○		○		○	○	○	○
1~10	63								◉	

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

SHORT DIN338 - DIN6537K DIN6537L - DIN345	H	HSS BR	118°	12~15°	138HB	
	NH	HSS/CO HT	130°	30°	238NVA	
	SPLIT POINT	HSS/Co TiN	135°	33°	2386STI	
	N	HSS OX	118°	25~30°	145N	
	N	HSS TiN	118°	25~30°	145NTI	
	NH	HSS/CO HT	130°	30°	245N	
LONG DIN340 - DIN341 OSAWA NORM	SUH	MG PV300	140°	30°	358SUH 8xD	
	4HTA	MG PV300	140°	30°	3584HTA 8xD	
	SUH	MG PV300	140°	30°	3512SUH 12xD	
	NH	HSS/CO HT	130°	30°	234NVA	
	LS	HSS/CO OX	130°	35~40°	234LS	
	LS	HSS/CO PV15	130°	35~40°	234LSTH	
	LS	HSS/Co BR	130°	35~40°	241LS	
EXTRA LONG DIN1869/1-2-3 DIN1870/1-2	LS	HSS/Co BR	130°	35~40°	2691LS	
	LS	HSS/CO PV15	130°	35~40°	2691LSTH	
	LS	HSS BR	130°	35~40°	1692LS	
	LS	HSS BR	130°	35~40°	1693LS	
	LS	HSS/Co BR	130°	35~40°	2701LS	
	LS	HSS/Co BR	130°	35~40°	2702LS	

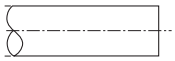
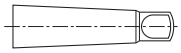
Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	BRASS OTTONE MESSING LAITON
1~10	63									◉
1~20	69	◉	○		◉		○	○	○	○
1~13	69	◉	○		◉		○	○	○	○
5~60	80	◉	○		○		○	○	○	○
13~30	80	◉	○		○		○	○	○	○
13~30	80	◉	○		◉		○	○	○	○
1~2.9	22	◉	◉		◉			◉		
3~16	32	◉	◉		◉			◉		
1~2.9	22	◉	◉		◉			◉		
2~12	74	◉	○		◉		○	○	○	○
2~13	74	◉	○					○	○	
2~13	74	◉	○				○	○	○	
13~30	85	◉	○				○	○	○	
2~13	77	◉	○				○	○	○	
2~13	77	◉	○				○	○	○	
3~12	79	◉	○				○	○	○	
3.5~12	79	◉	○				○	○	○	
13~30	86	◉	○				○	○	○	
13~30	86	◉	○				○	○	○	

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

Caption

Legenda / Verzeichnis / Légende

STOCK	
●	stock standard
○	non-standard stock / stock non standard / nicht Standard Lager / stock non standard
EX	stock exhaustion / esaurimento stock / Vorraterschöpfung / épuisement du stock

SHANK / ATTACCO / SCHAFT / QUEUE	
cylindrical shank / attacco cilindrico / zylindrischer Schaft / queue cylindrique	
Morse Taper shank / attacco Cono Morse / MK Schaft / queue conique	

GEOMETRY / GEOMETRIA / GEOMETRIE / GÉOMÉTRIE	
TA	30° - 140° general purpose / uso generico / allgemeine Anwendung / applications génériques
HTA	30° - 140° general purpose with inside coolant / uso generico con refrigerazione interna allgemeine Anwendung mit innerer Kühlmittelzuführung / applications génériques à trous d'huile
4HTA	4 guide chamfer with inside coolant / 4 fasi con refrigerazione interna 4 Führungsfasen mit innerer Kühlmittelzuführung / 4 listels à trous d'huile
SUH	30° - 140° stainless steel with inside coolant / acciaio inossidabile con refrigerazione interna rostfreien Stahl mit innerer Kühlmittelzuführung / acier inoxydable à trous d'huile
ALH	30° - 140° aluminium with inside coolant / alluminio con refrigerazione interna Aluminium mit innerer Kühlmittelzuführung / aluminium à trous d'huile
LF	35°~40° 130° high performance, selfcentering / alto rendimento, autocentrante hochleistung, selbstzentrierende / haute performance, auto centreur
SU	38° 130°≤4mm. 120°≥4mm. for stainless steel and general application / per acciaio inossidabile e applicazioni generiche für rostfreien Stahl und allgemeine Anwendung / pour acier inoxydable et applications génériques
N	25°~30° 118°
SPLIT POINT	30° 118° HSS 33° 135° HSS/CO
NH	30° 130° for stainless steel and general application / per acciaio inossidabile e applicazioni generiche für rostfreien Stahl und allgemeine Anwendung / pour acier inoxydable et applications génériques
LS	35°~40° 130° for deep holes / per fori profondi / für tiefe Löcher / pour trous profonds
H	12°~15° 118° for brass / per ottone / für Messing / pour laiton

Caption

Legenda / Verzeichnis / Légende

GEOMETRY / GEOMETRIA / GEOMETRIE / GÉOMÉTRIE

W	35°~40° 130° for aluminium / per alluminio / für Aluminium / pour aluminium

MATERIAL / MATERIALE / WERKSTOFF / MATIÈRE

MG ...	micrograin / micrograna / Mikrokörnung / micrograin
HSS ...	high speed steel / acciaio super rapido / Hochleistungsschnellschnittstahl / acier rapide
HSS/Co ...	high speed steel 5%~8% Co / acciaio super rapido 5%~8% Co Hochleistungsschnellschnittstahl 5%~8% Co / acier rapide 5%~8% Co
HSSE ...	HSS/Co + EV

SURFACE TREATMENT / TRATTAMENTO SUPERFICIALE / OBERFLÄCHENBEHANDLUNG / TRAITMENT DE SURFACE

... OX	vaporization / vaporizzazione / Dämpfung / traitment vapeur
... HT	heat treatment / trattamento termico / thermische Behandlung / traitment thermique

COATINGS / RIVESTIMENTI / BESCHICHTUNGEN / REVÊTEMENTS

	... TiN	... PV10	... PV15	... PV200	... PV300 LAPPED
HARDNESS (HV) / DUREZZA (HV) HÄRTE (HV) / DURETÉ (HV)	2300	3300		3500	3500
FRICTION COEFFICIENT / COEFFICIENTE D'ATTRITO REIBUNGSKOEFFIZIENT / COEFFICENT DE FROTTEMENT	0.4	0.35	0.2	0.5	0.5
THICKNESS (µ) / SPESSORE (µ) DICKE (µ) / EPAISSEUR (µ)	1~4	1~5	2~5	1~4	1~4
MAX WORKING (°C) / TEMPERATURA MAX (°C) HOCHSTE TEMPERATUR (°C) / TEMPÉRATURE MAXIMALE (°C)	600	900	0~1000	800	800

PARAMETERS / PARAMETRI / PARAMETER / PARAMÉTRES

n Vf PAGE	parameters reference / riferimento parametri / Parameter Hinweis / référence des paramètres

New typhoon drills

NEW TYPHOON DRILLS

General-purpose TA, HTA and 4HTA (4 guide chamfers) geometries, SUH for stainless steel and ALH for aluminium: here comes the Osawa New Typhoon range of solid carbide drills.

TA, HTA e 4HTA (4 fasi) per applicazioni generiche, SUH per acciai inossidabili ed ALH per alluminio: le nuove punte in metallo duro integrale Osawa New Typhoon.

TA, HTA und 4HTA (4 Führungsfasen) für allgemeine Anwendungen, SUH für rostfreie Stähle und ALH für Aluminium: diese neuen Vollhartmetall-Bohrer der Osawa New Typhoon- Reihe haben optimierte Schneidgeometrien für jedes Anwendungsgebiet.

Géométries tout-terrain TA, HTA et 4HTA (4 listels), SUH pour inox et ALH pour alu: voila la nouvelle gamme de forets carbure monobloc Osawa New Typhoon.

TA HTA	PV200 COATING GENERAL PURPOSE · USO GENERICO ALLGEMEINE ANWENDUNGEN · APPLICATIONS GÉNÉRIQUES
4HTA	PV300 COATING GENERAL PURPOSE · USO GENERICO ALLGEMEINE ANWENDUNGEN · APPLICATIONS GÉNÉRIQUES
SUH	PV300 COATING LAPPED FLUTES · GOLE LAPPATE GELÄPPTE NUTEN · GOUJOURES RODÉES STAINLESS STEEL · ACCIAIO INOSSIDABILE ROSTFREIER STAHL · ACIER INOXYDABLE
ALH	UNCOATED LAPPED FLUTES · GOLE LAPPATE GELÄPPTE NUTEN · GOUJOURES RODÈES ALUMINIUM · ALLUMINIO ALUMINIUM · ALUMINIUM

OSAWA

n Vf
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DIN 6539

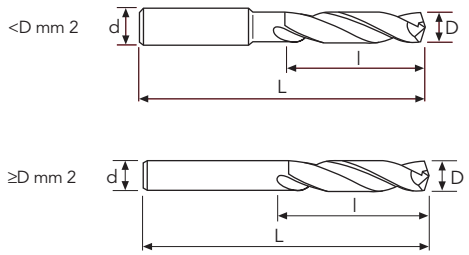
3XD

343TA - 318N (h7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -10	0 / -12	0 / -15	0 / -18	0 / -21

NEW NEW

343TA 318N



D(h7)		d(h6)	l	L	Stock	Stock
mm	1.00	2	6	40	●	●
	1.10	2	7	40	●	●
	1.20	2	8	40	●	●
	1.30	2	8	40	●	●
	1.40	2	9	40	●	●
	1.50	2	9	40	●	●
	1.60	2	10	40	●	●
	1.70	2	10	40	●	●
	1.80	2	11	40	●	●
	1.90	2	11	40	●	●
	2.00	2	12	40	●	●
	2.10	2.1	12	40	●	●
	2.20	2.2	13	40	●	●
	2.30	2.3	13	46	●	●
	2.40	2.4	14	46	●	●
	2.50	2.5	14	46	●	●
	2.60	2.6	14	46	●	●
	2.70	2.7	16	46	●	●
	2.80	2.8	16	49	●	●
	2.90	2.9	16	49	●	●
	3.00	3	16	49	●	●
	3.10	3.1	18	49	●	●
	3.20	3.2	18	49	●	●
	3.30	3.3	18	52	●	●
	3.40	3.4	20	52	●	●
	3.50	3.5	20	52	●	●
	3.60	3.6	20	52	●	●
	3.70	3.7	20	52	●	●
	3.80	3.8	22	55	●	●
	3.90	3.9	22	55	●	●
	4.00	4	22	55	●	●
	4.10	4.1	22	55	●	●
	4.20	4.2	22	55	●	●
	4.30	4.3	24	58	●	●
	4.40	4.4	24	58	●	○
	4.50	4.5	24	58	●	●

● stock standard ○ non-standard stock EX stock exhaustion

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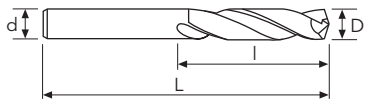
3XD

343TA - 318N (h7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -10	0 / -12	0 / -15	0 / -18	0 / -21

NEW NEW



	343TA	318N
	TA	TA
	MG PV200	MG BR
	140°	140°
	30°	30°

D(h7)		d(h6)	l	L	Stock	Stock
mm	4.60	4.6	24	58	●	●
	4.70	4.7	24	58	●	●
	4.80	4.8	26	62	●	●
	4.90	4.9	26	62	●	●
	5.00	5	26	62	●	●
	5.10	5.1	26	62	●	●
	5.20	5.2	26	62	●	●
	5.30	5.3	26	66	●	●
	5.40	5.4	28	66	●	●
	5.50	5.5	28	66	●	●
	5.60	5.6	28	66	●	●
	5.70	5.7	28	66	●	●
	5.80	5.8	28	70	●	●
	5.90	5.9	28	70	●	●
	6.00	6	28	70	●	●
	6.10	6.1	31	70	●	●
	6.20	6.2	31	70	●	●
	6.30	6.3	31	70	●	●
	6.40	6.4	31	70	●	●
	6.50	6.5	31	70	●	●
	6.60	6.6	31	70	●	○
	6.70	6.7	31	70	●	●
	6.80	6.8	34	74	●	●
	6.90	6.9	34	74	●	●
	7.00	7	34	74	●	●
	7.10	7.1	34	74	●	○
	7.20	7.2	34	74	●	○
	7.30	7.3	34	79	●	○
	7.40	7.4	34	79	●	○
	7.50	7.5	34	79	●	●
	7.60	7.6	37	79	●	○
	7.70	7.7	37	79	●	○
	7.80	7.8	37	79	●	○
	7.90	7.9	37	79	●	○
	8.00	8	37	79	●	●
	8.10	8.1	37	79	●	●

● stock standard ○ non-standard stock EX stock exhaustion

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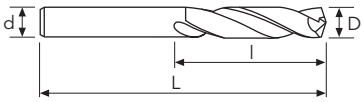
DIN 6539

3XD

343TA - 318N (h7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -10	0 / -12	0 / -15	0 / -18	0 / -21

NEW NEW



	343TA	318N
	TA	TA
	MG PV200	MG BR
	140°	140°
	30°	30°

D(h7)	d(h6)	l	L	Stock	Stock
mm 8.20	8.2	37	79	●	●
8.30	8.3	37	84	●	○
8.40	8.4	37	84	●	○
8.50	8.5	37	84	●	●
8.60	8.6	40	84	●	○
8.70	8.7	40	84	●	●
8.80	8.8	40	84	●	●
8.90	8.9	40	84	●	○
9.00	9	40	84	●	●
9.10	9.1	40	84	●	○
9.20	9.2	40	84	●	●
9.30	9.3	40	89	●	●
9.40	9.4	40	89	●	○
9.50	9.5	40	89	●	●
9.60	9.6	43	89	●	○
9.70	9.7	43	89	●	○
9.80	9.8	43	89	●	●
9.90	9.9	43	89	●	○
10.00	10	43	89	●	●
10.20	10.2	43	89	●	●
10.50	10.5	43	95	●	●
10.80	10.8	47	95	○	
11.00	11	47	95	●	●
11.20	11.2	47	102	○	
11.30	11.3	47	102	○	
11.50	11.5	47	95	●	●
11.80	11.8	47	102	○	
12.00	12	51	102	●	●
12.20	12.2	51	102	○	
12.50	12.5	51	103	●	●
12.80	12.8	51	103	○	
13.00	13	51	103	●	●
13.50	13.5	54	107	●	
13.80	13.8	54	107	○	
14.00	14	54	107	●	
14.50	14.5	56	111	●	

● stock standard ○ non-standard stock EX stock exhaustion

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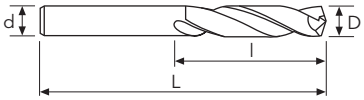
3XD

343TA - 318N (h7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -10	0 / -12	0 / -15	0 / -18	0 / -21

NEW NEW

343TA 318N



	343TA	318N
	TA	TA
	MG PV200	MG BR
	140°	140°
	30°	30°

D(h7)	d(h6)	l	L	Stock	Stock
mm **15.00**	15	56	111	●	
15.30	15.3	58	115	○	
15.50	15.5	58	115	●	
15.80	15.8	58	115	○	
16.00	16	58	115	●	

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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OSAWA NORM

8XD

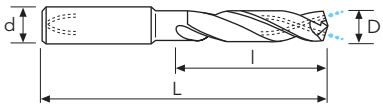
12XD

358SUH - 3512SUH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

NEW NEW

358SUH 3512SUH



SUH SUH

MG PV300 MG PV300

140° 140°

30° 30°

D(m7)		d(h6)	l	L	Stock	Stock
mm	1.00	3	9.5	50	●	
	1.00	3	13.5	55		●
	1.10	3	10.5	50	●	
	1.10	3	14.9	55		○
	1.20	3	11.4	50	●	
	1.20	3	16.2	55		●
	1.30	3	12.4	50	●	
	1.30	3	17.6	55		●
	1.40	3	13.3	50	●	
	1.40	3	18.9	55		○
	1.50	3	14.3	50	●	
	1.50	3	20.3	55		●
	1.60	3	15.2	50	●	
	1.60	3	21.6	65		●
	1.70	3	16.2	60	●	
	1.70	3	23	65		○
	1.80	3	17.1	60	●	
	1.80	3	24.3	65		●
	1.90	3	18.1	60	●	
	1.90	3	25.7	65		○
	2.00	3	19	60	●	
	2.00	3	27	65		●
	2.10	3	20	60	●	
	2.10	3	28.4	65		●
	2.20	3	20.9	60	●	
	2.20	3	29.7	65		●
	2.30	3	21.9	60	●	
	2.30	3	31.1	65		○
	2.40	3	22.8	60	●	
	2.40	3	32.4	75		○
	2.50	3	23.8	60	●	
	2.50	3	33.8	75		●
	2.60	3	24.7	60	●	
	2.60	3	35.1	75		●
	2.70	3	25.7	60	●	
	2.70	3	36.5	75		○

● stock standard ○ non-standard stock EX stock exhaustion

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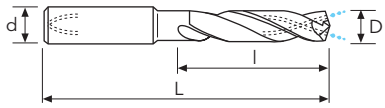
OSAWA NORM

8XD

12XD

358SUH - 3512SUH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8



					358SUH	3512SUH
					NEW	NEW
					SUH	SUH
					MG PV300	MG PV300
					140°	140°
					30°	30°
D(m7)		d(h6)	l	L	Stock	Stock
mm	2.80	3	26.6	60	●	
	2.80	3	37.8	75		●
	2.90	3	27.6	60	●	
	2.90	3	39.2	75		○

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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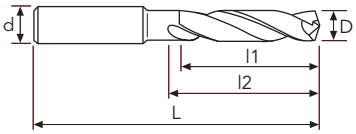
3XD

353TA - 353HTA - 353SUH - 353ALH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

NEW	NEW	NEW	NEW
353TA	353HTA	353SUH	353ALH
TA	HTA	SUH	ALH
MG PV200	MG PV200	MG PV300	MG LAPPED
140°	140°	140°	140°
30°	30°	30°	30°

353TA



353HTA
353SUH
353ALH

D(m7)	d(h6)	l1	l2	L	Stock	Stock	Stock	Stock
mm 3.00	6	14	20	62	●	●	●	●
3.10	6	14	20	62	●	●	●	○
3.20	6	14	20	62	●	●	●	○
3.30	6	14	20	62	●	●	●	●
3.40	6	14	20	62	●	●	●	●
3.50	6	14	20	62	●	●	●	●
3.60	6	14	20	62	●	●	●	○
3.70	6	14	20	62	●	●	●	○
3.80	6	17	24	66	●	●	●	●
3.90	6	17	24	66	●	●	●	○
4.00	6	17	24	66	●	●	●	●
4.10	6	17	24	66	●	●	●	○
4.20	6	17	24	66	●	●	●	●
4.30	6	17	24	66	●	●	●	●
4.40	6	17	24	66	●	●	●	○
4.50	6	17	24	66	●	●	●	●
4.60	6	17	24	66	●	●	●	○
4.70	6	17	24	66	●	●	●	○
4.80	6	20	28	66	●	●	●	●
4.90	6	20	28	66	●	●	●	○
5.00	6	20	28	66	●	●	●	●
5.10	6	20	28	66	●	●	●	●
5.20	6	20	28	66	●	●	●	●
5.30	6	20	28	66	●	●	●	○
5.40	6	20	28	66	●	●	●	○
5.50	6	20	28	66	●	●	●	●
5.60	6	20	28	66	●	●	●	○
5.70	6	20	28	66	●	●	●	○
5.80	6	20	28	66	●	●	●	●
5.90	6	20	28	66	●	●	●	○
6.00	6	20	28	66	●	●	●	●
6.10	8	24	34	79	●	●	●	○
6.20	8	24	34	79	●	●	●	●
6.30	8	24	34	79	●	●	●	○
6.40	8	24	34	79	●	●	●	○
6.50	8	24	34	79	●	●	●	●

● stock standard ○ non-standard stock EX stock exhaustion

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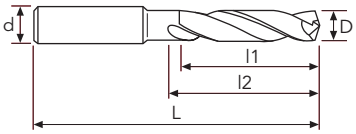
3XD

	NEW	NEW	NEW	NEW
	353TA	353HTA	353SUH	353ALH

353TA - 353HTA - 353SUH - 353ALH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

353TA



353HTA
353SUH
353ALH

	TA	HTA	SUH	ALH
	MG PV200	MG PV200	MG PV300	MG LAPPED
	140°	140°	140°	140°
	30°	30°	30°	30°

D(m7)	d(h6)	l1	l2	L	Stock	Stock	Stock	Stock
mm 6.60	8	24	34	79	●	●	●	○
6.70	8	24	34	79	●	●	●	○
6.80	8	24	34	79	●	●	●	●
6.90	8	24	34	79	●	●	●	○
7.00	8	24	34	79	●	●	●	●
7.10	8	29	41	79	●	●	●	○
7.20	8	29	41	79	●	●	●	○
7.30	8	29	41	79	●	●	●	○
7.40	8	29	41	79	●	●	●	○
7.50	8	29	41	79	●	●	●	●
7.60	8	29	41	79	●	●	●	○
7.70	8	29	41	79	●	●	●	○
7.80	8	29	41	79	●	●	●	●
7.90	8	29	41	79	●	●	●	○
8.00	8	29	41	79	●	●	●	●
8.10	10	35	47	89	●	●	●	○
8.20	10	35	47	89	●	●	●	●
8.30	10	35	47	89	●	●	●	○
8.40	10	35	47	89	●	●	●	○
8.50	10	35	47	89	●	●	●	●
8.60	10	35	47	89	●	●	●	○
8.70	10	35	47	89	●	●	●	○
8.80	10	35	47	89	●	●	●	●
8.90	10	35	47	89	●	●	●	○
9.00	10	35	47	89	●	●	●	●
9.10	10	35	47	89	●	●	●	○
9.20	10	35	47	89	●	●	●	○
9.30	10	35	47	89	●	●	●	○
9.40	10	35	47	89	●	●	●	○
9.50	10	35	47	89	●	●	●	●
9.60	10	35	47	89	●	●	●	○
9.70	10	35	47	89	●	●	●	○
9.80	10	35	47	89	●	●	●	○
9.90	10	35	47	89	●	●	●	○
10.00	10	35	47	89	●	●	●	●
10.10	12	40	55	102	●	●		

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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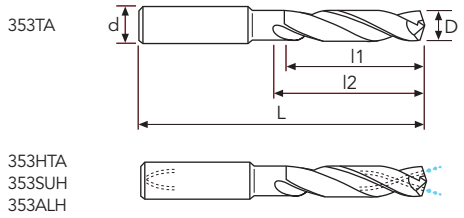
3XD

353TA - 353HTA - 353SUH - 353ALH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

NEW	NEW	NEW	NEW
353TA	353HTA	353SUH	353ALH
TA	HTA	SUH	ALH
MG PV200	MG PV200	MG PV300	MG LAPPED
140°	140°	140°	140°
30°	30°	30°	30°



D(m7)	d(h6)	l1	l2	L	Stock	Stock	Stock	Stock
mm 10.20	12	40	55	102	●	●	●	●
10.30	12	40	55	102	●	●	●	
10.40	12	40	55	102	○	○		
10.50	12	40	55	102	●	●	●	●
10.60	12	40	55	102	●	●	●	
10.70	12	40	55	102	○	○		
10.80	12	40	55	102	●	●	●	○
10.90	12	40	55	102	○	○		
11.00	12	40	55	102	●	●	●	●
11.10	12	40	55	102	○	○		
11.20	12	40	55	102	●	●	○	○
11.30	12	40	55	102	●	●	○	○
11.40	12	40	55	102	○	○		
11.50	12	40	55	102	●	●	●	●
11.60	12	40	55	102	○	○		
11.70	12	40	55	102	○	○		
11.80	12	40	55	102	●	●	●	○
11.90	12	40	55	102	○	○		
12.00	12	40	55	102	●	●	●	●
12.20	14	40	60	107	○	●	●	○
12.50	14	43	60	107	●	●	●	○
12.60	14	43	60	107				
12.80	14	43	60	107	○	●	●	○
13.00	14	43	60	107	●	●	●	○
13.30	14	43	60	107	○	●	●	○
13.50	14	43	60	107	●	●	●	○
13.80	14	43	60	107	○	●	●	○
14.00	14	43	60	107	●	●	●	○
14.20	16	45	65	115			●	
14.50	16	45	65	115	●	●	●	○
14.60	16	45	65	115				
15.00	16	65	65	115	●	●	●	○
15.30	16	65	65	115	○	●	●	○
15.50	16	65	65	115	●	●	●	○
15.80	16	65	73	115	○	●	●	○
16.00	16	65	73	115	●	●	●	○

● stock standard ○ non-standard stock EX stock exhaustion

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DIN 6537K

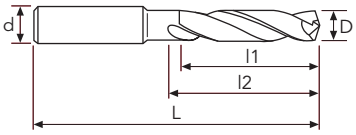
3XD

353TA - 353HTA - 353SUH - 353ALH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

	NEW 353TA	NEW 353HTA	NEW 353SUH	NEW 353ALH
	TA	HTA	SUH	ALH
	MG PV200	MG PV200	MG PV300	MG LAPPED
	140°	140°	140°	140°
	30°	30°	30°	30°

353TA



353HTA
3535UH
353ALH

D(m7)	d(h6)	l1	l2	L	Stock	Stock	Stock	Stock
mm **16.50**	18	73	73	123	○	●	●	○
17.00	18	73	73	123	○	●	●	○
17.50	18	73	73	123	○	●	●	○
18.00	18	73	73	123	○	●	●	○
18.50	20	79	79	131	○	●	●	○
19.00	20	79	79	131	○	●	●	○
19.50	20	79	79	131	○	●	●	○
20.00	20	79	79	131	○	●	●	○

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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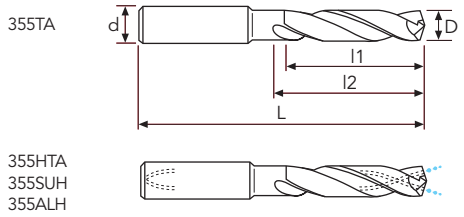
5XD

355TA - 355HTA - 355SUH - 355ALH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

NEW NEW NEW NEW



	355TA	355HTA	355SUH	355ALH
	TA	HTA	SUH	ALH
	MG PV200	MG PV200	MG PV300	MG LAPPED
	140°	140°	140°	140°
	30°	30°	30°	30°

D(m7)		d(h6)	l1	l2	L	Stock	Stock	Stock	Stock
mm	3.00	6	23	28	66	●	●	●	●
	3.10	6	23	28	66	●	●	●	○
	3.20	6	23	28	66	●	●	●	○
	3.30	6	23	28	66	●	●	●	●
	3.40	6	23	28	66	●	●	●	●
	3.50	6	23	28	66	●	●	●	●
	3.60	6	23	28	66	●	●	●	○
	3.70	6	23	28	66	●	●	●	○
	3.80	6	29	36	74	●	●	●	●
	3.90	6	29	36	74	●	●	●	○
	4.00	6	29	36	74	●	●	●	●
	4.10	6	29	36	74	●	●	●	○
	4.20	6	29	36	74	●	●	●	●
	4.30	6	29	36	74	●	●	●	●
	4.40	6	29	36	74	●	●	●	○
	4.50	6	29	36	74	●	●	●	●
	4.60	6	29	36	74	●	●	●	○
	4.70	6	29	36	74	●	●	●	○
	4.80	6	35	44	82	●	●	●	●
	4.90	6	35	44	82	●	●	●	○
	5.00	6	35	44	82	●	●	●	●
	5.10	6	35	44	82	●	●	●	●
	5.20	6	35	44	82	●	●	●	●
	5.30	6	35	44	82	●	●	●	○
	5.40	6	35	44	82	●	●	●	○
	5.50	6	35	44	82	●	●	●	●
	5.60	6	35	44	82	●	●	●	○
	5.70	6	35	44	82	●	●	●	○
	5.80	6	35	44	82	●	●	●	●
	5.90	6	35	44	82	●	●	●	○
	6.00	6	35	44	82	●	●	●	●
	6.10	8	43	53	91	●	●	●	○
	6.20	8	43	53	91	●	●	●	●
	6.30	8	43	53	91	●	●	●	○
	6.40	8	43	53	91	●	●	●	○
	6.50	8	43	53	91	●	●	●	●

● stock standard ○ non-standard stock EX stock exhaustion

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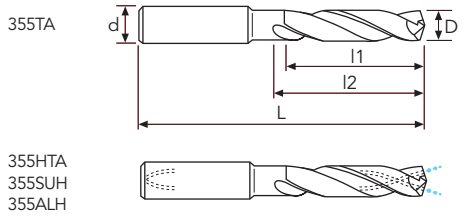
5XD

355TA - 355HTA - 355SUH - 355ALH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

NEW	NEW	NEW	NEW
355TA	355HTA	355SUH	355ALH



	355TA	355HTA	355SUH	355ALH
	TA	HTA	SUH	ALH
	MG PV200	MG PV200	MG PV300	MG LAPPED
	140°	140°	140°	140°
	30°	30°	30°	30°

D(m7)	d(h6)	l1	l2	L	Stock	Stock	Stock	Stock
mm 6.60	8	43	53	91	●	●	●	○
6.70	8	43	53	91	●	●	●	○
6.80	8	43	53	91	●	●	●	●
6.90	8	43	53	91	●	●	●	○
7.00	8	43	53	91	●	●	●	●
7.10	8	43	53	91	●	●	●	○
7.20	8	43	53	91	●	●	●	○
7.30	8	43	53	91	●	●	●	○
7.40	8	43	53	91	●	●	●	○
7.50	8	43	53	91	●	●	●	●
7.60	8	43	53	91	●	●	●	○
7.70	8	43	53	91	●	●	●	○
7.80	8	43	53	91	●	●	●	●
7.90	8	43	53	91	●	●	●	○
8.00	8	43	53	91	●	●	●	●
8.10	10	49	61	103	●	●	●	○
8.20	10	49	61	103	●	●	●	●
8.30	10	49	61	103	●	●	●	○
8.40	10	49	61	103	●	●	●	○
8.50	10	49	61	103	●	●	●	●
8.60	10	49	61	103	●	●	●	○
8.70	10	49	61	103	●	●	●	○
8.80	10	49	61	103	●	●	●	●
8.90	10	49	61	103	●	●	●	○
9.00	10	49	61	103	●	●	●	●
9.10	10	49	61	103	●	●	●	○
9.20	10	49	61	103	●	●	●	○
9.30	10	49	61	103	●	●	●	○
9.40	10	49	61	103	●	●	●	○
9.50	10	61	61	103	●	●	●	●
9.60	10	61	61	103	●	●	●	○
9.70	10	61	61	103	●	●	●	○
9.80	10	61	61	103	●	●	●	○
9.90	10	61	61	103	●	●	●	○
10.00	10	61	61	103	●	●	●	●
10.10	12	71	71	118	●	●		

● stock standard ○ non-standard stock EX stock exhaustion

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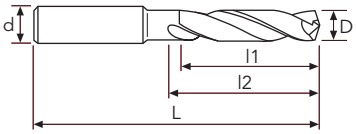
5XD

355TA - 355HTA - 355SUH - 355ALH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

NEW NEW NEW NEW

355TA



355HTA
355SUH
355ALH

	355TA	355HTA	355SUH	355ALH
	TA	HTA	SUH	ALH
	MG PV200	MG PV200	MG PV300	MG LAPPED
	140°	140°	140°	140°
	30°	30°	30°	30°

D(m7)	d(h6)	l1	l2	L	Stock	Stock	Stock	Stock
mm 10.20	12	71	71	118	●	●	●	●
10.30	12	71	71	118	●	●	●	
10.40	12	71	71	118	○	○		
10.50	12	71	71	118	●	●	●	●
10.60	12	71	71	118	●	●	●	
10.70	12	71	71	118	○	○		
10.80	12	71	71	118	●	●	●	○
10.90	12	71	71	118	○	○		
11.00	12	71	71	118	●	●	●	●
11.10	12	71	71	118	○	○		
11.20	12	71	71	118	●	●	●	○
11.30	12	71	71	118	●	●	●	○
11.40	12	71	71	118	○	●		
11.50	12	71	71	118	●	●	●	●
11.60	12	71	71	118	○	○		
11.70	12	71	71	118	○	○		
11.80	12	71	71	118	●	●	●	○
11.90	12	71	71	118	○	○		
12.00	12	71	71	118	●	●	●	●
12.20	14	77	77	124	○	●	●	○
12.50	14	77	77	124	●	●	●	○
12.60	14	77	77	124		●	●	
12.80	14	77	77	124	○	●	●	○
13.00	14	77	77	124	●	●	●	○
13.30	14	77	77	124	○	●	●	○
13.50	14	77	77	124	●	●	●	○
13.80	14	77	77	124	○	●	●	○
14.00	14	77	77	124	●	●	●	○
14.20	16	83	83	133		●	●	
14.50	16	83	83	133	●	●	●	○
14.60	16	83	83	133		●		
15.00	16	83	83	133	●	●	●	○
15.30	16	83	83	133	○	●	●	○
15.50	16	83	83	133	●	●	●	○
15.80	16	83	83	133	○	●	●	○
16.00	16	83	83	133	●	●	●	○

● stock standard ○ non-standard stock EX stock exhaustion

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DIN 6537L

5XD

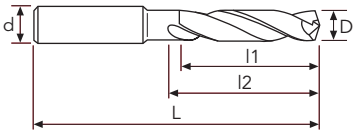
355TA - 355HTA - 355SUH - 355ALH (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8

NEW NEW NEW NEW

355TA	355HTA	355SUH	355ALH
TA	HTA	SUH	ALH
MG PV200	MG PV200	MG PV300	MG LAPPED
140°	140°	140°	140°
30°	30°	30°	30°

355TA



355HTA
355SUH
355ALH

D(m7)	d(h6)	l1	l2	L	Stock	Stock	Stock	Stock
mm 16.50	18	93	93	143	○	●	●	○
17.00	18	93	93	143	○	●	●	○
17.50	18	93	93	143	○	●	●	○
18.00	18	93	93	143	○	●	●	○
18.50	20	101	101	153	○	●	●	○
19.00	20	101	101	153	○	●	●	○
19.50	20	101	101	153	○	○	●	○
20.00	20	101	101	153	○	●	●	○

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf
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OSAWA NORM

8XD

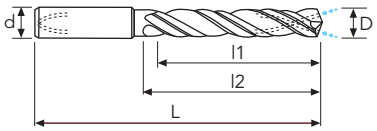
4 guide chamfers
4 fasi
4 Führungsfasen
4 listels

NEW

3584HTA

3584HTA (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8



4HTA

MG
PV300

140°

30°

D(m7)	d(h6)	l1	l2	L	Stock
mm 3.00	6	32	40	85	●
3.10	6	32	40	85	○
3.20	6	32	40	85	●
3.30	6	32	40	85	●
3.40	6	32	40	85	○
3.50	6	32	40	85	●
3.60	6	36	40	85	○
3.70	6	36	40	85	○
3.80	6	36	40	85	●
3.90	6	36	40	85	○
4.00	6	38	46	85	●
4.10	6	38	46	85	●
4.20	6	38	46	85	●
4.30	6	40	46	97	●
4.40	6	40	46	97	○
4.50	6	44	46	97	●
4.60	6	44	46	97	○
4.70	6	44	46	97	○
4.80	6	44	46	97	●
4.90	6	44	46	97	○
5.00	6	48	57	97	●
5.10	6	48	57	97	●
5.20	6	48	57	97	●
5.30	6	48	57	97	○
5.40	6	48	57	97	○
5.50	6	48	57	97	●
5.60	6	48	57	97	●
5.70	6	48	57	97	○
5.80	6	48	57	97	●
5.90	6	48	57	97	○
6.00	6	48	57	97	●
6.10	8	64	76	116	●
6.20	8	64	76	116	●
6.30	8	64	76	116	●
6.40	8	64	76	116	○
6.50	8	64	76	116	●

● stock standard ○ non-standard stock EX stock exhaustion

NEW

3584HTA

n Vf
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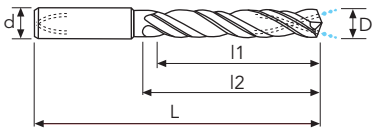
OSAWA NORM

8XD

4 guide chamfers
4 fasi
4 Führungsfasen
4 listels

3584HTA (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8



4HTA

MG
PV300

140°

30°

D(m7)	d(h6)	l1	l2	L	Stock
mm 6.60	8	64	76	116	○
6.70	8	64	76	116	○
6.80	8	64	76	116	●
6.90	8	64	76	116	○
7.00	8	64	76	116	●
7.10	8	64	76	116	●
7.20	8	64	76	116	●
7.30	8	64	76	116	○
7.40	8	64	76	116	○
7.50	8	64	76	116	●
7.60	8	64	76	116	○
7.70	8	64	76	116	○
7.80	8	64	76	116	●
7.90	8	64	76	116	○
8.00	8	64	76	116	●
8.10	10	80	95	142	●
8.20	10	80	95	142	●
8.30	10	80	95	142	●
8.40	10	80	95	142	○
8.50	10	80	95	142	●
8.60	10	80	95	142	●
8.70	10	80	95	142	○
8.80	10	80	95	142	●
8.90	10	80	95	142	○
9.00	10	80	95	142	●
9.10	10	80	95	142	●
9.20	10	80	95	142	●
9.30	10	80	95	142	○
9.40	10	80	95	142	○
9.50	10	80	95	142	●
9.60	10	80	95	142	○
9.70	10	80	95	142	○
9.80	10	80	95	142	●
9.90	10	80	95	142	○
10.00	10	80	95	142	●
10.20	12	96	114	163	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

NEW

3584HTA

n Vf

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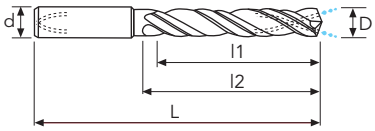
OSAWA NORM

8XD

4 guide chamfers
4 fasi
4 Führungsfasen
4 listels

3584HTA (m7)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	+12 / +2	+16 / +4	+21 / +6	+25 / +7	+29 / +8



4HTA

MG
PV300

140°

30°

D(m7)	d(h6)	l1	l2	L	Stock
mm 10.50	12	96	114	163	●
10.80	12	96	114	163	●
11.00	12	96	114	163	●
11.20	12	96	114	163	●
11.30	12	96	114	163	○
11.50	12	96	114	163	●
11.80	12	96	114	163	●
12.00	12	96	114	163	●
12.20	14	112	133	182	●
12.50	14	112	133	182	●
12.80	14	112	133	182	●
13.00	14	112	133	182	●
13.50	14	112	133	182	●
14.00	14	112	133	182	●
14.50	16	128	152	204	●
15.00	16	128	152	204	●
15.50	16	128	152	204	●
16.00	16	128	152	204	●

● stock standard ○ non-standard stock EX stock exhaustion

LFTA - General purpose
SUTA - Inox

LFTA - SUTA

High-performance drills made of premium HSSE: LFTA for general purpose and SUTA for stainless steel.

Punte ad alto rendimento in HSSE di qualità superiore: LFTA per uso generico e SUTA per acciaio inossidabile.

Hochleistungs- Bohrer in spitzen HSSE- Qualität. Benutzen Sie LFTA für allgemeine Anwendungen und SUTA für alle rostfreien Stähle.

Forets haute performance en HSSE de qualité supérieure: LFTA tout-terrain et SUTA pour inox.

LF	PV10 COATING GENERAL PURPOSE · USO GENERICO ALLGEMEINE ANWENDUNGEN · APPLICATIONS GÉNÉRIQUES
SU	PV10 COATING INOX

OSAWA

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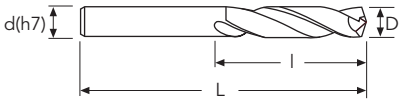
218LFTA

218LFTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)		l	L	Stock
mm	2.00	12	38	●
	2.10	12	38	●
	2.20	13	40	●
	2.30	13	40	●
	2.40	14	43	●
	2.50	14	43	●
	2.60	14	43	●
	2.70	16	46	●
	2.80	16	46	●
	2.90	16	46	●
	3.00	16	46	●
	3.10	18	49	●
	3.20	18	49	●
	3.30	18	49	●
	3.40	20	52	●
	3.50	20	52	●
	3.60	20	52	●
	3.70	20	52	●
	3.80	22	55	●
	3.90	22	55	●
	4.00	22	55	●
	4.10	22	55	●
	4.20	22	55	●
	4.30	24	58	●
	4.40	24	58	●
	4.50	24	58	●
	4.60	24	58	●
	4.70	24	58	●
	4.80	26	62	●
	4.90	26	62	●
	5.00	26	62	●
	5.10	26	62	●
	5.20	26	62	●
	5.30	26	62	●
	5.40	28	66	●
	5.50	28	66	●

● stock standard ○ non-standard stock EX stock exhaustion

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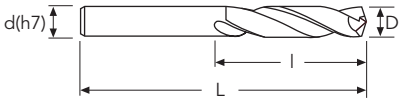
218LFTA

218LFTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)		l	L	Stock
mm	5.60	28	66	●
	5.70	28	66	●
	5.80	28	66	●
	5.90	28	66	●
	6.00	28	66	●
	6.10	31	70	●
	6.20	31	70	●
	6.30	31	70	●
	6.40	31	70	●
	6.50	31	70	●
	6.60	31	70	●
	6.70	31	70	●
	6.80	34	74	●
	6.90	34	74	●
	7.00	34	74	●
	7.10	34	74	●
	7.20	34	74	●
	7.30	34	74	●
	7.40	34	74	●
	7.50	34	74	●
	7.60	37	79	●
	7.70	37	79	●
	7.80	37	79	●
	7.90	37	79	●
	8.00	37	79	●
	8.10	37	79	●
	8.20	37	79	●
	8.30	37	79	●
	8.40	37	79	●
	8.50	37	79	●
	8.60	40	84	●
	8.70	40	84	●
	8.80	40	84	●
	8.90	40	84	●
	9.00	40	84	●
	9.10	40	84	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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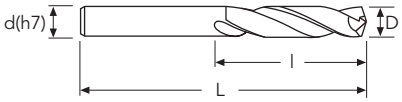
218LFTA

218LFTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

LF

HSS/CO PV10

130°

35~40°

D(h8)		l	L	Stock
mm	9.20	40	84	●
	9.30	40	84	●
	9.40	40	84	●
	9.50	40	84	●
	9.60	43	89	●
	9.70	43	89	●
	9.80	43	89	●
	9.90	43	89	●
	10.00	43	89	●
	10.20	43	89	●
	10.30	43	89	● NEW
	10.50	43	89	●
	10.80	47	95	● NEW
	11.00	47	95	●
	11.20	47	95	● NEW
	11.30	47	95	● NEW
	11.50	47	95	●
	11.80	47	95	● NEW
	12.00	51	102	●
	12.20	51	102	● NEW
	12.50	51	102	●
	12.80	51	102	● NEW
	13.00	51	102	●
	13.30	54	107	● NEW
	13.50	54	107	●
	13.80	54	107	● NEW
	14.00	54	107	●
	14.50	56	111	●
	14.80	56	111	● NEW
	15.00	56	111	●
	15.30	56	111	● NEW
	15.50	58	115	●
	15.80	58	115	● NEW
	16.00	58	115	●
	16.50	60	119	●
	17.00	60	119	●

● stock standard ○ non-standard stock EX stock exhaustion

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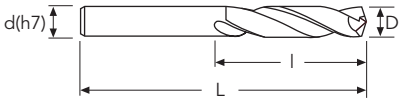
DIN 1897

218LFTA

218LFTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)	l	L	Stock
mm 17.50	62	123	●
18.00	62	123	●
18.50	64	127	●
19.00	64	127	●
19.50	66	131	●
20.00	66	131	●

● stock standard ○ non-standard stock EX stock exhaustion

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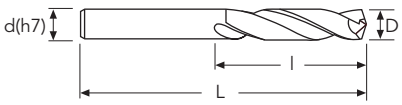
DIN 338

238LFTA

238LFTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)		l	L	Stock
mm	2.00	24	49	●
	2.10	24	49	●
	2.20	27	53	●
	2.30	27	53	●
	2.40	30	57	●
	2.50	30	57	●
	2.60	30	57	●
	2.70	33	61	●
	2.80	33	61	●
	2.90	33	61	●
	3.00	33	61	●
	3.10	36	65	●
	3.20	36	65	●
	3.30	36	65	●
	3.40	39	70	●
	3.50	39	70	●
	3.60	39	70	●
	3.70	39	70	●
	3.80	43	75	●
	3.90	43	75	●
	4.00	43	75	●
	4.10	43	75	●
	4.20	43	75	●
	4.30	47	80	●
	4.40	47	80	●
	4.50	47	80	●
	4.60	47	80	●
	4.70	47	80	●
	4.80	52	86	●
	4.90	52	86	●
	5.00	52	86	●
	5.10	52	86	●
	5.20	52	86	●
	5.30	52	86	●
	5.40	57	93	●
	5.50	57	93	●

● stock standard ○ non-standard stock EX stock exhaustion

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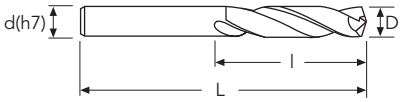
DIN 338

238LFTA

238LFTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)		l	L	Stock
mm	5.60	57	93	●
	5.70	57	93	●
	5.80	57	93	●
	5.90	57	93	●
	6.00	57	93	●
	6.10	63	101	●
	6.20	63	101	●
	6.30	63	101	●
	6.40	63	101	●
	6.50	63	101	●
	6.60	63	101	●
	6.70	63	101	●
	6.80	69	109	●
	6.90	69	109	●
	7.00	69	109	●
	7.10	69	109	●
	7.20	69	109	●
	7.30	69	109	●
	7.40	69	109	●
	7.50	69	109	●
	7.60	75	117	●
	7.70	75	117	●
	7.80	75	117	●
	7.90	75	117	●
	8.00	75	117	●
	8.10	75	117	●
	8.20	75	117	●
	8.30	75	117	●
	8.40	75	117	●
	8.50	75	117	●
	8.60	81	125	●
	8.70	81	125	●
	8.80	81	125	●
	8.90	81	125	●
	9.00	81	125	●
	9.10	81	125	●

● stock standard ○ non-standard stock EX stock exhaustion

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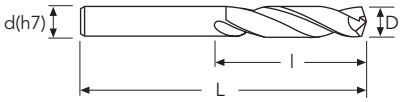
238LFTA

238LFTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

LF

HSS/CO
PV10

130°

35~40°

D(h8)	l	L	Stock
mm 9.20	81	125	●
9.30	81	125	●
9.40	81	125	●
9.50	81	125	●
9.60	87	133	●
9.70	87	133	●
9.80	87	133	●
9.90	87	133	●
10.00	87	133	●
10.20	87	133	●
10.30	87	133	● NEW
10.50	87	133	●
10.80	94	142	● NEW
11.00	94	142	●
11.20	94	142	● NEW
11.30	94	142	● NEW
11.50	94	142	●
11.80	94	142	● NEW
12.00	101	151	●
12.20	101	151	● NEW
12.50	101	151	●
12.80	101	151	● NEW
13.00	101	151	●
13.30	108	160	● NEW
13.50	108	160	●
13.80	108	160	● NEW
14.00	108	160	●
14.50	114	169	●
14.80	114	169	● NEW
15.00	114	169	●
15.30	120	178	● NEW
15.50	120	178	●
15.80	120	178	● NEW
16.00	120	178	●
16.50	125	184	● NEW
17.00	125	184	● NEW

● stock standard ○ non-standard stock EX stock exhaustion

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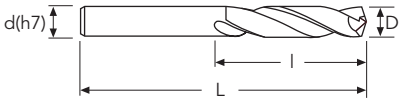
DIN 338

238LFTA

238LFTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

LF

HSS/CO
PV10

130°

35~40°

D(h8)	l	L	Stock
mm 17.50	130	191	● NEW
18.00	130	191	● NEW
18.50	135	198	● NEW
19.00	135	198	● NEW
19.50	140	205	● NEW
20.00	140	205	● NEW

● stock standard ○ non-standard stock EX stock exhaustion

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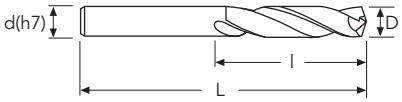
OSAWA NORM

3XD

980SUTA

980SUTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -33	0 / -33



d = D

SU

HSSE
PV10

120°

38°

D(h8)	l	L	Stock
mm 2.00	12	44	●
2.10	12	44	●
2.20	13	45	●
2.30	13	45	●
2.40	14	46	●
2.50	14	46	●
2.60	14	46	●
2.70	16	48	●
2.80	16	48	●
2.90	16	48	●
3.00	16	48	●
3.10	18	50	●
3.20	18	50	●
3.30	18	50	●
3.40	20	52	●
3.50	20	52	●
3.60	20	52	●
3.70	20	52	●
3.80	22	54	●
3.90	22	54	●
4.00	22	54	●
4.10	22	66	●
4.20	22	66	●
4.30	24	68	●
4.40	24	68	●
4.50	24	68	●
4.60	24	68	●
4.70	24	68	●
4.80	26	70	●
4.90	26	70	●
5.00	26	70	●
5.10	26	70	●
5.20	26	70	●
5.30	26	70	●
5.40	28	72	●
5.50	28	72	●

● stock standard ○ non-standard stock EX stock exhaustion

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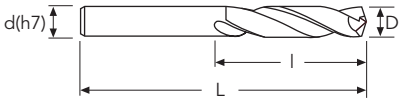
OSAWA NORM

3XD

980SUTA

980SUTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)		l	L	Stock
mm	5.60	28	72	●
	5.70	28	72	●
	5.80	28	72	●
	5.90	28	72	●
	6.00	28	72	●
	6.10	31	75	●
	6.20	31	75	●
	6.30	31	75	●
	6.40	31	75	●
	6.50	31	75	●
	6.60	31	75	●
	6.70	31	75	●
	6.80	34	78	●
	6.90	34	78	●
	7.00	34	78	●
	7.10	34	78	●
	7.20	34	78	●
	7.30	34	78	●
	7.40	34	78	●
	7.50	34	78	●
	7.60	37	81	●
	7.70	37	81	●
	7.80	37	81	●
	7.90	37	81	●
	8.00	37	81	●
	8.10	37	87	●
	8.20	37	87	●
	8.30	37	87	●
	8.40	37	87	●
	8.50	37	87	●
	8.60	40	90	●
	8.70	40	90	●
	8.80	40	90	●
	8.90	40	90	●
	9.00	40	90	●
	9.10	40	90	●

● stock standard ○ non-standard stock EX stock exhaustion

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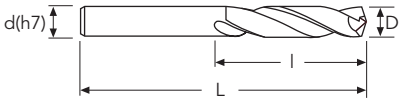
OSAWA NORM

3XD

980SUTA

980SUTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)	l	L	Stock
mm 9.20	40	90	●
9.30	40	90	●
9.40	40	90	●
9.50	40	90	●
9.60	43	93	●
9.70	43	93	●
9.80	43	93	●
9.90	43	93	●
10.00	43	93	●
10.10	43	100	●
10.20	43	100	●
10.30	43	100	●
10.40	43	100	●
10.50	43	100	●
10.60	43	100	●
10.70	47	104	●
10.80	47	104	●
10.90	47	104	●
11.00	47	104	●
11.10	47	104	●
11.20	47	104	●
11.30	47	104	●
11.40	47	104	●
11.50	47	104	●
11.60	47	104	●
11.70	47	104	●
11.80	47	104	●
11.90	51	108	●
12.00	51	108	●
12.10	51	108	●
12.20	51	108	●
12.30	51	108	●
12.40	51	108	●
12.50	51	108	●
12.60	51	108	●
12.70	51	108	●

● stock standard ○ non-standard stock EX stock exhaustion

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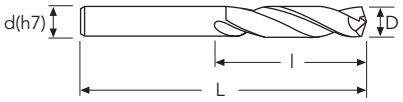
OSAWA NORM

3XD

980SUTA

980SUTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

SU

HSSE
PV10

120°

38°

D(h8)	l	L	Stock
mm 12.80	51	108	●
12.90	51	108	●
13.00	51	108	●

● stock standard ○ non-standard stock EX stock exhaustion

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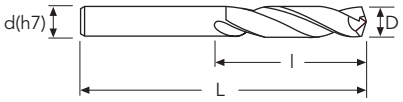
OSAWA NORM

5XD

990SUTA

990SUTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)		l	L	Stock
mm	2.00	24	56	●
	2.10	24	56	●
	2.20	27	59	●
	2.30	27	59	●
	2.40	30	62	●
	2.50	30	62	●
	2.60	30	62	●
	2.70	33	65	●
	2.80	33	65	●
	2.90	33	65	●
	3.00	33	65	●
	3.10	36	68	●
	3.20	36	68	●
	3.30	36	68	●
	3.40	39	71	●
	3.50	39	71	●
	3.60	39	71	●
	3.70	39	71	●
	3.80	43	75	●
	3.90	43	75	●
	4.00	43	75	●
	4.10	43	87	●
	4.20	43	87	●
	4.30	47	91	●
	4.40	47	91	●
	4.50	47	91	●
	4.60	47	91	●
	4.70	47	91	●
	4.80	52	96	●
	4.90	52	96	●
	5.00	52	96	●
	5.10	52	96	●
	5.20	52	96	●
	5.30	52	96	●
	5.40	57	101	●
	5.50	57	101	●

● stock standard ○ non-standard stock EX stock exhaustion

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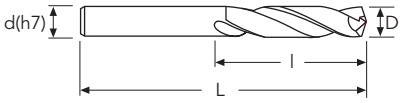
OSAWA NORM

5XD

990SUTA

990SUTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -33	0 / -33



d = D

D(h8)		l	L	Stock
mm	5.60	57	101	●
	5.70	57	101	●
	5.80	57	101	●
	5.90	57	101	●
	6.00	57	101	●
	6.10	63	107	●
	6.20	63	107	●
	6.30	63	107	●
	6.40	63	107	●
	6.50	63	107	●
	6.60	63	107	●
	6.70	63	107	●
	6.80	69	113	●
	6.90	69	113	●
	7.00	69	113	●
	7.10	69	113	●
	7.20	69	113	●
	7.30	69	113	●
	7.40	69	113	●
	7.50	69	113	●
	7.60	75	119	●
	7.70	75	119	●
	7.80	75	119	●
	7.90	75	119	●
	8.00	75	119	●
	8.10	75	125	●
	8.20	75	125	●
	8.30	75	125	●
	8.40	75	125	●
	8.50	75	125	●
	8.60	81	131	●
	8.70	81	131	●
	8.80	81	131	●
	8.90	81	131	●
	9.00	81	131	●
	9.10	81	131	●

● stock standard ○ non-standard stock EX stock exhaustion

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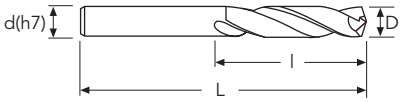
OSAWA NORM

5XD

990SUTA

990SUTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)	l	L	Stock
mm 9.20	81	131	●
9.30	81	131	●
9.40	81	131	●
9.50	81	131	●
9.60	87	137	●
9.70	87	137	●
9.80	87	137	●
9.90	87	137	●
10.00	87	137	●
10.10	87	144	●
10.20	87	144	●
10.30	87	144	●
10.40	87	144	●
10.50	87	144	●
10.60	87	144	●
10.70	94	151	●
10.80	94	151	●
10.90	94	151	●
11.00	94	151	●
11.10	94	151	●
11.20	94	151	●
11.30	94	151	●
11.40	94	151	●
11.50	94	151	●
11.60	94	151	●
11.70	94	151	●
11.80	94	151	●
11.90	101	158	●
12.00	101	158	●
12.10	101	158	●
12.20	101	158	●
12.30	101	158	●
12.40	101	158	●
12.50	101	158	●
12.60	101	158	●
12.70	101	158	●

● stock standard ○ non-standard stock EX stock exhaustion

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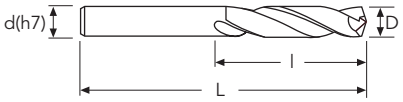
OSAWA NORM

5XD

990SUTA

990SUTA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

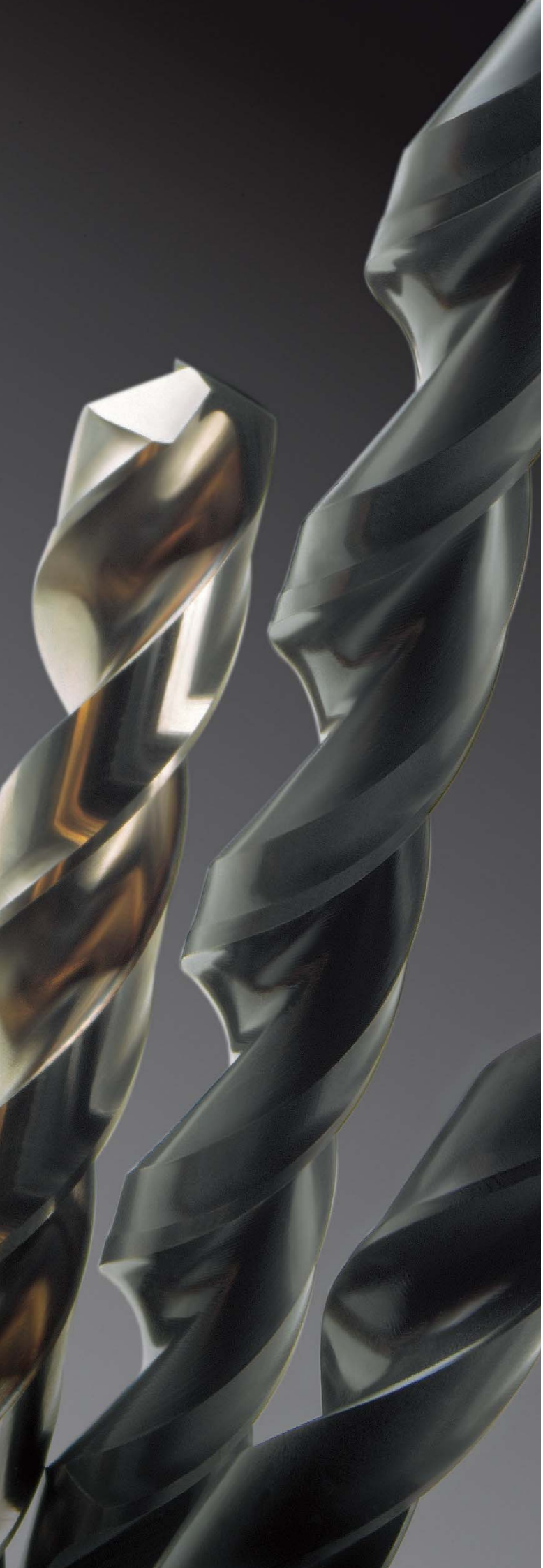


d = D

D(h8)	l	L	Stock
mm 12.80	101	158	●
12.90	101	158	●
13.00	101	158	●
13.50	106	166	●
14.00	106	166	●
14.10	109	169	●
14.50	109	169	●
15.00	109	169	●
15.50	112	172	●
15.60	112	172	●
16.00	112	172	●
16.50	115	181	●
17.00	115	181	●
17.50	118	184	●
17.60	118	184	●
18.00	118	184	●
18.50	122	188	●
19.00	122	188	●
19.50	125	191	●
20.00	125	191	●

● stock standard ○ non-standard stock EX stock exhaustion

HSS - HSS/CO Drills



HSS-HSS/CO DRILLS

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, ed una vantaggiosa combinazione di rendimento e convenienza, sono i punti di forza delle punte in HSS ed 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 et de normes constructives, aussi que une combinaison très rentable de performance et prix.

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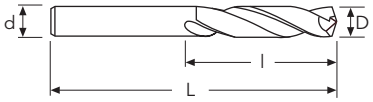
118N - 218NVA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

118N	218NVA
N	NH
HSS OX *	HSS/CO HT
118°	130°
25~30°	30°



d = D

D(h8)	l	L	118N Stock	218NVA Stock
mm 1.00	6	26	●	●
1.10	7	28	○	○
1.20	8	30	○	●
1.25	8	30	●	○
1.30	8	30	●	○
1.40	9	32	○	○
1.50	9	32	●	●
1.60	10	34	●	○
1.70	10	34	●	○
1.75	11	36	●	○
1.80	11	36	●	○
1.90	11	36	●	○
2.00	12	38	●	●
2.10	12	38	●	○
2.20	13	40	●	○
2.25	13	40	●	○
2.30	13	40	●	○
2.40	14	43	●	●
2.50	14	43	●	●
2.60	14	43	●	○
2.70	16	46	●	○
2.75	16	46	●	○
2.80	16	46	●	○
2.90	16	46	●	○
3.00	16	46	●	●
3.10	18	49	●	○
3.20	18	49	●	●
3.25	18	49	●	●
3.30	18	49	●	●
3.40	20	52	●	●
3.50	20	52	●	●
3.60	20	52	●	○
3.70	20	52	●	○
3.75	20	52	●	○
3.80	22	55	●	○
3.90	22	55	●	○

* OX ≥ mm. 2

● stock standard ○ non-standard stock EX stock exhaustion

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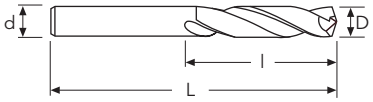
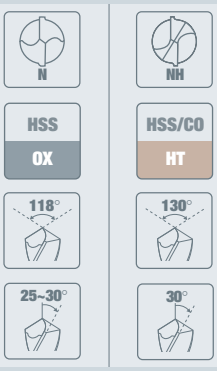
118N - 218NVA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

118N 218NVA



d = D



D(h8)		l	L	118N Stock	218NVA Stock
mm	4.00	22	55	●	●
	4.10	22	55	●	●
	4.20	22	55	●	●
	4.25	22	55	●	●
	4.30	24	58	●	●
	4.40	24	58	○	○
	4.50	24	58	●	●
	4.60	24	58	●	●
	4.70	24	58	●	○
	4.75	24	58	●	○
	4.80	26	62	●	●
	4.90	26	62	●	○
	5.00	26	62	●	●
	5.10	26	62	●	●
	5.20	26	62	●	●
	5.25	26	62	●	○
	5.30	26	62	●	○
	5.40	28	66	●	○
	5.50	28	66	●	●
	5.60	28	66	●	○
	5.70	28	66	●	○
	5.75	28	66	●	○
	5.80	28	66	●	○
	5.90	28	66	○	○
	6.00	28	66	●	●
	6.10	31	70	●	○
	6.20	31	70	●	○
	6.25	31	70	●	○
	6.30	31	70	●	○
	6.40	31	70	●	○
	6.50	31	70	●	●
	6.60	31	70	○	○
	6.70	31	70	●	●
	6.75	34	74	●	●
	6.80	34	74	●	●
	6.90	34	74	●	○

● stock standard ○ non-standard stock EX stock exhaustion

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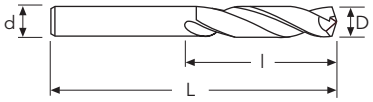
118N - 218NVA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

118N 218NVA



d = D

	118N	218NVA
	N	NH
	HSS OX	HSS/CO HT
	118°	130°
	25~30°	30°

D(h8)		l	L	Stock	Stock
mm	7.00	34	74	●	●
	7.10	34	74	●	○
	7.20	34	74	●	○
	7.25	34	74	●	○
	7.30	34	74	●	○
	7.40	34	74	○	○
	7.50	34	74	●	●
	7.60	37	79	●	○
	7.70	37	79	○	○
	7.75	37	79	●	○
	7.80	37	79	●	○
	7.90	37	79	○	○
	8.00	37	79	●	●
	8.10	37	79	●	○
	8.20	37	79	●	●
	8.25	37	79	●	○
	8.30	37	79	○	●
	8.40	37	79	○	○
	8.50	37	79	●	●
	8.60	40	84	●	●
	8.70	40	84	○	●
	8.75	40	84	●	●
	8.80	40	84	○	○
	8.90	40	84	○	○
	9.00	40	84	●	●
	9.10	40	84	●	○
	9.20	40	84	○	○
	9.25	40	84	○	○
	9.30	40	84	○	○
	9.40	40	84	○	○
	9.50	40	84	●	●
	9.60	43	89	○	○
	9.70	43	89	○	○
	9.75	43	89	○	○
	9.80	43	89	○	○
	9.90	43	89	○	○

● stock standard ○ non-standard stock EX stock exhaustion

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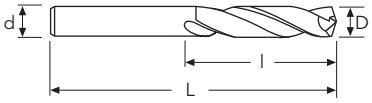
118N - 218NVA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

118N	218NVA
N	NH
HSS OX	HSS/CO HT
118°	130°
25~30°	30°



d = D

D(h8)	l	L	118N Stock	218NVA Stock
mm 10.00	43	89	●	●
10.20	43	89	●	●
10.25	43	89	●	●
10.50	43	89	●	●
10.75	47	95	●	●
11.00	47	95	●	●
11.25	47	95	●	○
11.50	47	95	●	●
11.75	47	95	●	●
12.00	51	102	●	●
12.25	51	102	●	●
12.50	51	102	●	●
12.75	51	102	●	●
13.00	51	102	●	●
13.25	54	107	●	○
13.50	54	107	●	●
13.75	54	107	●	○
14.00	54	107	●	●
14.25	56	111	●	●
14.50	56	111	●	●
14.75	56	111	●	○
15.00	56	111	●	●
15.25	58	115	●	○
15.50	58	115	●	●
15.75	58	115	○	○
16.00	58	115	●	●
16.25	60	119		○
16.50	60	119		●
16.75	60	119		○
17.00	60	119		●
17.25	62	123		○
17.50	62	123		●
17.75	62	123		○
18.00	62	123		●
18.25	64	127		○
18.50	64	127		●

● stock standard ○ non-standard stock EX stock exhaustion

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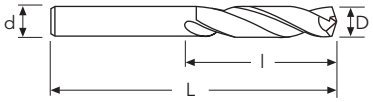
118N - 218NVA (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

118N 218NVA



d = D

N | NH

HSS OX | HSS/CO HT

118° | 130°

25~30° | 30°

D(h8)	l	L	Stock	Stock
mm 18.75	64	127		○
19.00	64	127		●
19.25	66	131		○
19.50	66	131		●
19.75	66	131		●
20.00	66	131		●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf

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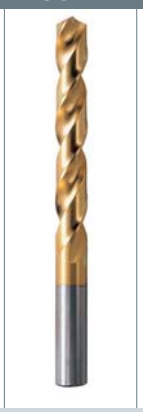
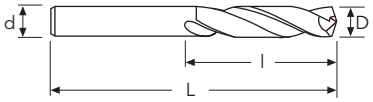
138N - 1386STI - 138NTI - 138HB - 138WB (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33





d = D

	138N	1386STI	138NTI	138HB	138WB
	N	SPLIT POINT	N	H	W
	HSS OX *	HSS TiN	HSS TiN	HSS BR	HSS BR
	118°	118°	118°	118°	130°
	25~30°	30°	25~30°	12~15°	35~40°

D(h8)		l	L	Stock	Stock	Stock	Stock	Stock
mm	0.20	2.5	19	●				
	0.30	3	19	●				
	0.40	5	20	●				
	0.50	6	22	●				
	0.60	7	24	●				
	0.70	9	28	●				
	0.75	9	28	●				
	0.80	10	30	●				
	0.90	11	32	●				
	1.00	12	34	●	●**	●		
	1.10	14	36	●	●**	●		
	1.20	16	38	●	●**	●		
	1.25	16	38	●				
	1.30	16	38	●	●**	●		
	1.40	18	40	●	●**	●		
	1.50	18	40	●	●**	●	●	●
	1.60	20	43	●	●	●	○	○
	1.70	20	43	●	●	●	○	○
	1.75	22	46	●				
	1.80	22	46	●	●	●	○	○
	1.90	22	46	●	●	●	○	○
	2.00	24	49	●	●	●	●	●
	2.10	24	49	●	●	●	○	○
	2.20	27	53	●	●	●	●	○
	2.25	27	53	●				
	2.30	27	53	●	●	●	○	○
	2.40	30	57	●	●	○	●	●
	2.50	30	57	●	●	●	●	●
	2.60	30	57	●	●	○	○	○
	2.70	33	61	●	●	●	○	○
	2.75	33	61	●				
	2.80	33	61	●	●	●	○	○
	2.90	33	61	●	●	●	○	○
	3.00	33	61	●	●	●	●	●
	3.10	36	65	●	●	●	○	○
	3.20	36	65	●	●	●	○	●

* OX ≥ mm. 2
** N TYPE ≤ mm. 1.5 = 1385NTI

● stock standard ○ non-standard stock EX stock exhaustion

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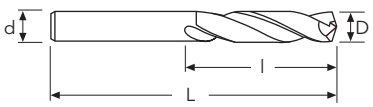
DIN 338

138N - 1386STI - 138NTI - 138HB - 138WB (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

	138N	1386STI	138NTI	138HB	138WB
	N	SPLIT POINT	N	H	W
	HSS OX	HSS TiN	HSS TiN	HSS BR	HSS BR
	118°	118°	118°	118°	130°
	25~30°	30°	25~30°	12~15°	35~40°

D(h8)		l	L	Stock	Stock	Stock	Stock	Stock
mm	3.25	36	65	●				
	3.30	36	65	●	●	●	●	●
	3.40	39	70	●	●	●	○	○
	3.50	39	70	●	●	●	●	●
	3.60	39	70	●	●	●	○	●
	3.70	39	70	●	●	●	○	●
	3.75	39	70	●		○		
	3.80	43	75	●	●	●	●	●
	3.90	43	75	●	●	●	○	●
	4.00	43	75	●	●	●	●	●
	4.10	43	75	●	●	●	○	●
	4.20	43	75	●	●	●	●	●
	4.25	43	75	●				
	4.30	47	80	●	●	●	○	○
	4.40	47	80	●	●	●	○	○
	4.50	47	80	●	●	●	●	●
	4.60	47	80	●	●	●	○	●
	4.70	47	80	●	●	●	○	○
	4.75	47	80	●		○		
	4.80	52	86	●	●	●	●	○
	4.90	52	86	●	●	●	○	○
	5.00	52	86	●	●	●	●	●
	5.10	52	86	●	●	●	○	○
	5.20	52	86	●	●	●	○	●
	5.25	52	86	●				
	5.30	52	86	●	●	●	○	○
	5.40	57	93	●	●	●	○	○
	5.50	57	93	●	●	●	●	●
	5.60	57	93	●	●	●	○	●
	5.70	57	93	●	●	●	○	○
	5.75	57	93	●				
	5.80	57	93	●	●	●	○	○
	5.90	57	93	●	●	●	○	○
	6.00	57	93	●	●	●	●	●
	6.10	63	101	●	●	●	○	○
	6.20	63	101	●	●	●	○	○

● stock standard ○ non-standard stock EX stock exhaustion

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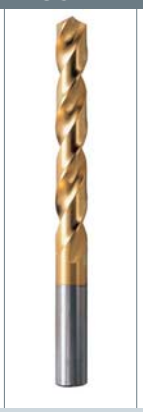
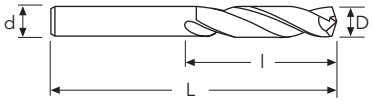
DIN 338

138N - 1386STI - 138NTI - 138HB - 138WB (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33





d = D

	138N	1386STI	138NTI	138HB	138WB
	N	SPLIT POINT	N	H	W
	HSS OX	HSS TiN	HSS TiN	HSS BR	HSS BR
	118°	118°	118°	118°	130°
	25~30°	30°	25~30°	12~15°	35~40°

D(h8)	l	L	Stock	Stock	Stock	Stock	Stock
mm 6.25	63	101	●				
6.30	63	101	●	●	●	○	○
6.40	63	101	●	●	●	○	○
6.50	63	101	●	●	●	●	●
6.60	63	101	●	●	●	○	○
6.70	63	101	●	●	●	○	○
6.75	69	109	●				
6.80	69	109	●	●	●	○	●
6.90	69	109	●	●	○	○	○
7.00	69	109	●	●	●	●	●
7.10	69	109	●	●	○	○	○
7.20	69	109	●	●	●	○	○
7.25	69	109	●				
7.30	69	109	●	●	●	○	○
7.40	69	109	●	●	●	○	○
7.50	69	109	●	●	●	●	●
7.60	75	117	●	●	○	○	○
7.70	75	117	●	●	●	○	○
7.75	75	117	●				
7.80	75	117	●	●	●	●	○
7.90	75	117	●	●	●	○	○
8.00	75	117	●	●	●	●	●
8.10	75	117	●	●	●	○	○
8.20	75	117	●	●	●	○	○
8.25	75	117	●				
8.30	75	117	●	●	●	○	○
8.40	75	117	●	●	○	○	○
8.50	75	117	●	●	●	●	●
8.60	81	125	●	●	●	○	○
8.70	81	125	●	●	●	○	○
8.75	81	125	●				
8.80	81	125	●	●	●	○	○
8.90	81	125	●	●	●	○	○
9.00	81	125	●	●	●	●	●
9.10	81	125	●	●	○	○	○
9.20	81	125	●	●	○	○	○

● stock standard ○ non-standard stock EX stock exhaustion

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n Vf

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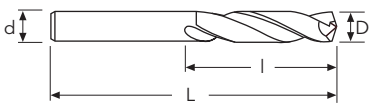
DIN 338

138N - 1386STI - 138NTI - 138HB - 138WB (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

	138N	1386STI	138NTI	138HB	138WB
	N	SPLIT POINT	N	H	W
	HSS OX	HSS TiN	HSS TiN	HSS BR	HSS BR
	118°	118°	118°	118°	130°
	25~30°	30°	25~30°	12~15°	35~40°

D(h8)	l	L	Stock	Stock	Stock	Stock	Stock
mm 9.25	81	125	●	●		○	
9.30	81	125	●	●	○	○	○
9.40	81	125	●	●	○	○	○
9.50	81	125	●	●	●	●	●
9.60	87	133	●	●	○	○	○
9.70	87	133	●	●	○	○	○
9.75	87	133	●	●	○	○	
9.80	87	133	●	●	○	○	○
9.90	87	133	●	●	○	○	○
10.00	87	133	●	●	●	●	●
10.10	87	133	●	●			
10.20	87	133	●	●	●		
10.25	87	133	●				
10.30	87	133	●	●			
10.40	87	133	●	●			
10.50	87	133	●	●	●	○	○
10.60	87	133	●	●			
10.70	94	142	●	●			
10.75	94	142	●				
10.80	94	142	●	●			
10.90	94	142	●	●			
11.00	94	142	●	●	●	○	○
11.10	94	142	●	●			
11.20	94	142	●	●			
11.25	94	142	●				
11.30	94	142	●	●			
11.40	94	142	●	●			
11.50	94	142	●	●	●	○	○
11.60	94	142	●	●			
11.70	94	142	●	●			
11.75	94	142	●				
11.80	94	142	●	●			
11.90	101	151	●	●			
12.00	101	151	●	●	●	○	○
12.10	101	151	●	●			
12.20	101	151	●	●			

● stock standard ○ non-standard stock EX stock exhaustion

n Vf

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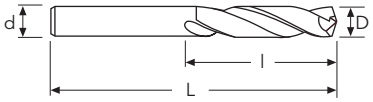
DIN 338

138N - 1386STI - 138NTI - 138HB - 138WB (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

	138N	1386STI	138NTI	138HB	138WB
	N	SPLIT POINT	N	H	W
	HSS OX	HSS TiN	HSS TiN	HSS BR	HSS BR
	118°	118°	118°	118°	130°
	25~30°	30°	25~30°	12~15°	35~40°

D(h8)	l	L	Stock	Stock	Stock	Stock	Stock
mm 12.25	101	151	●				
12.30	101	151	●	●			
12.40	101	151	●	●			
12.50	101	151	●	●	●	○	○
12.60	101	151	●	●			
12.70	101	151	●	●			
12.75	101	151	●				
12.80	101	151	●	●			
12.90	101	151	●	●			
13.00	101	151	●	●	●	○	○
13.25	108	160	●				
13.50	108	160	●		●		
13.75	108	160	●				
14.00	108	160	●		●		
14.25	114	169	●				
14.50	114	169	●		●		
14.75	114	169	●				
15.00	114	169	●		●		
15.25	120	178	●				
15.50	120	178	●		●		
15.75	120	178	●				
16.00	120	178	●		●		
16.25	125	184	●				
16.50	125	184	●				
16.75	125	184	○				
17.00	125	184	●				
17.50	130	191	●				
18.00	130	191	●				
18.50	135	198	●				
19.00	135	198	●				
19.50	140	205	●				
20.00	140	205	●				

● stock standard ○ non-standard stock EX stock exhaustion

138NA01A
Set 50pcs.
138N DIN338 HSS
Ø1mm~Ø5,9mm x 0,1mm

138NA01B
Set 41pcs.
138N DIN338 HSS
Ø6mm~Ø10mm x 0,1mm

138NA05C
Set 25pcs.
138N DIN338 HSS
Ø1mm~Ø13mm x 0,5mm

1386STIA01A
Set 50pcs.
1386STI DIN338 HSS TIN POINTED
Ø1mm~Ø5,9mm x 0,1mm

1386STIA01B
Set 41pcs.
1386STI DIN338 HSS TIN POINTED
Ø6mm~Ø10mm x 0,1mm

1386STIA05C
Set 25pcs.
1386STI DIN338 HSS TIN POINTED
Ø1mm~Ø13mm x 0,5mm

n Vf
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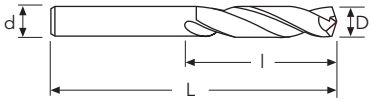
DIN 338

238NVA 2386STI*

238NVA - 2386STI (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)	l	L	Stock	Stock
mm 1.00	12	34	●	●*
1.10	14	36	●	●*
1.20	16	38	●	●*
1.25	16	38	●	
1.30	16	38	●	●*
1.40	18	40	●	●*
1.50	18	40	●	●*
1.60	20	43	●	●
1.70	20	43	●	●
1.75	22	46	●	
1.80	22	46	●	●
1.90	22	46	●	●
2.00	24	49	●	●
2.10	24	49	●	●
2.20	27	53	●	●
2.25	27	53	●	
2.30	27	53	●	●
2.40	30	57	●	●
2.50	30	57	●	●
2.60	30	57	●	●
2.70	33	61	●	●
2.75	33	61	●	
2.80	33	61	●	●
2.90	33	61	●	●
3.00	33	61	●	●
3.10	36	65	●	●
3.20	36	65	●	●
3.25	36	65	●	
3.30	36	65	●	●
3.40	39	70	●	●
3.50	39	70	●	●
3.60	39	70	●	●
3.70	39	70	●	●
3.75	39	70	●	
3.80	43	75	●	●
3.90	43	75	●	●

* N TYPE ≤ mm. 1.5 = 2385NTI

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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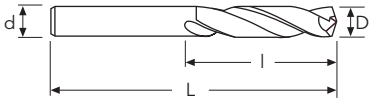
DIN 338

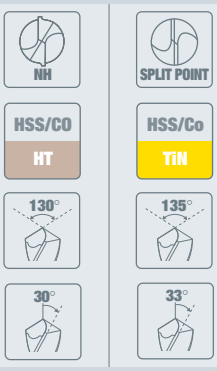
238NVA - 2386STI (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

238NVA 2386STI



d = D



D(h8)		l	L	Stock	Stock
mm	4.00	43	75	●	●
	4.10	43	75	●	●
	4.20	43	75	●	●
	4.25	43	75	●	
	4.30	47	80	●	●
	4.40	47	80	●	●
	4.50	47	80	●	●
	4.60	47	80	●	●
	4.70	47	80	●	●
	4.75	47	80	●	
	4.80	52	86	●	●
	4.90	52	86	●	●
	5.00	52	86	●	●
	5.10	52	86	●	●
	5.20	52	86	●	●
	5.25	52	86	●	
	5.30	52	86	●	●
	5.40	57	93	●	●
	5.50	57	93	●	●
	5.60	57	93	●	●
	5.70	57	93	●	●
	5.75	57	93	●	
	5.80	57	93	●	●
	5.90	57	93	●	●
	6.00	57	93	●	●
	6.10	63	101	●	●
	6.20	63	101	●	●
	6.25	63	101	●	
	6.30	63	101	●	●
	6.40	63	101	●	●
	6.50	63	101	●	●
	6.60	63	101	●	●
	6.70	63	101	●	●
	6.75	69	109	●	
	6.80	69	109	●	●
	6.90	69	109	●	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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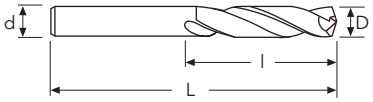
DIN 338

238NVA 2386STI

238NVA - 2386STI (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)	l	L	Stock	Stock
mm 7.00	69	109	●	●
7.10	69	109	●	●
7.20	69	109	●	●
7.25	69	109	●	
7.30	69	109	●	●
7.40	69	109	●	●
7.50	69	109	●	●
7.60	75	117	●	●
7.70	75	117	●	●
7.75	75	117	●	
7.80	75	117	●	●
7.90	75	117	●	●
8.00	75	117	●	●
8.10	75	117	●	●
8.20	75	117	●	●
8.25	75	117	●	
8.30	75	117	●	●
8.40	75	117	●	●
8.50	75	117	●	●
8.60	81	125	●	●
8.70	81	125	●	●
8.75	81	125	●	
8.80	81	125	●	●
8.90	81	125	●	●
9.00	81	125	●	●
9.10	81	125	●	●
9.20	81	125	●	●
9.25	81	125	●	
9.30	81	125	●	●
9.40	81	125	●	●
9.50	81	125	●	●
9.60	87	133	●	●
9.70	87	133	●	●
9.75	87	133	●	
9.80	87	133	●	●
9.90	87	133	●	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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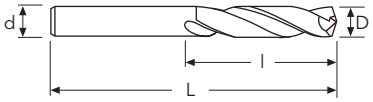
DIN 338

238NVA - 2386STI (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

238NVA 2386STI



d = D

NH | SPLIT POINT
HSS/CO HT | HSS/Co TiN
130° | 135°
30° | 33°

D(h8)	l	L	Stock	Stock
mm 10.00	87	133	●	●
10.10	87	133		●
10.20	87	133	●	●
10.30	87	133		●
10.40	87	133		●
10.50	87	133	●	●
10.60	87	133		●
10.70	87	133		●
10.80	94	142		●
10.90	94	142		●
11.00	94	142	●	●
11.10	94	142		●
11.20	94	142		●
11.30	94	142		●
11.40	94	142		●
11.50	94	142	●	●
11.60	94	142		●
11.70	94	142		●
11.80	94	142		●
11.90	101	151		●
12.00	101	151	●	●
12.10	101	151		●
12.20	101	151		●
12.30	101	151		●
12.40	101	151		●
12.50	101	151	●	●
12.60	101	151		●
12.70	101	151		●
12.80	101	151		●
12.90	101	151		●
13.00	101	151	●	●
13.50	108	160	●	
14.00	108	160	●	
14.50	114	169	●	
15.00	114	169	●	
15.50	120	178	●	

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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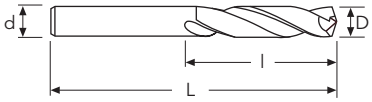
DIN 338

238NVA 2386STI

238NVA - 2386STI (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

D(h8)	l	L	Stock	Stock
mm **16.00**	120	178	●	
16.50	125	184	●	
17.00	125	184	●	
17.50	130	191	●	
18.00	130	191	●	
18.50	135	198	●	
19.00	135	198	●	
19.50	104	205	○	
20.00	104	205	●	

● stock standard ○ non-standard stock EX stock exhaustion

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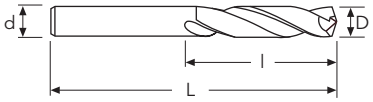
234NVA - 234LS - 234LSTH (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

234NVA*	234LS	234LSTH
NH	LS	LS
HSS/CO HT	HSS/CO OX	HSS/CO PV15
130°	130°	130°
30°	35~40°	35~40°



d = D

	D(h8)	l	L	Stock	Stock	Stock
mm	0.50	12	32	●*		
	0.60	15	35	●*		
	0.70	21	42	●*		
	0.80	25	46	●*		
	0.90	29	51	●*		
	1.00	33	56	●*		
	1.10	37	60	●*		
	1.20	41	65	●*		
	1.30	41	65	●*		
	1.40	45	70	●*		
	1.50	45	70	●*		
	1.60	50	76	●*		
	1.70	50	76	●*		
	1.80	53	80	●*		
	1.90	53	80	●*		
	2.00	56	85	●	●	●
	2.10	56	85	●	●	●
	2.20	59	90	●	●	●
	2.30	59	90	●	●	●
	2.40	62	95	●	●	●
	2.50	62	95	●	●	●
	2.60	62	95	●	●	●
	2.70	66	100	●	●	●
	2.80	66	100	●	○	●
	2.90	66	100	●	●	●
	3.00	66	100	●	●	●
	3.10	69	106	●	●	●
	3.20	69	106	●	●	●
	3.30	69	106	●	●	●
	3.40	73	112	●	●	●
	3.50	73	112	●	●	●
	3.60	73	112	●	●	●
	3.70	73	112	●	●	●
	3.80	78	119	●	●	●
	3.90	78	119	●	●	●
	4.00	78	119	●	●	●

* ≤ mm. 1.9 = 134N HSS

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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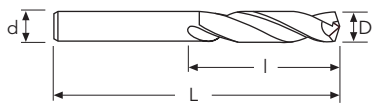
DIN 340

234NVA - 234LS - 234LSTH (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

	234NVA	234LS	234LSTH
	NH	LS	LS
	HSS/CO HT	HSS/CO OX	HSS/CO PV15
	130°	130°	130°
	30°	35~40°	35~40°

D(h8)		l	L	Stock	Stock	Stock
mm	4.10	78	119	●		
	4.20	78	119	●	●	●
	4.30	82	126	●		
	4.40	82	126	●		
	4.50	82	126	●	●	●
	4.60	82	126	●		
	4.70	82	126	●		
	4.80	87	132	●	●	●
	4.90	87	132	●		
	5.00	87	132	●	●	●
	5.10	87	132	●		
	5.20	87	132	●	●	●
	5.30	87	132	●		
	5.40	91	139	●		
	5.50	91	139	●	●	●
	5.60	91	139	●		
	5.70	91	139	●		
	5.80	91	139	●	●	●
	5.90	91	139	●		
	6.00	91	139	●	●	●
	6.10	97	148	●		
	6.20	97	148	●	●	●
	6.30	97	148	●		
	6.40	97	148	○		
	6.50	97	148	●	●	●
	6.60	97	148	●		
	6.70	97	148	●		
	6.80	102	156	●	●	●
	6.90	102	156	●		
	7.00	102	156	●	●	●
	7.10	102	156	●		
	7.20	102	156	●	●	○
	7.30	102	156	○		
	7.40	102	156	●		
	7.50	102	156	●	●	●
	7.60	109	165	●		

● stock standard ○ non-standard stock EX stock exhaustion

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n Vf

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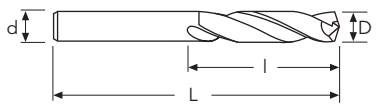
DIN 340

234NVA - 234LS - 234LSTH (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

	234NVA	234LS	234LSTH
	NH	LS	LS
	HSS/CO HT	HSS/CO OX	HSS/CO PV15
	130°	130°	130°
	30°	35~40°	35~40°

D(h8)		l	L	Stock	Stock	Stock
mm	7.70	109	165	●		
	7.80	109	165	●	●	○
	7.90	109	165	●		
	8.00	109	165	●	●	●
	8.10	109	165	●		
	8.20	109	165	●	●	○
	8.30	109	165	○		
	8.40	109	165	○		
	8.50	109	165	●	●	●
	8.60	115	175	●		
	8.70	115	175	●		
	8.80	115	175	●		
	8.90	115	175	●		
	9.00	115	175	●	●	●
	9.10	115	175	●		
	9.20	115	175	●		
	9.30	115	175	●		
	9.40	115	175	●		
	9.50	115	175	●	●	●
	9.60	121	184	●		
	9.70	121	184	●		
	9.80	121	184	●	●	○
	9.90	121	184	●		
	10.00	121	184	●	●	●
	10.20	121	184	●		
	10.50	121	184	●	●	●
	10.80	128	195	●		
	11.00	128	195	●	●	●
	11.20	128	195	●		
	11.50	128	195	●	●	●
	11.80	128	195	●		
	12.00	134	205	●	●	●
	12.50	134	205		●	●
	13.00	134	205		●	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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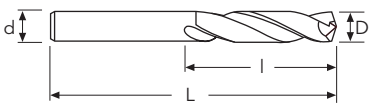
DIN 1869 1

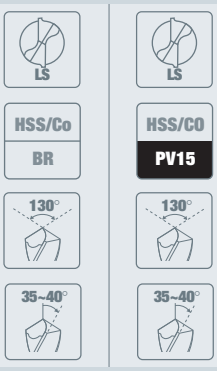
2691LS 2691LSTH

2691LS - 2691LSTH (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D



D(h8)		l	L	Stock	Stock
mm	2.00	85	125	●	●
	2.25	90	135	○	○
	2.50	95	140	●	●
	2.75	100	150	○	○
	3.00	100	150	●	●
	3.25	105	155	●	○
	3.50	115	165	●	●
	3.75	115	165	○	○
	4.00	120	175	●	●
	4.25	120	175	●	○
	4.50	125	185	●	●
	4.75	125	185	○	○
	5.00	135	195	●	●
	5.25	135	195	●	○
	5.50	140	205	●	●
	5.75	140	205	○	○
	6.00	140	205	●	●
	6.25	150	215	○	○
	6.50	150	215	●	●
	6.75	155	225	●	○
	7.00	155	225	●	●
	7.25	155	225	○	○
	7.50	155	225	●	●
	7.75	165	240	○	○
	8.00	165	240	●	●
	8.25	165	240	○	○
	8.50	165	240	●	●
	8.75	175	250	○	○
	9.00	175	250	●	●
	9.25	175	250	○	○
	9.50	175	250	●	●
	9.75	185	265	○	○
	10.00	185	265	●	●
	10.50	185	265	●	●
	11.00	195	280	●	●
	11.50	195	280	●	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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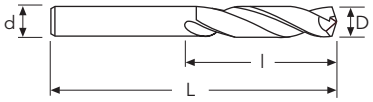
DIN 1869 1

2691LS - 2691LSTH (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33

2691LS 2691LSTH



d = D

LS | HSS/Co BR | 130° | 35~40°

LS | HSS/CO PV15 | 130° | 35~40°

D	l	L	Stock	Stock
mm 12.00	205	295	●	●
12.50	205	295	●	●
13.00	205	295	●	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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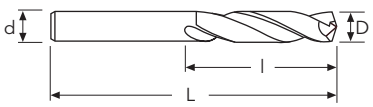
DIN 1869 2-3

1692LS - 1693LS (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~20
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



d = D

	D	l	L	1692LS Stock	1693LS Stock
mm	3.00	130	190	●	
	3.50	145	210	●	
	3.50	180	265		●
	4.00	150	220	●	
	4.00	190	280		●
	4.50	160	235	●	
	4.50	200	295		●
	5.00	170	245	●	
	5.00	210	315		●
	5.50	180	260	●	
	5.50	225	330		●
	6.00	180	260	●	
	6.00	225	330		●
	6.50	190	275	●	
	6.50	235	350		●
	7.00	200	290	●	
	7.00	250	370		●
	7.50	200	290	●	
	7.50	250	370		●
	8.00	210	305	●	
	8.00	265	390		●
	8.50	210	305	●	
	8.50	265	390		●
	9.00	220	320	●	
	9.00	280	410		●
	9.50	220	320	●	
	9.50	280	410		●
	10.00	235	340	●	
	10.00	295	430		●
	10.50	235	340	●	
	10.50	295	430		●
	11.00	250	365	●	
	11.00	310	455		●
	12.00	260	375	●	
	12.00	330	480		●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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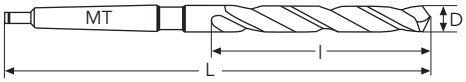
DIN 345

145N - 145NTI - 245N (h8)

Ø mm	3.1~6	6.1~10	10.1~18	18.1~30	30.1~50	50.1~80
tol. D µ	0 / -18	0 / -22	0 / -27	0 / -33	0 / -39	0 / -46



	145N	145NTI	245N
	N	N	NH
	HSS OX	HSS TiN	HSS/CO HT
	118°	118°	130°
	25~30°	25~30°	30°

D(h8)	l	L	MT	Stock	Stock	Stock
mm 5.00	52	133	1	●		
5.25	52	133	1	○		
5.50	57	138	1	●		
5.75	57	138	1	○		
6.00	57	138	1	●		
6.25	63	144	1	○		
6.50	63	144	1	●		
6.75	69	150	1	●		
7.00	69	150	1	●		
7.25	69	150	1	○		
7.50	69	150	1	●		
7.75	75	156	1	○		
8.00	75	156	1	●		
8.25	75	156	1	○		
8.50	75	156	1	●		
8.75	81	162	1	○		
9.00	81	162	1	●		
9.25	81	162	1	○		
9.50	81	162	1	●		
9.75	87	168	1	○		
10.00	87	168	1	●		
10.25	87	168	1	●		
10.50	87	168	1	●		
10.75	94	175	1	○		
11.00	94	175	1	●		
11.25	94	175	1	○		
11.50	94	175	1	●		
11.75	94	175	1	○		
12.00	101	182	1	●		
12.25	101	182	1	○		
12.50	101	182	1	●		
12.75	101	182	1	○		
13.00	101	182	1	●	●	●
13.25	108	189	1	●		
13.50	108	189	1	●	●	●
13.75	108	189	1	●		

● stock standard ○ non-standard stock EX stock exhaustion

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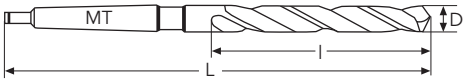
DIN 345

145N - 145NTI - 245N (h8)

Ø mm	3.1~6	6.1~10	10.1~18	18.1~30	30.1~50	50.1~80
tol. D µ	0 / -18	0 / -22	0 / -27	0 / -33	0 / -39	0 / -46



	145N	145NTI	245N
	N	N	NH
	HSS OX	HSS TiN	HSS/CO HT
	118°	118°	130°
	25~30°	25~30°	30°

D(h8)	l	L	MT	Stock	Stock	Stock
mm 14.00	108	189	1	●	●	●
14.25	114	212	2	●		
14.50	114	212	2	●	●	●
14.75	114	212	2	●		
15.00	114	212	2	●	●	●
15.25	120	218	2	●		
15.50	120	218	2	●	●	●
15.75	120	218	2	●		
16.00	120	218	2	●	●	●
16.25	125	223	2	●		
16.50	125	223	2	●	●	●
16.75	125	223	2	●		
17.00	125	223	2	●	●	●
17.25	130	228	2	●		
17.50	130	228	2	●	●	●
17.75	130	228	2	●		
18.00	130	228	2	●	●	●
18.25	135	233	2	●		
18.50	135	233	2	●	●	●
18.75	135	233	2	●		
19.00	135	233	2	●	●	●
19.25	140	238	2	●		
19.50	140	238	2	●	●	●
19.75	140	238	2	●		
20.00	140	238	2	●	●	●
20.25	145	243	2	●		
20.50	145	243	2	●	●	●
20.75	145	243	2	●		
21.00	145	243	2	●	●	●
21.25	150	248	2	●		
21.50	150	248	2	●	●	●
21.75	150	248	2	●		
22.00	150	248	2	●	●	●
22.25	150	248	2	●		
22.50	155	253	2	●	●	●
22.75	155	253	2	●		

● stock standard ○ non-standard stock EX stock exhaustion

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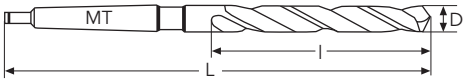
DIN 345

145N - 145NTI - 245N (h8)

Ø mm	3.1~6	6.1~10	10.1~18	18.1~30	30.1~50	50.1~80
tol. D µ	0 / -18	0 / -22	0 / -27	0 / -33	0 / -39	0 / -46



	145N	145NTI	245N
	N	N	NH
	HSS OX	HSS TiN	HSS/CO HT
	118°	118°	130°
	25~30°	25~30°	30°

D(h8)	l	L	MT	Stock	Stock	Stock
mm 23.00	155	253	2	●	●	●
23.25	155	276	3	●		
23.50	155	276	3	●	●	●
23.75	160	281	3	●		
24.00	160	281	3	●	●	●
24.25	160	281	3	●		
24.50	160	281	3	●	●	●
24.75	160	281	3	●		
25.00	160	281	3	●	●	●
25.25	165	286	3	○		
25.50	165	286	3	●	○	●
25.75	165	286	3	○		
26.00	165	286	3	●	●	●
26.25	165	286	3	○		
26.50	165	286	3	●	○	●
26.75	170	291	3	○		
27.00	170	291	3	●	●	●
27.25	170	291	3	○		
27.50	170	291	3	●	○	●
27.75	170	291	3	○		
28.00	170	291	3	●	●	●
28.25	175	296	3	○		
28.50	175	296	3	●	○	●
28.75	175	296	3	○		
29.00	175	296	3	●	●	●
29.25	175	296	3	○		
29.50	175	296	3	●	○	●
29.75	175	296	3	○		
30.00	175	296	3	●	●	●
30.25	180	301	3	○		
30.50	180	301	3	●		
30.75	180	301	3	○		
31.00	180	301	3	●		
31.25	180	301	3	○		
31.50	180	301	3	●		
31.75	185	306	3	○		

● stock standard ○ non-standard stock EX stock exhaustion

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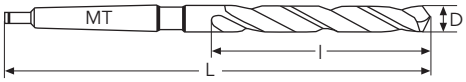
DIN 345

145N - 145NTI - 245N (h8)

Ø mm	3.1~6	6.1~10	10.1~18	18.1~30	30.1~50	50.1~80
tol. D µ	0 / -18	0 / -22	0 / -27	0 / -33	0 / -39	0 / -46



	145N	145NTI	245N
	N	N	NH
	HSS OX	HSS TiN	HSS/CO HT
	118°	118°	130°
	25~30°	25~30°	30°

D(h8)	l	L	MT	145N Stock	145NTI Stock	245N Stock
mm 32.00	185	334	4	●		
32.50	185	334	4	●		
33.00	185	334	4	●		
33.50	185	334	4	●		
34.00	190	339	4	●		
34.50	190	339	4	●		
35.00	190	339	4	●		
35.50	190	339	4	●		
36.00	195	344	4	●		
36.50	195	344	4	●		
37.00	195	344	4	●		
37.50	195	344	4	●		
38.00	200	349	4	●		
38.50	200	349	4	●		
39.00	200	349	4	●		
39.50	200	349	4	●		
40.00	200	349	4	●		
40.50	205	354	4	○		
41.00	205	354	4	●		
41.50	205	354	4	○		
42.00	205	354	4	●		
42.50	205	354	4	○		
43.00	210	359	4	●		
43.50	210	359	4	○		
44.00	210	359	4	●		
44.50	210	359	4	○		
45.00	210	359	4	●		
45.50	215	364	4	○		
46.00	215	364	4	●		
46.50	215	364	4	○		
47.00	215	364	4	●		
47.50	215	364	4	○		
48.00	220	369	4	●		
48.50	220	369	4	○		
49.00	220	369	4	●		
49.50	220	369	4	○		

● stock standard ○ non-standard stock EX stock exhaustion

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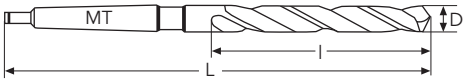
DIN 345

145N - 145NTI - 245N (h8)

Ø mm	3.1~6	6.1~10	10.1~18	18.1~30	30.1~50	50.1~80
tol. D µ	0 / -18	0 / -22	0 / -27	0 / -33	0 / -39	0 / -46

145N	145NTI	245N
N	N	NH
HSS OX	HSS TiN	HSS/CO HT
118°	118°	130°
25~30°	25~30°	30°



D(h8)	l	L	MT	Stock	Stock	Stock
mm 50.00	220	369	4	●		
51.00	225	412	5	○		
52.00	225	412	5	○		
53.00	225	412	5	○		
54.00	230	417	5	○		
55.00	230	417	5	●		
56.00	230	417	5	○		
57.00	235	422	5	○		
58.00	235	422	5	○		
59.00	235	422	5	○		
60.00	235	422	5	●		

● stock standard ○ non-standard stock EX stock exhaustion

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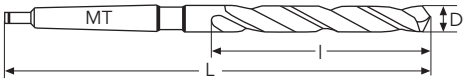
DIN 341

241LS

241LS (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~30
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



D(h8)	l	L	MT	Stock
mm 13.00	134	215	1	●
13.50	142	223	1	●
14.00	142	223	1	●
14.50	147	245	2	●
15.00	147	245	2	●
15.50	153	251	2	●
16.00	153	251	2	●
16.50	159	257	2	●
17.00	159	257	2	●
17.50	165	263	2	●
18.00	165	263	2	●
18.50	171	269	2	●
19.00	171	269	2	●
19.50	177	275	2	●
20.00	177	275	2	●
21.00	184	282	2	●
22.00	191	289	2	●
23.00	198	296	2	●
24.00	206	327	3	●
25.00	206	327	3	●
26.00	214	335	3	●
27.00	222	343	3	●
28.00	222	343	3	●
29.00	230	351	3	●
30.00	230	351	3	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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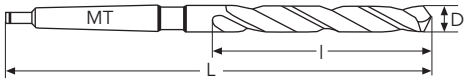
DIN 1870 1-2

2701LS - 2702LS (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~30
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



	2701LS	2702LS
	LS	LS
	HSS/Co BR	HSS/Co BR
	130°	130°
	35~40°	35~40°

D(h8)	l	L	MT	Stock	Stock
mm 13.00	205	310	1	●	
13.00	260	395	1		●
13.50	220	325	1	●	
13.50	275	410	1		●
14.00	220	325	1	●	
14.00	275	410	1		●
14.50	220	340	2	●	
14.50	275	425	2		●
15.00	220	340	2	●	
15.00	275	425	2		●
15.50	230	355	2	●	
15.50	295	445	2		●
16.00	230	355	2	●	
16.00	295	445	2		●
16.50	230	355	2	●	
16.50	295	445	2		●
17.00	230	355	2	●	
17.00	295	445	2		●
17.50	245	370	2	●	
17.50	310	465	2		●
18.00	245	370	2	●	
18.00	310	465	2		●
18.50	245	370	2	●	
18.50	310	465	2		●
19.00	245	370	2	●	
19.00	310	465	2		●
19.50	260	385	2	●	
19.50	325	490	2		●
20.00	260	385	2	●	
20.00	325	490	2		●
20.50	260	385	2	○	
20.50	325	490	2		○
21.00	260	385	2	●	
21.00	325	490	2		●
21.50	270	405	2	○	
21.50	345	515	2		○
22.00	270	405	2	●	

● stock standard ○ non-standard stock EX stock exhaustion

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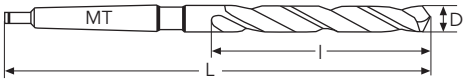
DIN 1870 1-2

2701LS - 2702LS (h8)

Ø mm	1~3	3.1~6	6.1~10	10.1~18	18.1~30
tol. D µ	0 / -14	0 / -18	0 / -22	0 / -27	0 / -33



	2701LS	2702LS
	LS	LS
	HSS/Co BR	HSS/Co BR
	130°	130°
	35~40°	35~40°

D(h8)	l	L	MT	Stock	Stock
mm 22.00	345	515	2		●
22.50	270	405	2	○	
22.50	345	515	2		○
23.00	270	405	2	●	
23.00	345	515	2		●
23.50	270	425	3	○	
23.50	345	535	3		○
24.00	290	440	3	●	
24.00	365	555	3		●
24.50	290	440	3	○	
24.50	365	555	3		○
25.00	290	440	3	●	
25.00	365	555	3		●
25.50	290	440	3	○	
25.50	365	555	3		○
26.00	290	440	3	●	
26.00	365	555	3		●
26.50	290	440	3	○	
26.50	365	555	3		○
27.00	305	460	3	●	
27.00	385	580	3		●
27.50	305	460	3	○	
27.50	385	580	3		○
28.00	305	460	3	●	
28.00	385	580	3		●
28.50	305	460	3	○	
28.50	385	580	3		○
29.00	305	460	3	●	
29.00	385	580	3		●
29.50	305	460	3	○	
29.50	385	580	3		○
30.00	305	460	3	●	
30.00	385	580	3		●

● stock standard ○ non-standard stock EX stock exhaustion

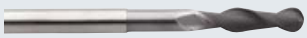
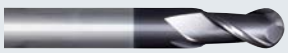
END MILLS

END MILLS SELECTION GUIDE / GUIDA ALLA SCELTA DELLA FRESA / HILFE ZUR AUSWAHL DER FRÄSER / GUIDE À LA CHOIX DES FRAISES. 90
CAPTION / LEGENDA / VERZEICHNIS / LÉGENDE. 104

2FL	Z2	NMG UH RED	UH RADIUS	30°	UHCS2	
	Z2	UMG ENDLESS ORANGE	MEX	30°	MEXCS2	
	Z2	UMG ENDLESS ORANGE	MEX	30°	MEXCL2	
	Z2	UMG ENDLESS ORANGE	MEX RADIUS	30°	MEXCL2R	
	Z2	UMG ENDLESS	VA	35°	MEFCS2	
	Z2	MG LAPPED	ALU	42°	MDCSA2	
	Z2	MG TiCN	ALU RADIUS	25°	MCA212R	
	Z2	MG BR	N	30°	GB205	
	Z2	MG PV200	N	30°	G2CS2	
	Z2	MG PV200	N	30°	G2210	
	Z2	MG PV200	N	30°	G2211	
	Z2	MG PV200	N	30°	G2212	
	Z2	MG PV200	N	30°	G2213	
	Z2	MG PV200	N	30°	MDTACS2	
	Z2	MG PV200	N	30°	MDTA210	
	Z2	MG BR	N	30°	MDCL2	
	Z2	MG PV200	N	30°	MDTACL2	
	Z2	HSS-P PV200	UM	30°	UMWS2	
	Z2	HSS/Co BR	N	30°	WS2	
	Z2	HSS/Co PV200	N	30°	TAWS2	

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
1~12	129			◉						
1~25	114	○	◉	◉	○			○		
1~20	114	○	◉	◉	○			○		
3~12	122	○	◉	◉	○			○		
1~20	152	○	◉		◉	○	◉			
3~20	142								◉	
2~12	143								◉	
1~12	162	◉	◉		○			◉	○	
1~20	162	◉	◉		○	○	○	◉	○	
2~6	162	◉	◉		○	○	○	◉	○	
5~12	162	◉	◉		○	○	○	◉	○	
8~20	162	◉	◉		○	○	○	◉	○	
16~20	162	◉	◉		○	○	○	◉	○	
1~20	174	◉	◉		○	○	○	◉	○	
3~16	174	◉	◉		○	○	○	◉	○	
3~16	174	◉	◉		○			◉	○	
3~20	174	◉	◉		○	○	○	◉	○	
2~20	182	◉	○		○			◉		
1~32	188	◉	○		○			○		
1~25	188	◉	○		○			○		

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

2FL	Z2	HSS/Co BR	ALU	45°	WSA2	
	Z2	HSS/Co BR	N	30°	WL2	
	Z2	HSS/Co PV200	N	30°	TAWL2	
2FL MICRO	Z2	NMG UH RED	UH RADIUS	30°	UHM2	
	Z2	UMG ENDLESS ORANGE	MEX	30°	MEXM2	
2FL RIB PROCESSING	Z2	NMG UH RED	UH	30°	UHCR2	
	Z2	NMG UH RED	UH RADIUS	30°	UH211	
	Z2	UMG ENDLESS ORANGE	MEX	30°	MEXCR2	
	Z2	MG	MDC RADIUS	30°	MDC2203	
2FL BALL	Z2 BALL	NMG UH RED	UH BALL NOSE	30°	UHCSB2	
	Z2 BALL	NMG UH RED	UH BALL NOSE	30°	UH250	
	Z2 BALL	UMG ENDLESS ORANGE	MEX BALL NOSE	30°	MEXCSB2	
	Z2 BALL	UMG ENDLESS ORANGE	MEX BALL NOSE	30°	MEXCLSB2	
	Z2 BALL	UMG ENDLESS ORANGE	MEX BALL NOSE	30°	MEX253	
	Z2 BALL	MG	MDC BALL NOSE	30°	MDC2251	
	Z2 BALL	MG LAPPED	ALU BALL NOSE	40°	MDCAB2	
	Z2 BALL	MG BR	N BALL NOSE	30°	GB255	
	Z2 BALL	MG PV200	N BALL NOSE	30°	G2CSB2	
	Z2 BALL	MG PV200	N BALL NOSE	30°	G2250	
	Z2 BALL	MG PV200	N BALL NOSE	30°	G2251	

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
2~20	146								◉	
3~40	193	◉	○		○			○		
3~20	193	◉	○		○			○		
0.3~2	129			◉						
0.1~1.4	114	○	◉	◉	○			○		
0.1~4	130			◉						
0.5~12	132			◉						
0.4~6	116	○	◉	◉	○			○		
0.6~2	141								○	◉
0.1~12	125			◉						
1~12	125			◉						
1~12	110	○	◉	◉	○			○		
1~20	110	○	◉	◉	○			○		
2~12	110	○	◉	◉	○			○		
2~6	140								○	◉
1~12	145								◉	
1~12	170	◉	◉		○			◉	○	
1~20	170		◉		○	○	○	◉	○	
1~12	170		◉		○	○	○	◉	○	
8~20	170		◉		○	○	○	◉	○	

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

2FL BALL	Z2 BALL	MG PV200	N BALL NOSE	30°	MDTACSB2
	Z2 BALL	MG PV200	N BALL NOSE	30°	MDTA250
	Z2 BALL	HSS/Co BR	N BALL NOSE	30°	WSB2
	Z2 BALL	HSS/Co PV200	N BALL NOSE	30°	TAWSB2
	Z2 BALL	HSS/Co BR	N BALL NOSE	30°	WLB2
	Z2 BALL	HSS/Co PV200	N BALL NOSE	30°	TAWLB2
2FL BALL MICRO	Z2 BALL	UMG ENDLESS ORANGE	MEX BALL NOSE	30°	MEXMB2
	Z2 BALL	MG	MDC BALL NOSE	30°	MDC2253
2FL BALL RIB PROCESSING	Z2 BALL	NMG UH RED	UH BALL NOSE	30°	UHCRB2
	Z2 BALL	UMG ENDLESS ORANGE	MEX BALL NOSE	30°	MEXCRB2
3FL	Z3	MG	MDC RADIUS	30°	MDC3311
	Z3	MG LAPPED	ALU	55°	MDCSA3
	Z3	MG LAPPED	ALU	55°	MDA310
	Z3	MG LAPPED	ALU	55°	MDA311
	Z3	MG LAPPED	ALU	55°	MDA312
	Z3~Z4	UMG ENDLESS	VA	50°	MEFCSH3
	Z3	MG BR	N	45°	GB305
	Z3	MG PV200	N	45°	G2CSH3
	Z3	MG PV200	N	45°	G2310
	Z3	MG PV200	N	45°	G2311

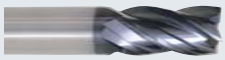
Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
1~20	178		◉		○	○	○	◉	○	
3~12	178		◉		○	○	○	◉	○	
2~30	188	◉	○		○			○		
2~30	188	◉	○		○			○		
3~20	193	◉	○		○			○		
3~20	193	◉	○		○			○		
0.1~0.9	110	○	◉	◉	○			○		
0.6~2	140								○	◉
0.1~4	126			◉						
0.4~6	112	○	◉	◉	○			○		
2~12	141								○	◉
1~20	144								◉	
3~6	144								◉	
3~12	144								◉	
8~20	144								◉	
6~20	152	○	◉		◉	○	◉			
1~12	164	◉	◉		○			◉	○	
1~20	164	◉	◉		○	○	○	◉	○	
2~6	164	◉	◉		○	○	○	◉	○	
5~12	164	◉	◉		○	○	○	◉	○	

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

3FL	Z3	MG / PV200	N	45°	G2312	
	Z3	MG / PV200	N	30°	MDTACS3	
	Z3	MG / PV200	N	50°	MDTAWSH3	
	Z3	HSS-P / PV200	UM	30°	UMWS3	
	Z3	HSS/Co / BR	N	30°	WS3	
	Z3	HSS/Co / PV200	N	30°	TAWS3	
	Z3~Z4	HSS/Co / BR	N	45°	WSH3	
	Z3~Z4	HSS/Co / PV200	N	45°	TAWSH3	
	Z3	HSS/Co / BR	N	30°	WL3	
	Z3	HSS/Co / PV200	N	30°	TAWL3	
4FL	Z4	NMG / UH RED	UH RADIUS	30°	UHCS4	
	Z4	NMG / UH RED	UH RADIUS	30°	UH411	
	Z4	NMG / UH RED	UH RADIUS	30°	UH412	
	Z4	NMG / UH RED	UH RADIUS	30°	UHF430	
	Z4	UMG / ENDLESS ORANGE	MEX	30°	MEXCS4	
	Z4	UMG / ENDLESS ORANGE	MEX RADIUS	30°	MEX410R	
	Z4	UMG / ENDLESS ORANGE	MEX	30°	MEXCL4	
	Z4	UMG / ENDLESS ORANGE	MEX RADIUS	30°	MEXCL4R	
	Z4	UMG / ENDLESS	VA	35°	MEFCS4	
	Z4	MG / BR	N	30°	GB405	

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
8~20	164	◉	◉		○	○	○	◉	○	
2~20	175	◉	◉		○	○	○	◉	○	
3~20	175	◉	◉		○	○	○	◉	○	
2~20	182	◉	○		○			◉		
1~32	190	◉	○		○			○		
1~32	190	◉	○		○			○		
6~30	190	◉	○		○			○		
6~30	194	◉	○		○			○		
3~25	194	◉	○		○			○		
3~25	194	◉	○		○			○		
1~20	134			◉						
3~12	135			◉						
6~12	135			◉						
2~12	128			◉						
1~20	118	○	◉	◉	○			○		
2~12	122	○	◉	◉	○			○		
2~25	118	○	◉	◉	○			○		
3~20	122	○	◉	◉	○			○		
2~20	152	○	◉		◉	○	◉			
1~12	166	◉	◉		○			◉	○	

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

4FL	Z4	MG PV200	N	30°	G2CS4	
	Z4	MG PV200	N	30°	G2410	
	Z4	MG PV200	N	30°	G2411	
	Z4	MG PV200	N	30°	G2412	
	Z4	MG PV200	N	30°	G2413	
	Z4	MG PV200	N	30°	MDTACS4	
	Z4	MG PV200	N	30°	MDTA410	
	Z4	MG BR	N	30°	MDCL4	
	Z4	MG PV200	N	30°	MDTACL4	
	Z4	HSS-P PV200	UM	30°	UMWS4	
	Z4~Z6	HSS/Co BR	N	30°	WS4	
	Z4~Z6	HSS/Co PV200	N	30°	TAWS4	
	Z4~Z6	HSS/Co BR	N	30°	WL4	
	Z4~Z6	HSS/Co PV200	N	30°	TAWL4	
4FL VARIABLE HELIX	Z4	MG PV30	HF	VARI	HF400	
	Z4	MG PV30	HF	VARI	HF410R	
4FL BALL	Z4 BALL	MG PV200	N BALL NOSE	30°	G2CSB4	
MULTI FLUTES	Z6	NMG UH RED	UH RADIUS	30°	UH610R	
	Z6	NMG UH RED	UH RADIUS	30°	UH611R	
	Z6~Z8	UMG ENDLESS ORANGE	MEX	45°	MEXCSHM	

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
1~20	166	◉	◉		○	○	○	◉	○	
2~6	166	◉	◉		○	○	○	◉	○	
5~12	166	◉	◉		○	○	○	◉	○	
8~20	166	◉	◉		○	○	○	◉	○	
16~20	166	◉	◉		○	○	○	◉	○	
2~20	176	◉	◉		○	○	○	◉	○	
3~16	176	◉	◉		○	○	○	◉	○	
3~20	176	◉	◉		○			◉	○	
3~20	176	◉	◉		○	○	○	◉	○	
3~20	183	◉	○		○			◉		
2~40	191	◉	○		○			○		
2~40	191	◉	○		○			○		
3~40	194	◉	○		○			○		
3~40	194	◉	○		○			○		
3~25	158	◉	◉		◉	○	◉			
3~25	158	◉	◉		◉	○	◉			
1~20	170	◉	◉		○	○	○	◉	○	
6~12	136			◉						
6~20	136			◉						
6~25	120	○	◉	◉	○			○		

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

MULTI FLUTES	Z6	UMG ENDLESS ORANGE	MEX	45°	MEXCLHM	
	Z6	UMG ENDLESS ORANGE	MEX RADIUS	45°	MEX610R	
	Z6	UMG ENDLESS ORANGE	MEX RADIUS	45°	MEX611R	
	Z6~Z8	UMG ENDLESS	VA	50°	MEF600	
	Z6	MG PV200	N	45°	G2CSHM	
ROUGHING	Z3~Z4	UMG ENDLESS	MEX HR FINE	20°	MEXCSFR	
	Z3~Z6	UMG ENDLESS	VA HR FINE	45°	MEF901	
	Z4~Z6	UMG ENDLESS	VA HR FINE	45°	MEF902	
	Z3	HSS/Co BR	ALU WR COARSE	45°	WSAR	
	Z3~Z4	MG PV200	HR FINE	30°	G2CSFR	
	Z4	MG PV200	NR COARSE	30°	MDTAWSR	
	Z3~Z5	HSS-P PV200	UM HR FINE	30°	UMWSFR	
	Z3~Z6	HSS/Co BR	NR COARSE	30°	WSR	
	Z3~Z6	HSS/Co PV200	NR COARSE	30°	TAWSR	
	Z3~Z6	HSS/Co BR	HR FINE	30°	WSFR	
	Z3~Z6	HSS/Co PV200	HR FINE	30°	TAWSFR	
	Z3~Z6	HSS/Co BR	HR FINE	30°	WLFR	
	Z3~Z6	HSS/Co PV200	HR FINE	30°	TAWLFR	
VARIOUS	Z8~Z14	HSS/Co BR	N	30°	FM	
	Z8~Z14	HSS/Co PV200	N	30°	TAFM	

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
6~25	120	○	◉	◉	○			○		
6~12	121	○	◉	◉	○			○		
6~20	121	○	◉	◉	○			○		
6~20	153	○	◉		◉	○	◉			
6~20	168	◉	◉		○	○	○	◉	○	
6~20	123	○	◉	◉	○			○		
4~20	154	○	◉		◉	○	◉			
6~20	154	○	◉		◉	○	◉			
6~25	147								◉	
6~20	167	◉	◉		○	○	○	◉	○	
6~20	177	◉	◉		○	○	○	◉	○	
6~20	184	◉	○		○			◉		
6~30	192	◉	○		○			○		
6~25	192	◉	○		○			○		
6~30	192	◉	○		○			○		
6~40	192	◉	○		○			○		
6~25	195	◉	○		○			○		
6~40	195	◉	○		○			○		
40~160	196	◉	○		○			○		
40~160	196	◉	○		○			○		

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

VARIOUS	Z6~Z12	HSS/Co BR	HR FINE	30°	FFR	
	Z6~Z12	HSS/Co PV200	HR FINE	30°	TAFFR	
	Z4	HSS/Co BR	N	0°	WCR	
	Z6~Z12	HSS/Co BR	N	α 45°	WDC	
	Z6~Z12	HSS/Co BR	N	α 45°	WDD	
	Z6~Z8	HSS/Co BR	N	15°	WTM	
	Z8~Z14	HSS/Co BR	N	10°	WWK	

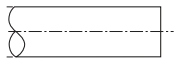
Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER ~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
40~160	196	◉	○		○			○		
40~160	196	◉	○		○			○		
R1~R20	197	◉	○		○			○		
16~38	198	◉	○		○			○		
16~38	198	◉	○		○			○		
12.5~40	199	◉	○		○			○		
10.5~45.5	200	◉	○		○			○		

◉ most suitable / molto adatto / am besten geeignete / le plus indiqué
○ suitable / adatto / geeignet / indiqué

Caption

Legenda / Verzeichnis / Légende

STOCK	
●	stock standard
○	non-standard stock / stock non standard / nicht Standard Lager / stock non standard
EX	stock exhaustion / esaurimento stock / Vorraterschöpfung / épuisement du stock

SHANK / ATTACCO / SCHAFT / QUEUE	
cylindrical shank / attacco cilindrico / zylindrischer Schaft / queue cylindrique	
weldon	
Morse Taper shank / attacco Cono Morse / MK Schaft / queue conique	

TYPE / TIPO / TYP / TYPE	
	flutes number / numero di taglienti / Schneidenanzahl / nombre de dents
	ball nose / raggiata / runder Stirn / bout hémisphérique
	corner radius / torica / Eckradius / torique

GEOMETRY / GEOMETRIA / GEOMETRIE / GÉOMÉTRIE	
MEX	~HRC65 for hardened steel / per acciai temprati / für Hartstahl / pour acier trempé
UH	HRC50~70 for hardened steel / per acciai temprati / für Hartstahl / pour acier trempé
MDC	for graphite / per grafite / für Graphit / pour graphite
ALU	for aluminium / per alluminio / für Aluminium / pour aluminium
MEF	for stainless steel / per acciaio inossidabile / für rostfreien Stahl / pour acier inoxydable
HF	variable helix / elica diseguale / ungleiche Spirale / hélice variable
UM	high performance / alto rendimento / hochleistung / haute performance
N	standard

GEOMETRY / GEOMETRIA / GEOMETRIE / GÉOMÉTRIE	
NR COARSE	roughing coarse pitch / sgrossare passo grosso / Schruppfräser Regelgewinde / ébauche pas gros
HR FINE	roughing fine pitch / sgrossare passo fine / Schruppfräser Feingewinde / ébauche pas fin
WR ALU	roughing for light alloy / sgrossare per leghe leggere / Schruppfräser für weiche Werkstoffe / ébauche pour alliages légers

MATERIAL / MATERIALE / WERKSTOFF / MATIÈRE	
UMG ...	ultra fine micrograin / micrograna ultra fine / ultrafeine Mikrokörnung / micrograin ultra-fin
NMG ...	nano micrograin / nano micrograna / nano Mikrokörnung / nano micrograin
MG ...	micrograin / micrograna / Mikrokörnung /micrograin
HSS-P ...	powder steel / acciaio sinterizzato / Sinterstahl / acier fritté
HSS/Co ...	high speed steel 5%~8% Co / acciaio super rapido 5%~8% Co Hochleistungsschnellschnittstahl 5%~8% Co / acier rapide 5%~8% Co

COATINGS / RIVESTIMENTI / BESCHICHTUNGEN / REVÊTEMENTS	... TiCN	... PV30	... PV200	... ENDLESS ORANGE	... UH RED	...
HARDNESS (HV) / DUREZZA (HV) HÄRTE (HV) / DURETÉ (HV)	3000	3300	3500	3300	4500	5000 - 8000
FRICTION COEFFICIENT / COEFFICIENTE D'ATTRITO REIBUNGSKOEFFIZIENT / COEFFICENT DE FROTTEMENT	0.4	0.4	0.5	0.4	0.45	
THICKNESS (µ) / SPESSORE (µ) DICKE (µ) / ÉPAISSEUR (µ)	1~4	1~5	1~4	1~4	1~4	
MAX WORKING (°C) / TEMPERATURA MAX (°C) HOCHSTE TEMPERATUR (°C) / TEMPÉRATURE MAXIMALE (°C)	400	900	800	900	1200	

PARAMETERS / PARAMETRI / PARAMETER / PARAMÉTRES	
n Vf PAGE	parameters reference / riferimento parametri / Parameter Hinweis / référence des paramètres

Mex Endless Orange ~HRC65
UH Red HRC50~70

MEX - UH

Mex (micro grain solid carbide and "endless orange" coating) and Uh (nano micro grain carbide and "Uh red" coating): a top-level range of end mills for middle-hard and hard steel, up to 70 HRC.

Mex (metallo duro micro grana e rivestimento "Endless orange") ed Uh (nano micro grana e rivestimento "Uh red"): una gamma di altissimo livello per acciai medio duri e duri fino a 70HRC.

Mex (Feinkorn- Hartmetall und „Endless orange"-Beschichtung) sowie Uh (Nano- Feinkorn und „Uh red"-Beschichtung) Fräser bieten höchste Leistungen für mittel und hoch gehärtete Stähle bis 70 HRC.

Mex (carbure micro grain et revêtement «Endless orange») et UH (carbure nano micro grain et revêtement «Uh red») : une gamme de fraisage de très haut niveau pour aciers durs jusqu'à 70 HRC.

MEX UMG	ENDLESS ORANGE COATING ULTRA FINE MICROGRAIN	~HRC65
UH NMG	UH RED COATING NANO MICROGRAIN	HRC50~70

OSAWA

n Vf

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OSAWA NORM

MEXMB2 - MEXCLSB2 - MEX253

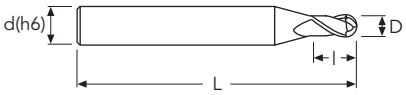
Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±10	±10

MEXCSB2

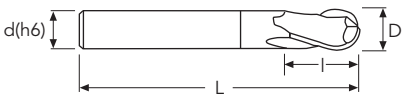
Ø mm	~6	>6
tol. D µ	0 / -30	0 / -30
tol. R µ	±10	±10

MEXMB2 MEXCSB2 MEXCLSB2 MEX253

MEXMB2



MEXCSB2
MEXCLSB2
MEX253



Z2 BALL | UMG ENDLESS ORANGE | MEX BALL NOSE | 30°

D	d	l	L	Stock	Stock	Stock	Stcok
mm 0.1	4	0.2	40	○ NEW			
0.2	4	0.4	40	○ NEW			
0.3	4	0.6	40	○ NEW			
0.4	4	0.8	40	○ NEW			
0.5	4	1	40	○ NEW			
0.6	4	1.2	40	●			
0.7	4	1.4	40	●			
0.8	4	1.6	40	●			
0.9	4	1.8	40	○			
1	3	3	38		●		
1	4	2.5	50			●	
1.2	4	3	50			● NEW	
1.5	3	3	38		●		
1.5	4	4	50			●	
2	6	3	50		●		
2	6	5	50			●	
2	6	4	80				●
2.5	6	6	60				
3	6	4	50		●		
3	6	8	60			●	
3	6	6	100				●
4	6	5	54		●		
4	6	8	70			●	
4	6	8	100				●
5	6	6	54		●		
5	6	10	80			●	
5	6	10	120				●
6	6	12	60		●		
6	6	12	90			●	
6	6	12	120				●
7	8	8	58		○		
7	8	14	90			○	
8	8	14	60		●		
8	8	14	100			●	
8	8	16	150				●
9	10	10	66		○		
9	10	18	100			○	

● stock standard ○ non-standard stock EX stock exhaustion

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OSAWA NORM

MEXMB2 - MEXCLSB2 - MEX253

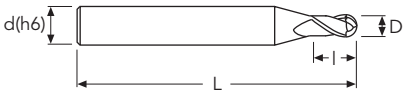
Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±10	±10

MEXCSB2

Ø mm	~6	>6
tol. D µ	0 / -30	0 / -30
tol. R µ	±10	±10

MEXMB2 MEXCSB2 MEXCLSB2 MEX253

MEXMB2



MEXCSB2
MEXCLSB2
MEX253

D	d	l	L	Stock	Stock	Stock	Stock
mm **10**	10	18	70		●		
10	10	18	100			●	
10	10	20	180				●
12	12	22	80		●		
12	12	22	110			●	
12	12	24	200				●
14	12	26	100			●	
16	16	30	150			●	
18	18	34	150			○	
20	20	38	150			○	

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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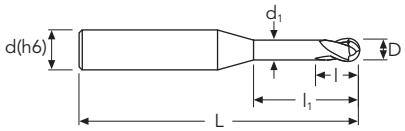
OSAWA NORM

MEXCRB2

MEXCRB2

Ø mm	~6
tol. D µ	0 / -12
tol. R µ	±10



$d_1 < D$

Z2 BALL

UMG ENDLESS ORANGE

MEX BALL NOSE

30°

D		d	l	l1	L	Stock
mm	**0.4**	4	0.4	3	45	●
	0.5	4	0.5	6	45	●
	0.5	4	0.5	8	45	●
	0.6	4	0.6	6	45	●
	0.6	4	0.6	8	45	●
	0.8	4	0.8	6	45	●
	0.8	4	0.8	8	45	●
	1	4	1	6	45	●
	1	4	1	8	45	●
	1	4	1	12	45	●
	1	4	1	16	50	●
	1	4	1	20	55	●
	1.2	4	1.2	8	45	●
	1.2	4	1.2	12	45	●
	1.4	4	1.4	12	45	●
	1.5	4	1.5	8	45	●
	1.5	4	1.5	12	45	●
	1.5	4	1.5	16	50	●
	1.5	4	1.5	20	55	●
	1.6	4	1.6	20	55	●
	1.8	4	1.8	16	50	●
	1.8	4	1.8	20	55	○
	2	4	2	8	45	●
	2	4	2	12	50	●
	2	4	2	16	50	●
	2	4	2	20	55	●
	2	4	2	26	70	●
	2	4	2	30	70	●
	3	6	3	16	55	●
	3	6	3	20	60	●
	3	6	3	26	70	●
	3	6	3	30	70	●
	4	6	4	16	60	●
	4	6	4	20	65	●
	4	6	4	26	70	●
	4	6	4	30	70	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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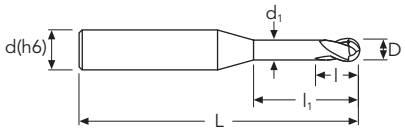
OSAWA NORM

MEXCRB2

MEXCRB2

Ø mm	~6
tol. D µ	0 / -12
tol. R µ	±10



$d_1 < D$

Z2 BALL
UMG ENDLESS ORANGE
MEX BALL NOSE
30°

D		d	l	l1	L	Stock
mm	4	6	4	40	90	●
	4	6	4	50	100	○
	5	6	5	20	60	●
	5	6	5	30	80	●
	6	6	6	30	90	●
	6	6	6	40	100	●
	6	6	6	50	110	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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OSAWA NORM

MEXM2 - MEXCS2

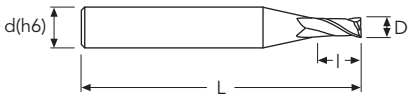
Ø mm	~25
tol. D µ	0 / -12

MEXCL2

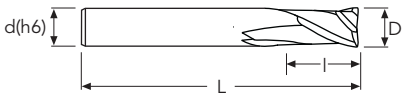
Ø mm	~16
tol. D µ	0 / -30

MEXM2	MEXCS2	MEXCL2

MEXM2



MEXCS2
MEXCL2



Z2 | UMG ENDLESS ORANGE | MEX | 30°

D		d	l	L	Stock	Stock	Stock
mm	0.1	4	0.2	40	○ NEW		
	0.2	4	0.4	40	○ NEW		
	0.3	4	0.6	40	● NEW		
	0.4	4	0.8	40	●		
	0.5	4	1	40	●		
	0.6	4	1.2	40	●		
	0.7	4	1.4	40	●		
	0.8	4	1.6	40	●		
	0.9	4	1.8	40	○		
	1	4	2.5	40		●	
	1	6	8	60			○ NEW
	1.1	4	2.5	40	○		
	1.2	4	4	40	●		
	1.3	4	4	40	○		
	1.4	4	4	40	●		
	1.5	4	4	40		●	
	1.5	6	12	60			○ NEW
	2	4	6	40		●	
	2	6	12	60			●
	2.5	4	8	40		●	
	3	6	8	55		●	
	3	6	15	60			●
	3.5	6	10	55		●	
	4	6	10	55		●	
	4	6	20	60			●
	4.5	6	12	55		●	
	5	6	13	55		●	
	5	6	25	70			●
	5.5	6	14	55		●	
	6	6	15	60		●	
	6	6	25	70			●
	6.5	8	17	65		●	
	7	8	18	65		●	
	7.5	8	19	65		○	
	8	8	20	70		●	
	8	8	30	80			●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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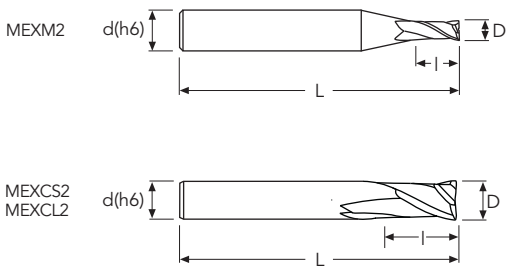
OSAWA NORM

MEXM2 - MEXCS2

Ø mm	~25
tol. D µ	0 / -12

MEXCL2

Ø mm	~16
tol. D µ	0 / -30



Z2 | UMG ENDLESS ORANGE | MEX | 30°

D	d	l	L	MEXM2 Stock	MEXCS2 Stock	MEXCL2 Stock
mm 8.5	10	21	70		●	
9	10	23	70		●	
9.5	10	24	70		○	
10	10	22	75		●	
10	10	35	90			●
11	12	28	75		●	
12	12	26	80		●	
12	12	40	90			●
13	12	35	90		○	
14	12	35	90		●	
14	16	50	110			○
15	16	38	90		○	
16	16	32	100		●	
16	16	50	110			○
18	18	45	100			
20	20	40	100			
25	25	50	120		○	

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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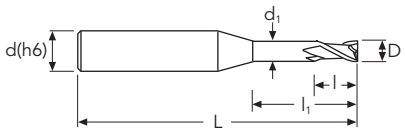
OSAWA NORM

MEXCR2

MEXCR2

Ø mm	~6
tol. D µ	0 / -12



$d_1 < D$

Z2

UMG ENDLESS ORANGE

MEX

30°

D		d	l	l1	L	Stock
mm	0.4	4	0.6	4	45	●
	0.5	4	0.7	6	45	●
	0.5	4	0.7	8	45	●
	0.6	4	0.9	6	45	●
	0.6	4	0.9	8	45	●
	0.7	4	1	6	45	●
	0.7	4	1	8	45	○
	0.8	4	1.2	6	45	●
	0.8	4	1.2	10	45	○
	0.8	4	1.2	12	45	●
	0.9	4	1.35	10	45	○
	0.9	4	1.35	15	50	○
	1	4	1.5	6	45	●
	1	4	1.5	8	45	●
	1	4	1.5	12	45	●
	1	4	1.5	16	50	●
	1	4	1.5	20	55	●
	1.2	4	1.8	12	45	●
	1.2	4	1.8	16	50	●
	1.4	4	2.1	12	45	●
	1.4	4	2.1	16	50	●
	1.4	4	2.1	22	55	●
	1.5	4	2.3	8	45	●
	1.5	4	2.3	10	45	●
	1.5	4	2.3	12	45	●
	1.5	4	2.3	16	50	●
	1.5	4	2.3	20	55	●
	1.6	4	2.4	20	55	●
	1.8	4	2.7	12	45	○
	1.8	4	2.7	20	55	●
	2	4	3	12	45	●
	2	4	3	16	50	●
	2	4	3	20	55	●
	2	4	3	26	60	●
	2	4	3	30	70	●
	2.5	4	3.7	12	45	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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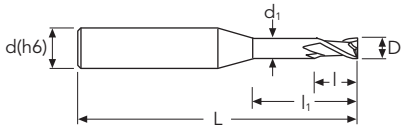
OSAWA NORM

MEXCR2

MEXCR2

Ø mm	~6
tol. D µ	0 / -12



$d_1 < D$

Z2
UMG ENDLESS ORANGE
MEX
30°

D		d	l	l1	L	Stock
mm	2.5	4	3.7	20	60	●
	2.5	4	3.7	30	80	●
	3	6	4.5	14	50	●
	3	6	4.5	18	55	●
	3	6	4.5	26	65	●
	3	6	4.5	30	70	●
	3	6	4.5	40	90	●
	4	6	6	16	60	○
	4	6	6	20	60	●
	4	6	6	26	70	●
	4	6	6	30	70	○
	4	6	6	40	90	●
	4	6	6	50	100	○
	5	6	7.5	20	60	○
	5	6	7.5	26	70	●
	5	6	7.5	30	80	●
	5	6	7.5	50	110	●
	6	6	9	30	90	●
	6	6	9	50	110	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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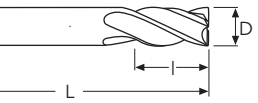
OSAWA NORM

MEXCS4 - MEXCL4

Ø mm	~25
tol. D µ	0 / -30

MEXCS4 MEXCL4



Z4 | UMG ENDLESS ORANGE | MEX | 30°

D		d	l	L	Stock	Stock
mm	2	4	6	40	●	
	2	6	8	60		●
	2.5	4	8	40	●	
	3	6	8	45	●	
	3	6	15	60		●
	3.5	6	10	45	●	
	4	6	11	45	●	
	4	6	20	60		●
	4.5	6	11	45	●	
	5	6	13	50	●	
	5	6	25	70		●
	5.5	6	13	50	●	
	6	6	13	50	●	
	6	6	25	70		●
	6.5	8	17	65	●	
	7	8	18	65	●	
	7.5	8	19	65	○	
	8	8	20	70	●	
	8	8	30	80		●
	8.5	10	21	70	○	
	9	10	23	70	●	
	9.5	10	24	70	○	
	10	10	22	75	●	
	10	10	35	90		●
	11	12	28	75	●	
	12	12	26	80	●	
	12	12	40	90		●
	13	12	35	90	○	
	14	12	35	90	●	
	14	16	50	110		●
	15	16	26	90	○	
	16	16	32	100	●	
	16	16	50	110		●
	18	18	32	100	○	
	18	20	50	110		○
	20	20	38	105	●	

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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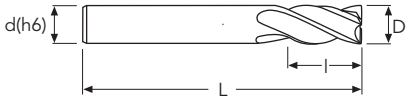
OSAWA NORM

MEXCS4 - MEXCL4

Ø mm	~25
tol. D µ	0 / -30

MEXCS4 MEXCL4



Z4 UMG ENDLESS ORANGE MEX 30°

D		d	l	L	Stock	Stock
mm	**20**	20	55	110		●
	25	25	50	120	●	
	25	25	70	130		●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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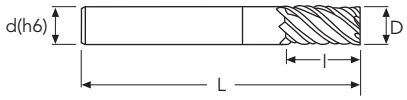
OSAWA NORM

MEXCSHM - MEXCLHM

Ø mm	~25
tol. D µ	0 / -30



D		d	l	L	MEXCSHM Z6~Z8 UMG ENDLESS ORANGE MEX 45° Stock	MEXCLHM Z6 UMG ENDLESS ORANGE MEX 45° Stock
mm	6	6	15	60	●	
	6	6	25	80		●
	7	8	20	65	○	
	8	8	20	70	●	
	8	8	40	100		●
	9	10	23	70	○	
	10	10	25	80	●	
	10	10	45	120		●
	12	12	30	80	●	
	12	12	60	120		●
	14	14	35	100	●	
	16	16	40	100	●	
	16	16	80	150		●
	18	18	45	100	○*	
	20	20	50	100	●*	
	20	20	80	150		●
	25	25	50	100	○*	
	25	25	90	150		●

* Z=8

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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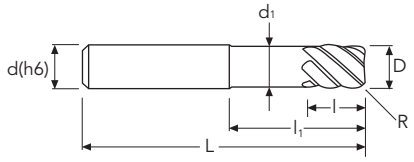
OSAWA NORM

MEX610R - MEX611R

Ø mm	~20
tol. D µ	0 / -30
tol. R µ	±20

MEX610R MEX611R



$d_1 < D$

Z6 | UMG ENDLESS ORANGE | MEX RADIUS | 45°

D			d	l	l1	L	Stock	Stock
mm	6	R0.5	6	6	14	50	●	
	6	R0.5	6	15		90		●
	8	R0.5	8	8	24	60	●	
	8	R0.5	8	20		100		●
	10	R0.5	10	25		100		●
	10	R1.0	10	10	30	70	●	
	10	R1.0	10	25		100		●
	12	R0.5	12	30		100		●
	12	R1.0	12	12	30	75	●	
	12	R1.0	12	30		100		●
	16	R1.0	16	40		150		○
	20	R1.0	20	50		150		○

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf
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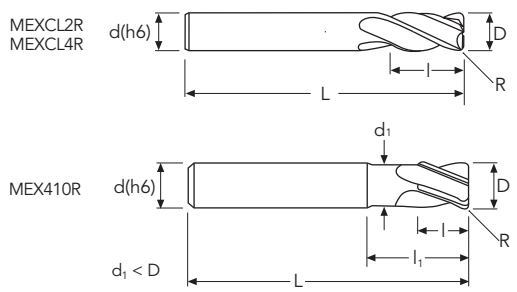
OSAWA NORM

MEXCL2R MEXCL4R MEX410R

MEXCL2R - MEXCL4R - MEX410R

Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±20	±20



Z2 | Z4 | Z4
UMG ENDLESS ORANGE | UMG ENDLESS ORANGE | UMG ENDLESS ORANGE
MEX RADIUS | MEX RADIUS | MEX RADIUS
30° | 30° | 30°

D			d	l	l1	L	Stock	Stock	Stock
mm	2	R0.2	6	2.5	5	50			●
	2.5	R0.25	6	3	6	50			●
	3	R0.3	6	4	7	50			●
	3	R0.3	6	8		50	●	●	
	4	R0.3	6	10		50	●	●	
	4	R0.5	6	5	9	50			●
	4	R0.5	6	10		50	●		
	5	R0.3	6	13		50	○	●	
	5	R0.5	6	6	12	50			●
	5	R0.5	6	13		50	●	●	
	6	R0.3	6	15		60	●	●	
	6	R0.5	6	7	14	60			●
	6	R0.5	6	15		60	●	●	
	6	R1.0	6	15		60	●	●	
	8	R0.3	8	20		70	○	○	
	8	R0.5	8	20		70	●	●	
	8	R1.0	8	10	18	70			●
	8	R1.0	8	20		70	●	●	
	8	R2.0	8	25		70	○	●	
	10	R0.3	10	25		90	○	●	
	10	R0.5	10	25		90	●	●	
	10	R1.0	10	12	25	75			●
	10	R1.0	10	25		90	●	●	
	10	R2.0	10	25		90	●	●	
	12	R0.5	12	30		100	○	○	
	12	R1.0	12	15	30	80			●
	12	R1.0	12	30		100	○	●	
	12	R2.0	12	30		100	●	●	
	16	R1.0	16	40		110		○	
	16	R2.0	16	40		110		●	
	20	R1.0	20	45		110		○	
	20	R2.0	20	45		110		○	

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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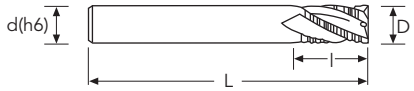
OSAWA NORM

MEXCSFR

MEXWSFR - MEXCSFR

Ø mm	~6	7~10	11~18	20
tol. D µ	0 / -48	0 / -58	0 / -70	0 / -84



Z3~Z4
UMG ENDLESS
MEX HR FINE
20°

D		d	l	L	Z	Stock
mm	6	6	15	60	3	●
	7	6	18	70	3	●
	8	8	20	65	3	●
	9	10	22	70	4	●
	10	10	25	70	4	●
	12	12	30	80	4	●
	14	14	25	100	4	●
	16	16	40	100	4	●
	20	20	50	100	4	●

● stock standard ○ non-standard stock EX stock exhaustion

UH Red HRC50~70

n Vf
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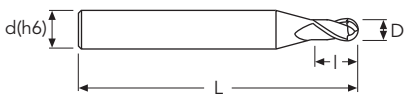
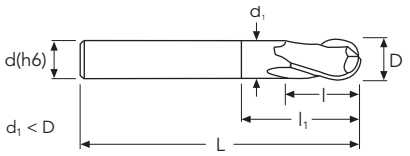
OSAWA NORM

UHCSB2 - UH250

Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±5	±10

UHCSB2 UH250





Z2 BALL | NMG UH RED | UH BALL NOSE | 30°

D		d	l	l1	L	Stock	Stock
mm	0.1	6	0.1		40	○	
	0.2	6	0.2		40	○	
	0.3	6	0.3		40	○	
	0.4	6	0.4		40	●	
	0.5	6	0.5		40	●	
	0.6	6	0.6		40	●	
	0.7	6	0.7		40	○	
	0.8	6	0.8		40	●	
	0.9	6	0.9		40	○	
	1	6	1.5		40	●	
	1	4	1	2.2	50		●
	1.5	6	2.5		40	●	
	1.5	4	1.5	3	50		●
	2	6	3		40	●	
	2	6	2	4	50		●
	2.5	6	3		50	●	
	3	6	4.5		50	●	
	3	6	3	6	60		●
	4	6	6		50	●	
	4	6	4	8	70		●
	5	6	7.5		50	●	
	5	6	5	10	80		●
	6	6	9		50	●	
	6	6	6	12	90		●
	8	8	12		50	●	
	8	8	8	16	100		●
	10	10	15		60	●	
	10	10	10	20	100		●
	12	12	18		60	●	
	12	12	12	24	110		●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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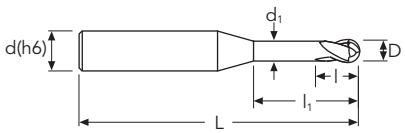
OSAWA NORM

UHCRB2

UHCRB2

Ø mm	~6
tol. D µ	0 / -12
tol. R µ	±5



$d_1 < D$

Z2 BALL

NMG
UH RED

UH BALL NOSE

30°

D		d	l	l1	L	Stock
mm	**0.1**	4	0.1	0.3	45	●
	0.2	4	0.2	0.6	45	○
	0.2	4	0.2	1	45	●
	0.3	4	0.3	2	45	●
	0.3	4	0.3	3	45	○
	0.4	4	0.4	1	45	●
	0.4	4	0.4	3	45	●
	0.5	6	0.5	2	45	●
	0.5	4	0.5	2	45	○
	0.5	6	0.5	4	45	●
	0.5	4	0.5	6	45	○
	0.6	6	0.6	2	45	○
	0.6	6	0.6	4	45	●
	0.6	4	0.6	6	45	●
	0.6	4	0.6	10	45	○
	0.8	6	0.8	2	45	●
	0.8	6	0.8	6	45	●
	0.8	4	0.8	10	45	○
	1	6	1	3	50	●
	1	6	1	6	50	●
	1	4	1	10	50	●
	1	6	1	10	50	●
	1	4	1	16	50	●
	1	4	1	20	55	●
	1.2	6	1.2	4.4	50	○
	1.2	6	1.2	8	50	●
	1.2	4	1.2	12	50	○
	1.5	6	1.5	4	50	●
	1.5	6	1.5	10	50	●
	1.5	4	1.5	12	50	●
	1.5	6	1.5	12	50	●
	1.5	4	1.5	20	55	●
	2	6	3	6	50	●
	2	4	3	10	50	●
	2	6	3	12	50	●
	2	4	3	16	50	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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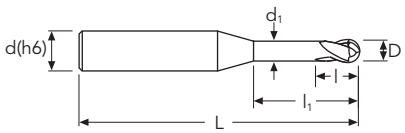
OSAWA NORM

UHCRB2

UHCRB2

Ø mm	~6
tol. D µ	0 / -12
tol. R µ	±5



$d_1 < D$

Z2 BALL
NMG
UH RED
UH BALL NOSE
30°

D		d	l	l1	L	Stock
mm	2	6	3	20	50	●
	2	4	3	25	60	●
	2	4	3	30	70	●
	3	6	4	12	55	●
	3	6	4	16	55	●
	3	6	4	20	60	●
	3	6	4	30	70	●
	4	6	5	16	55	●
	4	6	5	20	60	●
	4	6	5	30	70	●
	4	6	5	40	80	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

NEW

UHF430

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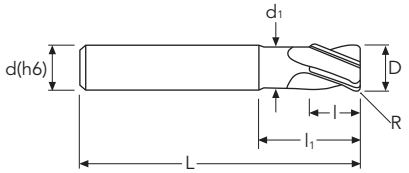
OSAWA NORM

UHF430

Ø mm	~12
tol. D µ	0 / -20
tol. R µ	±5



$d_1 < D$

Z4

NMG

UH RED

UH RADIUS

30°

D			d	l	l1	L	Stock
mm	2	R0.5	6	1	6	70	●
	3	R0.5	6	1.2	8	70	●
	4	R0.5	6	1.5	10	70	●
	5	R0.5	6	2	10	70	●
	6	R0.5	6	2.5	12	90	●
	6	R1	6	2.5	12	90	●
	8	R1	8	3.5	16	100	●
	8	R2	8	3.5	16	100	●
	10	R1	10	4	20	100	●
	10	R2	10	4	20	100	●
	12	R2	12	5	25	110	●
	12	R3	12	5	25	110	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
PAGE
244-245-246

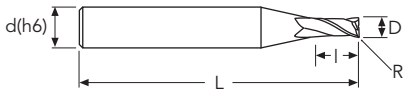
OSAWA NORM

UHM2 - UHCS2

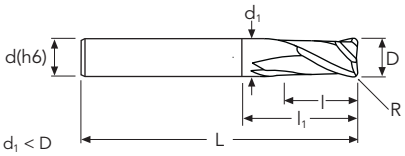
Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±10	±15

UHM2 UHCS2

UHM2



UHCS2



Z2 | NMG UH RED | UH RADIUS | 30°

D			d	l	l1	L	Stock	Stock
mm	0.3		6	0.45		50	●	
	0.4		6	0.6		50	●	
	0.5	R0.05	6	0.7		50	●	
	0.6	R0.05	6	0.9		50	●	
	0.8	R0.05	6	1.2		50	●	
	1	R0.1	4	2	3	50		●
	1	R0.1	6	1.5		50	●	
	1.5	R0.1	4	2.5	4	50		●
	1.5	R0.15	6	2.2		50	●	
	2	R0.15	6	2.2		50	●	
	3	R0.1	6	4.5	8	55		●
	4	R0.1	6	6	10	55		●
	5	R0.2	6	6	11	50		●
	6	R0.2	6	9	15	60		●
	8	R0.2	8	12	20	65		●
	10	R0.2	10	15	25	70		●
	12	R0.3	12	18	30	80		●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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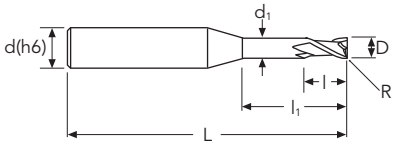
OSAWA NORM

UHCR2

UHCR2	
Ø mm	~4
tol. D µ	0 / -12



$d_1 < D$

Z2

NMG

UH RED

UH

30°

D		d	l	l1	L	Stock
mm 0.1		4	0.15	0.3	45	○
0.2		4	0.3	1	45	●
0.3		4	0.45	1.5	45	●
0.3		4	0.45	3	45	●
0.4		4	0.6	3	45	○
0.4		4	0.6	5	45	●
0.5		4	0.7	2	45	● NEW
0.5		4	0.7	4	45	●
0.5		4	0.7	8	45	○
0.6	R0.05	6	0.9	2	50	EX
0.6	R0.05	6	0.9	4	50	EX
0.6		4	0.9	4	45	● NEW
0.6		4	0.9	6	45	●
0.8	R0.05	6	1.2	5.5	50	EX
0.8		4	1.2	8	45	●
1		4	1.5	4	50	● NEW
1	R0.10	6	1.5	6.7	50	EX
1		4	1.5	8	50	● NEW
1		4	1.5	10	50	●
1		4	1.5	16	50	●
1		4	1.5	20	55	●
1.2		4	1.8	4	50	● NEW
1.2		4	1.8	10	50	● NEW
1.5		4	2.3	6	50	● NEW
1.5		4	2.3	10	50	● NEW
1.5		4	2.3	16	50	●
1.5		4	2.3	20	55	●
2		4	3	6	50	● NEW
2		4	3	12	50	● NEW
2	R0.15	6	2.2	13	50	EX
2		4	3	16	50	●
2		4	3	20	55	●
3		6	4.5	12	55	●
3		6	4.5	16	55	●
3		6	4.5	20	60	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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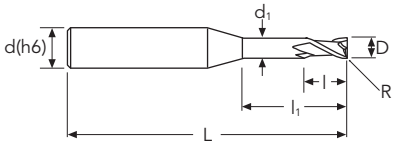
OSAWA NORM

UHCR2

UHCR2

Ø mm	~4
tol. D µ	0 / -12



$d_1 < D$

Z2

NMG
UH RED

UH

30°

D		d	l	l1	L	Stock
mm	3	6	4.5	30	70	○
	4	6	6	20	60	●
	4	6	6	30	70	○
	4	6	6	40	80	○

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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OSAWA NORM

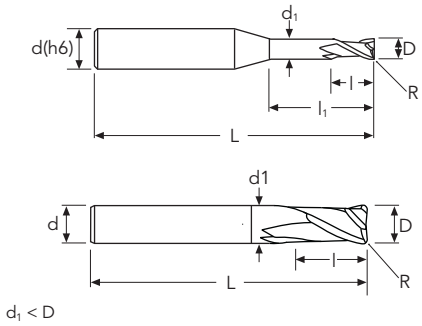
UH211

UH211

Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±10	±15

< D6

≥ D6



Z2

NMG UH RED

UH RADIUS

30°

D			d	l	l1	L	Stock
mm	0.5	R0.05	4	0.7	1.5	45	● NEW
	0.5	R0.05	4	0.7	4	45	● NEW
	0.6	R0.05	4	0.9	2	45	● NEW
	0.6	R0.05	4	0.9	4	45	● NEW
	0.8	R0.05	4	1.2	2	45	● NEW
	0.8	R0.05	4	1.2	6	45	● NEW
	1	R0.1	4	2	4	50	● NEW
	1	R0.1	4	2	6	50	●
	1	R0.1	4	2	8	50	● NEW
	1	R0.2	4	2	4	50	●
	1	R0.2	4	2	8	50	●
	1	R0.3	4	2	4	50	●
	1	R0.3	4	2	8	50	●
	1.5	R0.1	4	2.5	6	50	● NEW
	1.5	R0.1	4	2.5	10	50	● NEW
	1.5	R0.2	4	2.5	4	50	●
	1.5	R0.2	4	2.5	8	50	●
	1.5	R0.2	4	2.5	12	50	●
	1.5	R0.3	4	2.5	4	50	●
	1.5	R0.3	4	2.5	8	50	●
	2	R0.1	4	3	6	50	● NEW
	2	R0.1	4	3	12	50	● NEW
	2	R0.2	4	3	6	50	●
	2	R0.2	4	3	12	50	●
	2	R0.3	4	3	8	50	●
	2	R0.3	4	3	12	50	●
	2	R0.3	4	3	16	50	●
	2	R0.5	4	3	6	50	●
	2	R0.5	4	3	12	50	●
	2.5	R0.2	4	3.5	8	55	● NEW
	2.5	R0.2	4	3.5	12	55	● NEW
	3	R0.2	6	4.5	10	55	●
	3	R0.2	6	4.5	16	55	●
	3	R0.3	6	4.5	10	55	●
	3	R0.3	6	4.5	16	55	●
	3	R0.5	6	4.5	10	55	●

● stock standard ○ non-standard stock EX stock exhaustion

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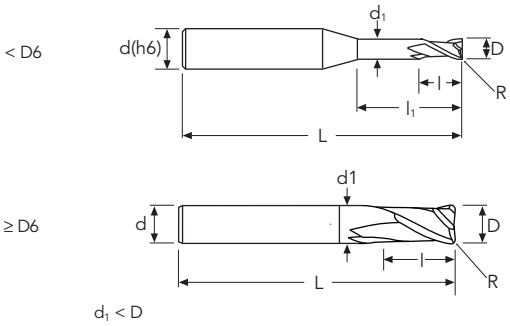
OSAWA NORM

UH211

UH211

Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±10	±15



Z2

NMG
UH RED

UH RADIUS

30°

D			d	l	l1	L	Stock
mm	3	R0.5	6	4.5	16	55	●
	4	R0.2	6	6	12	55	○
	4	R0.2	6	6	20	60	●
	4	R0.3	6	6	20	60	●
	4	R0.5	6	6	12	55	●
	4	R0.5	6	6	20	60	●
	4	R1.0	6	6	16	55	●
	6	R0.5	6	9	15	60	●
	6	R1	6	9	15	60	●
	6	R2	6	9	15	60	●
	8	R0.5	8	12	20	65	●
	8	R1	8	12	20	65	●
	8	R2	8	9	25	60	●
	10	R0.5	10	15	25	70	●
	10	R1	10	15	25	70	●
	10	R2	10	15	25	70	●
	12	R0.5	12	18	30	80	○
	12	R1	12	18	30	80	●
	12	R2	12	18	30	80	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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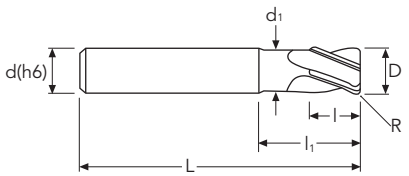
OSAWA NORM

UHCS4

UHCS4

Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±10	±15



$d_1 < D$

Z4

NMG

UH RED

UH RADIUS

30°

D			d	l	l1	L	Stock
mm	1	R0.1	4	2	3	50	●
	1.5	R0.1	4	2.5	4	50	●
	2	R0.1	4	3	6	50	●
	3	R0.1	6	4	8	55	●
	4	R0.1	6	6	10	55	●
	5	R0.2	6	6	11	50	●
	6	R0.2	6	9	15	60	●
	8	R0.2	8	12	20	70	●
	10	R0.2	10	15	25	70	●
	12	R0.3	12	18	30	80	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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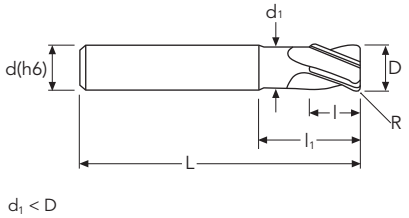
OSAWA NORM

UH411 - UH412

Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±10	±15



	UH411	UH412
	Z4	Z4
	NMG UH RED	NMG UH RED
	UH RADIUS	UH RADIUS
	30°	30°

D			d	l	l1	L	Stock	Stock
mm	3	R0.3	6	4	12	55	●	
	3	R0.3	6	4	20	60	●	
	3	R0.5	6	4	10	55	●	
	3	R0.5	6	4	20	60	●	
	4	R0.3	6	6	12	55	●	
	4	R0.3	6	6	20	60	●	
	4	R0.5	6	6	12	55	●	
	4	R0.5	6	6	20	60	●	
	4	R1.0	6	6	12	55	●	
	6	R0.5	6	9	15	60	●	
	6	R0.5	6	9	20	90		●
	6	R1.0	6	9	15	60	●	
	6	R1.0	6	9	20	90		●
	8	R0.5	8	12	20	70	●	
	8	R0.5	8	12	25	100		●
	8	R1.0	8	12	20	70	●	
	8	R1.0	8	12	25	100		●
	8	R2.0	8	12	20	70	●	
	10	R0.5	10	15	25	70	●	
	10	R0.5	10	15	32	100		●
	10	R1.0	10	15	25	70	●	
	10	R1.0	10	15	32	100		●
	10	R2.0	10	15	25	70	●	
	10	R2.0	10	15	32	100		●
	12	R0.5	12	18	30	80	●	
	12	R0.5	12	18	38	110		●
	12	R1.0	12	18	30	80	●	
	12	R1.0	12	18	38	110		●
	12	R2.0	12	18	30	80	●	
	12	R2.0	12	18	38	110		●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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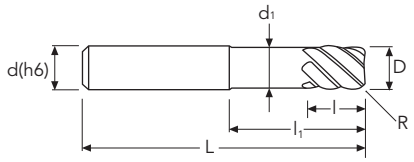
OSAWA NORM

UH610R UH611R

UH610R - UH611R

Ø mm	~20
tol. D µ	0 / -30
tol. R µ	±15



$d_1 < D$

Z6 | NMG UH RED | UH RADIUS | 45°

D		d	l	l1	L	Stock	Stock
mm 6	R0.5	6	6	15	50	●	
6	R0.5	6	15		70		●
8	R0.5	8	8	25	60	●	
8	R0.5	8	20		100		●
10	R0.5	10	25	30	100		●
10	R1.0	10	10	30	70	●	
10	R1.0	10	25		100		●
12	R1.0	12	12	30	75	●	
12	R0.5	12	30		110		●
12	R1.0	12	30		110		●
16	R1.0	16	32		130		●
16	R1.5	16	32		130		EX
20	R1.0	20	38		140		○
20	R1.5	20	38		140		EX
20	R2.0	20	38		140		○

● stock standard ○ non-standard stock EX stock exhaustion

MDC - Diamond graphite
Alu mills

MDC - Alu mills

MDC Diamond, micro grain carbide, geometry specifically designed to machine graphite and new coating MDC-Diamond with increased thickness to achieve an even longer tool life.
ALU MILLS, for Aluminium and alloy, made of micro grain carbide and HSS/Co, geometry specifically designed and polished flutes, ensure long tool life, outstanding surface finishing and accuracy even at ultra fast cutting speed.

MDC Diamond, metallo duro micrograna, con geometria specifica per la lavorazione di grafite e nuovo rivestimento diamante MDC a spessore maggiorato per garantire una durata ancor più lunga.
ALU MILLS, per Alluminio e leghe, in metallo duro micro-grana e HSS/Co, con geometria specifica e gole lappate, garantiscono lunga durata, finitura eccezionale e taglio preciso anche alle altissime velocità.

MDC Diamond aus Hartmetall Mikrokorn, mit Spezial-geometrie entworfen für das Fresen von Graphit. Dank der neuen extrastarken MDC Diamant Beschichtung, wird eine noch längere Lebensdauer garantiert.
ALU MILLS, fur Aluminium und legierungen, Fräser aus Hartmetall Mikrokorn und HSS/Co, mit Spezialgeometrie und das Reibschleifen von Rillen. Diese Fräser garantieren Lebensdauer, hervorragende Fertigungsqualität und einen genauen Schnitt auch bei Hochgeschwindigkeiten.

MDC Diamond, carbure micro grain revêtu monobloc, avec géométrie spécifique pour l'usinage de la graphite et nouveau revêtement diamant MDC à grande épaisseur, pour une durée encore plus longue.
ALU MILLS, pour Aluminium et alliages, en carbure micro grain revêtu monobloc et HSS/Co, avec géométrie spécifique et goujures polies, garantissent une longue durée, une finition exceptionnelle et une coupe très précise, même à vitesse de coupe très élevée.

OSAWA

n Vf

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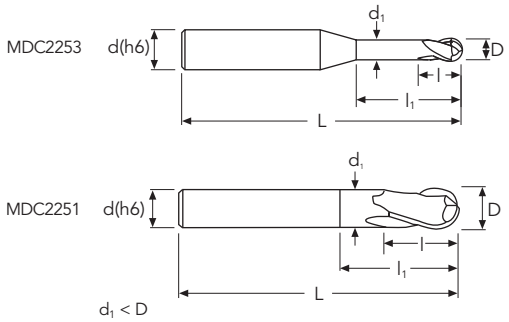
OSAWA NORM

NEW NEW

MDC2253 MDC2251

MDC2253 - MDC2251

Ø mm	~12
tol. D µ	0 / -20
tol. R µ	±10



Z2 BALL | MG | MDC BALL NOSE | 30°

D		d(h6)	l	l1	L	Stock	Stock
mm	**0.6**	3	0.6	3	40	○	
	0.8	3	0.8	4	40	○	
	1	3	1	5	40	○	
	1.2	3	1.2	6	50	○	
	1.5	3	1.5	7.5	50	○	
	2	3	2.2	10	60	○	
	2	4	10	20	80		○
	3	4	15	25	80		○
	4	4	20	30	80		○
	5	6	30	50	100		○
	6	6	30	50	100		○
	8	8	40	60	110		○
	10	10	50	70	120		○
	12	12	55	75	130		○

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
PAGE 248-249

OSAWA NORM

NEW NEW

MDC2203	MDC3311

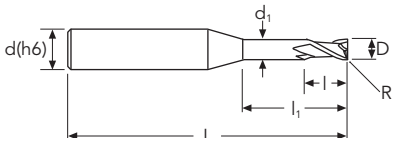
MDC2203

Ø mm	~2
tol. D µ	0 / -15
tol. R µ	±10

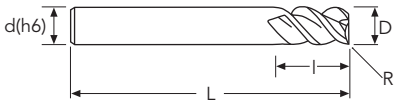
MDC3311

Ø mm	~12
tol. D µ	0 / -30
tol. R µ	±10

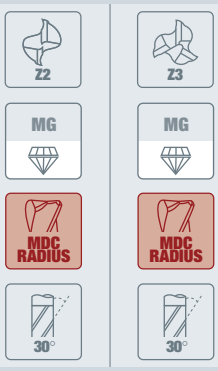
MDC2203



MDC3311



$d_1 < D$



D			d(h6)	l	l1	L	Stock	Stock
mm	0.6	R0.05	3	0.9	3	40	○	
	0.8	R0.05	3	1.2	4	40	○	
	1	R0.1	3	1.4	5	40	○	
	1.2	R0.1	3	1.8	6	50	○	
	1.5	R0.15		2.2	7.5	50	○	
	2	R0.15	3	2.2	10	60	○	
	2	R0.15	2	9		60		○
	3	R0.15	3	30		60		○
	4	R0.2	4	30		60		○
	5	R0.3	5	35		70		○
	6	R0.3	6	40		100		○
	8	R0.5	8	40		100		○
	10	R0.5	10	40		100		○
	12	R0.5	12	45		100		○

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf
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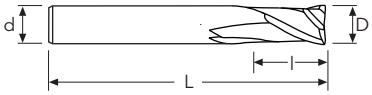
OSAWA NORM

MDCSA2

MDCSA2

Ø mm	3~20
tol. D µ	0 / -30



Z2

MG LAPPED

ALU

42°

D		d(h6)	l	L	Stock
mm	3	6	8	57	●
	4	6	11	57	●
	5	6	13	57	●
	6	6	13	57	●
	8	8	19	63	●
	10	10	22	72	●
	12	12	26	83	●
	14	14	26	83	●
	16	16	32	92	●
	18	18	32	92	●
	20	20	38	104	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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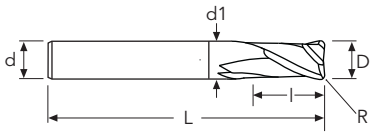
OSAWA NORM

MCA212R

MCA212R

Ø mm	2~12
tol. D µ	0 / -30
tol. R µ	±



d1 < D

Z2
MG
TiCN
ALU RADIUS
25°

D		d(h6)	l	l1	L	Stock
mm 2	xR0.2	3	3	6	40	●
3	xR0.2	3	4	8	40	●
4	xR0.2	4	5	12	50	●
5	xR0.2	5	8	14	50	●
6	xR0.2	6	8	18	65	●
8	xR0.2	8	10	22	70	●
10	xR0.2	10	14	28	80	●
12	xR0.2	12	16	35	90	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf
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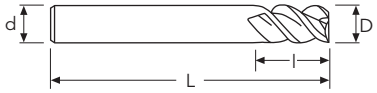
OSAWA NORM

MDCSA3

Ø mm	~6	8~12	16~20
tol. D µ	0 / -20	0 / -25	0 / -30

MDA310 - MDA311 - MDA312

Ø mm	~6	8~12	16~20
tol. D µ	0 / -30	0 / -35	0 / -40



d1 < D

D		d(h6)	l	L	MDCSA3 Stock	MDA310 Stock	MDA311 Stock	MDA312 Stock
mm	1	4	3	50	●			
	1.5	4	4.5	50	●			
	2	4	6	50	●			
	3	4	8	50	●			
	3	6	12	75		●		
	3	6	15	100			●	
	4	4	11	50	●			
	4	6	16	75		●		
	4	6	20	100			●	
	5	6	13	50	●			
	5	6	20	75		●		
	5	6	30	100			●	
	6	6	15	50	●			
	6	6	30	75		●		
	8	8	20	60	●			
	8	8	35	100			●	
	8	8	40	150				●
	10	10	25	75	●			
	10	10	40	100			●	
	10	10	50	150				●
	12	12	30	75	●			
	12	12	45	100			●	
	12	12	50	150				●
	16	16	40	100	●			
	16	16	70	150				●
	20	20	40	100	●			
	20	20	80	150				●

Z3 | MG LAPPED | ALU | 55° / 45°

● stock standard ○ non-standard stock EX stock exhaustion

NEW

n Vf
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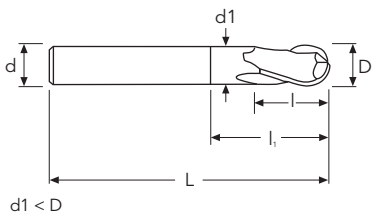
OSAWA NORM

MDCAB2

MDCAB2

Ø mm	~6	8~12
tol. D µ	0 / -20	0 / -25
tol. R µ	± 10	± 10



Z2 BALL
MG LAPPED
ALU BALL NOSE
40°

D		d(h6)	l	l1	L	Stock
mm	1	4	2		50	●
	1.5	4	3		50	●
	2	4	4		50	●
	3	4	6		50	●
	4	4	8		50	●
	5	6	10		50	●
	6	6	12		50	●
	8	8	16		60	●
	10	10	20		75	●
	12	12	24		75	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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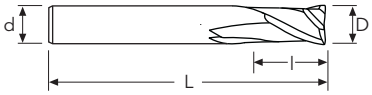
DIN 844

WSA2

WSA2

Ø mm	3~6	7~10	12~18	20~25
tol.D µ	±60	±75	±90	±105



Z2

HSS/Co
BR

ALU

45°

D(e8)	d(h6)	l	L	Stock
mm 2	6	7	51	●
2.5	6	8	52	●
3	6	8	52	●
4	6	11	55	●
5	6	13	57	●
6	6	13	57	●
8	10	19	69	●
10	10	22	72	●
12	12	26	83	●
14	12	26	83	●
16	16	32	92	●
18	16	32	92	●
20	20	38	104	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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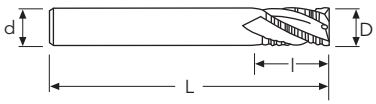
DIN 844

WSAR

WSAR (js12)

Ø mm	3~6	7~10	12~18	20~25
tol.D µ	±60	±75	±90	±105



Z3
HSS/Co
BR
ALU WR COARSE
45°

D(js12)	d(h6)	l	L	Stock
mm 6	6	13	57	●
8	10	19	69	●
10	10	22	72	●
12	12	26	83	●
14	12	26	83	●
16	16	32	92	●
18	16	32	92	●
20	20	38	104	●
25	25	45	121	●

● stock standard ○ non-standard stock EX stock exhaustion

Mef - Inox

Mef

Micro grain solid carbide, "Endless" coating and specific cutting geometry to machine stainless, titanium and Inconel: MEF end mills are at the top of the rank.

Metallo duro micrograna, rivestimento "Endless" e geometria specifica: le frese MEF sono il punto di riferimento per la lavorazione di acciaio inossidabile, titanio ed inconel.

Feinkorn- Hartmetall, „Endless"- Beschichtung und eine spezielle Geometrie: all diese Eigenschaften machen die MEF- Fräser zur ersten Wahl für rostfreie Stähle, Titan und Inconel.

Carbure micro grain, revêtement "Endless" et coupe spécifique: voici les caractéristiques qui font des fraises Mef le point de repère pour l'usinage des inox, du titane et de l'inconel.

VA UMG	ENDLESS COATING ULTRA FINE MICROGRAIN INOX

OSAWA

n Vf

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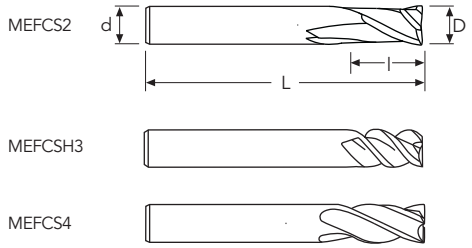
OSAWA NORM

MEFCS2 - MEFCSH3 - MEFCS4

Ø mm	1~20
tol. D µ	0 / -30

MEFCS2 MEFCSH3 MEFCS4



Z2 | Z3~Z4 | Z4

UMG ENDLESS | UMG ENDLESS | UMG ENDLESS

VA | VA | VA

35° | 50° | 35°

D		d(h6)	l	L	Stock	Stock	Stock
mm	1	4	2.5	40	●		
	1.5	4	4	40	●		
	2	4	6	40	●		●
	2.5	4	8	40	●		●
	3	6	8	45	●		●
	4	6	11	45	●		●
	5	6	13	50	●		●
	6	6	13	50	●	●	●
	7	8	16	60	●		○
	8	8	19	60	●	●	●
	9	10	19	70	○		○
	10	10	22	70	●	●	●
	11	12	22	75	○		○
	12	12	26	75	●	●	●
	14	16	26	85	●	●	●
	16	16	32	100	●	●	●
	18	16	32	100	○	○	○
	20	20	38	105	○	● (Z4)	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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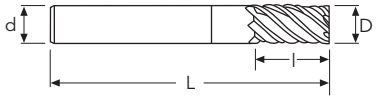
OSAWA NORM

MEF600

MEF600

Ø mm	6~20
tol. D µ	0 / -30



Z6~Z8

UMG ENDLESS

VA

50°

D		d(h6)	l	L	Z	Stock
mm	6	6	13	57	6	●
	7	8	16	63	6	○
	8	8	19	63	6	●
	9	10	19	72	6	○
	10	10	22	72	6	●
	12	12	26	83	6	●
	16	16	32	92	6	●
	20	20	38	104	8	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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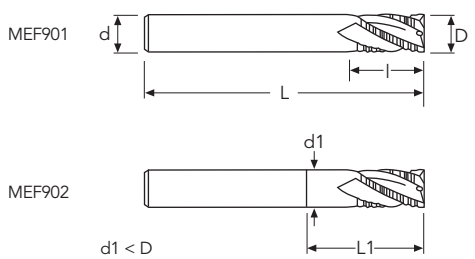
OSAWA NORM

MEF901 - MEF902 (h10)

Ø mm	~6	7~10	11~18	19~20
tol. R µ	0 / -48	0 / -58	0 / -70	0 / -84

MEF901 MEF902



Z3~Z6 | Z4~Z6
UMG ENDLESS | UMG ENDLESS
VA HR FINE | VA HR FINE
45° | 45°

	D(h10)	d(h6)	l	l1	L	Z	Stock	Stock
mm	4	6	11		57	3	●	
	5	6	13		57	4	●	
	6	6	16		57	4	●	
	6	6	16	20	57	4		●
	7	8	16		63	4	○	
	8	8	16		63	4	●	
	8	8	16	26	63	4		●
	9	10	19		72	4	○	
	10	10	22		72	4	●	
	10	10	22	31	72	4		●
	12	12	26		83	4	●	
	12	12	26	37	83	4		●
	14	14	26		83	5	●	
	16	16	32		92	5	●	
	16	16	32	51	100	5		●
	20	20	38		104	6	●	
	20	20	38	59	110	6		●

● stock standard ○ non-standard stock EX stock exhaustion

HF - Variable helix

HF

Solid carbide end mills featuring double variable helix for an efficient reduction of vibration, allowing very high feed and enabling to cut 1xD slots in a single pass.

Frese in metallo duro integrale con geometria a doppia elica variabile per l'assorbimento delle vibrazioni: altissimi avanzamenti e taglio di cave 1xD in un'unica passata.

Die Vollhartmetallfräser mit ungleicher Winkelteilung der Schneiden sind optimal geeignet um Vibrationen aufzunehmen: mit sehr hohen Vorschüben machen Sie eine Nut 1xD mit nur einem Schnitt.

Fraises carbure monobloc à double hélice variable pour l'élimination des vibrations: avance très haute et réalisation de rainures 1xD dans une seule passe.

HF MG	PV30 COATING MICROGRAIN VARIABLE HELIX VARIABLE HELIX · ELICA DISEGUALE UNGLEICHE SPIRALE · HÉLICE VARIABLE

OSAWA

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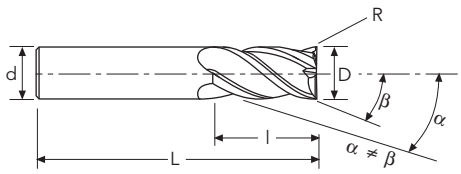
OSAWA NORM

HF400 - HF410R

Ø mm	3~25
tol. D µ	0 / -30

HF400	HF410R
Z4	Z4
MG PV30	MG PV30
HF	HF
VARI	VARI



D		d(h6)	l	L	Stock	Stock
mm. 3	xR0.31	6	8	57		●
3		6	8	57	●	
4	xR0.31	6	11	57		●
4		6	11	57	●	
5	xR0.31	6	13	57		●
5		6	13	57	●	
6	xR0.45	6	13	57		●
6		6	13	57	●	
8	xR0.45	8	19	63		●
8		8	19	63	●	
10	xR0.45	10	22	72		●
10		10	22	72	●	
12	xR0.70	12	26	83		●
12		12	26	83	●	
14	xR0.70	14	26	83		●
14		14	26	83	●	
16	xR0.95	16	32	92		●
16		16	32	92	●	
18	xR0.95	18	32	92		●
18		18	32	92	●	
20	xR0.95	20	38	104		●
20		20	38	104	●	
25	xR0.95	25	38	104		○
25		25	38	104	○	

● stock standard ○ non-standard stock EX stock exhaustion

G2 - General purpose

G2

A new generation 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.
An extremely competitive price, thanks to a fully optimized manufacturing process and to large production batches.

Una nuova generazione di frese per uso generico, dotate di geometria di taglio e rivestimenti innovativi per garantirne prestazioni ancora più elevate.
La risposta forte di Osawa a un mercato che chiede utensili sempre più performanti.
Un prezzo estremamente competitivo, grazie all'ottimizzazione del processo produttivo e agli alti volumi di produzione.

Eine neue Generation von Fräsern für allegemeine Anwendung, mit neuer Schnittgeometrie und innovativen Beschichtungen für noch höheren Leistungen
Die starke Entgegnung von Osawa zu einem Markt, der immer leistungs-fähigere Werkzeuge erfordert.
Extrem konkurrenzfähiger Preis durch optimale Produktionsprozesse und große Produktionsumfänge

Une nouvelle génération de fraises passe-partout, caractérisées par une géométrie de coupe innovante et des nouveaux revêtements, qui garantissent des performance encore plus hautes.
La réponse de Osawa à un marché qui demande des outils de plus en plus performants.
Un prix extrêmement compétitif, grâce à l'optimisation du procès d'affûtage et à des volumes de prodution très importants.

G2	PV200 COATING MICROGRAIN
MG	GENERAL PURPOSE · USO GENERICO ALLGEMEINE ANWENDUNGEN · APPLICATIONS GÉNÉRIQUES

OSAWA

n Vf

PAGE 256

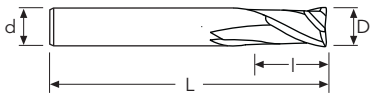
OSAWA NORM

GB205 - G2CS2

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -20	0 / -25	0 / -30

G2210 - G2211 - G2212 - G2213

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -30	0 / -35	0 / -40



	NEW	NEW	NEW	NEW	NEW	NEW
	GB205	G2CS2	G2210	G2211	G2212	G2213
	Z2	Z2	Z2	Z2	Z2	Z2
	MG BR	MG PV200	MG PV200	MG PV200	MG PV200	MG PV200
	N	N	N	N	N	N
	30°	30°	30°	30°	30°	30°

D	d	l	L	Stock	Stock	Stock	Stock	Stock	Stock
mm 1	4	3	50	●	●				
1.5	4	4.5	50	●	●				
2	4	6	50	●	●				
2	4	9	75			●			
2.5	4	7	50		●				
3	4	8	50	●	●				
3	4	15	75			●			
3.5	4	10	50		●				
4	4	11	50	●	●				
4	4	20	75			●			
4.5	6	13	50		●				
5	6	13	50	●	●				
5	6	25	75			●			
5	6	30	100				●		
5.5	6	13	50		●				
6	6	15	50	●	●				
6	6	25	75			●			
6	6	30	100				●		
6.5	8	17	60		●				
7	8	17	60		●				
7	8	35	100				○		
7.5	8	17	60		●				
8	8	20	60	●	●				
8	8	35	100				●		
8	8	40	150					●	
8.5	10	23	75		●				
9	10	23	75		●				
9	10	40	100				○		
10	10	25	75	●	●				
10	10	40	100				●		
10	10	50	150					●	
10.5	12	25	75		●				
11	12	28	75		●				
11	12	45	100				○		
12	12	30	75	●	●				
12	12	45	100				●		

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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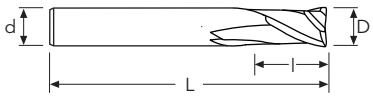
OSAWA NORM

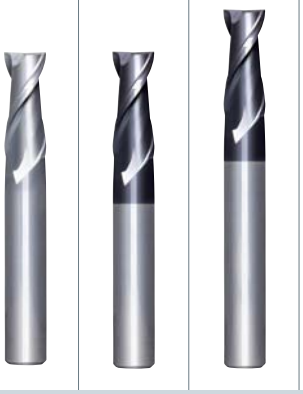
GB205 - G2CS2

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -20	0 / -25	0 / -30

G2210 - G2211 - G2212 - G2213

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -30	0 / -35	0 / -40





	NEW	NEW	NEW	NEW	NEW	NEW
	GB205	G2CS2	G2210	G2211	G2212	G2213
	Z2	Z2	Z2	Z2	Z2	Z2
	MG BR	MG PV200	MG PV200	MG PV200	MG PV200	MG PV200
	N	N	N	N	N	N
	30°	30°	30°	30°	30°	30°

D	d	l	L	Stock	Stock	Stock	Stock	Stock	Stock
mm **12**	12	50	150					●	
14	14	26	83		●				
16	16	32	92		●				
16	16	70	150					●	
16	16	40	200						○
18	20	40	100		●				
18	20	80	150					○	
20	20	40	100		●				
20	20	80	150					○	
20	20	40	200						○

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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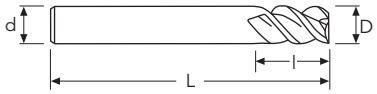
OSAWA NORM

GB305 - G2CSH3

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -20	0 / -25	0 / -30

G2310 - G2311 - G2312

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -30	0 / -35	0 / -40



	NEW	NEW	NEW	NEW	NEW
	GB305	G2CSH3	G2310	G2311	G2312
	Z3	Z3	Z3	Z3	Z3
	MG BR	MG PV200	MG PV200	MG PV200	MG PV200
	N	N	N	N	N
	45°	45°	45°	45°	45°

D		d	l	L	Stock	Stock	Stock	Stock	Stock
mm	1	4	3	50	●	●			
	1.5	4	4.5	50	●	●			
	2	4	6	50	●	●			
	2	4	9	75			●		
	2.5	4	7	50		●			
	3	4	8	50	●	●			
	3	4	15	75			●		
	3.5	4	10	50		●			
	4	4	11	50	●	●			
	4	4	20	75			●		
	4.5	6	13	50		●			
	5	6	13	50	●	●			
	5	6	25	75			●		
	5	6	30	100				●	
	5.5	6	13	50		●			
	6	6	15	50	●	●			
	6	6	25	75			●		
	6	6	30	100				●	
	6.5	8	17	60		●			
	7	8	17	60		●			
	7	8	35	100				○	
	7.5	8	17	60		○			
	8	8	20	60	●	●			
	8	8	35	100				●	
	8	8	40	150					●
	8.5	10	23	75		○			
	9	10	23	75		●			
	9	10	40	100				○	
	10	10	25	75	●	●			
	10	10	40	100				●	
	10	10	50	150					●
	10.5	12	25	75		○			
	11	12	28	75		●			
	11	12	45	100				○	
	12	12	30	75	●	●			
	12	12	45	100				●	

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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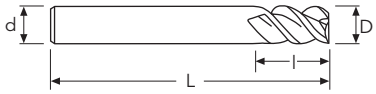
OSAWA NORM

GB305 - G2CSH3

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -20	0 / -25	0 / -30

G2310 - G2311 - G2312

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -30	0 / -35	0 / -40



	GB305	G2CSH3	G2310	G2311	G2312
	NEW	NEW	NEW	NEW	NEW
	Z3	Z3	Z3	Z3	Z3
	MG BR	MG PV200	MG PV200	MG PV200	MG PV200
	N	N	N	N	N
	45°	45°	45°	45°	45°

D	d	l	L	Stock	Stock	Stock	Stock	Stock
mm **12**	12	50	150					●
14	13	26	83		●			
16	16	32	92		●			
16	16	70	150					●
18	20	40	100		○			
18	20	80	150					●
20	20	40	100		●			
20	20	80	150					●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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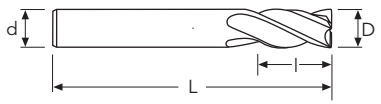
OSAWA NORM

GB405 - G2CS4

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -20	0 / -25	0 / -30

G2410 - G2411 - G2412 - G2413

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -30	0 / -35	0 / -40



	NEW	NEW	NEW	NEW	NEW	NEW
	GB405	G2CS4	G2410	G2411	G2412	G2413
	Z4	Z4	Z4	Z4	Z4	Z4
	MG BR	MG PV200	MG PV200	MG PV200	MG PV200	MG PV200
	N	N	N	N	N	N
	30°	30°	30°	30°	30°	30°

D	d	l	L	Stock	Stock	Stock	Stock	Stock	Stock
mm 1	4	3	50	●	●				
1.5	4	4.5	50	●	●				
2	4	6	50	●	●				
2	4	9	75			●			
2.5	4	7	50		●				
3	4	8	50	●	●				
3	4	15	75			●			
3.5	4	10	50		●				
4	4	11	50	●	●				
4	4	20	75			●			
4.5	6	13	50		●				
5	6	13	50	●	●				
5	6	25	75			●			
5	6	30	100				●		
5.5	6	13	50		●				
6	6	15	50	●	●				
6	6	25	75			●			
6	6	30	100				●		
6.5	8	17	60		●				
7	8	17	60		●				
7	8	35	100				○		
7.5	8	17	60		○				
8	8	20	60	●	●				
8	8	35	100				●		
8	8	40	150					●	
8.5	10	23	75		○				
9	10	23	75		●				
9	10	40	100				○		
10	10	25	75	●	●				
10	10	40	100				●		
10	10	50	150					●	
10.5	12	25	75		○				
11	12	28	75		●				
11	12	45	100				○		
12	12	30	75	●	●				
12	12	45	100				●		

● stock standard ○ non-standard stock EX stock exhaustion

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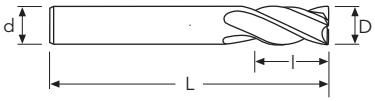
OSAWA NORM

GB405 - G2CS4

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -20	0 / -25	0 / -30

G2410 - G2411 - G2412 - G2413

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -30	0 / -35	0 / -40



	GB405	G2CS4	G2410	G2411	G2412	G2413
	NEW	NEW	NEW	NEW	NEW	NEW
	Z4	Z4	Z4	Z4	Z4	Z4
	MG BR	MG PV200	MG PV200	MG PV200	MG PV200	MG PV200
	N	N	N	N	N	N
	30°	30°	30°	30°	30°	30°

D	d	l	L	Stock	Stock	Stock	Stock	Stock	Stock
mm 12	12	50	150					●	
14	14	26	83		●				
16	16	32	92		●				
16	16	70	150					●	
16	16	40	200						●
18	20	40	100		●				
18	20	80	150					○	
20	20	40	100		●				
20	20	80	150					●	
20	20	40	200						●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

NEW

G2CSFR

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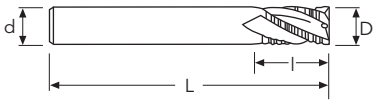
OSAWA NORM

G2CSFR

Ø mm	~20
tol. D µ	0 / -50



Z3~Z4

MG
PV200

HR
FINE

30°

D	d	l	L	Z	Stock
mm 6	6	15	50	3	●
8	8	20	60	3	●
10	10	25	75	4	●
12	12	30	75	4	●
14	14	30	82	4	●
16	16	35	92	4	●
20	20	40	100	4	●

● stock standard ○ non-standard stock EX stock exhaustion

NEW

G2CSHM

n Vf
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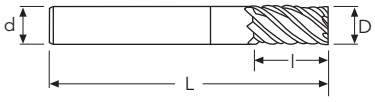
OSAWA NORM

G2CSHM

Ø mm	~6	6.5~12	13~20
tol. D µ	0 / -20	0 / -25	0 / -30



Z6
MG
PV200
N
45°

D	d	l	L	Stock
mm 6	6	15	50	●
8	8	20	60	●
10	10	25	75	●
12	12	30	75	●
14	14	30	82	●
16	16	35	92	●
20	20	40	100	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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OSAWA NORM

GB255 - G2CSB2 - G2CSB4

Ø mm	~6	7~12	14~20
tol. D µ	0 / -20	0 / -25	0 / -30
tol. R µ	±15	±15	0 / -30

G2250 - G2251

Ø mm	~6	7~12	14~20
tol. D µ	0 / -25	0 / -30	0 / -35
tol. R µ	±15	±15	0 / -30

	NEW	NEW	NEW	NEW	NEW
	GB255	G2CSB2	G2250	G2251	G2CSB4
	Z2 BALL	Z2 BALL	Z2 BALL	Z2 BALL	Z4 BALL
	MG BR	MG PV200	MG PV200	MG PV200	MG PV200
	N BALL NOSE	N BALL NOSE	N BALL NOSE	N BALL NOSE	N BALL NOSE
	30°	30°	30°	30°	30°

D		d	l	L	Stock	Stock	Stock	Stock	Stock
mm	1	4	2	50	●	●			○
	1	4	2	75			●		
	1.5	4	3	50	●	●			○
	1.5	4	3	75			●		
	2	4	4	50	●	●			●
	2	4	4	75			●		
	2.5	4	5	50		●			○
	3	4	6	50	●	●			●
	3	4	6	75			●		
	4	4	8	50	●	●			●
	4	4	8	75			●		
	5	6	10	50	●	●			●
	5	5	10	75			●		
	6	6	12	50	●	●			●
	6	6	12	100			●		
	6	6	12	150				○	
	7	8	14	60		○			○
	8	8	16	60	●	●			●
	8	8	16	100			●		
	8	8	16	150				○	
	9	10	18	75		○			○
	10	10	20	75	●	●			●
	10	10	20	100			●		
	10	10	20	150				○	
	12	12	24	75	●	●			●
	12	12	24	100			●		
	12	12	24	150				○	
	16	16	30	92		●			○
	16	16	30	150				○	
	20	20	30	100		●			○
	20	20	30	150				○	

● stock standard ○ non-standard stock EX stock exhaustion

MDTA - General purpose

MDTA

MDTA is the OSAWA range of micrograin carbide with PV200 coating. The MDTA endmills have been developed for general purpose milling and machining of steel up to 45 HRC. Thanks to the top quality micrograin carbide and the new generation coating, MDTA endmills can offer amazing performance and great versatility, as well as an almost unbeatable quality/price ratio.
The exclusive and innovative PV200 coating, with its 3500HV surface hardness and great resistance at high temperature, ensures the best performance in dry machining (air blow or mist oil).

MDTA sono le frese OSAWA in metallo duro micrograna con rivestimento PV200. Le frese della serie MDTA sono state sviluppate per la fresatura di materiali generici ed acciai sino a 45HRC. La scelta della micrograna ed il rivestimento di ultima generazione, fanno di MDTA un prodotto di altissimo rendimento ed assolutamente versatile, con un rapporto qualità/prezzo pressochè imbattibile.
L'esclusivo ed innovativo rivestimento PV200 con 3500HV di durezza superficiale e resistente alle alte temperature, garantisce performance elevate nelle lavorazioni a secco (getto d'aria o nebulizzazione).

MDTA ist die OSAWA Fräserreihe aus Harmetall Mikrokorn mit PV200 Beschichtung. MDTA Fräserserie ist für die Fräsarbeit von allgemeinen Materialien und Stähle bis zum 45HRC entwickelt worden. MDTA ist ein hochleistunge und vielseitige Produkt wegen des Mikrokorn und der Beschichtung der letzen Generation. Die Qualität-Preis Beziehung ist unschlagbar.
Die exklusive und erneuernde PV200 Beschichtung garantiert ausgezeichnete Leistungen auf trockene Bearbeitungen (Luftstrahl oder Verstäubung) dank zu der 3500HV Oberflächenhärte und der Hitzebeständigkeit.

MDTA est la gamme OSAWA de fraises carbure micrograin avec revêtement PV200. Les fraises MDTA ont été développées pour les applications de fraisage générique et pour le fraisage des aciers jusqu'à 45HRC. La choix du carbure micrograin et le revêtement de nouvelle conception font de MDTA un produit de la plus haute performance et versatilité ; en plus, le rapport qualité-prix est presque imbattable.
L'exclusif et innovant revêtement PV200, grâce à sa dureté de surface de 3500HV et à sa résistance aux hautes températures, garantit la meilleure performance dans l'usinage en sec (soufflage d'air ou huile atomisé).

MDTA MG	PV100 COATING MICROGRAIN GENERAL PURPOSE · USO GENERICO ALLGEMEINE ANWENDUNGEN · APPLICATIONS GÉNÉRIQUES

OSAWA

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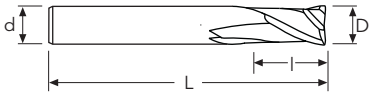
OSAWA NORM

MDTACS2 - MDTA210

Ø mm	1~20
tol. D µ	0 / -30

MDCL2 - MDTACL2 (h10)

Ø mm	1~3	3.5~6	7~10	12~18	20~30
tol. D µ	0 / -40	0 / -48	0 / -58	0 / -70	0 / -84



	MDTACS2	MDTA210	MDCL2	MDTACL2
	Z2	Z2	Z2	Z2
	MG PV200	MG PV200	MG BR	MG PV200
	N	N	N	N
	30°	30°	30°	30°

D		d(h6)	l	L	Stock	Stock	Stock	Stock
mm	1	4	3	40	●			
	1.5	4	4.5	40	●			
	2	2	8	32	●			
	2.5	2.5	8	32	●			
	3	3	12	32	●			
	3	3	20	60		●		
	3	3	30	75			●	○
	4	4	12	40	●			
	4	4	20	60		●		
	4	4	30	75			●	○
	5	5	14	50	●			
	5	5	25	75		●		
	5	5	40	100			●	○
	6	6	16	50	●			
	6	6	30	75		●		
	6	6	50	150			●	○
	7	7	20	60	●			
	8	8	20	60	●			
	8	8	30	75		●		
	8	8	50	150			●	○
	9	9	20	60	●			
	10	10	22	70	●			
	10	10	40	100		●		
	10	10	60	150			●	○
	12	12	22	70	●			
	12	12	45	100		●		
	12	12	75	150			●	○
	14	14	25	75	●			
	14	14	45	100		●		
	14	14	65	150			○	○
	16	16	25	75	●			
	16	16	45	100		●		
	16	16	65	150			○	○
	20	20	32	100	●			
	20	20	65	150			○	○

● stock standard ○ non-standard stock EX stock exhaustion

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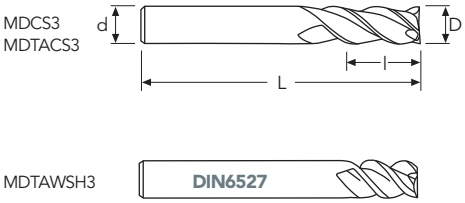
OSAWA NORM

MDTACS3 - MDTAWSH3

Ø mm	1~20
tol. D µ	0 / -30



	MDTACS3	MDTAWSH3
	Z3	Z3
	MG PV200	MG PV200
	N	N
	30°	50°

D		d(h6)	l	L	Stock	Stock
mm	2	2	8	32	●	
	2.5	2.5	8	32	○	
	3	3	12	32	●	
	3	6	7	57		●
	4	4	12	40	●	
	4	6	8	57		●
	5	5	14	50	●	
	5	6	10	57		●
	6	6	16	50	●	
	6	6	10	57		●
	7	7	20	60	●	
	8	8	20	60	●	
	8	8	16	63		●
	9	9	20	60	●	
	10	10	22	70	●	
	10	10	19	72		●
	12	12	22	70	●	
	12	12	22	83		●
	14	14	25	75	●	
	14	14	22	83		●
	16	16	25	75	●	
	16	16	26	92		●
	20	20	32	100	●	
	20	20	32	104		●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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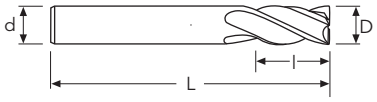
OSAWA NORM

MDTACS4 - MDTA410

Ø mm	1~20
tol. D µ	0 / -30

MDCL4 - MDTACL4 (h10)

Ø mm	1~3	3.5~6	7~10	12~18	20~30
tol. D µ	0 / -40	0 / -48	0 / -58	0 / -70	0 / -84



	MDTACS4	MDTA410	MDCL4	MDTACL4
	Z4	Z4	Z4	Z4
	MG PV200	MG PV200	MG BR	MG PV200
	N	N	N	N
	30°	30°	30°	30°

D(h10)	d(h6)	l	L	Stock	Stock	Stock	Stock
mm 2	2	8	32	●			
2.5	2.5	8	32	●			
3	3	12	32	●			
3	3	20	60		●		
3	3	30	75			●	○
4	4	12	40	●			
4	4	20	60		●		
4	4	30	75			●	○
5	5	14	50	●			
5	5	25	75		●		
5	5	40	100			●	○
6	6	16	50	●			
6	6	30	75		●		
6	6	50	150			●	○
7	7	20	60	●			
8	8	20	60	●			
8	8	30	75		●		
8	8	50	150			●	○
9	9	20	60	●			
10	10	22	70	●			
10	10	40	100		●		
10	10	60	150			●	○
12	12	22	70	●			
12	12	45	100		●		
12	12	75	150			●	○
14	14	25	75	●			
14	14	45	100		●		
14	14	65	150			○	○
16	16	25	75	●			
16	16	45	100		●		
16	16	65	150			●	○
20	20	32	100	●			
20	20	65	150			●	○

● stock standard ○ non-standard stock EX stock exhaustion

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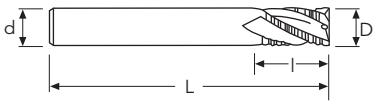
OSAWA NORM

MDTAWSR

MDTAWSR (h10)

Ø mm	1~3	3.5~6	7~10	12~18	20~30
tol. D µ	0 / -40	0 / -48	0 / -58	0 / -70	0 / -84



Z3~Z4

MG
PV200

NR
COARSE

30°

D(h10)	d(h6)	l	L	Z	Stock
mm 6	6	16	57	3	●
8	8	16	63	3	●
10	10	22	72	4	●
12	12	26	83	4	●
14	14	26	83	4	●
16	16	32	92	4	●
20	20	38	104	4	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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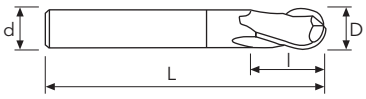
OSAWA NORM

MDTACSB2 - MDTA250

Ø mm	1~20
tol. D µ	0 / -30
tol. R µ	±20

MDTACSB2 MDTA250



Z2 BALL | MG PV200 | N BALL NOSE | 30°

D(h10)	d (h6)	l	L	Stock	Stock
mm 1	3	3	39	●	
1.5	3	5	39	●	
2	3	7	39	●	
2.5	3	8	39	●	
3	3	10	39	●	
3	3	5	75		●
4	4	12	40	●	
4	4	8	75		●
5	5	14	50	●	
5	5	9	75		●
6	6	7	51	●	
6	6	10	100		●
8	8	9	59	●	
8	8	12	100		●
10	10	10	60	●	
10	10	14	100		●
12	12	14	71	●	
12	12	16	100		●
14	14	14	71	○	
16	16	16	76	○	
18	18	18	76	○	
20	20	20	82	○	

● stock standard ○ non-standard stock EX stock exhaustion

Ultra mills

Ultra mills

Ultra Mills, made of powder HSS, can meet the highest requirements whenever the use of solid carbide end mills is not allowed.

La linea di fresatura Ultra Mills in HSS sinterizzato soddisfa le esigenze di alto rendimento in tutte le applicazioni in cui l'utilizzo del metallo duro non sia consentito.

Die Ultra Mills Produktpalette wird aus gesintertem HSS hergestellt. Sie befriedigt damit alle Bedürfnisse der Anwendungen, wo Vollhartmetall nicht verwendet werden kann.

La gamme de fraisage Ultra Mills, en acier fritté, satisfait toutes exigences de haute performance quand l'utilisation du carbure n'est pas possible.

UM HSSP	PV200 COATING POWDER STEEL HIGH PERFORMANCE · ALTO RENDIMENTO HOCHLEISTUNG · HAUTE PERFORMANCE

OSAWA

n Vf

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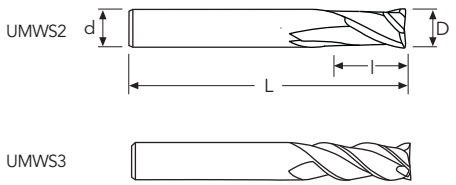
DIN 327

UMWS2 - UMWS3 (e8)

Ø mm	1~3	4~6	7~10	12~18	20~25
tol. D µ	-14 / -28	-20 / -38	-25 / -47	-32 / -59	-40 / -73

UMWS2 UMWS3



Z2 | Z3

HSS-P PV200 | HSS-P PV200

UM | UM

30° | 30°

D(e8)	d(h6)	l	L	Stock	Stock
mm 2	6	4	48	○	○
3	6	5	49	●	●
4	6	7	51	●	●
5	6	8	52	●	●
6	6	8	52	●	●
7	10	10	60	○	○
8	10	11	61	●	●
9	10	11	61	○	○
10	10	13	63	●	●
12	12	16	73	●	●
14	12	16	73	●	●
16	16	19	79	●	●
18	16	19	79	●	●
20	20	22	88	●	●

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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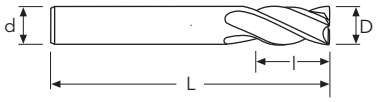
DIN 844

UMWS4

UMWS4	
Ø mm	1~20
tol. D µ	0 / +30



Z4

HSS-P
PV200

UM

30°

D		d(h6)	l	L	Stock
mm	3	6	8	52	●
	4	6	11	55	●
	5	6	13	57	●
	6	6	13	57	●
	7	10	16	66	○
	8	10	19	69	●
	9	10	19	69	○
	10	10	22	72	●
	12	12	26	83	●
	14	12	26	83	●
	16	16	32	92	●
	18	16	32	92	●
	20	20	38	104	●

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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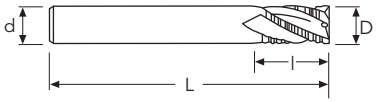
DIN 844

UMWSFR

UMWSFR (js12)

Ø mm	3~6	7~10	12~18	20~25
tol.D µ	±60	±75	±90	±105



Z3~Z4

HSS-P PV200

UM HR FINE

30°

D(js12)	d(h6)	l	L	Z	Stock
mm 6	6	13	57	3	●
7	10	16	66	3	●
8	10	19	69	3	●
9	10	19	69	3	●
10	10	22	72	4	●
12	12	26	83	4	●
14	12	26	83	4	●
16	16	32	92	4	●
18	16	32	92	4	●
20	20	38	104	4	●

● stock standard ○ non-standard stock EX stock exhaustion

HSS/Co end mills

HSS/Co end mills

The Osawa catalogue also includes a wide range of HSS/Co end mills, both coated and uncoated.

Il catalogo Osawa include un'ampia scelta di frese in HSS/Co nudo e rivestito.

Der Osawa Katalog umfasst eine große Auswahl an beschichteten und unbeschichteten Fräsern aus HSS/Co.

Le catalogue Osawa inclut une large gamme de fraises en HSS/Co, soit revêtues, soit non revêtues.

HSS/Co

HSS/Co
HIGH SPEED STEEL

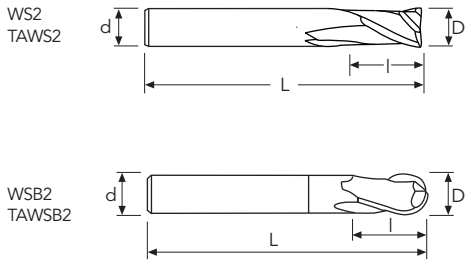
n Vf

PAGE 263-266

DIN 327

WS2 - TAWS2 - WSB2 - TAWSB2 (e8)

Ø mm	1~3	3.5~6	6.5~10	10.5~18	19~30	32~40
tol. D µ	-14 / -28	-20 / -38	-25 / -47	-32 / -59	-40 / -73	-50 / -89
tol. R µ	±20					



	WS2	TAWS2	WSB2	TAWSB2
	Z2	Z2	Z2 BALL	Z2 BALL
	HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
	N	N	N BALL NOSE	N BALL NOSE
	30°	30°	30°	30°

D(e8)	d(h6)	l	L	Stock	Stock	Stock	Stock
mm 1	6	2.5	47	●	●		
1.5	6	3	47	●	●		
2	6	4	48	●	●	●	○
2.5	6	5	49	●	●	○	○
3	6	5	49	●	●	●	●
3.5	6	6	50	●	●	○	○
4	6	7	51	●	●	●	●
4.5	6	7	51	●	●	○	○
5	6	8	52	●	●	●	●
5.5	6	8	52	●	●	○	○
6	6	8	52	●	●	●	●
6.5	10	10	60	●	●		
7	10	10	60	●	●	○	○
7.5	10	10	60	●	●		
8	10	11	61	●	●	●	●
8.5	10	11	61	●	●		
9	10	11	61	●	●	○	○
9.5	10	11	61	●	●		
10	10	13	63	●	●	●	●
10.5	12	13	70	●	●		
11	12	13	70	●	●	○	○
11.5	12	13	70	●	●		
12	12	16	73	●	●	●	●
12.5	12	16	73	●	●		
13	12	16	73	●	●	○	○
13.5	12	16	73	●	●		
14	12	16	73	●	●	●	●
15	12	16	73	●	●	○	○
16	16	19	79	●	●	●	●
17	16	19	79	●	●	○	○
18	16	19	79	●	●	●	●
19	16	19	79	●	●	○	○
20	20	22	88	●	●	●	●
21	20	22	88	○			
22	20	22	88	●	●	●	○
24	25	26	102	●	○		

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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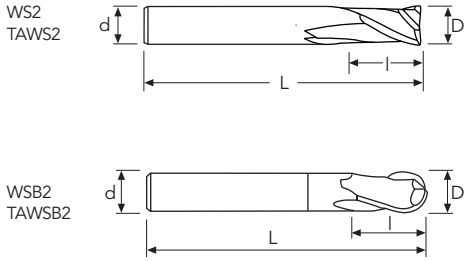
DIN 327

WS2 - TAWS2 - WSB2 - TAWSB2 (e8)

Ø mm	1~3	3.5~6	6.5~10	10.5~18	19~30	32~40
tol. D µ	-14 / -28	-20 / -38	-25 / -47	-32 / -59	-40 / -73	-50 / -89
tol. R µ	±20					



	WS2	TAWS2	WSB2	TAWSB2
	Z2	Z2	Z2 BALL	Z2 BALL
	HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
	N	N	N BALL NOSE	N BALL NOSE
	30°	30°	30°	30°

D(e8)	d(h6)	l	L	Stock	Stock	Stock	Stock
mm 25	25	26	102	●	●	●	○
26	25	26	102	●			
27	25	26	102	○			
28	25	26	102	●		○	○
30	25	26	102	●		○	○
32	32	32	112	○			

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

n Vf

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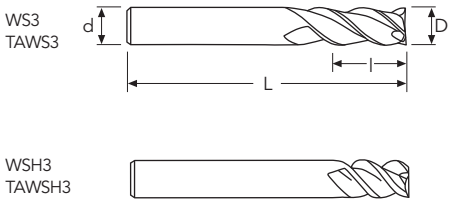
DIN 844

WS3 - TAWS3 (e8)

Ø mm	1~3	3.5~6	6.5~10	10.5~18	19~30	32~40
tol. D µ	-14 / -28	-20 / -38	-25 / -47	-32 / -59	-40 / -73	-50 / -89

WSH3 - TAWSH3

Ø mm	1~3	3.5~6	6.5~10	10.5~18	19~30	32~40
tol. D µ		0 / +48	0 / +58	0 / +70	0 / +84	



	WS3	TAWS3	WSH3	TAWSH3
	Z3	Z3	Z3~Z4	Z3~Z4
	HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
	N	N	N	N
	30°	30°	45°	45°

D		d(h6)	l	L	Stock	Stock	Stock	Stock
mm	1	6	3	47	●	○		
	1.5	6	7	51	●	○		
	2	6	7	51	●	●		
	2.5	6	8	52	●	●		
	3	6	8	52	●	●		
	3.5	6	10	54	●	●		
	4	6	11	55	●	●		
	4.5	6	11	55	●	●		
	5	6	13	57	●	●		
	5.5	6	13	57	●	●		
	6	6	13	57	●	●	○	●
	6.5	10	16	66	●	●		
	7	10	16	66	●	●		
	8	10	19	69	●	●	○	●
	8.5	10	19	69	●	●		
	9	10	19	69	●	●		
	10	10	22	72	●	●	○	●
	11	12	22	79	●	●		
	12	12	26	83	●	●	○	●
	13	12	26	83	●	●		
	14	12	26	83	●	●	○	●
	15	12	26	83	●	●		
	16	16	32	92	●	●	○	●
	18	16	32	92	●	●	○	○
	20	20	38	104	●	●	○	●
	22	20	38	104	●	●		
	24	25	45	121	○			
	25	25	45	121	●	●	○(Z4)	○(Z4)
	28	25	45	121	○			
	30	25	45	121	●	○	○(Z4)	○(Z4)
	32	32	53	133	○	○		

● stock standard ○ non-standard stock EX stock exhaustion

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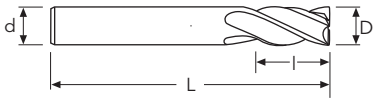
DIN 844

WS4 - TAWS4

Ø mm	2~40
tol. D µ	0 / +40

WS4 (6) TAWS4 (6)



Z4~Z6 | Z4~Z6

HSS/Co BR | HSS/Co PV200

N | N

30° | 30°

D	d(h6)	l	L	Stock	Stock
mm 2	6	7	51	●	●
3	6	8	52	●	●
4	6	11	55	●	●
5	6	13	57	●	●
6	6	13	57	●	●
7	10	16	66	●	●
8	10	19	69	●	●
9	10	19	69	●	●
10	10	22	72	●	●
11	12	22	79	●	●
12	12	26	83	●	●
13	12	26	83	●	●
14	12	26	83	●	●
15	12	26	83	●	●
16	16	32	92	●	●
17	16	32	92	○	●
18	16	32	92	●	●
19	16	32	92	○	○
20	20	38	104	●	●
22	20	38	104	●	●
24	25	45	121	● (Z6)	○ (Z6)
25	25	45	121	●	●
26	25	45	121	○ (Z6)	○ (Z6)
28	25	45	121	● (Z6)	○ (Z6)
30	25	45	121	● (Z6)	● (Z6)
32	32	53	133	○ (Z6)	● (Z6)
36	32	53	133	○ (Z6)	● (Z6)
40	32	63	143	○ (Z6)	● (Z6)

● stock standard ○ non-standard stock EX stock exhaustion

OSAWA

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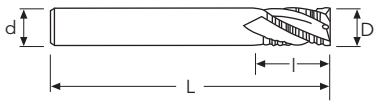
DIN 844

WSR ≤ Ø20
TAWSR ≤ Ø20
WSFR ≤ Ø20
TAWSFR ≤ Ø40

WSR ≥ Ø22
TAWSR ≥ Ø22
WSFR ≥ Ø22

WSR - TAWSR - WSFR - TAWSFR (js12)

Ø mm	~6	6.5~10	10.5~18	19~30	32~40
tol. D µ	±60	±75	±90	±105	±125



	WSR	TAWSR	WSFR	TAWSFR
	Z3~Z6	Z3~Z6	Z3~Z6	Z3~Z6
	HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
	NR COARSE	NR COARSE	HR FINE	HR FINE
	30°	30°	30°	30°

D(js12)	d(h6)	l	L	Z	Stock	Stock	Stock	Stock
mm 6	6	13	57	3	○	●	●	●
7	10	16	66	3	○	●	○	●
8	10	19	69	3	○	●	●	●
9	10	19	69	3	○	●	○	●
10	10	22	72	4	○	●	●	●
11	12	22	79	4	○	●	○	●
12	12	26	83	4	○	●	●	●
13	12	26	83	4	○	●	○	●
14	12	26	83	4	○	●	●	●
15	12	26	83	4	○	●	○	●
16	16	32	92	4	○	●	●	●
17	16	32	92	4	○	●		●
18	16	32	92	4	○	●	●	●
19	16	32	92	4	○	○		
20	20	38	104	4	○	●	●	●
22	20	38	104	5	○	○	○	●
24	25	45	121	5				
25	25	45	121	5	○	○	○	●
26	25	45	121	6				
28	25	45	121	6			○	●
30	25	45	121	6	○		○	●
32	32	53	133	6				●
34	32	53	133	6				
35	32	53	133	6				
36	32	53	133	6				●
38	32	63	155	6				
40	32	63	155	6				●

● stock standard ○ non-standard stock EX stock exhaustion

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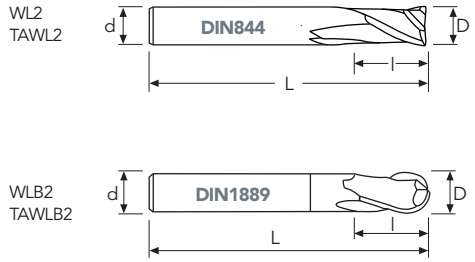
DIN 844 1889

WL2 - TAWL2 - WLB2 - TAWLB2 (e8)

Ø mm	1~3	3.5~6	6.5~10	10.5~18	19~30	32~40
tol. D µ	-14 / -28	-20 / -38	-25 / -47	-32 / -59	-40 / -73	-50 / -89
tol. R µ	±20					



	WL2	TAWL2	WLB2	TAWLB2
	Z2	Z2	Z2 BALL	Z2 BALL
	HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
	N	N	N BALL NOSE	N BALL NOSE
	30°	30°	30°	30°

D(e8)	d(h6)	l	L	Stock	Stock	Stock	Stock
mm 3	6	8	56	●	●	○	○
4	6	11	63	●	●	○	○
5	6	13	68	●	●	○	○
6	6	13	68	●	●	○	○
7	10	16	80	●	○	○	○
8	10	19	88	●	●	○	○
9	10	19	88	●	○	○	○
10	10	22	95	●	●	○	○
11	12	22	102	●	○	○	○
12	12	26	110	●	●	○	○
13	12	26	110	●	○	○	○
14	12	26	110	●	●	○	○
15	12	26	110	●	○	○	○
16	16	32	123	●	●	○	○
17	16	32	123	●	○	○	○
18	16	32	123	●	●	○	○
20	20	38	141	●	●	○	○
22	20	38	141	●			
24	25	45	166	●			
25	25	45	166	●			
28	25	45	166	●			
30	25	45	166	●			
32	32	53	186	○			
36	32	53	186	○			
40	32	63	207	○			

● stock standard ○ non-standard stock EX stock exhaustion

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DIN 844

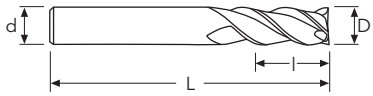
WL3 - TAWL3 (e8)

Ø mm	~3	3.5~6	6.5~10	10.5~18	19~30	32~40
tol. D µ	-14 / -28	-20 / -38	-25 / -47	-32 / -59	-40 / -73	-50 / -89

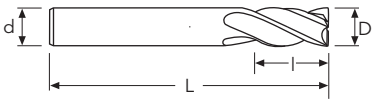
WL4 - TAWL4

Ø mm	3~6	7~40
tol. D µ	0 / +40	0 / +50

WL3 TAWL3



WL4 TAWL4



	WL3	TAWL3	WL4 (6)	TAWL4 (6)
	Z3	Z3	Z4~Z6	Z4~Z6
	HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
	N	N	N	N
	30°	30°	30°	30°

D	d(h6)	l	L	Stock	Stock	Stock	Stock
mm 3	6	12	56	●	●	●	○
4	6	19	63	●	●	●	○
5	6	24	68	●	●	●	○
6	6	24	68	●	●	●	●
7	10	30	80			●	○
8	10	38	88	●	●	●	●
9	10	38	88			●	○
10	10	45	95	●	●	●	●
11	12	45	102			●	○
12	12	53	110	●	●	●	●
13	12	53	110			●	○
14	12	53	110	●	●	●	●
15	12	53	110			●	○
16	16	63	123	●	●	●	●
17	16	63	123			○	○
18	16	63	123	●	●	●	●
19	16	63	123			○	○
20	20	75	141	●	●	● (Z6)	● (Z6)
22	20	75	141	●	○	○ (Z6)	● (Z6)
24	25	90	166			○ (Z6)	
25	25	90	166	●	○	● (Z6)	● (Z6)
26	25	90	166			○ (Z6)	
28	25	90	166			○ (Z6)	○ (Z6)
30	25	90	166			○ (Z6)	● (Z6)
32	32	106	186			○ (Z6)	● (Z6)
36	32	106	186			○ (Z6)	● (Z6)
40	40	125	217			○ (Z6)	● (Z6)

● stock standard ○ non-standard stock EX stock exhaustion

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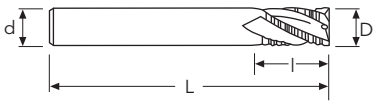
DIN 844

WLFR - TAWLFR (j12)

Ø mm	~6	6.5~10	10.5~18	19~30	32~40
tol. D µ	±60	±75	±90	±105	±125

WLFR TAWLFR



Z3~Z6 | HSS/Co BR | HR FINE | 30°

Z3~Z6 | HSS/Co PV200 | HR FINE | 30°

D(js 12)	d(h6)	l	L	Z	Stock	Stock
mm 6	6	24	68	3	●	●
8	10	38	88	3	●	●
10	10	45	95	4	●	●
12	12	53	110	4	●	●
14	12	53	110	4	●	●
16	16	63	123	4	●	●
18	16	63	123	4	●	●
20	20	75	141	4	●	●
22	20	75	141	5		●
25	25	90	166	5	○	●
30	25	90	166	6		●
32	32	106	186	6		●
36	32	106	186	6		●
40	32	125	217	6		●

● stock standard ○ non-standard stock EX stock exhaustion

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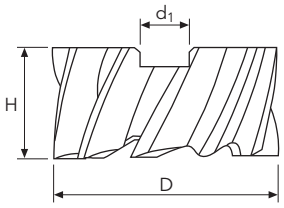
DIN 1880

FM - TAFM - FFR - TAFFR

tol. D mm	+0.25 / -0.15
tol. d1 mm	+0.02 / -0
tol. H mm	+0.5 / -0



	FM	TAFM	FFR	TAFFR
	Z8~Z14	Z8~Z14	Z6~Z12	Z6~Z12
	HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
	N	N	HR FINE	HR FINE
	30°	30°	30°	30°

D	d1	H	Stock	Stock	Stock	Stock
mm 40	16	32	● (Z8)	● (Z8)	● (Z6)	● (Z6)
50	22	36	● (Z8)	● (Z8)	● (Z8)	● (Z8)
63	27	40	● (Z8)	● (Z8)	● (Z8)	● (Z8)
80	27	45	○ (Z10)	○ (Z10)	○ (Z10)	○ (Z10)
100	32	50	○ (Z10)	○ (Z10)	○ (Z10)	○ (Z10)
160	50	63	○ (Z14)	○ (Z14)	○ (Z12)	○ (Z12)

● stock standard ○ non-standard stock EX stock exhaustion

n Vf
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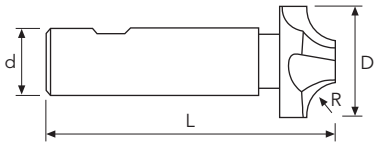
DIN 6518

WCR

WCR (H11)

Ø mm	8~12	13~20	21~28	31~52
tol. R µ	+60 / 0	+75 / 0	+90 / 0	+110 / 0



Z4
HSS/Co
BR
N
0°

D	R(H11)	d(h6)	L	Stock
mm 8	1.0	10	60	●
9	1.5	10	60	●
10	2.0	10	60	●
11	2.5	10	60	●
12	3.0	12	60	●
13	3.5	12	60	●
14	4.0	12	60	●
15	4.5	12	60	●
16	5.0	12	60	●
19	5.5	16	67	●
20	6.0	16	67	●
21	6.5	16	71	●
22	7.0	16	71	●
23	7.5	16	71	●
24	8.0	16	71	●
25	8.5	25	85	●
26	9.0	25	85	●
27	9.5	25	85	●
28	10.0	25	85	●
31	10.5	25	90	○
32	11.0	25	90	●
34	12.0	25	90	●
41	12.5	25	100	○
42	13.0	25	100	○
44	14.0	25	100	○
46	15.0	25	100	○
48	16.0	25	100	○
52	18.0	32	112	○
56	20	32	112	○

● stock standard ○ non-standard stock EX stock exhaustion

n Vf

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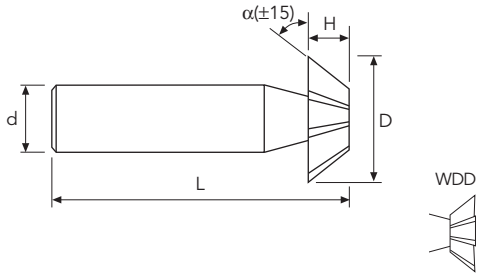
DIN 1833

WDC45 - WDC60 - WDD45 - WDD60 (js16)

Ø mm	~18	20~30	32~38
tol. D mm	±0.65	±0.65	±0.80



	WDC45	WDC60	WDD45	WDD60
	Z6~Z12	Z6~Z12	Z6~Z12	Z6~Z12
	HSS/Co BR	HSS/Co BR	HSS/Co BR	HSS/Co BR
	N	N	N	N
	α 45°	α 60°	α 45°	α 60°

D(js16)	d(h6)	H	L	Z	Stock	Stock	Stcok	Stock
mm 16	12	4	60	6	●		●	
20	12	5	63	6	●		●	
22	12	6	67	6	●		●	
25	16	6.3	67	8	●		●	
28	16	7.5	67	8	●		●	
32	16	8	71	10	●		●	
38	16	10	80	12	○		○	
mm 16	12	6.3	60	6		●		●
20	12	8	63	6		●		●
22	12	9	67	6		●		●
25	16	10	67	8		●		●
28	16	11	67	8		●		●
32	16	12.5	71	10		●		●
38	16	16	80	12		○		○

● stock standard ○ non-standard stock EX stock exhaustion

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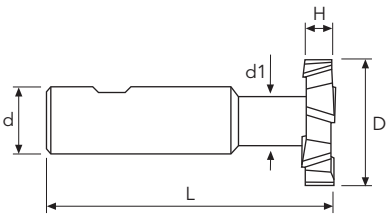
DIN 851

WTM

WTM (d11)

Ø mm	10~18	19~30	32~40
tol. D µ	-50 / -160	-65 / -195	-80 / -240



Z6~Z8
HSS/Co
BR
N
15°

D(d11)	d(h6)	d1	H(d11)	L	Z	Stock
mm 12.5	10	5	6	57	6	●
16	10	6.5	8	62	6	●
18	12	8	8	70	6	●
19	12	8	9	71	6	●
21	12	10	9	74	6	●
22	12	10	10	75	6	●
25	16	12	11	82	6	●
28	16	13	12	83	6	●
32	16	15	14	90	8	●
36	25	17	16	103	8	○
40	25	19	18	108	8	○

● stock standard ○ non-standard stock EX stock exhaustion

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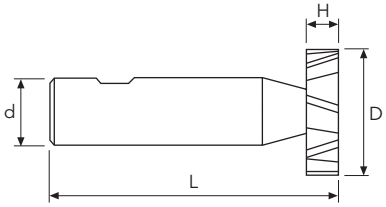
DIN 850

WWK

WWK (h11 - e8)

Ø mm	10~18	19~30	32~50
tol. D µ	0 / -110	0 / -130	0 / -160
tol. H µ	-32 / -59	-40 / -73	-50 / -89



Z8~Z14

HSS/Co
BR

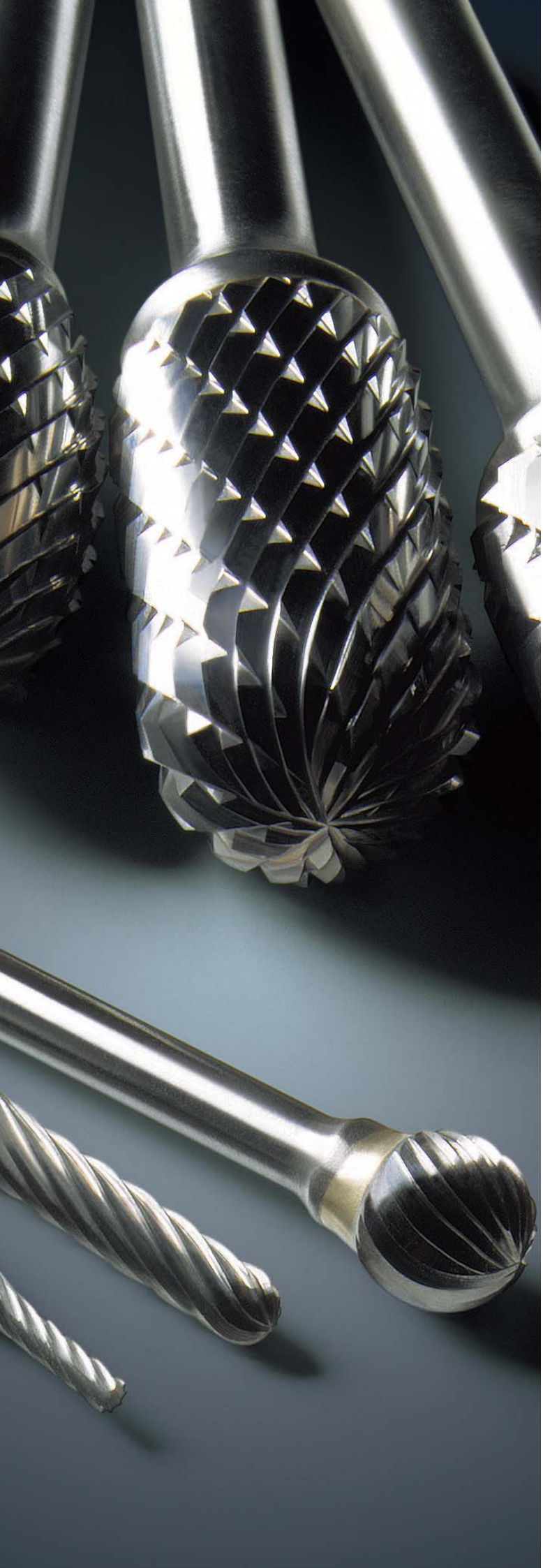
N

10°

D(h11)	d(h6)	H(e8)	L	Z	Stock
mm 10.5	6	2	50	8	●
10.5	6	2.5	50	8	○
10.5	6	3	50	8	●
13.5	10	2	56	8	●
13.5	10	2.5	56	8	○
13.5	10	3	56	8	●
13.5	10	4	56	8	●
16.5	10	2.5	56	8	●
16.5	10	3	56	8	●
16.5	10	4	56	8	●
16.5	10	5	56	8	●
19.5	10	3	63	10	●
19.5	10	4	63	10	●
19.5	10	5	63	10	●
19.5	10	6	63	10	●
22.5	10	4	63	10	●
22.5	10	5	63	10	●
22.5	10	6	63	10	●
22.5	10	8	63	10	○
25.5	10	5	63	10	●
25.5	10	6	63	10	●
25.5	10	7	63	10	○
25.5	10	8	63	10	○
28.5	10	5	63	10	●
28.5	10	6	63	10	●
28.5	10	7	63	10	○
28.5	10	8	63	10	○
32.5	12	5	71	12	●
32.5	12	6	71	12	●
32.5	12	7	71	12	○
32.5	12	8	71	12	●
32.5	12	10	71	12	●
38.5	12	7	71	12	○
38.5	12	8	71	12	○
38.5	12	9	71	12	○
38.5	12	10	71	12	○
45.5	12	10	71	14	○

● stock standard ○ non-standard stock EX stock exhaustion

Carbide burrs



Carbide burrs

Don't miss the Osawa quality on carbide rotary burrs, which are available in a wide variety of shapes and geometries.

Ritrovate tutta la qualità Osawa anche nella gamma di lime rotative in metallo duro, disponibili in un'ampia scelta di forme e geometrie.

Die Osawa- Qualität steht auch für Hartmetall-Rotierfeilen. Diese sind in einer breiten Auswahl an Formen und Geometrien erhältlich.

Retrouvez toute la qualité Osawa dans la gamme de limes rotatives carbure, disponibles dans une grande variété de formes et géométries.

M

DOUBLE CUT · DOPPIO TAGLIO
2 SCHNEIDEN · COUPE DOUBLE

MPC

PLAIN CUT · TAGLIO PIANO
FLACHSCHNEIDE · COUPE PLANE

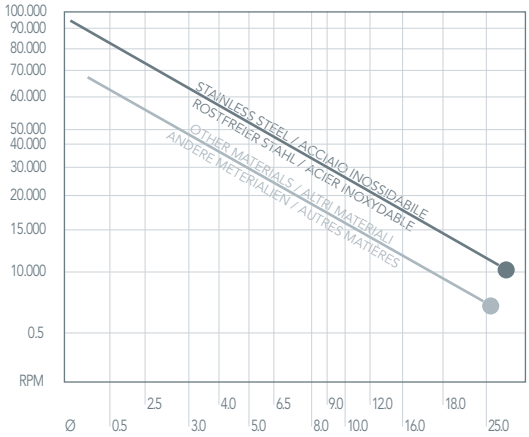
MDC

DIAMOND CUT · TAGLIO DIAMANTE
DIAMANT SCHNEIDEN · COUPE DIAMANT

MNF

ALUCUT

SPEED TABLE · TABELLA VELOCITÀ
GESCHWINDIGKEITSTABELLE · TABLEAU DE VITESSE



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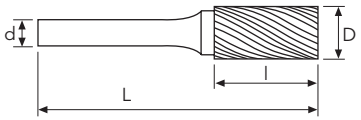
OSAWA NORM



Item No.	D	d	l	L	M Stock	MPC Stock	MNF Stock
SA41	1.5	3	6	38	●	●	
SA41 - L2	1.5	3	6	50	○	○	
SA41 - L3	1.5	3	6	75	○	○	
SA42	2.5	3	11	38	●	●	
SA42 - L2	2.5	3	11	50	○	○	
SA42 - L3	2.5	3	11	75	○	○	
SA43	3	3	14	38	●	●	
SA43 - L2	3	3	14	50	○	○	
SA43 - L3	3	3	14	75	○	○	
SA52	4	3	12.7	38	●	●	
SA53	5	3	12.7	38	○	●	
SA51	6.3	3	12.7	50	●	●	
SA11	3	6	12	56	●	○	
SA13	4	6	16	50	●	○	
SA14	5	6	16	50	●	○	
SA1	6	6	16	50	●	○	●
SA1 - L	6	6	25	50	○	○	
SA2	8	6	19	63	●	○	
SA3	9.5	6	19	63	●	○	●
SA3 - L	9.5	6	25	69	○	○	
SA4	11	6	25	69	●	○	
SA5	12.7	6	25	69	●	○	●
SA6	16	6	25	69	●	○	○
SA7	19	6	25	69	●	○	○
SA9	25	6	25	69	●	○	

MDC a richiesta · on request · auf Anfrage · sur demande

● stock standard ○ non-standard stock EX stock exhaustion

Always wear goggles when using the rotary burs / 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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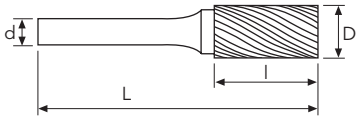
OSAWA NORM



Item No.	D	d	l	L	M Stock	MPC Stock	MNF Stock
SB41	1.5	3	6	38	●	●	
SB41 - L2	1.5	3	6	50	○	○	
SB41 - L3	1.5	3	6	75	○	○	
SB42	2.5	3	11	38	○	●	
SB42 - L2	2.5	3	11	50	○	○	
SB42 - L3	2.5	3	11	75	○	○	
SB43	3	3	14	38	●	●	
SB43 - L2	3	3	14	50	○	○	
SB43 - L3	3	3	14	75	○	○	
SB51	6.3	3	4.7	43	●	●	
SB11	3	6	12	56	●	○	
SB13	4	6	16	50	●	○	
SB14	5	6	16	50	●	○	
SB1	6	6	16	50	●	○	○
SB1 - L	6	6	25	50	○	○	
SB2	8	6	19	63	●	○	
SB3	9.5	6	19	63	●	○	○
SB3 - L	9.5	6	25	69	○	○	
SB4	11	6	25	69	●	○	
SB5	12.7	6	25	69	●	○	○
SB6	16	6	25	69	●	○	○
SB7	19	6	25	69	●	○	○
SB9	25	6	25	69	●	○	

MDC a richiesta · on request · auf Anfrage · sur demande

● stock standard ○ non-standard stock EX stock exhaustion

Always wear goggles when using the rotary burs / 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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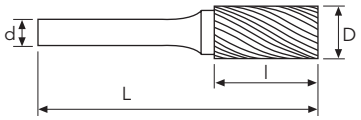

Item No.	D	d	l	L	M Stock	MPC Stock	MNF Stock
SC41	2.5	3	11	38	●	●	
SC42	3	3	14	38	●	●	
SC42 - L2	3	3	14	50	○	○	
SC42 - L3	3	3	14	75	○	○	
SC51	6.3	3	12.7	50	○	●	
SC52	4	3	12.7	38	●	●	
SC53	5	3	12.7	38	●	●	
SC11	3	6	12	56	●	○	
SC13	4	6	16	50	●	○	
SC14	5	6	16	50	●	○	
SC1	6	6	16	50	●	○	●
SC1 - L	6	6	25	50	○	○	
SC2	8	6	19	63	●	○	
SC3	9.5	6	19	63	●	○	●
SC3 - L	9.5	6	25	69	○	○	
SC4	11	6	25	69	●	○	
SC5	12.7	6	25	69	●	○	●
SC6	16	6	25	69	●	○	○
SC7	19	6	25	69	●	○	○
SC9	25	6	25	69	●	○	

MDC a richiesta · on request · auf Anfrage · sur demande

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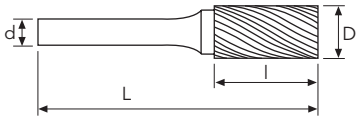

Item No.	D	d	l	L	M Stock	MPC Stock	MNF Stock
SD41	2.5	3	2.3	38	●	●	
SD42	3	3	2.8	38	●	●	
SD42 - L2	3	3	2.8	50	○	○	
SD42 - L3	3	3	2.8	75	○	○	
SD51	6.3	3	5	44	●	●	
SD53	5	3	4	38	●	●	
SD11	3	6	2.8	50	●	○	
SD14	5	6	4	50	●	○	
SD1	6	6	5	50	●	○	○
SD2	8	6	6.4	50	●	○	
SD3	9.5	6	8	52	●	○	○
SD4	11	6	9.5	54	●	○	
SD5	12.7	6	11	55	●	○	○
SD6	16	6	14	58	●	○	○
SD7	19	6	16	62	●	○	○
SD9	25	6	23	68	●	○	

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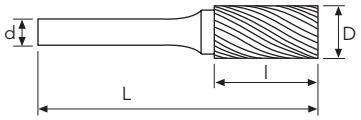

Item No.	D	d	l	L	M Stock	MPC Stock	MNF Stock
SE41	3	3	5.5	38	●	●	
SE41 - L2	3	3	5.5	50	○	●	
SE41 - L3	3	3	5.5	75	○	●	
SE51	6.3	3	9.5	47	●	●	
SE53	5	3	7.1	38	●	●	
SE1	6	6	9.5	50	●	○	
SE3	9.5	6	16	60	●	○	○
SE5	12.7	6	22	66	●	○	○
SE6	16	6	25	69	●	○	○
SE7	19	6	25	69	●	○	○

MDC a richiesta · on request · auf Anfrage · sur demande

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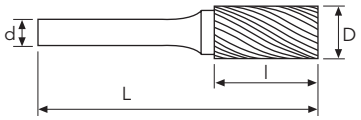

Item No.	D	d	l	L	M Stock	MPC Stock	MNF Stock
SF41	3	3	6	38	○	●	
SF42	3	3	12.7	38	●	●	
SF42 - L2	3	3	12.7	50	○	○	
SF42 - L3	3	3	12.7	75	○	○	
SF51	6.3	3	12.7	50	●	●	
SF53	5	3	12.7	38	●	●	
SF11	3	6	12.7	56	●	○	
SF1	6	6	16	50	●	○	○
SF3	9.5	6	19	63	●	○	○
SF4	11	6	25	69	●	○	
SF13	12.7	6	19	63	○	○	
SF5	12.7	6	25	69	●	○	○
SF6	16	6	25	69	●	○	○
SF7	19	6	25	69	●	○	
SF14	19	6	32	76	○	○	○
SF15	19	6	38	82	○	○	

MDC a richiesta · on request · auf Anfrage · sur demande

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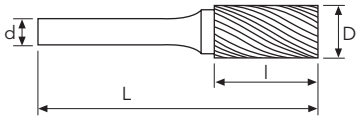

Item No.	D	d	l	L	M Stock	MPC Stock	MNF Stock	
SG41	3	3	6	38	●	●		
SG43	3	3	9.5	38	●	●		
SG44	3	3	12.7	38	●	●		
SG44 - L2	3	3	12.7	50	○	○		
SG44 - L3	3	3	12.7	75	○	●		
SG51	6.3	3	12.7	50	●	●		
SG53	5	3	12.7	38	●	●		
SG1	6	6	16	50	●	○		
SG2	8	6	19	63	●	○		
SG3	9.5	6	19	63	●	○		
SG13	12.7	6	19	63	○	○		
SG5	12.7	6	25	69	●	○		
SG6	16	6	25	69	●	○		
SG7	19	6	25	69	●	○		
SG15	19	6	38	82	○	○		

MDC a richiesta · on request · auf Anfrage · sur demande

● stock standard ○ non-standard stock EX stock exhaustion

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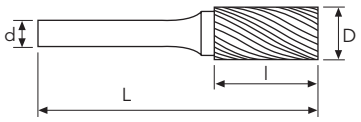

Item No.		D	d	l	L		M Stock	MPC Stock	MNF Stock	
SH41	3	3	6.3	38		●	●			
SH41 - L2	3	3	6.3	50		○	○			
SH41 - L3	3	3	6.3	75		○	○			
SH53	5	3	9.5	38		○	●			
SH2	8	6	19	63		●	○			
SH5	12.7	6	32	76		●	○			
SH6	16	6	36	80		●	○			
SH7	19	6	41	85		●	○			

MDC a richiesta · on request · auf Anfrage · sur demande

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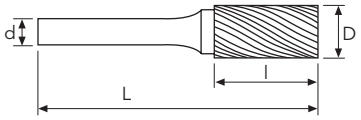

Item No.	D	d	l	L	α	M Stock	MPC Stock	MNF Stock
SJ42	3	3	2.5	38	60°	○	●	
SJ1	6	6	4	50	60°	●	○	
SJ3	9.5	6	8	55	60°	●	○	
SJ5	12.7	6	11	58	60°	●	○	
SJ6	16	6	13.5	61	60°	●	○	
SJ7	19	6	16.5	65	60°	○	○	
SJ9	25	6	21.5	68	60°	○	○	

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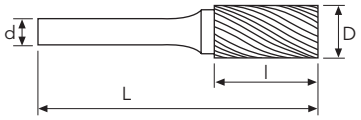

Item No.	D	d	l	L	α	M Stock	MPC Stock	MNF Stock	
SK42	3	3	1.5	38	90°	○	●		
SK1	6	6	3	50	90°	●	○		
SK3	9.5	6	4.7	52	90°	●	○		
SK5	12.7	6	6.3	54	90°	●	○		
SK6	16	6	8	57	90°	●	○		
SK7	19	6	9.5	58	90°	○	○		
SK9	25	6	12.7	60	90°	○	○		

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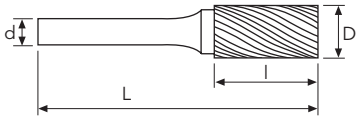

Item No.	D	d	l	L	α	M Stock	MPC Stock	MNF Stock
SL41	3	3	9.5	38	8°	●	●	
SL42	3	3	12.7	38	8°	●	●	
SL42 - L2	3	3	12.7	50	8°	○	○	
SL42 - L3	3	3	12.7	75	8°	○	○	
SL53	5	3	12.7	38	14°	○	●	
SL1	6	6	16	50	14°	●	○	
SL2	8	6	22	69	14°	●	○	
SL3	9.5	6	27	74	14°	●	○	○
SL4	12.7	6	28	76	14°	●	○	●
SL5	16	6	30	77	14°	●	○	○
SL7	19	6	38	85	14°	○	○	

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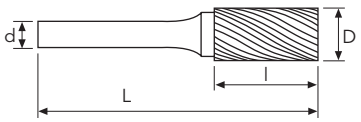

Item No.	D	d	l	L	α	M Stock	MPC Stock	MNF Stock
SM41	3	3	8.9	38	12°	●	●	
SM42	3	3	11	38	14°	●	●	
SM42 - L2	3	3	11	50	14°	○	○	
SM42 - L3	3	3	11	75	14°	○	○	
SM43	3	3	16	38	7°	●	●	
SM51	6.3	3	12.7	53	22°	●	●	
SM53	5	3	12.7	38	16°	○	●	
SM1	6	6	12.7	50	22°	●	○	
SM2	6	6	19	50	14°	●	○	
SM3	6	6	25	50	10°	●	○	
SM4	9.5	6	16	63	28°	●	○	
SM5	12.7	6	22	69	28°	●	○	
SM6	16	6	25	73	31°	●	○	

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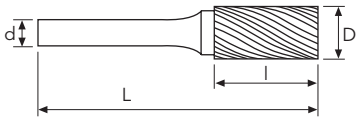

Item No.	D	d	l	L	α	M Stock	MPC Stock	MNF Stock
SN41	2.5	3	3	38	10°	●	●	
SN42	3	3	4	38	10°	●	●	
SN51	6.3	3	6	44	10°	○	●	
SN53	5	3	6.3	38	10°	○	●	
SN1	6	6	8	50	10°	●	○	
SN2	9.5	6	9.5	53	13°	●	○	
SN4	12.7	6	12.7	57	28°	●	○	
SN6	16	6	19	63	18°	●	○	
SN7	19	6	16	70	30°	○	○	

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BUR10 M TYPE
Set 10pcs.
shank / gambo / Schaft / queue Ø6 mm
SA1 - SB1 - SC1 - SD1 - SE1
SF1 - SG1 - SL1 - SM1 - SN1

A15FW MPC TYPE
Set 15pcs.
shank / gambo / Schaft / queue Ø3 mm
SA41 - SA42 - SA43 - SA52 - SB43 - SC42 - SD41
SD42 - SD53 - SE41 - SG43 - SL42 - SM42 - SM43 - SN42

A16FW M TYPE
Set 15pcs.
shank / gambo / Schaft / queue Ø3 mm
SA41 - SA42 - SA43 - SA52 - SB43 - SC42 - SD41
SD42 - SD53 - SE41 - SG43 - SL42 - SM42 - SM43 - SN42

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Parameters

OSAWA

GROUPS / GRUPPI / GRUPPE / GROUPES	AISI	W-stoff	DIN	BS	SS
1 <550 N/mm² LOW CARBON AND FREE CUTTING STEEL ACCIAI A BASSO TENORE DI CARBONIO ED AUTOMATICI KOHLENSTOFFARME STÄHLE ACIERS BAS CARBONE ET POUR DÉCOLLETAGE	A570-36	1.0038	RSt 37-2	4360 40 C	1311
	A36	1.0044	St 44-2	4360 43 A	1411
	A573-81 65	1.0116	St 37-3	4360 40 B	1312
	1006	1.0201	St 36	-	1160
	A515-65	1.0345	H I	1501 161	1330
	1015	1.0401	C 15	080 M 15	1350
	1020	1.0402	C22	050 A 20	1450
	-	1.0425	H II	-	1432
	1213	1.0715	9 SMn 28	230 M 07	1912
	(12L13)	1.0718	9 SMnPb 28	-	1914
	-	1.0723	15 S 20	210 A 15	1922
	1140	1.0726	35 S 20	212 M 36	1957
	1146	1.0727	45 S 20	212 M 44	1973
	1215	1.0736	9 SMn 36	240 M 07	-
	-	1.0765	-	-	-
	1010	1.1121	Ck 10	045 M 10	1265
	-	1.1121	St 37-1	4360 40 A	1300
	1022	1.1133	GS-20Mn 5	120 M 19	1410
	1015	1.1141	Ck 15	080 M 15	1370
	1025	1.1158	Ck 25	070 M 26	1450
	1018	-	-	-	-
2 450-700 N/mm² MEDIUM CARBON STEEL ACCIAI A MEDIO TENORE DI CARBONIO MITTELGEKOHLTE FLUSSTÄHLE ACIERS MOYEN CARBONE	A662 C	1.0436	ASt 45	1501 224	2103
	1035	1.0501	C 35	060 A 35	1550
	1035	1.0501	C 35	080 M 36	1550
	1045	1.0503	C 45	080 M 46	1650
	1040	1.0511	C 40	080 M 40	-
	1055	1.0535	C 55	070 M 55	1655
	-	1.0570	St 52-3	4360 50 B	2132
	A738	1.0577	ASt 52	1501 224	2107
	1039	1.1157	40Mn4	150 M 36	-
	1035	1.1181	Ck 35	060 A 35	1572
	1035	1.1183	Cf 35	080 M 36	1572
	1045	1.1191	Ck 45	808 M 46	1672
	1055	1.1203	Ck55	070 M 55	-
	1050	1.1213	Cf 53	060 A 52	1674
	1045	1.1730	C45W	En 43 B	1672
	A572-60	1.8900	StE 380	4360 55 E	2145
	-	1.8905	StE 460	HP 6	-
3 550-850 N/mm² HIGH CARBON STEEL ACCIAI AD ELEVATO TENORE DI CARBONIO KOHLENSTOFFREICHE STÄHLE ACIERS HAUT CARBONE	1060	1.0601	C60	060 A 62	-
	1064	1.1221	Ck 60	060 A 62	1678
	1070	1.1231	Ck 67	070 A 72	1770
	1080	1.1248	Ck 75	060 A 78	1774
	1095	1.1274	Ck 101	060 A 96	1870
4 600-900 N/mm² LOW ALLOY STEEL ACCIAI DEBOLMENTE LEGATI NIEDRIGLEGIERTE STÄHLE ACIERS FAIBLEMENT ALLIÉS	9255	1.0904	55 Si 7	250 A 53	2090
	1335	1.1167	36 Mn 5	150 M 36	2120
	1330	1.1170	28 Mn 6	150 M 28	-
	P4	1.2341	X6 CrMo 4	-	-
	52100	1.3505	100 Cr 6	534 A 99	2258
	A204A	1.5415	15 Mo 3	1501 240	2912
	8620	1.6523	21 NiCrMo 2	805 M 20	2506
	8740	1.6546	40NiCrMo22	311-Type 7	-
	-	1.6587	17CrNiMo6	820 A 16	-
	5132	1.7033	34 Cr 4	530 A 32	-
	5140	1.7035	41 Cr 4	530 A 40	-
	5140	1.7035	41 Cr 4	530 A 40	-
	5140	1.7045	42 Cr 4	530 A 40	2245
	5115	1.7131	16 MnCr 5	(527 M 20)	2511
	5155	1.7176	55 Cr 3	527 A 60	2253
	4130	1.7218	25 CrMo 4	1717CDS 110	2225
	4135 (4137)	1.7220	35 CrMo 4	708 A 37	2234
	4142	1.7223	41 CrMo 4	708 M 40	2244
	4140	1.7225	42 CrMo 4	708 M 40	2244
	4137	1.7225	42 CrMo 4	708 M 40	2244
	A387 12-2	1.7337	16 CrMo 4 4	1501 620	2216
	-	1.7361	32CrMo12	722 M 24	2240
	A182 F-22	1.7380	10 CrMo9 10	1501 622	2218
	6150	1.8159	50 CrV 4	735 A 50	2230
	-	1.8515	31 CrMo 12	722 M 24	2240
	-	-	-	-	-

AFNOR	U.N.E. / I.H.A.	JIS	UNI	EN	ISO	TRADE MARK
E 24-2 Ne	-	SS 34	Fe 360B FN	-	-	-
NFA 35-501 E 28	-	-	-	-	-	-
E 24-U	-	-	Fe37-3	-	-	-
Fd 5	-	-	-	-	-	-
A 37 CP	F.1110	SGV 410	-	-	-	-
CC 12	F.111	S 15 C	080 M 15	-	-	-
CC20	F.112	-	C20C21	-	-	-
A 42 CP	A42 RCI	SGV 410	Fe 410 1KW	-	-	-
S 250	11SMn28	SUM 22	CF9SMn28	-	-	AVP
S 250 Pb	11SMnPb28	SUM 22 L	CF9SMnPb28	-	-	-
-	F.210.F	SUM 32	-	-	-	-
35 MF 6	F.210.G	-	-	-	-	-
45 MF 4	-	-	-	-	-	-
S 300	12 SMn 35	SUM 25	CF 9 SMn 36	-	-	AVZ
-	-	-	36SMnPb14	-	-	PR 80
XC 10	F.1510	S 10 C	C10	-	-	-
-	-	S 10 C	-	-	-	-
20 M 5	F.1515	SMnC 420	G22Mn3	-	-	-
XC 18	F.1511	S 15 Ck	080 M 15	-	-	-
XC 25	F.1120	S 25 C	C25	-	-	-
-	-	SS400	Fe 360 B			-
A 48 FP	-	-	-	-	-	-
CC 35	F.113	S 35 C	C35	-	-	-
CC 35	F.113	S 35 C	C35	-	-	-
CC45	F.114	S 45 C	C45	-	-	-
AF 60 C 40	F.114.A	-	C40	-	-	-
AF 70 C 55	F.115	S 55 C	C55	-	-	-
E 36-3	-	SM 490 A, B, C	Fe 510	-	-	-
A 52 FP	-	-	-	-	-	-
35 M 5	-	-	-	-	-	-
XC 38	F.1130	S 35 C	C35	-	-	-
XC 38 TS	-	S 35 C	C36	-	-	-
XC 45	F.1140	S 45 C	C45	-	-	-
XC 55	F.1203	S55 C	C50	-	-	-
XC 48 TS	-	S 50 C	C53	-	-	-
Y342	F.1140	-	-	-	-	-
-	-	-	FeE390KG	-	-	-
-	-	-		-	-	-
CC55	-	-	C60	-	-	-
XC 65	F.1150	S 58 C	C60	-	-	-
XC 68	F.5103	-	C70	-	-	-
XC 75	F.5107	-	-	-	-	-
XC 100	F.5117	SUP 4	-	-	-	-
55 S 7	56Si7	-	5SSi8	-	-	-
40 M 5	36Mn5	SMn 438(H)	-	-	-	-
20 M 5	-	SCMn1	C28MN	-	-	-
-	-	-	-	-	-	-
100 C 6	F.131	SUJ 2	100Cr6	-	-	-
15 D 3	16 Mo3	STBA 12	16Mo3 KW	-	-	-
20 NCD 2	F.1522	SNCM 220(H)	20NiCrMo2	-	-	-
40 NCD 2	F.129	SNCM 240	40NiCrMo2(KB)	-	-	-
18 NCD 6	14NiCrMo13	-	-	-	-	-
32 C 4	35Cr4	SCr430(H)	34Cr4(KB)	-	-	-
42 C 2	42 Cr 4	SCr 440 (H)	40Cr4	-	-	-
42 C 2	42 Cr 4	SCr 440 (H)	41Cr4 KB	-	-	-
42 C 4 TS	F.1207	SCr 440	-	-	-	-
16 MC 5	F.1516	-	16MnCr5	-	-	-
55 C 3	-	SUP 9(A)	55Cr3	-	-	-
25 CD 4	F.1251/55Cr3	SCM 420 / SCM430	25CrMo4(KB)	-	-	-
35 CD 4	34 CrMo 4	SCM 432	34CrMo4KB	-	-	-
42 CD 4 TS	42 CrMo 4	SCM 440	41 CrMo 4	-	-	-
40 CD 4	F.1252	SCM 440	40CrMo4	-	-	-
42 CD 4	F.1252	SCM 440	42CrMo4	-	-	-
15 CD 4.5	-	-	12CrMo910	-	-	-
30 CD 12	F.124.A	-	30CrMo12	-	-	-
12 CD 9, 10	F.155 / TU.H	-	12CrMo9 10	-	-	-
50 CV 4	F.143	SUP 10	50CrV4	-	-	-
30 CD 12	F.1712	-	30CrMo12	-	-	-
-	-	-	-	-	-	Weldox 500

All the trademarks or tradenames mentioned belong to their respective owners.

GROUPS / GRUPPI / GRUPPE / GROUPES	AISI	W-stoff	DIN	BS	SS
5 700-1000 N/mm² ALLOY STEEL ACCIAI LEGATI LEGIERTE STÄHLE ACIERS ALLIÉS	W1	1.1545	C105W1	BW1A	1880
	L3	1.2067	100Cr6	BL 3	(2140)
	L2	1.2210	115 CrV 3	-	-
	P20 + S	1.2312	40 CrMnMoS 8 6	-	-
	-	1.2419	105WCr6	-	2140
	O1	1.2510	100 MnCrW 4	BO1	-
	S1	1.2542	45 WCrV 7	BS1	2710
	4340	1.6582	34 CrNiMo 6	817 M 40	2541
	5120	1.7147	20 MnCr 5	-	-
	-	-	-	-	-
6 900-1200 N/mm² TOOL AND HIGH ALLOY STEEL ACCIAI DA UTENSILI E ALTO LEGATI WERKZEUG- UND HOCHLEGIERTE STÄHLE ACIERS POUR OUTILS ET FORTEMENT ALLIÉS	D3	1.2080	X210 Cr 12	BD3	2710
	P20	1.2311	40 CrMnMo 7	-	-
	H13	1.2344	X40CrMoV 5 1	BH13	2242
	A2	1.2363	X100 CrMoV 5 1	BA2	2260
	D2	1.2379	X155 CrMoV 12 1	BD2	2310
	D4 (D6)	1.2436	X210 CrW 12	BD6	2312
	H21	1.2581	X30WCrV9 3	BH21	-
	L6	1.2713	55NiCrMoV 6	-	-
	M 35	1.3243	S6/5/2/5	BM 35	2723
	M 2	1.3343	S6/5/2	BM2	2722
	M 7	1.3348	S2/9/2	-	2782
	HW 3	1.4718	X45CrSi 9 3	401 S 45	-
	-	1.7321	20 MoCr 4	-	2625
7 1200-1500 N/mm² (35-45HRC) HIGH TENSILE STRENGTH STEEL ACCIAI AD ELEVATA RESISTENZA HOCHFESTE STÄHLE ACIERS HAUTE RÉSISTANCE	A128 (A)	1.3401	G-X120 Mn 12	BW10	2183
8 45-63HRC HARDENED STEEL ACCIAI TEMPRATI GEHÄRTETE STÄHLE ACIERS TREMPÉS	-	-	-	-	-
9 MARTENSITIC AND FERRITIC STAINLESS STEEL ACCIAI INOSSIDABILI MARTENSITICI E FERRITICI MARTENSITISCHE UND FERRITISCHE ROSTFREIE STÄHLE ACIERS INOXYDABLES MARTENSITIQUES ET FERRITIQUES	420 C	1,4034	X43Cr16		
	440 B/1	1,4112	X90 Cr Mo V18		
	-	1.2083	X42 Cr 13	-	2314
	403	1.4000	X6Cr13	403 S 17	2301
	(410S)	1.4001	X7 Cr 14	(403 S17)	2301
	405	1.4002	X6 CrAl 13	405 S 17	-
	416	1.4005	X12 CrS 13	416 S 21	2380
	410	1.4006	X 10 Cr 13	410 S21	2302
	430	1.4016	X6 Cr 17	430 S 17	2320
	420	1.4021	X20 Cr 13	420 S 37	2303
	420F	1.4028	X30 Cr 13	420 S 45	(2304)
	(420)	1.4031	X39Cr13	420 S 45	(2304)
	431	1.4057	X20 CrNi 17 2	431 S 29	2321
	430F	1.4104	X12 CrMoS 17	-	2383
	434	1.4113	X6 CrMo 17	434 S 17	2325
	430Ti	1.4510	X6 CrTi 17	-	-
	409	1.4512	X5 CrTi 12	409 S 17	-
10 AUSTENITIC STAINLESS STEEL (V2A) ACCIAI INOSSIDABILI AUSTENITICI (V2A) AUSTENITISCHE ROSTFREIE STÄHLE (V2A) ACIERS INOXYDABLES AUSTENITIQUES (V2A)	304	1.4301	X5 CrNi 18 9	304 S 15	2332
	305	1.4303	X5 CrNi 18 12	305 S 19	-
	303	1.4305	X12 CrNiS 18 8	303 S 21	2346
	304L	1.4306	X2 CrNiS 18 9	304 S 12	2352
	301	1.4310	X12 CrNi 17 7	-	2331
	304	1.4350	X5 CrNi 18 9	304 S 31	2332
	304	1.4350	X5 CrNi 18 9	304 S 31	2333
11 AUSTENITIC STAINLESS STEEL (V4A) ACCIAI INOSSIDABILI AUSTENITICI (V4A) AUSTENITISCHE ROSTFREIE STÄHLE (V4A) ACIERS INOXYDABLES AUSTENITIQUES (V4A)	304LN	1.4311	X2 CrNiN 18 10	304 S 62	2371
	316	1.4401	X5 CrNiMo 18 10	316 S 16	2347
	316L	1.4404	-	316 S 12/13/14/22/24	2348
	316LN	1.4429	X2 CrNiMoN 18 13	-	2375
	316L	1.4435	X2 CrNiMo 18 12	316 S 12/13/14/22/24	2353
	316	1.4436	-	316 S 33	2343
	317L	1.4438	X2 CrNiMo 18 16	317 S 12	2367
	329	1.4460	X3 CrNiMoN 27 5 2	-	2324
	321	1.4541	X10 CrNiTi 18 9	321 S 12	2337
	347	1.4550	X10 CrNiNb 18 9	347 S 17	2338
	316Ti	1.4571	X10 CrNiMoTi 18 10	320 S 17	2350
	309	1.4828	X15 CrNiSi 20 12	309 S 24	-
	330	1.4864	X12 NiCrSi 36 16	-	-

AFNOR	U.N.E. / I.H.A.	JIS	UNI	EN	ISO	TRADE MARK
Y 105	F.5118	SK 3	C100 KU	-	-	-
Y 100 C 6	F.520 L	-	-	-	-	-
-	-	-	-	-	-	-
40 CMD 8 +S	X210CrW12	-	-	-	-	Holdax
105W C 13	F.5233	SKS 31	107WCr5KU	-	-	-
90MnWCrV5	F.5220	(SK53)	95MnWCr5KU	-	-	-
55W20	F.5241	-	45WCrV8KU	-	-	-
35 NCD 6	F.1280	SNCM 447	35NiCrMo6KB	-	-	-
20 MC 5	-	-	-	-	-	-
-	-	-	-	-	-	Weldox 700
Z200 C 12	F.5212	SKD 1	X210Cr13KU	-	-	K 100
40 CMD 8	F.5263	-	-	-	-	-
Z 40 CDV 5	F.5318	SKD 61	X40CrMoV511KU	-	-	-
Z 100 CDV 5	F.5227	SKD 12	X100CrMoV51KU	-	-	-
Z 160 CDV 12	F.520.A	SKD11	X155CrVMo121KU	-	-	K 110
Z 200 CD 12	F.5213	SKD 2	X215CrW121KU	-	-	-
Z 30 WCV 9	F.526	SKD5	X30WCrV 9 3 KU	-	-	-
55 NCDV 7	F.520.S	SKT4	-	-	-	-
6-5-2-5	F.5613	SKH 55	HS6-5-5	-	-	-
Z 85 WDCV	F.5603	SKH 51	HS6-5-2-2	-	-	-
2 9 2	-	-	HS2-9-2	-	-	-
Z 45 CS 9	F.3220	SUH1	X45CrSi8	-	-	-
-	F.1523	-	30CrMo4	-	-	-
Z 120 M 12	F.8251	SCMnH 1	GX120Mn12	-	-	-
-	-	-	-	-	-	-
						WRB
						WRA
Z 40 C 14	F.5263	SUS 420 J1	-	-	-	-
Z 6 C 13	F.3110	SUS 403	X6Cr13	-	-	-
Z 8 C 13	F.3110	SUS 410 S	X6Cr13	-	-	-
Z 8 CA 12	F.3111	SUS 405	X6 CrAl 13	-	-	-
Z 11 CF 13	F.3411	SUS 416	X12CrS13	-	-	-
Z 10 C 14	F.3401	SUS 410	X12Cr13	-	-	-
Z 8 C 17	F.3113	SUS 430	X8Cr17	-	-	-
Z 20 C 13	F.3402	SUS 420 J1	X20Cr13	-	-	-
Z 30 C 13	F.3403	SUS 420 J2	X30Cr13	-	-	-
Z 40 C 14	F.3404	(SUS 420 J1)	-	-	-	-
Z 15 CNi 16.02	F.3427	SUS 431	X16CrNi16	-	-	-
Z 10 CF 17	F.3117	SUS 430 F	X10CrS17	-	-	-
Z 8 CD 17.01	-	SUS 434	X8CrMo17	-	-	-
Z 4 CT 17	-	SUS 430 LX	X6CrTi17	-	-	-
Z 6 CT 12	-	SUH 409	X6CrTi12	-	-	-
Z 6 CN 18.09	F.3551	SUS 304	X5CrNi18 10	-	-	-
Z 8 CN 18.12	-	SUS 305	X8CrNi19 10	-	-	-
Z 10 CNF 18.09	F.3508	SUS 303	X10CrNiS 18 09	-	-	-
Z 2 CN 18.10	F.3503	SUS 304L	X2CrNi18 11	-	-	-
Z 12 CN 17.07	F.3517	SUS 301	X12CrNi17 07	-	-	-
Z 6 CN 18.09	F.3551	SUS 304	X5CrNi18 10	-	-	-
Z 6 CN 18.09	F.3551	SUS 304	X5CrNi18 10	-	-	-
Z 2 CN 18.10	-	SUS 304 LN	-	-	-	-
Z 6 CND 17.11	F.3543	SUS 316	X5CrNiMo17 12	-	-	-
Z 2 CND 17.13		SUS316L	X2CrNiMo17 12	-	-	-
Z 2 CND 17.13	-	SUS 316 LN	-	-	-	-
Z 2 CND 17.13	-	SUS316L	X2CrNiMo17 12	-	-	-
Z 6 CND18-12-03	-	-	X8CrNiMo 17 13	-	-	-
Z 2 CND 19.15	-	SUS 317 L	X2CrNiMo18 16	-	-	-
Z5 CND 27.05.Az	F.3309	SUS 329 J1	-	-	-	-
Z 6 CND 18.10	F.3553	SUS 321	X6CrNiTi18 11	-	-	-
Z 6 CNNb 18.10	F.3552	SUS 347	X6CrNiNb18 11	-	-	-
Z 6 CNDT 17.12	F.3535	-	X6CrNiMoTi 17 12	-	-	-
Z 15 CNS 20.12	-	SUH 309	X16 CrNi 24 14	-	-	-
Z 12 NCS 35.16	-	SUH 330	-	-	-	-

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OSAWA

GROUPS / GRUPPI / GRUPPE / GROUPES	AISI	W-stoff	DIN	BS	SS
12 DUPLEX	S32750	1.4410	X 2 CrNiMoN 25 7 4	-	2328
	S31500	1.4417	X 2 CrNiMoSi 19 5	-	2376
	S31803	1.4462	X 2 CrNiMoN 22 5 3	-	2377
	S32760	1.4501	X 3 CrNiMoN 25 7	-	-
	630	1.4542	X5CrNiCNb16-4	-	-
	A564/630	-	-	-	-
13 GREY CAST IRON GHISA GRIGIA GRAUGUSS FONTE GRISE	A48-20B	0.6010	GG-10	Grade 100	0110-00
	A48-25B	0.6015	GG-15	Grade 150	0115-00
	A48-30B	0.6020	GG-20	Grade 200	0120-00
	A48-40B	0.6025	GG-25	Grade 250	0125-00
	A48-45B	0.6030	GG-30	Grade 300	0130-00
	A48-50B	0.6035	GG-35	Grade 350	0135-00
	A48-60B	0.6040	GG-40	Grade 400	0140-00
	32510		GTS-35	B340/12	0815-00
	A220-40010	0.8145	GTS-45	P440/7	0852-00
	A220-50005	0.8155	GTS-55-04	P510/4	0854-00
	A220-70003	0.8165	GTS-65-02	P570/3	0856-00
	A220-70003	-	GTS-65	P570/3	0858
	A220-80002	0.8170	GTS-70-02	P690/2	0862-00
14 NODULAR CAST IRON GHISA SFEROIDALE SPHÄROGUSS FONTE NODULAIRE	-	0.7033	GGG-35.3	350/22L40	0717-15
	60/40/18	0.7040	GGG-40	420/12	0717-02
	(60/40/18)	0.7043	GGG-40.3	370/17	0717-12
	65/45/12	0.7050	GGG-50	500/7	0727-02
	80/55/06	0.7060	GGG-60	600/3	0727-03
	100/70/03	0.7070	GGG-70	700/2	0737-01
	120/90/02	0.7080	GGG-80	800/2	-
15 WROUGHT (ROLLED) ALUMINIUM ALLUMINIO LAMINATO GEWALZTES ALUMINIUM ALUMINIUM LAMINÉ	1200	3.0205	Al 99	1C	4010
	1050	3.0255	Al 99,5	1B	4007
	1350	3.0257	E-Al	E1E	-
	1070	3.0275	Al 99,7	-	-
	1080	3.0285	Al 99,8	1A	-
	1099	3.0385	AL99,98R	1	-
	3105	3.0505	AlMn0,5Mg0,5	N31	-
	3103	3.0515	AlMn1	N3	4054
	3003	3.0517	AlMn	N3	-
	3005	3.0525	ALMn1Mg0,5	-	-
	3004	3.0526	AlMn1Mg1	-	-
	6012	3.0615	AlMgSiPb	-	-
	2014	3.1255	AlCuSiMn	H15	4338
	2117	3.1305	AlCuMg0,5	L86	-
	2017	3.1325	AlCuMg 1	(H14)	-
	2024	3.1355	AlCuMg 2	DTD5090	-
	2030	3.1645	AlCuMgPb	-	4335
	2011	3.1655	AlCuBiPb	FC1	4355
	6082	3.2315	AlMgSi 1	H30	4212
	6060	3.3206	AlMgSi0,5	H9	4103/4104
	6005	3.3210	AlMgSi0,7	-	-
	6061	3.3211	AlMg1SiCu	H20	-
	5005	3.3315	AlMg1	N41	4106
	5050	3.3316	AlMg1,5	-	-
	5052	3.3523	AlMg2,5	-	4120
	5251	3.3525	AlMg2Mn0,3	N4	-
	5154	3.3535	ALMg3	N5/N56	-
	5454	3.3537	AlMg2,7Mn	N51	-
	5086	3.3545	AlMg4Mn	-	-
	5083	3.3547	AlMg4,5Mn	N8	4140
	5056	3.3555	ALMg5	N6	
	7020	3.4335	AlZn4,5Mg1	H17	4425
	7075	3.4365	AlZnMgCu1,5	2L95	-
	3304	-	AlMgMn	-	-
	7010	-	AlZn6MgCu	DTD5130	-
16 DIE-CAST ALUMINIUM (SI<12%) ALLUMINIO PRESSOFUSO (SI<12%) AL-GUSSLEGIERUNGEN (SI<12%) ALUMINIUM MOULÉ SOUS PRESSION (SI<12%)	A356	3.2371	G-AlSi7Mg	LM25	4244
	-	3.2373	G-AlSi9Mg	-	-
	A360	3.2381	G-AlSi10Mg	LM9	4253
	A413.2	3.2581	G-AlSi12	LM6	4261
	A413.0	3.2582	GD-AlSi12	-	4247
	A413.1	3.2583	G-AlSi12(Cu)	LM20	4260
	-	3.3561	G-AlMg5	LM5	4252
	-	3.5101	G-MgZn4SE1Zr1	MAG5	-
	-	3.5103	MgSE3Zn2Zr1	MAG6	-
	-	3.5106	G-MgAg3SE2Zr1	MAG 12	-

AFNOR	U.N.E. / I.H.A.	JIS	UNI	EN	ISO	TRADE MARK
Z3 CND 25.06 Az	-	-	-	-	-	-
Z2 CND 18.05.03	-	-	-	-	-	-
Z 3 CND 22.05 (Az)	-	-	-	-	-	-
Z 3 CND 25.06 Az	-	-	-	-	-	ZERON 100
-	-	-	-	-	-	-
-	-	-	-	-	-	17/4 PH
-	-	FC 100	G 10	-	-	-
Ft 15 D	FG 15	FC 150	G 15	-	-	-
Ft 20 D	FG 20	FC 200	G 20	-	-	-
Ft 25 D	FG 25	FC 250	G 25	-	-	-
Ft 30 D	FG 30	FC 300	G 30	-	-	-
Ft 35 D	FG 35	FC 350	G 35	-	-	-
Ft 40 D	-	FC 40	-	-	-	-
MN 35-10	-	FCMW 330	-	-	-	-
MN 450	-	FCMP 440/490	GMN 45	-	-	-
MP 50-5	-	FCMP 490	GMN 55	-	-	-
MN 650-3	-	FCMP 590	GMN 65	-	-	-
MN 60-3	-	FCMP 540	-	-	-	-
MN 700-2	-	FCMP 690	GMN 70	-	-	-
FGS 370/17	-	-	-	-	-	-
FGS 400/12	FGE 38-17	FCD 400	GS 400-12	-	-	-
FGS 370/17	-	-	GSO 42-12	-	-	-
FGS 500/7	FGE 50-7	FCD 500	GS 500-7	-	-	-
FGS 600/3	FGE 60-2	FCD 600	GS 600-3	-	-	-
FGS 700/2	FGS 70-2	FCD 700	GS 700-2	-	-	-
FGS 800/2	-	-	GS-800/2	-	-	-
A4	L-3001	A1x3	9001/1	-	-	-
A5	L-3051	A1x1	9001/2	-	-	-
-	-	-	-	-	-	-
A7	-	-	-	-	-	-
A8	-	-	-	-	-	-
A99	-	-	-	-	-	-
-	-	-	-	-	-	-
-	L-3811	-	9003/3	-	-	-
AM1	L-3810	A2x3	9003/1	-	-	Aluman 100
AMG0,5	-	-	9003/4	-	-	-
AM1G	L-3820	-	9003/2	-	-	-
ASGPB	-	-		-	-	-
AU4SG	L-3130	A3x1	9002/3	-	-	Avional 660
AU2G	-	-	9002/1	-	-	Avional 050
AU4G	L-3120	A3x2	9002/2	-	-	Avional 100
AU4G1	L-3140	A3x4	9002/4	-	-	Avional 150
AU4Pb	L-3121	-	9002/8	-	-	-
AU5PbBi	L-3192	-	9002/5	-	-	Recidal 11
ASGM 0,7	L-3451	-	9006/4	-	-	Anticorodal 100
AGS	L-3441	A2x5	9006/1	-	-	Anticorodal 063
ASG0,5	L-3454	A6NO1	9006/6	-	-	-
AGSUC	L-3420	A2x4	9006/2	-	-	Anticorodal 061
AG0,6	L-3350	A2x8	9005/1	-	-	Peraluman 080
-	-	-	9005/7	-	-	Peraluman 150
AG2,5C	L-3360	A2x1	9005/2	-	-	Peraluman 250
AG2M	L-3361	-	-	-	-	-
AG3	-	-	9005/8	-	-	Peraluman 350
AG2,5MC	L-3391	A2x9	9005/3	-	-	-
AG4MC	L-3322	-	9005/4	-	-	-
AG4,5MC	L-3321	A2x7	9005/5	-	-	Peraluman 440
A-G5	-	-	-	-	-	Peraluman 500
AZ5G	L-3741	-	9007/1	-	-	-
AZ5GU	L-3710	A34x6	9007/2	-	-	Ergal 55
AM1G	-	-	-	-	-	-
-	-	-	9007/4	-	-	-
A-S7G	-	AC4C	-	42000	AlSi7Mg	-
-	-	-	-	-	-	-
A-S10G	-	-	-	43100	Al Si 10 Mg	-
A-S12U	-	AC3A	-	44100	Al Si 12	-
-	-	-	-	-	-	-
A-S12	-	-	-	47000	Al Si 12 (Cu)	-
A-SU12	-	AC4A	-	51300	ALMg 6	-
G-Z4TR	-	-	-	-	-	-
G-TR3Z2	-	-	-	-	-	-
G-Ag22,5	-	-	-	-	-	-

All the trademarks or tradenames mentioned belong to their respective owners.

OSAWA

GROUPS / GRUPPI / GRUPPE / GROUPES	AISI	W-stoff	DIN	BS	SS
16 DIE-CAST ALUMINIUM (SI<12%) ALLUMINIO PRESSOFUSO (SI<12%) AL-GUSSLEGIERUNGEN (SI<12%) ALUMINIUM MOULÉ SOUS PRESSION (SI<12%)	-	3.5812	G-MgAl8Zn1	MAG1	-
	-	3.5912	G-MgAl9Zn1	MAG7	-
	355.1	-	G-AlSi5	LM16	-
	A380	-	G-AlSi8Cu3	LM24	4250
	319	-	G-AlSi6Cu4	LM21	-
	319.2	-	G-AlSi6Cu4	LM22	-
17 COPPER RAME KUPFER CUIVRE	C10200	2.0040	OF Cu	C103	-
	C11000	2.0060	E-Cu57	C101	-
	-	2.0065	E-Cu58	-	-
	C10300	2.0070	SE Cu	-	-
	C12200	2.0090	SF Cu	C106	-
	C12500	-	Cu-FRTP	C104	-
	C70320	2.0857	-	-	-
	C14200	2.1202	SB Cu	C107	-
	-	2.1356	Cu Mn 3	-	-
	-	2.1522	Cu Si2 Mn	-	-
	C16200		-	C108	-
	C18200		-	CC101	-
	C191010		-	-	-
	C70250		-	CC102	-
	C17200		-	CB101	-
	C17300		-	-	-
	C17510		-	-	-
	C17500		-	C112	-
	C15000		-	-	-
	C65100		-	-	-
	C65500		-	CS101	-
	C14500		-	C109	-
	C14700		-	C111	-
	C18700		-	-	-
18 BRASS OTTONE MESSING LAITON	C21000	2.0220	CuZn5	CZ125	-
	C22000	2.0230	CuZn10	Cz101	-
	C23000	2.0240	CuZn15	CZ102	-
	C24000	2.0250	CuZn20	CZ103	-
	C25600	-	CuZn28	-	-
	C26000	2.0265	CuZn30	CZ106	-
	C26800	2.0280	CuZn33	-	-
	C27200	-	CuZn36	-	-
	C27200	2.0321	CuZn37	CZ108	-
	C27000	2.0335	CuZn36	CZ107	-
	C28000	2.0360	CuZn40	CZ109	-
19 DIE-CAST BRASS OTTONE DA FUSIONE GUSSMESSING LAITON MOULÉ SOUS PRESSION	C33500	-	CuZn37Pb0.5	-	-
	C34000	-	CuZn35Pb1	CZ118	-
	C34500	2.0331	CuZn36Pb1,5	CZ119	-
	C34000	2.0331	CuZn36Pb1,5	CZ119	-
	C35300	2.0371	CuZn38Pb1,5	CZ128	-
	C36500	2.0372	CuZn39Pb0,5	CZ123	-
	C36000	2.0375	CuZn36Pb3	CZ124	-
	C37700	2.0380	CuZn39Pb2	CZ 131 / (CZ128)	-
	C38500	2.0401	CuZn39Pb3	CZ121	-
	C38000	2.0402	CuZn40Pb2	CZ122	-
	-	2.0410	CuZn44Pb2	CZ130	-
	C68700	2.0460	CuZn20Al2	CZ110	-
	C44300	2.0470	CuZn28Sn1	CZ111	-
	-	2.0530	CuZn38Sn1	-	-
	-	2.0550	CuZn40Al2	-	-
	-	2.0561	CuZn40Al1	-	-
	-	2.0572	CuZn40Mn2	CZ136	-
	C61400	2.0932	CuAl8Fe3	-	-
	C63000	2.0966	CuAl10Ni5Fe4	CA104	-
20 BRONZE BRONZO BRONZE BRONZE	C50700	2.1010	CuSn2	-	-
	C51100	2.1016	CuSn4	PB101	-
	C51000	-	CuSn5	PB102	-
	C51900	2.1020	CuSn6	PB103	-
	C52100	2.1030	CuSn8	PB104	-
	-	-	CuSn10	-	-
	-	-	CUSn11	-	-
	-	-	CuSn12	-	-
21 AMPCO	-	-	-	-	-
	-	-	-	-	-
	-	-	-	-	-

AFNOR	U.N.E. / I.H.A.	JIS	UNI	EN	ISO	TRADE MARK
G-A9	-	-	-	-	-	-
G-A9Z1	-	-	-	-	-	-
AS4GU	-	-	-	45300	ALSi5Cu 1	-
A-S9U3	-	AC4B	-	46500	Al Si9 Cu3 (Fe) (Zn)	-
A-S5UZ	-	AC2A	-	45000	Al Si 6 Cu 4	-
A-S5U	-	AC2A	-	45400	Al Si 5 Cu 3	-
Cu/c1	-	C1020	-	CW008A	Cu-OF	-
Cu/a1	-	C1100	E-Cu57	CW004A	Cu-ETP	-
-	-	-	-	-	-	-
-	-	-	-	CW021A	-	-
Cu/b	-	C1220	-	CW024A	Cu-DHP	-
Cu/A3	-	-	-	CR006A	-	-
-	-	-	-	CW112C	CuNi3Si	-
-	-	-	-	-	Cu-AsP	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	CuCd1	-
-	-	-	-	CW105C	CuCr1	-
-	-	-	-	CW109C	CuNi1Si	-
-	-	-	-	CW111C	CuNi2Si	-
-	-	-	-	CW101C	CuBe2	-
-	-	-	-	CW102C	CuBe2Pb	-
-	-	-	-	CW110C	CuNi2Be	-
-	-	-	-	CW104C	CuCo2Be	-
-	-	-	-	CW120C	CuZr	-
-	-	-	-	CW115C	CuSi2Mn	-
-	-	-	-	CW116C	CuSi3Mn1	-
-	-	-	-	CW118C	CuTeP	-
-	-	-	-	CW114C	CuSP	-
-	-	-	-	CW113C	CuPb1P	-
-	-	C2100	-	CW500L	-	-
-	-	C2200	-	CW501L	-	-
-	-	C2300	-	CW502L	-	-
-	-	C2400	-	CW503L	-	-
-	-	-	CuZn28	-	-	-
-	-	C2600	-	CW505L	-	-
-	-	C2680	-	CW506L	-	-
-	-	-	-	-	-	-
-	-	C2700	-	CW508L	-	-
-	-	C2700	-	CW507L	-	-
-	-	C2800	-	CW509L	-	-
-	-	-	-	-	-	-
-	-	C3501	-	-	-	-
-	-	-	-	CW601N	-	-
-	-	C3501	-	CW600N	-	-
-	-	-	-	-	-	-
-	-	-	-	CW610N	-	-
-	-	C3601	-	CW603N	-	-
-	-	C3771	-	CW612N	-	-
-	-	C3603	-	CW614N	-	-
-	-	-	-	CW617N	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	CW723R	-	-
-	-	-	-	CW303G	-	-
-	-	-	-	CW307G	-	-
-	-	-	-	-	-	-
-	-	C5111	-	CW450K	-	-
-	-	C5102	-	CW451K	-	-
-	-	C5191	-	CW452K	-	-
-	-	C5212	-	CW453K	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	AMPCO 18
-	-	-	-	-	-	AMPCO 21
-	-	-	-	-	-	AMPCO 22

All the trademarks or tradenames mentioned belong to their respective owners.

GROUPS / GRUPPI / GRUPPE / GROUPES	AISI	W-stoff	DIN	BS	SS
22 <30HRC NICKEL-BASE ALLOYS LEGHE DI NICKEL NICKELLEGIERUNGEN ALLIAGES DE NICKEL	N08800	1.4876	X10NiCrAlTi32-21	3075(NA15)	-
	N06075	2.4630	NiCr20Ti	HR5,203-4	-
	N07080	2.4631	NiCr20TiAl	HR401,601	-
	N06617	2.4663	-	-	-
	N06002	2.4665	NiCr22FeMo	HR6,204	-
	N06600	2.4816	-	-	-
	N06601	2.4851	NiCr23Fe	-	-
	N06625	2.4856	NiCr22Mo9Nb	-	-
	N08825	2.4858	NiCr21Mo	3072-76	-
23 >30HRC NICKEL-BASE ALLOYS LEGHE DI NICKEL NICKELLEGIERUNGEN ALLIAGES DE NICKEL	N10665	2.4617	NiMo28	-	-
	N10002	-	NiCr17Mo17Few	-	-
	N10003	-	-	-	-
	-	2.4642	-	-	-
	-	-	NiCo29Cr15MOAlTi	-	-
	N07718	2.4668	NiCr19Fe19NbMo	Hr8	-
	-	-	NiCr16FeTi	-	-
	N07725	-	-	-	-
	N07750	2.4669	NiCr 15 Fe 7 TiAl	HR505	-
	N07751	2.4694	-	-	-
24 HARDOX 400, STAVAX, RAMAX	-	-	-	-	-
	-	1.2365	-	-	-
	-	-	-	-	-
25 HARDOX 500					
	-	-	-	-	-
26 TITANIUM ALLOYS LEGHE DI TITANIO TITAN-LEGIERUNGEN ALLIAGES DE TITANE	-	3.7025	Ti 99,8	-	-
	-	3.7035	Ti 99,7a	-	-
	-	3.7055	Ti 99,6	-	-
	-	3.7065	Ti 99,5	-	-
	-	3.7115	TiAl5Sn2.5	TA14/17	-
	-	3.7164	TiAl6V4	TA10-13/TA29	-
	-	3.7175	TiAl6V6Sn2	-	-
	-	3.7185	TiAl4Mo4Sn2	-	-

AFNOR	U.N.E. / I.H.A.	JIS	UNI	EN	ISO	TRADE MARK
-	-	-	-	-	-	Incoloy 800
NC20T	-	-	-	-	-	Nimonic 75
NC20TA	-	-	-	-	-	Nimonic 80A
-	-	-	-	-	-	Inconel 617
NC22FeD	-	-	-	-	-	Hastelloy X
NC15Fe	-	-	-	-	-	Inconel 600
-	-	-	-	-	-	Inconel 601
NC22DNb	-	-	-	-	-	Inconel 625
NC21FeDU	-	-	-	-	-	Incoloy 825
-	-	-	-	-	-	Hastelloy B
NC17DWY	-	-	-	-	-	Hastelloy C
-	-	-	-	-	-	Hastelloy N
-	-	-	-	-	-	Inconel 690
NK27CADT	-	-	-	-	-	Inconel 700
Nc19FeNb	-	-	-	-	-	Inconel 718
Nc16FeTi	-	-	-	-	-	Inconel 722
-	-	-	-	-	-	Inconel 725
NC19FeNB	-	-	-	-	-	Inconel 750-X
-	-	-	-	-	-	Inconel 751
-	-	-	-	-	-	Hardox 400
-	-	-	-	-	-	Ramax
-	-	-	-	-	-	Stavax
-	-	-	-	-	-	Hardox 500
TA 1	-	-	-	-	-	-
TA 2-5	-	-	-	-	-	-
-	-	-	-	-	-	-
TA 6	-	-	-	-	-	-
-A6V	-	-	-	-	-	-
T-A5E	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

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OSAWA

CAPTION-FORMULAS / LEGENDA-FORMULE / FORMELN / FORMULE		
Vc (m/min)	speed / velocità / Geschwindigkeit / vitesse	$Vc\ (m/min) = \frac{\pi \times D \times n}{1000}$
D (mm)	diameter / diametro / Durchmesser / diamètre	
n (rev/min)	revolutions per minute / nr di giri al minuto	$n\ (rev/min) = \frac{1000 \times Vc}{\pi \times D}$
	U/min (Umdrehungen pro Minute) / tours par minute	
π	3,14	
Vf (mm/min)	feed / avanzamento / Vorschub / avance	$Vf\ (mm/min) = n \times Zn \times fz$
Zn	number of teeth / numero taglienti / Schneidenanzahl / numéro de dents	
fz	feed per tooth / avanzamento-dente / Vorschub (mm/Schneiden) / avance (mm/dent)	
fn	feed (mm/rev) / avanzamento (mm/giro) / Vorschub (mm/Umdrehungen) / avance (mm/tour)	$fn\ (mm/rev) = Zn \times fz$

NEW TYPHOON DRILLS
343TA - 318N* - 353TA - 355TA - 353HTA - 353SUH - 353ALH - 355HTA - 355SUH - 355ALH - 3584HTA

GROUP GRUPPO GRUPPE GROUPE	ISO	N/mm²	L	fn (mm/rev) - Ø 3~5	5~8	8~11	11~14	14~17	17~20	Vc (m/min)	
1 2 3 4	P	~700	3xD	0.08~0.16	0.14~0.25	0.20~0.30	0.25~0.35	0.30~0.40	0.35~0.45	90~140	75~120
			5xD	0.07~0.14	0.12~0.22	0.18~0.25	0.22~0.31	0.26~0.35	0.31~0.40		
			8xD	0,05~0,10	0,08~0,15	0,12~0,17	0,15~0,21	0,18~0,24	0,21~0,28		
3 4 5		700~1000	3xD	0.07~0.14	0.12~0.18	0.15~0.22	0.20~0.25	0.25~0.30	0.30~0.40	80~120	70~105
			5xD	0.06~0.12	0.10~0.16	0.13~0.19	0.17~0.22	0.22~0.25	0.26~0.35		
			8xD	0,04~0,08	0,07~0,11	0,09~0,13	0,12~0,15	0,15~0,18	0,18~0,25		
6		1000~1300	3xD	0.06~0.12	0.10~0.16	0.15~0.20	0.18~0.25	0.20~0.28	0.22~0.30	60~80	50~70
			5xD	0.05~0.10	0.09~0.14	0.13~0.17	0.16~0.22	0.17~0.25	0.19~0.26		
			8xD	0,04~0,07	0,06~0,10	0,09~0,12	0,11~0,15	0,12~0,18	0,13~0,19		
13 14	K		3xD	0.10~0.20	0.18~0.32	0.30~0.38	0.35~0.45	0.40~0.50	0.45~0.55	80~140	70~125
			5xD	0.09~0.17	0.16~0.28	0.26~0.34	0.31~0.40	0.35~0.44	0.40~0.48		
			8xD	0,06~0,12	0,11~0,20	0,18~0,24	0,22~0,28	0,25~031	0,28~0,34		
9 10	M		3xD	0.07~0.14	0.12~0.18	0.16~0.25	0.20~0.28	0.25~0.32	0.30~0.35	50~75	
			5xD	0.06~0.12	0.10~0.16	0.14~0.22	0.17~0.25	0.22~0.28	0.26~0.31		
			8xD	0,04~0,08	0,08~0,14	0,13~0,17	0,15~0,20	0,18~0,22	0,20~0,24		
11			3xD	0.05~0.10	0.08~0.12	0.10~0.15	0.12~0.18	0.14~0.22	0.16~0.25	30~50	
			5xD	0.05~0.09	0.07~0.11	0.09~0.13	0.10~0.16	0.12~0.19	0.14~0.22		
			8xD	0,04~0,06	0,05~0,08	0,06~0,09	0,07~0,11	0,08~0,13	0,10~0,15		
15 16	N		3xD	0.10~0.20	0.18~0.32	0.30~0.38	0.35~0.45	0.40~0.50	0.45~0.55	130~240	
			5xD	0.09~0.17	0.16~0.28	0.26~0.34	0.31~0.40	0.35~0.44	0.40~0.48		
			8xD	0,06~0,12	0,11~0,20	0,18~0,24	0,22~0,28	0,25~0,31	0,28~0,34		

*318N Vc & fn = -30%

NEW TYPHOON DRILLS - MINI
358SUH - 3512SUH

GROUP GRUPPO GRUPPE GROUPE	ISO	N/mm²	L	fn (mm/rev) - Ø 1~1.5	1.5~2	2~2.5	2.5~2.9
1 2 3 4	P	~700	Vc(m/min)	50~90	60~115	70~115	70~115
			8xD	0.040~0.065	0.061~0.087	0.080~0.110	0.100~0.130
			12xD	0.033~0.052	0.049~0.070	0.065~0.088	0.080~0.105
3 4 5		700~1000	Vc(m/min)	40~70	50~80	60~80	60~80
			8xD	0.037~0.059	0.055~0.079	0.074~0.100	0.092~0.120
			12xD	0.030~0.048	0.045~0.064	0.060~0.080	0.075~0.097
6		1000~1300	Vc(m/min)	25~45	33~52	40~52	40~52
			8xD	0.018~0.029	0.027~0.038	0.036~0.048	0.045~0.058
			12xD	0.014~0.023	0.022~0.031	0.029~0.039	0.036~0.047
13 14	K		Vc(m/min)	50~80	60~100	70~105	70~105
			8xD	0.052~0.084	0.080~0.112	0.105~0.140	0.130~0.170
			12xD	0.042~0.068	0.063~0.090	0.085~0.114	0.105~0.138
9 10	M		Vc(m/min)	30~50	40~60	40~60	40~60
			8xD	0.021~0.036	0.032~0.048	0.043~0.061	0.054~0.074
			12xD	0.017~0.030	0.026~0.039	0.035~0.050	0.043~0.059
11			Vc(m/min)	18~22	23~38	27~38	27~38
			8xD	0.018~0.029	0.027~0.038	0.036~0.048	0.045~0.058
			12xD	0.014~0.023	0.022~0.031	0.029~0.039	0.036~0.047
15 16	N		Vc(m/min)	70~120	90~140	105~140	105~140
			8xD	0.052~0.084	0.080~0.112	0.105~0.140	0.130~0.170
			12xD	0.042~0.068	0.0630.090	0.085~0.115	0.105~0.138

For 8xD and 12xD drills, reduce fn by 50% for initial 0.5xD / Per punte 8xD e 12xD, ridurre fn del 50% per profondità iniziale di 0.5xD
Für Bohrer 8xD und 12xD, fn 50% reduzieren für die erste Tiefe von 0.5xD / Forets 8xD et 12xD: réduire l'avance du 50% dans la partie initiale du trou (jusqu'à une profondeur de 0.5xD)

980SUTA 990SUTA*														
GROUP GRUPPO GRUPPE GROUPE	1 2		9		10		15 16 18 19 20		17		22		26	
Vc [m/min]	35~45		18~22		16~20		70~90		30~40		8~10		13~15	
HRC														
N/mm²	~600													
Ø mm.	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn
2	6300	0.080	3100	0.070	2600	0.070	11000	0.090	5600	0.060	1250	0.03	2080	0.06
3	4200	0.130	2100	0.080	1800	0.080	7000	0.130	3800	0.080	850	0.05	1440	0.06
4	3200	0.140	1600	0.100	1300	0.100	7100	0.180	2800	0.100	630	0.06	1040	0.08
5	2500	0.160	1250	0.150	1100	0.140	5500	0.220	2300	0.130	500	0.08	840	0.11
6	2100	0.180	1100	0.180	900	0.170	4600	0.260	1900	0.150	430	0.09	720	0.14
8	1550	0.220	800	0.240	650	0.220	3500	0.340	1400	0.200	320	0.12	520	0.18
10	1250	0.260	650	0.300	550	0.260	2800	0.400	1100	0.250	260	0.15	440	0.21
12	1100	0.320	550	0.360	450	0.330	2300	0.500	950	0.300	210	0.18	360	0.26
14	900	0.360	450	0.440	400	0.360	2100	0.550	800	0.330	193	0.22	320	0.29
16	800	0.400	400	0.480	350	0.400	1800	0.620	700	0.350	178	0.24	280	0.32
18	700	0.450	350	0.500	300	0.430	1600	0.700	620	0.400	167	0.26	240	0.34
20	620	0.470	320	0.530	260	0.460	1500	0.750	560	0.400	159	0.28	208	0.37

*fn = -10%~15%

218LFTA														
GROUP GRUPPO GRUPPE GROUPE	1 2 3		3 4		5 6		9 10		13 14		15 16 18 19 20		17	
Vc [m/min]	40~45		30~40		25~30		18~22		30~40		65~75		45~55	
HRC	~22		22~27		27~35									
N/mm²	500~800		800~900		900~1100									
Ø mm.	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn
2	6850	0.080	5600	0.060	4500	0.050	3200	0.040	5600	0.070	11150	0.080	8000	0.070
5	2750	0.200	2250	0.160	1800	0.130	1300	0.100	2250	0.180	4500	0.200	3200	0.180
8	1700	0.280	1400	0.220	1100	0.180	800	0.140	1400	0.250	2800	0.280	2000	0.250
12	1150	0.400	930	0.310	750	0.250	530	0.200	930	0.360	1850	0.400	1330	0.360
16	850	0.500	700	0.400	560	0.310	400	0.250	700	0.450	1400	0.500	1000	0.450
20	690	0.560	560	0.450	450	0.350	320	0.280	560	0.500	1120	0.560	800	0.500

238LFTA														
GROUP GRUPPO GRUPPE GROUPE	1 2 3		3 4		5 6		9 10		13 14		15 16 18 19 20		17	
Vc [m/min]	30~35		25~30		20~25		15~18		25~30		50~60		35~45	
HRC	~22		22~27		27~35									
N/mm²	500~800		800~900		900~1100									
Ø mm.	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn
2	5500	0.067	4500	0.050	3600	0.042	2560	0.033	4500	0.060	8900	0.067	6400	0.058
5	2200	0.170	1800	0.130	1450	0.110	1040	0.084	1800	0.150	3600	0.170	2560	0.150
8	1350	0.240	1120	0.180	880	0.150	640	0.120	1120	0.210	2250	0.240	1600	0.210
12	920	0.340	750	0.260	600	0.210	430	0.170	750	0.300	1480	0.340	1070	0.300
16	680	0.420	560	0.330	450	0.260	320	0.210	560	0.380	1120	0.420	800	0.380
20	550	0.470	450	0.380	360	0.300	260	0.240	450	0.420	900	0.470	640	0.420

118N - 218NVA* - 138N - 238NVA - 234NVA* - 145N - 245N - 138NTI** - 145NTI														
GROUP GRUPPO GRUPPE GROUPE	1 2		2 3 4		4 5		5 6		6		9		26	
Vc [m/min]	24~28		18~22		14~18		16~20		10~12		18~22		10~12	
HRC			~23		23~28		23~34		34~38					
N/mm²	~570		570~830		830~950		830~1110		1110~1260					
Ø mm.	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn
2	4250	0.025	3200	0.025	2400	0.015	3000	0.020	1750	0.015	3200	0.025	1750	0.020
2.5	3400	0.025	2600	0.025	1900	0.015	2400	0.020	1400	0.015	2600	0.025	1400	0.020
3	2700	0.050	2000	0.050	1500	0.025	1900	0.050	1100	0.020	2000	0.050	1100	0.025
4	2200	0.060	1650	0.060	1250	0.030	1600	0.060	900	0.020	1700	0.060	900	0.030
5	1700	0.065	1300	0.065	950	0.038	1200	0.063	700	0.025	1300	0.063	700	0.038
6	1500	0.090	1100	0.090	850	0.050	1100	0.090	600	0.030	1100	0.090	600	0.050
7	1250	0.110	950	0.110	700	0.060	900	0.110	520	0.030	950	0.110	520	0.060
8	1100	0.130	780	0.130	600	0.076	750	0.130	430	0.038	780	0.130	430	0.076
9	950	0.140	710	0.140	540	0.080	860	0.150	390	0.040	710	0.140	430	0.080
10	850	0.140	650	0.140	460	0.080	590	0.160	350	0.050	650	0.140	430	0.080
11	750	0.150	550	0.150	430	0.076	520	0.180	300	0.050	550	0.150	430	0.080
12	710	0.160	530	0.160	410	0.080	500	0.190	290	0.050	530	0.160	400	0.080
13	680	0.170	510	0.170	390	0.090	470	0.190	280	0.050	510	0.170	370	0.090
14	640	0.180	480	0.180	350	0.110	440	0.020	260	0.050	480	0.180	340	0.100
16	590	0.190	440	0.190	320	0.110	410	0.210	240	0.050	440	0.190	300	0.100
18	550	0.200	410	0.200	280	0.120	350	0.210	210	0.050	410	0.200	270	0.110
19	450	0.230	330	0.230	270	0.130	300	0.230	180	0.050	330	0.230	200	0.130
20	430	0.230	320	0.230	250	0.130	290	0.230	170	0.060	320	0.230	180	0.130
22	400	0.240	300	0.240	230	0.140	270	0.230	160	0.060	300	0.240	170	0.140
24	370	0.250	280	0.250	220	0.150	260	0.240	150	0.060	280	0.250	150	0.150
26	350	0.260	260	0.260	200	0.160	240	0.240	140	0.070	260	0.260	140	0.160
28	320	0.260	240	0.260	180	0.160	220	0.240	130	0.070	240	0.260	130	0.160
30	290	0.270	220	0.270	160	0.170	200	0.250	120	0.080	220	0.270	120	0.170
32	250	0.280	200	0.280	150	0.180	180	0.250	110	0.080	200	0.280	110	0.180
35	250	0.320	190	0.320	140	0.200	170	0.270	100	0.080	190	0.320	100	0.200
40	220	0.330	170	0.330	120	0.200	150	0.280	90	0.080	170	0.330	90	0.200
45	190	0.330	150	0.330	110	0.200	140	0.290	80	0.080	150	0.330	80	0.200
50	170	0.330	130	0.330	95	0.200	120	0.300	70	0.080	130	0.330	70	0.200

**n & fn = +30%~+15%

* DIN1897 - DIN340 - DIN1869 - DIN341 - DIN1870 : n= n x Q (page 231)
DIN1897 - DIN340 - DIN1869 - DIN341 - DIN1870 : fn= fn x R (page 231)

LS DIN338*								
GROUP GRUPPO GRUPPE GROUPE	3 4 5 6		5 6		13 14		13 14	
Vc [m/min]	15~18		12~14		24~28		10~12	
HRC	~30		20~40					
N/mm²	700~1000		800~1200		~250 (HB)		~300 (HB)	
Ø mm.	n	fn	n	fn	n	fn	n	fn
2	2650	0.030	2100	0.025	4200	0.060	1700	0.050
2.5	2100	0.040	1700	0.030	3300	0.080	1300	0.060
3	1700	0.050	1300	0.040	2650	0.100	1050	0.080
4	1300	0.080	1050	0.050	2100	0.130	850	0.100
5	1050	0.060	850	0.050	1700	0.130	660	0.100
6	850	0.080	660	0.060	1300	0.180	530	0.130
8	650	0.100	530	0.080	1050	0.200	420	0.170
10	530	0.130	420	0.100	850	0.250	330	0.210
13	420	0.130	330	0.100	650	0.250	260	0.210
16	330	0.150	260	0.130	530	0.300	210	0.250
20	260	0.200	210	0.150	420	0.400	170	0.300
25	210	0.250	170	0.200	330	0.500	130	0.500
30	170	0.250	130	0.200	260	0.500	110	0.500

* DIN340 - DIN1869 - DIN341 - DIN1870 : n= n x Q (page 231)
DIN340 - DIN1869 - DIN341 - DIN1870 : fn= fn x R (page 231)

GROUP GRUPPO GRUPPE GROUPE	13 14		15 16	
Vc [m/min]	19~20		18~55	
HRC			~23	
N/mm²			570~830	
Ø mm.	n	fn	n	fn
2	2800	0.025	8000	0.038
2.5	2300	0.025	6400	0.038
3	2000	0.050	5000	0.063
4	1700	0.060	4100	0.070
5	1300	0.063	3200	0.076
6	1100	0.090	2800	0.110
7	950	0.110	2400	0.150
8	800	0.130	2000	0.180
9	710	0.140	1800	0.160
10	650	0.140	1600	0.190
11	550	0.150	1400	0.200
12	530	0.160	1350	0.210
13	510	0.170	1260	0.230
14	480	0.160	1200	0.240
16	440	0.190	1100	0.250
18	410	0.200	1000	0.260
19	330	0.230	820	0.300
20	320	0.230	800	0.310
22	300	0.240	750	0.320
24	280	0.250	700	0.330
26	260	0.260	640	0.340
28	240	0.260	590	0.360
30	220	0.270	540	0.370
32	200	0.280	500	0.380
35	190	0.310	460	0.440
40	170	0.320	410	0.450
45	150	0.330	360	0.460
50	130	0.330	300	0.460

VARIAZIONE VELOCITÀ ED AVANZAMENTO IN BASE ALLA LUNGHEZZA DELLA PUNTA ED ALLA PROFONDITÀ DEL FORO
CUTTING SPEED AND FEED ADJUSTMENT ACCORDING TO THE DRILL LENGTH AND HOLE DEPTH
SCHNEIDGECHWINDIGKEIT UND VORSCHUBSCHWANKUNG GEMÄSS DER BOHRERLÄNGE UND BOHRUNGSTIEFE
VARIATION DE LA VITESSE DE COUPE ET DE L'AVANCE SELON LA LONGUEUR DU FORÊT ET LA PROFONDEUR DU TROU

	DIN1897	DIN338	DIN340	DIN1869			DIN345	DIN341	DIN1870	
				1	2	3			1	2
P	4xD	6~8xD	8~12xD	14~24xD	18~30xD	22~36xD	5~8xD	7~10xD	8~16xD	10~20xD
Q	1.25	1.00	0.80	0.70	0.60	0.50	1.00	0.80	0.70	0.60
R	1.20	1.00	0.90	0.80	0.70	0.60	1.00	0.90	0.80	0.70

138HB

GROUP GRUPPO GRUPPE GROUPE	18	
Vc [m/min]	50~60	
HRC		
N/mm²		
Ø mm.	n	fn
2	8800	0.08
3	5900	0.10
4	4400	0.12
5	3500	0.14
6	2900	0.16
7	2500	0.18
8	2200	0.20
9	2000	0.22
10	1800	0.25
11	1600	0.27
12	1500	0.28
13	1300	0.32

138WB

GROUP GRUPPO GRUPPE GROUPE	15		16	
Vc [m/min]	50~60		30~40	
HRC				
N/mm²				
Ø mm.	n	fn	n	fn
2	8000	0.08	5600	0.05
3	5300	0.10	3700	0.07
4	4000	0.12	2800	0.08
5	3200	0.14	2250	0.09
6	2700	0.16	1900	0.10
7	2300	0.18	1600	0.11
8	2000	0.20	1400	0.12
9	1800	0.22	1250	0.14
10	1600	0.25	1100	0.16
11	1500	0.28	1000	0.18
12	1350	0.32	950	0.20
13	1250	0.35	800	0.25

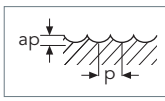
1386STI - 2386STI

GROUP GRUPPO GRUPPE GROUPE	1 2		2 3 4		5 6		9 10		16		26	
Vc [m/min]	40~45		38~42		22~26		20~24		90~100		22~27	
HRC			~23		23~34							
N/mm²	~570		570~830		830~1110							
Ø mm.	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn
1	14000	0.020	12500	0.020	7700	0.020	7000	0.020	30000	0.020	8100	0.020
2	7000	0.060	6100	0.060	3900	0.060	3500	0.060	15000	0.060	4100	0.060
3	4700	0.100	4100	0.080	2500	0.080	2400	0.080	9900	0.100	2700	0.080
4	3500	0.110	3100	0.110	2000	0.100	1800	0.100	7500	0.110	2000	0.090
5	2800	0.120	2450	0.110	1600	0.100	1400	0.100	6000	0.120	1600	0.100
6	2400	0.140	2100	0.130	1300	0.120	1200	0.120	5000	0.140	1350	0.120
7	2000	0.160	1750	0.150	1100	0.140	1000	0.140	4300	0.160	1150	0.140
8	1700	0.180	1550	0.180	950	0.150	880	0.150	3700	0.180	1000	0.150
9	1500	0.200	1350	0.220	850	0.180	780	0.180	3300	0.200	900	0.170
10	1400	0.210	1250	0.220	770	0.180	700	0.180	3000	0.230	800	0.180
11	1250	0.220	1100	0.220	700	0.180	650	0.180	2700	0.230	730	0.180
12	1150	0.230	1000	0.220	650	0.200	690	0.200	2500	0.230	670	0.200
13	1000	0.230	950	0.220	650	0.200	550	0.200	2300	0.230	620	0.200

MEXCSB2 - MEXCLSB2 - MEX253**						
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6		7	
Vc [m/min]	50~250		40~200 (HSC 80~500)		20~70 (HSC 80~200)	
HRC	~30		30~40		40~65	
N/mm²	~1000		1000~1250		1250~	
Ø mm.	n	Vf	n	Vf	n	Vf
1	15800	250	12750	200	5800	90
1 HSC			**30000**	**1300**	**25000**	**800**
1.5	15800	350	12150	270	5350	120
1.5 HSC			**23000**	**1400**	**23000**	**850**
2	14400	750	10700	490	4850	110
2 HSC			**21000**	**1500**	**21000**	**950**
2.5	14400	750	10700	490	4700	150
2.5 HSC			**21000**	**1800**	**19000**	**980**
3	13100	680	10000	460	4550	150
3 HSC			**21000**	**2000**	**17000**	**1050**
4	10500	740	8400	530	4200	180
4 HSC			**21000**	**2950**	**13700**	**1150**
5	9150	820	7300	580	3700	180
5 HSC			**21000**	**3600**	**12000**	**1200**
6	8500	1050	6900	830	3200	190
6 HSC			**21000**	**4000**	**10500**	**1250**
8	7200	1300	5800	1050	2500	220
8 HSC			**16700**	**4000**	**7900**	**1250**
10	6400	1550	5100	1050	2050	230
10 HSC			**14000**	**3900**	**6300**	**1200**
12	5900	1750	4650	1100	1750	250
12 HSC			**12200**	**3900**	**5300**	**1150**
16	4800	1700	3800	1050	1350	250
16 HSC			**9600**	**3500**	**3800**	**1000**
20	4150	1650	3300	1050	1100	250
20 HSC			**8000**	**3200**	**2950**	**950**
C ap x p	0.2Dx0.3mm*		0.2Dx0.3mm*		0.2Dx0.3mm*	
HSC **C ap x p**			0.05Dx0.3mm*		0.05x0.03mm*	

HSC = high speed cutting / alta velocità / hoch Geschwindigkeit / grande vitesse
*~Ø6 ap=0.2mm
**MEX253: n & Vf = -20%

MEXMB2				
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8	
Vc [m/min]	60~110		60~110	
HRC	30~45		45~55	
N/mm²	1000~1500		1500~	
Ø mm.	n	Vf	n	Vf
0.6	30000	510	30000	360
0.8	27000	560	27000	330
1	25000	560	25000	340
1.2	24000	570	24000	350
1.5	23000	600	23000	370
Ø<1 **C ap x p**	0.15Dx0.05D		0.1Dx0.05D	
Ø≥1 **C ap x p**	0.15Dx0.075D		0.15Dx0.05D	



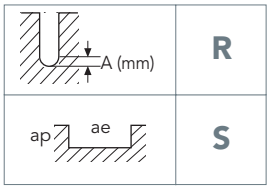
C

OSAWA

MEXCRB2									
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14			6 7			8		
Vc [m/min]	40~140			30~90			20~65		
HRC	~30			30~45			45~55		
N/mm²	~1000			1000~1500			1500~		
Ø mm.	n	Vf	A	n	Vf	A	n	Vf	A
0.4	31000~40000	180~490	0.018~0.036	22500~28000	85~270	0.018~0.036	14500~18000	85~180	0.004~0.007
0.5	31000~40000	180~490	0.023~0.045	22500~28000	85~270	0.023~0.045	14500~18000	85~180	0.005~0.009
0.6	31000~40000	230~630	0.027~0.054	22500~28000	110~350	0.027~0.054	14500~18000	110~230	0.005~0.011
0.8	31000~40000	230~630	0.036~0.072	22500~28000	110~350	0.036~0.072	14500~18000	110~230	0.007~0.014
1	29000~36000	250~700	0.045~0.090	20000~26000	130~400	0.045~0.090	13000~16500	130~250	0.009~0.018
1.2	24000~31000	250~780	0.055~0.100	17000~22000	130~400	0.055~0.100	11000~13700	130~250	0.010~0.022
1.4	21000~26000	250~780	0.062~0.125	15000~18000	130~400	0.062~0.125	9500~12000	130~250	0.012~0.025
1.5	19000~24000	250~780	0.070~0.135	13500~17500	130~400	0.070~0.135	8700~11000	130~250	0.014~0.028
1.6	18000~24000	250~780	0.075~0.145	13000~16500	130~400	0.075~0.145	8300~10500	130~250	0.015~0.030
1.8	17000~22000	250~780	0.080~0.160	12000~15000	130~400	0.080~0.160	7500~9500	130~250	0.016~0.032
2	15500~19000	250~780	0.090~0.180	11000~13500	130~400	0.090~0.180	7000~8600	130~250	0.018~0.035
3	10000~13000	250~780	0.135~0.270	7000~9000	130~400	0.135~0.270	4500~5700	130~250	0.028~0.055
4	8500~11000	250~780	0.180~0.360	5800~7800	130~400	0.180~0.360	4000~5000	130~250	0.035~0.070
5	6800~8800	250~780	0.225~0.450	4600~6200	130~400	0.225~0.450	3100~4000	130~250	0.045~0.090
6	5700~7300	250~780	0.270~0.540	4000~5200	130~400	0.270~0.540	2600~3300	130~250	0.053~0.105
R ap x ae	AxD			AxD			AxD		

MEXCS2										
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		9 10		8		8	
Vc [m/min]	60~90		40~55		30~45		25~35		18~20	
HRC	~30		30~45				45~55		55~65	
N/mm²	~1000		1000~1500				1500~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	9300	190	6100	120	5100	90	4050	35	2800	35
3	7200	210	4500	140	3700	120	2700	40	1900	40
4	6100	300	3700	180	3100	150	2350	40	1500	40
5	5100	320	3050	190	2550	160	1900	50	1250	40
6	4500	350	2700	220	2300	180	1600	55	1100	40
8	3400	380	2050	200	1700	180	1350	75	850	40
10	2600	330	1600	160	1350	160	1100	60	680	35
12	2200	280	1350	130	1100	130	950	55	550	35
16	1800	220	1100	110	850	110	750	40	450	20
20	1400	170	850	80	700	80	550	30	320	20
25	1100	130	680	70	550	60	450	20	250	15
S ap x ae	0.5D*xD		0.5D*xD		0.5D*xD		0.05DxD		0.05DxD	

*~Ø3 ap=0.2D
↓ Z axis : Vf = -50%

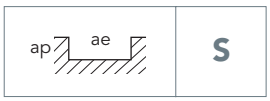


MEXM2				
GROUP GRUPPO GRUPPE GROUPE	6 7		8	
Vc [m/min]	35~55		28~42	
HRC	30~45		45~55	
N/mm²	1000~1500		1500~	
Ø mm.	n	Vf	n	Vf
0.4	30000	90	23000	50
0.8	24000	150	18000	65
1	20000	160	15000	75
1.2	16000	160	12000	75
1.5	12000	150	9000	70
S ap x ae	0.25D*xD		0.05D**xD	

*~Ø1 ap=0.15D
**~Ø1 ap=0.02D

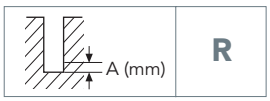
MEXCL2							
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		
Vc [m/min]	45~65		35~55		22~32		
HRC	~30		30~45		45~55		
N/mm²	~1000		1000~1500		1500~		
Ø mm.	n	Vf	n	Vf	n	Vf	
2	7600	70	6100	60	3800	30	
3	5300	85	4300	70	2650	35	
4	4300	100	3400	90	2150	40	
5	3700	125	2900	100	1900	45	
6	3200	150	2500	125	1650	60	
8	2400	160	1900	125	1300	60	
10	2050	160	1650	125	1000	60	
12	1650	125	1400	120	850	45	
16	1400	120	1100	90	670	40	
20	1000	90	850	60	500	30	
S ap x ae	0.3D*xD		0.3D*xD		0.05DxD		

*~Ø3 ap=0.4mm



OSAWA

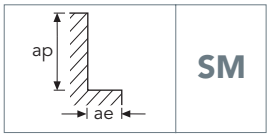
MEXCR2									
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14			6 7			8		
Vc [m/min]	40~90			30~65			20~50		
HRC	~30			30~45			45~55		
N/mm²	~1000			1000~1500			1500~		
Ø mm.	n	Vf	A	n	Vf	A	n	Vf	A
0.4	31000~40000	200~440	0.007~0.018	22500~28000	85~340	0.007~0.018	14300~17000	30~90	0.004~0.008
0.5	31000~40000	200~440	0.009~0.022	22500~28000	85~340	0.009~0.022	14300~17000	30~90	0.004~0.009
0.6	31000~40000	250~570	0.011~0.026	22500~28000	110~430	0.011~0.026	14300~17000	40~110	0.005~0.011
0.7	31000~40000	250~570	0.012~0.031	22500~28000	110~430	0.012~0.031	14300~17000	40~110	0.006~0.013
0.8	27000~35000	280~630	0.014~0.035	19500~24500	120~480	0.014~0.035	12500~14800	45~125	0.007~0.015
0.9	25000~31500	280~720	0.030~0.060	17500~22500	160~540	0.030~0.060	11000~12500	55~130	0.008~0.016
1	22500~28000	280~710	0.045~0.090	15700~20000	190~600	0.045~0.090	10000~12500	65~130	0.009~0.018
1.2	18500~23500	280~900	0.055~0.100	13000~16500	190~600	0.055~0.100	8300~10500	65~130	0.010~0.022
1.4	16000~20000	280~900	0.062~0.125	11500~14000	190~600	0.062~0.125	7200~9000	65~130	0.012~0.025
1.5	14500~18500	280~900	0.070~0.135	10500~13500	190~600	0.070~0.135	6700~8200	65~130	0.014~0.028
1.6	14000~18000	280~900	0.075~0.145	10200~12800	190~600	0.075~0.145	6400~8000	65~130	0.015~0.030
1.8	13000~16500	280~900	0.080~0.160	9200~11500	190~600	0.080~0.160	5700~7200	65~130	0.016~0.032
2	12000~14500	280~900	0.090~0.180	8300~10500	190~600	0.090~0.180	5300~6600	65~130	0.018~0.035
2.5	9500~12000	280~900	0.112~0.235	6700~8500	190~600	0.112~0.235	4300~5300	65~130	0.022~0.045
3	8000~10000	280~900	0.135~0.270	5500~7000	190~600	0.135~0.270	3500~4400	65~130	0.028~0.055
4	6000~7500	280~900	0.180~0.360	4100~5300	190~600	0.180~0.360	2600~3300	65~130	0.036~0.072
5	4800~6000	280~900	0.225~0.450	3300~4200	190~600	0.225~0.450	2100~2600	65~130	0.045~0.090
6	4000~5000	280~900	0.270~0.540	2800~3500	190~600	0.270~0.540	1800~2600	65~130	0.054~0.108
R ap x ae	AxD			AxD			AxD		



MEXCS4										
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		9 10		8		8	
Vc [m/min]	75~105		45~65 (HSC140~180)		40~55		30~45 (HSC75~95)		18~20	
HRC	~30		30~45				45~55		55~65	
N/mm²	~1000		1000~1500				1500~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	11550	280	7600	170	6300	140	5050	50	2800	50
2 HSC			**22300**	**450**			**12000**	**250**		
3	8900	320	5550	200	4600	170	3350	60	1900	60
3 HSC			**16000**	**640**			**8500**	**350**		
4	7600	570	4600	350	3900	280	2950	60	1500	60
4 HSC			**12500**	**750**			**6800**	**410**		
5	6300	600	3800	360	3150	300	2300	70	1250	60
5 HSC			**11000**	**880**			**5800**	**460**		
6	5600	660	3350	410	2850	330	2000	80	1100	60
6 HSC			**9550**	**960**			**5100**	**510**		
8	4200	710	2500	380	2100	350	1700	110	850	60
8 HSC			**7200**	**950**			**3800**	**500**		
10	3300	610	2000	300	1700	300	1350	90	700	50
10 HSC			**5800**	**970**			**3000**	**510**		
12	2750	520	1700	250	1350	240	1150	80	550	50
12 HSC			**4800**	**950**			**2500**	**500**		
16	2200	410	1350	200	1100	200	900	60	450	30
16 HSC			**3600**	**880**			**1900**	**470**		
20	1700	320	1050	160	850	150	700	40	320	30
20 HSC			**2900**	**820**			**1500**	**430**		
25	1350	250	850	130	680	120	550	30	250	20
25 HSC			**2300**	**660**			**1200**	**350**		
SM ap x ae	Dx0.05D		Dx0.05D		Dx0.05D		Dx0.05D		Dx0.05D	

HSC = high speed cutting / alta velocità / hoch Geschwindigkeit / grande vitesse

MEXCL4								
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		8	
Vc [m/min]	55~75		30~45		20~28		16~22	
HRC	~30		30~45		45~55		55~65	
N/mm²	~1000		1000~1500		1500~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
2	8850	200	5050	80	3150	45	2700	25
3	6200	230	3600	100	2200	55	1900	30
4	5000	280	2850	115	1800	60	1500	35
5	4300	360	2400	140	1600	70	1250	40
6	3700	430	2100	180	1400	90	1150	50
8	2800	460	1600	180	1050	90	850	50
10	2400	460	1350	180	850	90	680	50
12	1950	360	1150	160	700	70	550	40
16	1600	320	900	125	550	60	450	35
20	1200	230	700	90	420	45	350	25
SM ap x ae	2.5Dx0.05D		2.5Dx0.05D		2Dx0.02D		2Dx0.02D	



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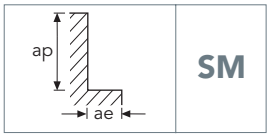
MEXCSHM								
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		8	
Vc [m/min]	100~120		70~85 (HSC320~360)		30~35 (HSC160~180)		20~25 (HSC80~90)	
HRC	~30		30~50		50~60		60~65	
N/mm²	~1000		1000~1750		1750~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	5600	2000	3900	1370	1600	210	1100	130
6 HSC			**16800**	**6100**	**8400**	**3050**	**4200**	**1470**
8	4200	2000	2900	1370	1200	210	850	130
8 HSC			**12600**	**6100**	**6300**	**3050**	**3200**	**1470**
10	3400	2000	2300	1370	1000	210	700	130
10 HSC			**10000**	**6000**	**5000**	**3050**	**2500**	**1470**
12	2800	1680	2000	1160	850	180	550	110
12 HSC			**8400**	**5000**	**4200**	**2500**	**2100**	**1260**
16	2100	1260	1500	880	650	130	420	70
16 HSC			**6300**	**3800**	**3200**	**1900**	**1600**	**950**
20	1700	1010	1200	690	500	110	320	60
20 HSC			**5000**	**3000**	**2500**	**1480**	**1300**	**760**
25	1500	900	1100	600	420	90	260	50
25 HSC			**4500**	**2700**	**2200**	**1300**	**1100**	**670**
SM ap x ae	1.5Dx0.1D		1.5Dx0.05D		Dx0.05D		Dx0.2mm	

HSC = high speed cutting / alta velocità / hoch Geschwindigkeit / grande vitesse

MEXCLHM								
GROUP GRUPPO GRUPPE GROUPE	5 6		7 8		8		8	
Vc [m/min]	40~45		30~35		25~30		18~22	
HRC	~40		40~50		50~60		60~65	
N/mm²	~1250		1250~					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	2200	470	1700	350	1400	250	1100	200
8	1700	450	1250	330	1050	240	850	180
10	1300	440	1000	300	850	230	700	160
12	1100	400	850	270	700	210	550	150
16	850	330	650	230	550	170	420	130
20	700	280	500	200	420	150	320	120
25	550	240	400	170	350	130	270	95
SM ap x ae	3Dx0.01D		3Dx0.01D		3Dx0.005D		3Dx0.005D	



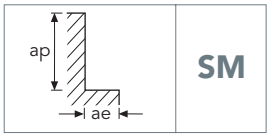
SM

MEX610R								
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		8	
Vc [m/min]	115~130		70~80 (HSC 300~320)		40~50 (HSC 150~170)		22~26 (HSC 75~85)	
HRC	~30		30~45		45~55		55~65	
N/mm²	~1000		1000~1500		1500~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	6700	790	4100	490	2400	95	1350	70
6 HSC			**16800**	**6100**	**8400**	**3100**	**4200**	**1450**
8	5100	850	3000	450	2000	130	1000	70
8 HSC			**12600**	**6100**	**6300**	**3100**	**3100**	**1450**
10	4000	730	2400	360	1650	110	820	60
10 HSC			**10000**	**6000**	**5050**	**3100**	**2500**	**1450**
12	3300	630	2000	300	1400	95	670	60
12 HSC			**8400**	**5050**	**4200**	**2500**	**2100**	**1250**
SM ap x ae	Dx0.05D		Dx0.05D		Dx0.05D		Dx0.05D	
HSC **SM ap x ae**			Dx0.03D		Dx0.03D		Dx0.3mm	

HSC = high speed cutting / alta velocità / hoch Geschwindigkeit / grande vitesse

MEX611R						
GROUP GRUPPO GRUPPE GROUPE	6 7		8		8	
Vc [m/min]	115~135 (HSC300~320)		70~80 (HSC150~170)		40~50 (HSC75~85)	
HRC	~50		50~60		60~65	
N/mm²						
Ø mm.	n	Vf	n	Vf	n	Vf
6	3900	1400	1600	210	1100	130
6 HSC	**16800**	**6100**	**8400**	**3100**	**4200**	**1450**
8	2900	1400	1200	210	850	130
8 HSC	**12600**	**6100**	**6300**	**3100**	**3100**	**1450**
10	2300	1400	1000	210	700	130
10 HSC	**10000**	**6000**	**5050**	**3100**	**2500**	**1450**
12	2000	1200	850	200	600	120
12 HSC	**8400**	**5050**	**4200**	**2500**	**2100**	**1250**
16	1500	900	650	150	420	70
16 HSC	**6300**	**3800**	**3150**	**1900**	**1600**	**950**
20	1200	700	500	120	320	60
20 HSC	**5050**	**3050**	**2500**	**1500**	**1300**	**760**
SM ap x ae	1.5Dx0.05D		Dx0.05D		Dx0.2mm	
HSC **SM ap x ae**	1.5Dx0.03D		Dx0.03D		Dx0.2mm	

HSC = high speed cutting / alta velocità / hoch Geschwindigkeit / grande vitesse



SM

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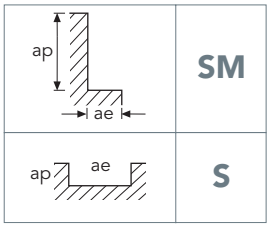
MEX410R								
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		8	
Vc [m/min]	90~130		55~85 (HSC180~240)		40~55 (HSC100~125)		20~25 (HSC70~90)	
HRC	~30		30~45		45~55		55~65	
N/mm²	~1000		1000~1500		1500~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
2	13900	340	9100	210	6100	60	3000	50
2 HSC			**29000**	**590**	**15500**	**310**	**11000**	**220**
2.5	12300	360	7900	220	5050	65	2600	60
2.5 HSC			**25000**	**700**	**13500**	**380**	**9500**	**270**
3	10700	390	6700	240	4050	70	2300	70
3 HSC			**21000**	**830**	**11000**	**440**	**7500**	**310**
3.5	9900	540	6100	330	3800	70	2050	70
3.5 HSC			**18500**	**900**	**10000**	**480**	**7000**	**340**
4	9100	690	5550	420	3550	70	1800	70
4 HSC			**16500**	**980**	**9000**	**530**	**6500**	**370**
5	7600	720	4550	430	2800	85	1500	70
5 HSC			**14500**	**1150**	**7500**	**600**	**5300**	**420**
6	6700	790	4050	490	2400	95	1350	70
6 HSC			**12500**	**1250**	**6500**	**650**	**4600**	**460**
8	5100	850	3050	460	2050	130	1050	70
8 HSC			**9500**	**1250**	**5000**	**650**	**3500**	**460**
10	3900	730	2400	360	1650	110	840	60
10 HSC			**7500**	**1250**	**3900**	**650**	**2700**	**460**
12	3300	630	2050	300	1400	95	680	60
12 HSC			**6200**	**1250**	**3300**	**650**	**2300**	**460**
16	2650	490	1650	240	1100	70	530	65
16 HSC			**4700**	**1150**	**2500**	**600**	**1750**	**420**
SM ap x ae	Dx0.05D		Dx0.05D		Dx0.05D		Dx0.05D	
HSC **SM ap x ae**	Dx0.02D		Dx0.02D		Dx0.02D		Dx0.02D	

HSC = high speed cutting / alta velocità / hoch Geschwindigkeit / grande vitesse

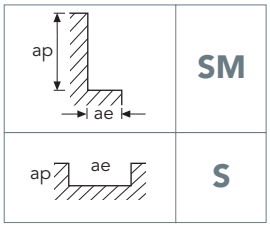
MEXCL2R								
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		8	
Vc [m/min]	60~80		40~55		25~35		18~22	
HRC	~30		30~45		45~55		55~65	
N/mm²	~1000		1000~1500		1500~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
3	6600	140	4300	70	2650	35	1900	20
4	5350	170	3400	85	2150	40	1500	20
5	4600	210	2900	100	1900	50	1250	25
6	3950	250	2500	125	1650	60	1150	35
8	3000	270	1900	125	1250	60	850	35
10	2500	270	1650	125	1000	60	670	35
12	2100	210	1400	115	850	50	550	25
16	1750	190	1100	90	670	40	450	20
20	1300	140	850	60	500	30	350	15
S ap x ae	0.3DxD		0.3DxD		0.005DxD		0.005DxD	

↓ Z axis : Vf = -50%



MEXCL4R								
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		8	
Vc [m/min]	60~20		40~55		25~35		18~22	
HRC	~30		30~45		45~55		55~65	
N/mm²	~1000		1000~1500		1500~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
3	6600	170	4300	130	2650	65	1900	30
4	5350	210	3400	180	2150	70	1500	35
5	4600	220	2900	180	1900	85	1250	40
6	3950	220	2500	180	1650	85	1150	50
8	3000	230	1900	180	1250	85	850	50
10	2500	230	1650	180	1000	85	670	50
12	2100	180	1400	160	850	70	550	40
16	1750	160	1100	125	670	60	450	35
20	1300	120	850	90	500	45	350	25
SM ap x ae	2.5Dx0.05D		2.5Dx0.05D		2Dx0.05D		Dx0.05D	

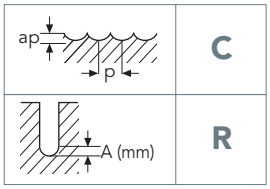
MEXCSFR										
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6		7		8		8	
Vc [m/min]	280~530		220~260		150~170		60~70		40~50	
HRC	~30		30~38		38~45		45~55		55~65	
N/mm²	~1000		1000~1200		1200~1400		1400~			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
6	15600	2320	12400	840	8400	570	3400	260	2400	190
8	11600	2320	9200	840	6300	570	2400	240	1800	180
10	9200	2320	7600	840	5100	570	2000	290	1300	190
12	8000	2400	6000	800	4200	570	1700	260	1200	190
14	6800	2400	5200	840	3600	570	1400	200	900	130
16	6000	2400	4800	760	3300	510	1200	160	800	110
18	5200	2320	4400	720	2700	420	1100	150	700	100
20	4800	2160	3600	560	2400	360	1000	150	650	100
25	4300	2150	3200	620	2160	410	900	160	600	100
S ap x ae	0.5DxD		0.5DxD		0.5DxD		0.05DxD		0.05DxD	
SM ap x ae	1.5Dx0.30D		1.5Dx0.3D		1.5Dx0.3D		Dx0.05D		Dx0.05D	



OSAWA

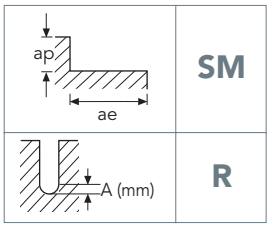
UHCSB2 - UH250												
GROUP GRUPPO GRUPPE GROUPE	5 6 7		7 8									
Vc [m/min]	30~260		30~250		30~230		25~200		20~180		20~160	
HRC	30~40		40~50		50~55		55~60		60~65		65~70	
N/mm²	1000~1250		1250~									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
0.2	50000	1200	50000	1000	45000	950	40000	770	35000	660	32000	550
0.3	50000	1500	50000	1350	45000	1200	40000	950	35000	840	32000	700
0.4	50000	1900	50000	1700	45000	1500	40000	1200	35000	1000	32000	890
0.5	50000	2400	50000	2100	45000	1900	40000	1500	35000	1300	32000	1100
0.6	50000	2900	50000	2500	45000	2200	40000	1800	35000	1600	32000	1400
0.8	50000	3900	50000	3300	45000	3000	40000	2400	35000	2100	32000	1800
1	50000	4800	50000	4200	45000	3800	40000	3000	34000	2600	32000	2300
1.2	50000	5100	48000	4300	43000	3800	38000	3000	33000	2700	30500	2300
1.5	50000	5400	48000	4500	43000	4000	37000	3100	32000	2700	30000	2300
2	48000	5700	46000	4800	40000	4000	35000	3100	21000	2800	28500	2300
3	33000	6000	32000	5300	27000	4000	24000	3100	16000	2800	19000	2300
4	24900	6000	24000	5300	20000	4000	18000	3100	14300	2800	14500	2300
5	19100	5800	18000	4900	14700	3700	13500	3000	11500	2500	10500	2100
6	14000	4800	14000	4100	11500	3100	10600	2500	9500	2100	8500	1700
8	11500	4200	10800	3500	9200	2700	8000	2100	7200	1800	6400	1500
10	9500	3700	8600	3100	7500	2400	6400	1900	5700	1600	5100	1350
12	7000	2900	6700	2500	6100	1900	5300	1500	4800	1200	4200	1000
C ap x p	0.05Dx0.02D		0.05Dx0.02D		0.05Dx0.02D		0.05Dx0.02D		0.05Dx0.02D		0.05Dx0.02D	

UHCRB2									
GROUP GRUPPO GRUPPE GROUPE	6 7			8			8		
Vc [m/min]	30~80			30~60			30~60		
HRC	30~45			45~55			55~65		
N/mm²	1000~1500								
Ø mm.	n	Vf	A	n	Vf	A	n	Vf	A
0.2	50000	300~350	0.005~0.015	50000	260~310	0.005~0.012	50000~	220~260	0.005~0.012
0.3	48000~50000	480~520	0.010~0.018	48000~50000	440~460	0.008~0.015	46000~49000	390~420	0.006~0.013
0.4	48000~50000	720~790	0.012~0.030	48000~50000	450~550	0.010~0.025	46000~49000	400~460	0.010~0.025
0.5	35000~48000	600~870	0.008~0.028	32000~37000	490~540	0.005~0.025	33000~37000	440~480	0.005~0.020
0.6	30000~41000	590~850	0.008~0.035	26000~31000	490~540	0.005~0.028	27000~30000	440~480	0.005~0.025
0.8	22000~31000	640~890	0.016~0.065	20000~23500	490~550	0.012~0.050	20000~22500	440~500	0.010~0.045
1	19000~25000	600~850	0.010~0.080	16000~19000	480~540	0.008~0.065	16000~18000	440~500	0.006~0.055
1.2	15000~20000	590~780	0.024~0.035	13000~15000	480~540	0.020~0.025	12000~14500	420~480	0.018~0.025
1.5	12000~15000	580~760	0.030~0.050	10500~12000	480~540	0.025~0.040	10000~12000	420~480	0.020~0.035
2	9000~12000	590~800	0.025~0.160	8000~9000	480~530	0.020~0.130	8000~9000	440~480	0.020~0.120
3	6000~8500	730~1000	0.065~0.240	5300~6000	590~650	0.050~0.190	5300~6000	550~620	0.050~0.120
4	4500~6300	680~990	0.080~0.320	4000~4500	550~620	0.060~0.250	3900~4500	530~570	0.060~0.230
R ap x ae	AxD			AxD			AxD		



UHF430										
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8	
Vc [m/min]	190~260		150~210		100~170		70~120		60~90	
HRC	30~40		40~50		50~55		55~60		60~65	
N/mm²	1000~1250		1250~							
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	28700	14850	21800	9700	14850	7750	10900	4400	8600	2400
3	21800	15850	16850	9900	12400	7900	9400	4550	6800	2450
4	16830	17300	12900	11900	10900	9100	7900	5450	5550	2850
6	13350	18300	10400	13650	8900	10900	6350	6350	4450	3550
8	9900	18300	7900	13850	6750	10900	4750	6600	3350	4050
10	7900	18300	6350	13850	5350	10900	3750	6750	2673	3750
12	6500	18300	5250	13850	4450	10900	3150	6900	2250	3550
SM ap x ae	0.1Rx0.3D		0.1Rx0.3D		0.1Rx0.3D		0.1Rx0.3D		0.1Rx0.3D	

GROUP GRUPPO GRUPPE GROUPE	17		
Vc [m/min]	30~160		
HRC			
N/mm²			
Ø mm.	n	Vf	A
0.2	50000	450~530	0.010~0.020
0.3	50000	690~790	0.005~0.025
0.4	50000	1000~1150	0.020~0.050
0.5	48000~50000	1100~1400	0.010~0.040
0.6	43000~49000	1100~1700	0.010~0.050
0.8	32000~45000	1100~2250	0.025~0.095
1	25000~45000	1100~2200	0.010~0.120
1.2	30000~40000	1480~1950	0.035~0.050
1.5	18000~30000	1100~1900	0.045~0.070
2	13000~25000	1100~2100	0.035~0.240
3	12000~18000	1900~2700	0.095~0.360
4	7000~13000	1250~2500	0.120~0.480
R ap x ae	AxD		

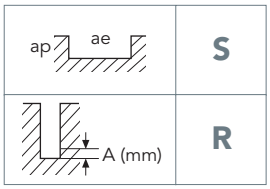


OSAWA

UHCS2												
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8		8	
Vc [m/min]	40~250		40~200		30~130		20~100		20~75		18~70	
HRC	30~40		40~50		50~55		55~60		60~65		65~70	
N/mm²	1000~1250		1250~									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
0.2	50000	130	50000	120	42000	90	35000	60	35000	45	28000	30
0.3	50000	190	50000	140	42000	110	35000	70	27000	50	22000	35
0.4	50000	240	50000	180	42000	140	35000	90	27000	55	22000	40
0.5	50000	370	50000	280	42000	220	35000	140	27000	96	22000	60
0.6	50000	470	50000	360	42000	280	32000	160	27000	110	22000	75
0.8	50000	600	45000	440	32000	290	27000	180	21000	110	17000	80
0.9	50000	660	42000	520	30000	330	24000	200	19000	125	15000	85
1	50000	750	40000	570	27000	360	22000	210	18000	135	13500	85
2	35000	850	28000	680	19000	420	16000	260	12000	160	10400	110
3	23000	850	19000	680	13000	420	10600	260	8000	160	7000	110
4	18000	880	14500	700	9500	440	8000	270	6000	170	5000	120
5	15900	1000	12800	810	8300	500	6400	280	4800	180	4500	130
6	13300	950	10600	770	6900	480	5300	280	4000	180	3700	130
8	10000	930	8000	720	5200	450	4000	250	3000	165	2800	120
10	8000	850	6400	680	4200	420	3200	240	2400	155	2200	110
12	6700	850	5300	680	3500	420	2700	240	2000	155	1900	110
S ap x ae	0.05DxD		0.05DxD		0.05DxD		0.05DxD		0.05DxD		0.02DxD	

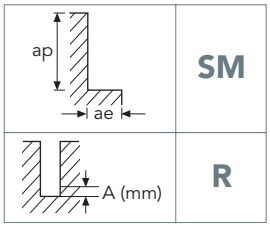
↓ Z axis : Vf = -50%

UHCR2									
GROUP GRUPPO GRUPPE GROUPE	6 7			8			8		
Vc [m/min]	30~65			30~45			30~35		
HRC	30~45			45~55			55~65		
N/mm²	1000~1500								
Ø mm.	n	Vf	A	n	Vf	A	n	Vf	A
0.2	50000	300~350	0.005~0.015	50000	260~310	0.005~0.012	50000	220~260	0.005~0.012
0.3	43000~50000	330~420	0.006~0.016	40000~47000	260~310	0.005~0.012	24000~33000	110~190	0.005~0.008
0.4	32000~50000	350~600	0.005~0.028	31000~36000	300~340	0.005~0.020	18000~25000	120~200	0.003~0.012
0.5	26000~33000	360~480	0.005~0.035	24000~26000	290~320	0.005~0.025	14000~18000	120~140	0.003~0.015
0.6	21000~36000	330~550	0.008~0.030	20000~22000	260~290	0.005~0.021	12000~16000	100~120	0.003~0.014
0.8	17000~27000	350~600	0.010~0.040	15000~17000	280~320	0.006~0.030	9000~12000	110~130	0.005~0.018
1	12500~19000	350~550	0.010~0.028	11000~12000	250~280	0.008~0.020	6000~8000	100~120	0.005~0.012
1.2	11000~18000	350~600	0.025~0.070	9000~10000	250~280	0.015~0.040	5500~7000	100~120	0.010~0.025
1.5	9000~18000	450~850	0.015~0.075	7000~8000	250~280	0.012~0.050	4500~5500	100~120	0.007~0.035
2	6500~11000	350~550	0.020~0.140	6000~7000	270~300	0.015~0.100	3500~4700	100~120	0.010~0.060
3	4500~7000	550~900	0.060~0.210	4000~4600	450~520	0.040~0.150	2500~3300	110~300	0.025~0.090
4	3500~5000	400~680	0.070~0.280	3000~3500	330~380	0.050~0.200	1900~2500	80~230	0.030~0.120
R ap x ae	AxD			AxD			AxD		



UHCS2												
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8		8	
Vc [m/min]	160~250		125~200		85~130		70~100		55~75		45~70	
HRC	30~40		40~50		50~55		55~60		60~65		65~70	
N/mm²	1000~1250		1250~									
Ø mm.	n	fn	n	fn	n	fn	n	fn	n	fn	n	fn
1	50000	1050	40000	820	27000	510	22000	310	18000	190	13500	120
2	35000	1200	28000	970	19000	600	16000	370	12000	230	10400	170
3	23000	1200	19000	970	13000	600	10600	370	8000	230	7000	170
4	18000	1250	14500	1000	9500	625	8000	390	6000	240	5000	170
5	15900	1450	12800	1150	8300	710	6400	410	4800	260	4500	190
6	13300	1350	10600	1100	6900	690	5300	400	4000	260	3700	180
8	10000	1320	8000	1030	5200	640	4000	370	3000	240	2800	170
10	8000	1200	6400	970	4200	590	3200	340	2400	220	2200	160
12	6700	1200	5300	970	3500	590	2700	340	2000	220	1900	160
SM ap x ae	Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D	

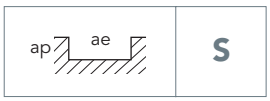
GROUP GRUPPO GRUPPE GROUPE	17		
Vc [m/min]	30~125		
HRC			
N/mm²			
Ø mm.	n	Vf	A
0.2	50000	450~530	0.010~0.020
0.3	50000	550~650	0.010~0.025
0.4	50000	800~920	0.010~0.045
0.5	50000	800~1150	0.010~0.060
0.6	38000~50000	780~1250	0.010~0.050
0.8	29000~47000	780~1300	0.015~0.070
1	23000~35000	800~1300	0.020~0.050
1.2	23000~32000	950~1350	0.040~0.100
1.5	15000~25000	800~1350	0.030~0.130
2	12000~19000	780~1250	0.035~0.240
3	9000~13000	1400~2100	0.100~0.360
4	7000~10000	1050~1580	0.130~0.480
R ap x ae	AxD		



UHM2										
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8	
Vc [m/min]	50~210		45~160		40~110		35~90		25~70	
HRC	30~40		40~50		50~55		55~60		60~65	
N/mm²	1000~1250		1250~							
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
0.3	50000	190	48000	140	42000	120	35000	70	27000	40
0.4	50000	230	48000	180	42000	140	35000	90	27000	55
0.5	50000	370	48000	280	42000	220	35000	140	27000	90
0.6	50000	470	48000	360	42000	290	32000	160	27000	110
0.8	50000	600	43000	440	32000	300	27000	180	20000	110
1	50000	750	40000	570	27000	360	22000	220	17000	130
1.2	46000	790	36000	640	24000	380	21000	250	15500	140
1.5	40000	800	33000	670	22000	410	18000	250	14000	150
2	33400	850	25500	680	17600	420	14400	260	11200	160
S ap x ae	0.05DxD		0.05DxD		0.05DxD		0.02DXD		0.02DXD	

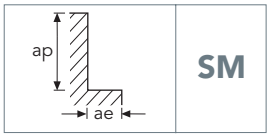
UH211												
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8		8	
Vc [m/min]	70~250		70~200		60~130		50~100		40~75		30~70	
HRC	30~40		40~50		50~55		55~60		60~65		65~70	
N/mm²	1000~1250		1250~									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
0.5	50000	290	45000	220	40000	170	33000	110	26000	60	20000	40
0.6	50000	370	45000	290	40000	220	30000	120	26000	80	20000	50
0.8	50000	480	45000	350	30000	230	25000	140	19000	90	16000	60
1	48000	600	38000	450	26000	280	21000	170	16000	110	13000	70
2	35000	680	26000	550	18000	330	15000	200	12000	130	10000	90
3	22000	680	18000	550	12000	330	10600	200	8000	130	7000	90
4	18000	700	13500	560	9000	350	8000	210	6000	140	5000	95
5	15900	800	12800	650	8300	400	6400	230	4800	140	4500	110
6	13300	760	10600	620	6900	380	5300	220	4000	140	3700	105
8	10000	750	8000	580	5200	350	4000	200	3000	130	2800	95
10	8000	680	6400	550	4200	330	3200	190	2400	120	2200	90
12	6700	680	5300	550	3500	330	2700	190	2000	120	1900	90
S ap x ae	0.05DxD		0.05DxD		0.05DxD		0.05DxD		0.05DxD		0.02DxD	

↓ Z axis : Vf = -50%



UH211												
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8		8	
Vc [m/min]	70~250		70~200		60~130		50~100		40~75		30~70	
HRC	30~40		40~50		50~55		55~60		60~65		65~70	
N/mm²	1000~1250		1250~									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
0.5	50000	200	45000	160	40000	120	33000	80	26000	45	20000	30
0.6	50000	260	45000	200	40000	160	30000	90	19000	60	20000	35
0.8	50000	330	45000	250	30000	160	25000	100	16000	65	16000	40
1	48000	840	38000	650	26000	400	21000	250	23900	150	13000	100
2	35000	950	26000	750	18000	480	15000	300	12000	180	10000	130
3	22000	950	18000	750	12000	480	10600	300	8000	180	7000	130
4	18000	1000	13500	800	9000	500	8000	300	6000	190	5000	135
5	15900	1150	12800	920	8300	560	6400	320	4800	210	4500	150
6	13300	1100	10600	880	6900	550	5300	320	4000	200	3700	145
8	10000	1050	8000	820	5200	500	4000	290	3000	190	2800	135
10	8000	950	6400	750	4200	460	3200	270	2400	175	2200	130
12	6700	950	5300	750	3500	460	2700	270	2000	175	1900	130
SM ap x ae	Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D	

UHCS4												
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8		8	
Vc [m/min]	150~250		120~200		80~130		65~100		50~75		40~70	
HRC	30~40		40~50		50~55		55~60		60~65		65~70	
N/mm²	1000~1250		1250~									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
1	48000	1480	38000	1100	26000	710	21000	430	16000	270	13000	170
2	33000	1750	26000	1250	17500	850	14500	520	11000	320	9500	230
3	22000	1750	17000	1250	11500	850	9600	520	7500	320	6500	230
4	17000	1800	13000	1300	9000	880	7500	540	6000	330	4800	240
5	15900	2000	12500	1500	8300	1000	6400	580	4800	370	4500	270
6	13300	1950	10600	1400	6900	950	5300	560	4000	350	3700	260
8	10000	1900	8000	1350	5200	900	4000	520	3000	330	2800	240
10	8000	1750	6400	1250	4200	850	3200	480	2400	310	2200	220
12	6700	1750	5300	1250	3500	850	2700	480	2000	300	1900	220
16	5000	1500	4000	1100	2600	730	2000	420	1500	270	1400	200
20	4000	1300	3200	950	2100	650	1600	380	1200	250	1100	180
SM ap x ae	Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D	



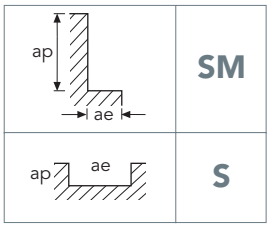
SM

UH411 - UH412												
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8		8	
Vc [m/min]	150~250		120~200		80~130		65~100		50~75		40~70	
HRC	30~40		40~50		50~55		55~60		60~65		65~70	
N/mm²	1000~1250		1250~									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
1	48000	1200	38000	850	26000	550	21000	350	16000	220	13000	140
2	34000	1400	26000	1000	18000	670	15000	420	12000	260	10000	190
3	22000	1400	18000	1000	12000	670	10000	420	8000	260	7000	190
4	17000	1450	14000	1050	9000	700	8000	430	6000	270	5000	190
5	15900	1600	12800	1200	8300	800	6400	460	4800	300	4500	220
6	13300	1550	10600	1150	6900	750	5300	450	4000	280	3700	210
8	10000	1500	8000	1100	5200	720	4000	420	3000	270	2800	190
10	8000	1400	6400	1000	4200	650	3200	390	2400	250	2200	180
12	6700	1400	5300	1000	3500	650	2700	390	2000	240	1900	180
16	5000	1200	4000	880	2600	580	2000	330	1500	220	1400	160
20	4000	1050	3200	780	2100	520	1600	300	1200	200	1100	150
SM ap x ae	Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D		Dx0.03D	

UH610 - UH611												
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8		8	
Vc [m/min]	450~500		430~480		280~320		230~270		180~210		140~160	
HRC	30~40		40~50		50~55		55~60		60~65		65~70	
N/mm²	1000~1250		1250~									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
6	25000	5300	23500	4900	16000	4900	13500	3300	10500	2100	8000	1450
8	20000	5500	19000	5000	12000	4600	1000	3100	8000	2000	6000	1400
10	16000	4900	15500	4500	9500	4100	8000	2900	6400	1800	4800	1300
12	13000	4500	12500	4100	8000	3800	6600	2500	5300	1600	4000	115
16	10000	4000	9700	3700	6000	3400	5000	2300	4000	1250	3000	850
20	8000	3300	7800	3400	4800	3200	4000	2100	3200	1050	2400	700
SM ap x ae	Dx0.05D		Dx0.05D		Dx0.05D		Dx0.03D		Dx0.03D		Dx0.03D	

MDC2203		
GROUP GRUPPO GRUPPE GROUPE	GRAPHITE	
Vc [m/min]	80~250	
HRC		
N/mm²		
Ø mm.	n	fn
0.6	40000	650
0.8	40000	800
1	40000	960
1.2	40000	1200
1.5	40000	1450
2	40000	1600
S ap x ae	0.5DxD	

↓ Z axis : Vf = -50%



MDC2251

GROUP GRUPPO GRUPPE GROUPE	GRAPHITE	
Vc [m/min]	180~360	
HRC		
N/mm²		
Ø mm.	n	Vf
2	30000	1600
2.5	27000	1650
3	24000	1700
3.5	22500	1800
4	21000	1900
5	18000	2400
6	16000	2800
8	13000	2600
10	11500	2500
12	9500	2400
C ap x p	0.2Dx0.1D	

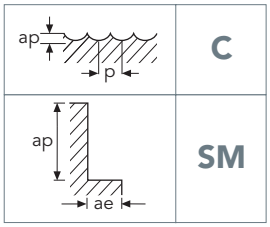
MDC2253

GROUP GRUPPO GRUPPE GROUPE	GRAPHITE	
Vc [m/min]	80~250	
HRC		
N/mm²		
Ø mm.	n	Vf
0.6	40000	800
0.8	40000	950
1	40000	1200
1.2	40000	1450
1.5	40000	1600
2	40000	2000
C ap x p	0.2Dx0.2D	

MDC3311

GROUP GRUPPO GRUPPE GROUPE	GRAPHITE	
Vc [m/min]	250~750	
HRC		
N/mm²		
Ø mm.	n	Vf
2	40000	3000
3	40000	4200
4	40000	6000
5	40000	7200
6	40000	8400
8	32000	8400
10	26000	8600
12	21000	8200
SM ap x ae	0.3Dx0.3D	

↓ Z axis : Vf = -50%



OSAWA

MDCSA2

GROUP GRUPPO GRUPPE GROUPE	15 16	
Vc [m/min]	100~250	
HRC		
N/mm²		
Ø mm.	n	Vf
3	10000	700
4	10000	900
5	10000	1000
6	10000	1200
8	8000	1400
10	8000	1700
12	8000	2100
14	6000	1800
16	6000	1900
18	4000	1400
20	4000	1600

S ap x ae	0.5DxD
SM ap x ae	Dx0.5*D

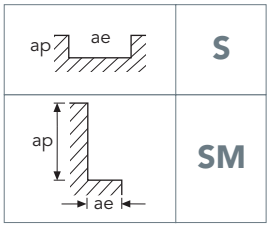
*≤Ø10 ae=0.25D
↓ Z axis : Vf = -50%

MCA212R

GROUP GRUPPO GRUPPE GROUPE	15 16	
Vc [m/min]	130~380	
HRC		
N/mm²		
Ø mm.	n	Vf
3	13000	900
4	13000	1200
5	13000	1300
6	13000	1500
8	10000	1800
10	10000	2200
12	10000	2700

S ap x ae	0.5DxD
SM ap x ae	Dx0.5*D

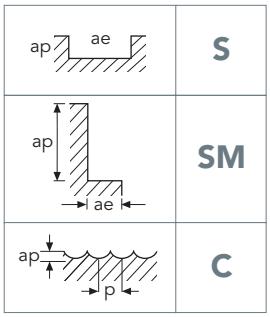
*≤Ø10 ae=0.25D
↓ Z axis : Vf = -50%



MDCSA3 - MDA310* - MDA311** - MDA312**		
GROUP GRUPPO GRUPPE GROUPE	15 16	
Vc [m/min]	150~250	
HRC		
N/mm²		
Ø mm.	n	Vf
3	21200	950
4	16000	960
5	12800	960
6	10600	960
8	8000	960
10	6400	1150
12	5300	1200
16	4000	1200
20	3200	1200
S ap x ae	0.5DxD	
SM ap x ae	1.5Dx0.2D	

*MDA310 n & Vf = -30%; ae = 0.1D
**MDA311, MDA312 n & Vf = -50%; ap = 0.1D
↓ Z axis : Vf = -50%

MDCAB2		
GROUP GRUPPO GRUPPE GROUPE	15 16	
Vc [m/min]	200~300	
HRC		
N/mm²		
Ø mm.	n	Vf
3	26500	1300
4	20000	1300
5	16000	1300
6	13300	1350
8	10000	1400
10	8000	1300
12	6600	1300
C ap x p	0.2Dx0.5D	

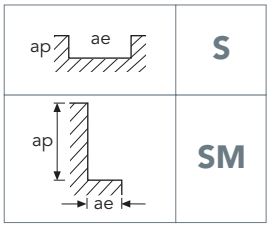


OSAWA

WSA2		
GROUP GRUPPO GRUPPE GROUPE	15 16	
Vc [m/min]	80~150	
HRC		
N/mm²		
Ø mm.	n	Vf
3	8000	560
6	7000	700
8	6000	850
10	5000	1200
12	5000	1200
14	3500	1250
16	3500	1250
18	2300	1300
20	2300	1300
S ap x ae	0.5DxD	
SM ap x ae	Dx0.5*D	

*≤Ø10 ae=0.25D
↓ Z axis : Vf = -50%

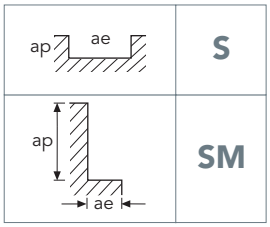
WSAR		
GROUP GRUPPO GRUPPE GROUPE	15 16	
Vc [m/min]	70~90	
HRC		
N/mm²	~500	
Ø mm.	n	Vf
6	4500	200
8	3100	230
10	2500	350
12	2000	400
14	1800	420
16	1600	450
18	1400	470
20	1200	500
S ap x ae	DxD	
SM ap x ae	1.5Dx0.5D	



MEFCS2						
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6		6 7		9 10 26	
Vc [m/min]	60~90		40~55		35~45	
HRC	~30		30~45			
N/mm²	~1000		1000~1500			
Ø mm.	n	Vf	n	Vf	n	Vf
2	9300	190	6100	120	5100	90
3	7200	210	4500	140	3700	120
4	6100	300	3700	180	3100	150
5	5100	320	3000	190	2550	160
6	4500	350	2700	220	2300	180
8	3400	380	2000	200	1700	180
10	2600	330	1600	160	1350	160
12	2200	280	1400	130	1100	130
16	1800	220	1100	110	850	110
20	1400	170	850	80	700	80
25	1100	130	670	70	550	60
S ap x ae	0.5D*xD		0.5*DxD		0.5*DxD	

*≤Ø3 ap=0.2D
↓ Z axis : Vf = -50%

MEFCS4						
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6		6 7		9 10 26	
Vc [m/min]	60~90		40~55		35~45	
HRC	~30		30~45			
N/mm²	~1000		1000~1500			
Ø mm.	n	Vf	n	Vf	n	Vf
2	9300	280	6100	170	5100	140
3	7200	320	4500	200	3700	170
4	6100	570	3700	350	3100	280
5	5100	600	3000	360	2550	300
6	4500	660	2700	410	2300	330
8	3400	710	2000	380	1700	350
10	2600	610	1600	200	1350	300
12	2200	520	1400	250	1100	240
16	1800	410	1100	200	850	200
20	1400	320	850	160	700	150
25	1100	250	670	130	550	120
SM ap x ae	Dx0.05D		Dx0.05D		Dx0.05D	

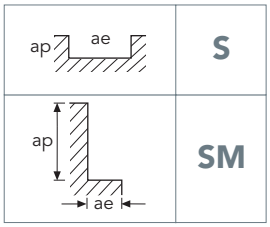


OSAWA

MEFCSH3								
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6		6 7		9 10 26		22 23	
Vc [m/min]	90~110		60~70		50~55		22~26	
HRC	~30		30~45					
N/mm²	~1000		1000~1500					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	5500	440	3400	340	2850	160	1300	55
8	4200	480	2500	310	2100	160	920	55
10	3300	420	2000	240	1700	140	740	55
12	2750	350	1700	210	1350	120	620	40
16	2200	280	1350	170	1050	115	460	35
18	1950	250	1200	160	950	110	410	30
20	1700	210	1050	140	850	90	350	30
25	1350	160	850	120	700	80	300	20
S ap x ae	0.5DxD		0.5DxD		0.5DxD		0.5DxD	

↓ Z axis : Vf = -50%

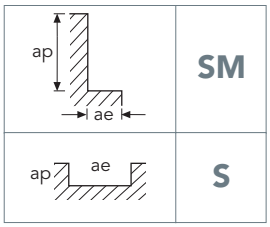
MEFCSH3								
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6		6 7		9 10 26		22 23	
Vc [m/min]	90~110		60~70		50~55		22~26	
HRC	~30		30~45					
N/mm²	~1000		1000~1500					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	5500	650	3400	510	2850	240	1300	80
8	4200	710	2500	460	2100	240	920	80
10	3300	630	2000	360	1700	210	740	80
12	2750	520	1700	310	1350	180	620	60
16	2200	420	1350	260	1050	170	460	50
18	1950	370	1200	240	950	165	410	45
20	1700	320	1050	210	850	135	350	45
25	1350	240	850	180	700	120	300	30
SM ap x ae	1.5Dx0.5D		1.5Dx0.5D		Dx0.05D		Dx0.05D	



MEF600								
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6		6 7		9 10 26		22 23	
Vc [m/min]	90~110 HSC420~470		70~85 HSC320~350		60~70		18~25	
HRC	~30		30~45					
N/mm²	~1000		1000~1500					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	5500	2000	3900	1400	3400	1100	1350	280
6 HSC	**22200**	**8000**	**16800**	**6100**				
8	4200	2000	2950	1400	2500	1100	1000	280
8 HSC	**16800**	**8000**	**12600**	**6100**				
10	3300	2000	2300	1400	1900	1100	440	280
10 HSC	**13400**	**8000**	**10000**	**6000**				
12	2850	1700	2000	1150	1600	1000	400	250
12 HSC	**11400**	**6700**	**8400**	**5000**				
16	2100	1300	1500	900	1150	770	300	190
16 HSC	**8400**	**5000**	**6300**	**3800**				
20	1700	1000	1150	700	900	620	250	160
20 HSC	**6700**	**4000**	**5000**	**3000**				
25	1500	900	1100	600	850	550	220	130
25 HSC	**6000**	**3600**	**4500**	**2700**				
SM ap x ae	1.5Dx0.1D		1.5Dx0.05D		1.5Dx0.05D		Dx0.02D	

MEF901 - MEF902								
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6		6 7		9 10 26		22 23	
Vc [m/min]	290~330		230~250		155~175			
HRC	~30		30~45					
N/mm²	~1000		1000~1500					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
4	23400	1260	18700	450	12700	300	3600	110
5	18700	1870	15000	660	10000	440	2900	170
6	15600	2300	12400	840	8400	570	2400	190
8	11600	2300	9200	840	6300	570	1800	180
10	9200	2300	7600	840	5100	570	1300	190
12	8000	2400	6000	800	4200	570	1200	190
14	6800	2400	5200	840	3600	570	900	130
16	6000	2400	4800	760	3300	510	800	110
18	5200	2300	4400	720	2700	420	700	100
20	4800	2160	3600	560	2400	360	650	100
25	4300	2150	3200	620	2160	410	600	110
S ap x ae	0.5DxD		0.5DxD		ap*xD		0.05DxD	
SM ap x ae	1.5Dx0.3D		1.5Dx0.3D		1.5Dxae**		Dx0.05D	

* Ø4~Ø10 ap=0.15D
Ø12~Ø16 ap=0.10D
Ø18~Ø25 ap=0.05D
**Ø4~Ø10 ae=0.25D
Ø12~Ø16 ae=0.15D
Ø18~Ø25 ae=0.10D



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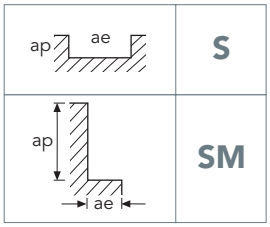
HF400 - HF410R												
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5		6		9		10 11		22		26	
Vc [m/min]	140~160		90~110		110~130		90~100		27~33		85~95	
HRC	~30		30~40									
N/mm²	~1000		~1250									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
3	15950	320	10600	210	13800	200	10100	190	3200	60	9550	190
4	12000	390	7950	260	10350	250	7560	250	2400	65	7200	240
5	9550	435	6400	300	8300	300	6050	300	1900	95	5730	280
6	8000	510	5300	340	6900	360	5000	350	1600	110	4780	330
8	6000	650	4000	430	5250	460	3800	460	1200	130	3580	430
10	4800	780	3200	500	4150	580	3000	570	950	180	2860	530
12	4000	800	2650	490	3450	570	2530	550	800	170	2400	530
14	3450	700	2300	450	2950	520	2160	510	680	165	2050	480
16	3000	660	1990	420	2600	480	1890	480	600	150	1790	450
18	2650	660	1770	415	2300	470	1680	465	530	140	1600	440
20	2400	650	1600	410	2070	450	1500	460	480	140	1430	440
25	1950	530	1280	310	1660	380	1200	390	380	130	1150	360
S ap x ae	DxD		DxD		DxD		DxD		Dx0.5D		DxD	
SM ap x ae	1.5Dx0.5D		1.5Dx0.5D		1.5Dx0.5D		1.5Dx0.5D		Dx0.25D		Dx0.25D	

↓ Z axis : Vf = -50%

G2 - MDTA 2FL												
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4		5 6		9 10 11		13 14		16		17 18 19	
Vc [m/min]	70~85		60~75		30~40		55~65		140~150		120~140	
HRC	~25		25~40									
N/mm²	~850		850~1250									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
1	24850	250	21650	170	11150	70	19100	190	47750	480	41400	330
1.5	16550	265	14450	200	7450	75	12750	200	31850	510	27600	390
2	12400	300	10850	220	5550	90	9550	230	23900	580	20700	420
3	8300	330	7200	220	3700	110	6350	250	15900	640	13800	420
4	6200	430	5400	270	2800	120	4800	340	11950	840	10350	520
5	4950	450	4350	290	2250	125	3800	340	9550	860	8300	550
6	4150	500	3600	330	1850	125	3200	380	7950	950	6900	620
8	3100	500	2700	330	1400	130	2400	380	5950	950	5200	620
10	2500	500	2150	330	1100	130	1900	380	4800	960	4150	620
12	2050	450	1800	330	930	120	1600	350	4000	880	3450	620
14	1750	420	1550	280	800	110	1350	325	3400	820	2950	530
16	1550	400	1350	270	700	100	1200	315	3000	780	2600	520
20	1250	350	1100	240	560	90	960	270	2400	680	2050	450
S ap x ae	0.5DxD		0.3DxD		0.5DxD		0.5DxD		0.5DxD		0.5DxD	
SM ap x ae	1.5Dx0.1D		1.5Dx0.05D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D	

G2210 - G2211 - MDTA210 n & Vf = -30%
G2212 - G2213 - MDTACL2 n & Vf = -50%
GB205 - G2213 - MDCL2 n & Vf = -30%
↓ Z axis : Vf = -50%

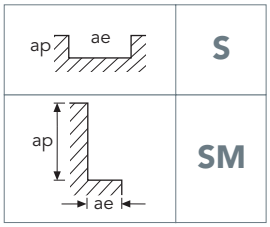


G2 - MDTA 3FL												
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4		5 6		9 10 11		13 14		16		17 18 19	
Vc [m/min]	70~85		60~75		30~40		55~65		140~150		120~140	
HRC	~25		25~40									
N/mm²	~850		850~1250									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
1	24850	370	21650	260	11150	100	19100	290	47750	720	41400	500
1.5	16550	400	14450	260	7450	110	12750	300	31850	760	27600	500
2	12400	450	10850	260	5550	120	9550	340	23900	860	20700	500
3	8300	500	7200	320	3700	130	6350	380	15900	950	13800	620
4	6200	650	5400	410	2800	150	4800	500	11950	1250	10350	780
5	4950	670	4350	430	2250	150	3800	510	9550	1290	8300	820
6	4150	690	3600	430	1850	150	3200	530	7950	1320	6900	830
8	3100	700	2700	450	1400	160	2400	540	5950	1340	5200	860
10	2500	680	2150	430	1100	150	1900	530	4800	1310	4150	840
12	2050	680	1800	430	930	150	1600	530	4000	1300	3450	830
14	1750	630	1550	400	800	140	1350	490	3400	1230	2950	750
16	1550	610	1350	370	700	130	1200	470	3000	1170	2600	700
20	1250	530	1100	330	560	120	960	410	2400	1000	2050	620
S ap x ae	0.5DxD		0.2DxD		0.3DxD		0.5DxD		0.5DxD		0.5DxD	
SM ap x ae	1.5Dx0.1D		1.5Dx0.05D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D	

G2310 - G2311 n & Vf = -30%
G2312 n & Vf = -50%
GB305 n & Vf = -30%
↓ Z axis : Vf = -50%

G2 - MDTA 4FL												
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4		5 6		9 10 11		13 14		16		17 18 19	
Vc [m/min]	70~85		60~75		30~40		55~65		140~150		120~140	
HRC	~25		25~40									
N/mm²	~850		850~1250									
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
1	24850	500	21650	340	11150	130	19100	380	47750	950	41400	660
1.5	16550	530	14450	400	7450	150	12750	410	31850	1000	27600	660
2	12400	600	10850	430	5550	180	9550	460	23900	1150	20700	660
3	8300	670	7200	430	3700	220	6350	510	15900	1280	13800	830
4	6200	860	5400	540	2800	250	4800	670	11950	1670	10350	1030
5	4950	890	4350	570	2250	250	3800	680	9550	1720	8300	1100
6	4150	1000	3600	650	1850	250	3200	700	7950	1750	6900	1100
8	3100	1000	2700	650	1400	260	2400	720	5950	1790	5200	1150
10	2500	1000	2150	650	1100	260	1900	700	4800	1730	4150	1120
12	2050	900	1800	650	930	240	1600	700	4000	1750	3450	1100
14	1750	840	1550	560	800	220	1350	650	3400	1640	2950	1000
16	1550	810	1350	540	700	200	1200	630	3000	1560	2600	940
20	1250	700	1100	500	560	170	960	550	2400	1350	2050	820
SM ap x ae	1.5Dx0.1D		1.5Dx0.05D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D	

G2410 - G2411 - MDTA410 n & Vf = -30%
G2412 - G2413 - MDTACL4 n & Vf = -50%
GB405 - G2213 - MDCL4 n & Vf = -30%



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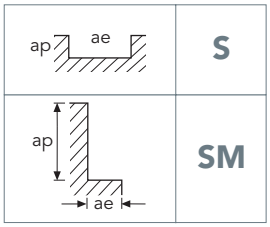
G2 HR - MDTA NR								
GROUP GRUPPO GRUPPE GROUPE	2 3 4		5 6		9 10 11		13 14	
Vc [m/min]	70~90		75~50		45~55		70~90	
HRC	~25		25~40					
N/mm²	~850		850~1250					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	4250	540	3600	330	2650	240	4250	540
8	3200	540	2700	430	2000	320	3200	540
10	2550	730	2150	450	1600	330	2550	730
12	2100	700	1800	440	1350	330	2100	700
14	1800	650	1550	400	1150	300	1800	650
16	1600	640	1350	390	1000	290	1600	640
18	1400	620	1200	370	880	270	1400	620
20	1250	620	1100	370	800	270	1250	620
25	1000	600	870	320	640	230	1000	600
S ap x ae	0.7DxD		0.5DxD		0.3DxD		0.7DxD	

G2 HR - MDTA NR								
GROUP GRUPPO GRUPPE GROUPE	2 3 4		5 6		9 10 11		13 14	
Vc [m/min]	80~100		70~85		55~65		80~100	
HRC	~25		25~40					
N/mm²	~850		850~1250					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	4800	600	4250	380	3200	290	4800	600
8	3600	600	3200	390	2400	290	3600	600
10	2850	810	2550	530	1900	400	2850	810
12	2400	800	2100	510	1600	390	2400	800
14	2050	740	1800	470	1350	350	2050	740
16	1800	720	1600	460	1200	350	1800	720
18	1600	720	1400	420	1050	320	1600	720
20	1450	720	1250	410	960	320	1450	720
25	1150	700	1000	360	760	280	1150	700
SM ap x ae	1.5Dx0.3D		1.5Dx0.2D		1.5Dx0.2D		1.5Dx0.3D	



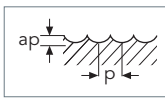
G2 - MDTA SFL BALL

GROUP GRUPPO GRUPPE GROUPE	1 2 3 4		5 6		7		9 10 11		13 14		16 17 18 19	
Vc [m/min]	90~110		85~105		75~85		55~65		90~110		140~160	
HRC	~25		25~40		40~45							
N/mm²	~850		850~1250		1250~1500							
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
1	31850	320	30250	240	25500	150	19100	230	31850	320	47750	380
1.5	21250	340	20150	280	17000	170	12750	250	21250	340	31850	320
2	15900	380	15150	300	12750	200	9550	290	15900	380	23900	290
3	10600	420	10100	300	8500	250	6350	240	10600	420	15900	320
4	7950	560	7550	380	6350	280	4800	200	7950	560	11950	360
5	6350	570	6050	400	5100	290	3800	180	6350	570	9550	380
6	5300	640	5050	450	4250	290	3200	190	5300	640	7950	350
8	4000	640	3800	460	3200	300	2400	220	4000	640	5950	400
10	3200	640	3050	460	2550	300	1900	220	3200	640	4800	420
12	2650	580	2500	450	2100	270	1600	220	2650	580	4000	480
14	2250	540	2150	390	1800	250	1350	220	2250	540	3400	470
16	2000	520	1900	380	1600	230	1200	210	2000	520	3000	470
20	1600	450	1500	330	1250	190	960	210	1600	450	2400	440
Ø<1 C ap x p	0.2Dx0.05D		0.2Dx0.05D		0.2Dx0.05D		0.2Dx0.05D		0.2Dx0.05D		0.5Dx0.2D	
Ø>1 C ap x p	0.2Dx0.1D		0.2Dx0.1D		0.2Dx0.1D		0.2Dx0.1D		0.2Dx0.1D		0.7Dx0.3D	

G2250 - MDTA250 n & Vf = -30%
G2251 n & Vf = -50%
GB255 n & Vf = -30%

G2CSB4

GROUP GRUPPO GRUPPE GROUPE	1 2 3 4		5 6		7		9 10 11		13 14	
Vc [m/min]	90~110		85~105		75~85		55~65		90~110	
HRC	~25		25~40		40~45					
N/mm²	~850		850~1250		1200~1500					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	15900	1270	15150	1000	12750	760	9550	760	15900	1270
3	10600	1060	10100	850	8500	620	6350	620	10600	1060
4	7950	1100	7550	900	6350	530	4800	530	7950	1100
5	6350	1150	6050	950	5100	490	3800	490	6350	1150
6	5300	1270	5050	970	4250	510	3200	510	5300	1270
8	4000	1440	3800	1000	3200	570	2400	570	4000	1440
10	3200	1400	3050	1150	2550	540	1900	540	3200	1400
12	2650	1380	2500	1100	2100	590	1600	590	2650	1380
14	2250	1260	2150	1070	1800	580	1350	580	2250	1260
16	2000	1400	1900	1070	1600	560	1200	560	2000	1400
20	1600	1220	1500	950	1250	550	960	550	1600	1220
Ø<1 C ap x p	0.2Dx0.05D		0.2Dx0.05D		0.2Dx0.05D		0.2Dx0.05D		0.2Dx0.05D	
Ø>1 C ap x p	0.2Dx0.1D		0.2Dx0.1D		0.2Dx0.1D		0.2Dx0.1D		0.2Dx0.1D	



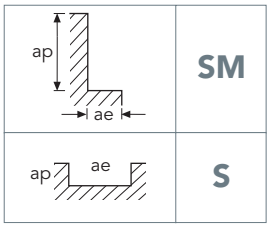
C

OSAWA

G2CSHM										
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4		5 6		7		9 10 11		13 14	
Vc [m/min]	90~110		65~90		45~65		35~50		90~110	
HRC	~25		25~45		40~45					
N/mm²	~850		850~1250		1250~1500					
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	15900	1270	15150	1000	12750	760	9550	760	15900	1270
3	10600	1060	10100	850	8500	620	6350	620	10600	1060
4	7950	1100	7550	900	6350	530	4800	530	7950	1100
5	6350	1150	6050	950	5100	490	3800	490	6350	1150
6	5300	1270	5050	970	4250	510	3200	510	5300	1270
8	4000	1440	3800	1000	3200	570	2400	570	4000	1440
10	3200	1400	3050	1150	2550	540	1900	540	3200	1400
12	2650	1380	2500	1100	2100	590	1600	590	2650	1380
14	2250	1260	2150	1070	1800	580	1350	580	2250	1260
16	2000	1400	1900	1070	1600	560	1200	560	2000	1400
20	1600	1220	1500	950	1250	550	960	550	1600	1220
SM ap x ae	1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D	

UMWS2										
GROUP GRUPPO GRUPPE GROUPE	1 2		2 3 4 13 14		4 5		6		9 10	
Vc [m/min]	45~60		35~50		30~40		20~28		12~20	
HRC			~20		20~30		30~35			
N/mm²	~500		500~800		800~1000		1000~1100			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	7000	120	5900	90	4900	80	3200	70	2000	40
3	5000	160	4100	140	3400	120	2300	80	1800	65
4	4300	230	3600	180	3200	160	2000	95	1600	80
5	3900	260	3300	200	2600	190	1700	100	1400	80
6	3500	270	2900	210	2300	190	1500	110	1200	90
8	2600	280	2200	240	1800	200	1200	120	900	90
10	2100	300	1800	270	1500	230	900	130	700	100
12	1800	280	1500	240	1200	200	750	120	600	90
14	1600	270	1300	200	1000	200	650	110	500	80
16	1400	270	1200	200	900	180	550	100	450	80
18	1200	240	1000	200	800	160	500	100	400	80
20	1000	220	800	170	700	150	450	90	360	70
22	850	190	700	150	600	130	400	80	320	60
25	750	160	650	140	500	120	350	70	250	50
S ap x ae	0.5DxD		0.5DxD		0.5DxD		0.5DxD		0.5DxD	

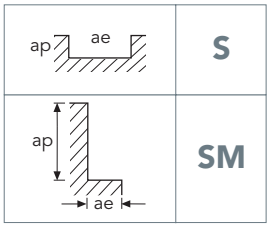
↓ Z axis : Vf = -50%



UMWS3										
GROUP GRUPPO GRUPPE GROUPE	1 2		2 3 4 13 14		4 5		6		9 10	
Vc [m/min]	45~60		35~50		30~40		20~28		12~20	
HRC			~20		20~30		30~35			
N/mm²	~500		500~800		800~1000		1000~1100			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	7000	70	5900	60	4900	50	3200	40	2000	30
3	5000	100	4100	90	3400	50	2300	45	1800	45
4	4300	140	3600	120	3200	80	2000	50	1600	55
5	3900	160	3300	130	2600	90	1700	60	1400	55
6	3500	230	2900	200	2300	140	1500	90	1200	75
8	2600	240	2200	200	1800	150	1200	100	900	85
10	2100	250	1800	200	1500	160	900	110	700	90
12	1800	280	1500	230	1200	170	750	110	600	90
14	1600	250	1300	220	1000	160	650	110	500	85
16	1400	240	1200	200	900	150	550	100	450	85
18	1200	240	1000	200	800	150	500	100	400	85
20	1000	240	800	200	700	150	450	100	360	85
22	850	240	700	200	600	150	400	100	320	85
25	750	240	650	200	500	150	350	100	250	85
S ap x ae	0.5DxD		0.5DxD		0.5DxD		0.5DxD		0.5DxD	

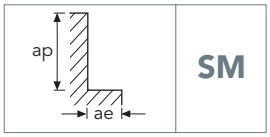
↓ Z axis : Vf = -50%

UMWS3										
GROUP GRUPPO GRUPPE GROUPE	1 2		2 3 4 13 14		4 5		6		9 10	
Vc [m/min]	55~75		40~60		35~50		25~35		15~25	
HRC			~20		20~30		30~35			
N/mm²	~500		500~800		800~1000		1000~1100			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	8000	100	7000	80	5500	70	3800	50	2400	40
3	5800	150	4800	120	3800	80	2700	70	2200	70
4	5200	190	4500	160	3500	110	2300	80	1900	80
5	4700	210	4000	180	3000	130	2000	90	1700	80
6	4200	300	3600	250	2600	200	1800	130	1500	100
8	3200	330	2600	270	2000	200	1300	140	1100	120
10	2500	350	2100	300	1600	200	1000	150	900	130
12	2100	350	1800	300	1400	230	900	150	750	130
14	1800	350	1500	290	1200	210	800	140	650	120
16	1600	330	1300	280	1000	200	650	150	550	120
18	1400	300	1200	270	900	200	600	130	500	110
20	1300	300	1100	260	800	200	550	130	450	110
22	1200	300	1000	260	750	200	500	130	400	110
25	1000	310	850	270	630	200	420	130	360	120
SM ap x ae	1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D	



UMWS4										
GROUP GRUPPO GRUPPE GROUPE	1 2		2 3 4 13 14		4 5		6		9 10	
Vc [m/min]	60~75		50~65		35~50		25~35		20~30	
HRC			~20		20~30		30~35			
N/mm²	~500		500~800		800~1000		1000~1100			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	9200	300	8500	250	6000	170	4000	120	3300	90
3	6500	400	6000	350	4500	250	2700	180	2400	120
4	5500	480	4700	400	3600	300	2300	200	2000	150
5	4500	500	4000	420	3000	330	2000	220	1700	160
6	4000	550	3600	450	2600	330	1800	230	1500	180
8	3000	560	2600	480	2000	370	1400	240	1200	190
10	2300	630	2100	530	1600	380	1000	270	900	200
12	2000	570	1800	480	1400	370	900	240	720	190
14	1800	550	1600	450	1100	350	800	230	650	170
16	1600	500	1500	440	1000	350	700	220	550	170
18	1500	460	1300	400	900	300	630	200	500	150
20	1300	450	110	380	800	280	550	180	450	150
22	1100	420	1000	330	700	260	470	160	400	130
25	1000	370	850	300	630	230	420	150	360	130
SM ap x ae	1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D	

UMWSFR								
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 13 14		4 5		6		9 10	
Vc [m/min]	50~60		40~50		30~35		25~30	
HRC	~20		20~30		30~35			
N/mm²	~800		800~1000		1000~1100			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	2800	230	2200	180	1600	120	1300	110
8	2400	290	1900	230	1400	160	1100	130
10	2000	420	1500	320	1100	200	900	160
12	1600	420	1200	330	900	230	750	180
14	1400	420	1100	330	760	230	650	180
16	1200	420	950	330	650	230	550	180
18	1100	420	900	330	600	230	500	180
20	1000	430	750	330	530	230	450	180
22	900	430	650	330	470	230	400	180
25	800	420	600	320	420	220	360	180
SM ap x ae	1.5Dx0.5D		1.5Dx0.5D		1.5Dx0.5D		1.5Dx0.5D	

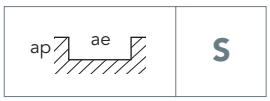


SM

UMWSFR								
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 13 14		4 5		6		9 10	
Vc [m/min]	50~60		40~50		30~35		25~30	
HRC	~20		20~30		30~35			
N/mm²	~800		800~1000		1000~1100			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
6	2700	150	2100	120	1500	80	1300	70
8	2300	190	1800	150	1300	110	1000	80
10	1800	270	1400	210	1000	130	850	110
12	1500	270	1200	220	850	150	700	120
14	1300	270	1000	220	720	150	600	120
16	1200	270	900	220	630	150	520	120
18	1000	270	850	220	580	150	470	120
20	950	280	720	220	500	150	420	120
22	850	280	620	220	450	150	380	120
25	750	270	570	210	400	140	340	120
S ap x ae	0.5DxD		0.5DxD		0.5DxD		0.5DxD	

WS2 (TAWS2**) - WL2* (TAWL2**)										
GROUP GRUPPO GRUPPE GROUPE	1 13		2 3 4 13 14		4 5		6 9 10		15 16 17	
Vc [m/min]	30~40		25~35		20~30		10~15		70~100	
HRC			~20		20~30		30~40			
N/mm²	~500		500~800		800~1000		1000~1300			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	5600	40	4500	30	4000	30	2200	15	12000	160
3	3500	55	3200	45	2500	40	1600	20	11000	250
4	2800	70	2200	55	1800	45	1100	30	8000	290
5	2200	90	1800	70	1600	60	900	35	6300	310
6	1800	90	1600	80	1200	60	800	40	5600	310
8	1400	100	1100	90	900	70	560	45	4000	390
10	1100	100	900	90	800	80	450	45	3100	400
12	900	110	800	100	630	80	400	50	2500	380
14	800	110	700	90	560	80	350	50	2200	350
16	700	110	560	90	450	70	280	45	2000	350
18	630	100	500	90	400	70	250	45	1800	350
20	550	100	450	90	400	70	220	45	1600	320
22	500	100	450	90	350	70	220	45	1400	300
25	450	90	400	80	310	60	180	35	1200	280
28	400	80	350	70	280	55	160	30	1100	270
30	350	70	310	60	250	50	160	30	1100	270
32	350	70	280	55	220	45	140	30	1000	240
36	310	60	250	50	200	40	120	25	900	220
40	280	60	220	50	180	40	110	25	800	200
S ap x ae	0.5DxD		0.5DxD		0.5DxD		0.5DxD		0.5DxD	

*WL2: Vf=-50%;
**TAW... : n & Vf = +30%~+50%
↓ Z axis : Vf = -50%



S

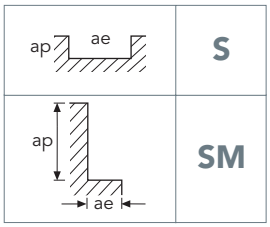
OSAWA

WS3 (TAWS3**) - WL3* (TAWL3**)										
GROUP GRUPPO GRUPPE GROUPE	1 13		2 3 4 13 14		4 5		6 9 10		15 16 17	
Vc [m/min]	30~40		25~35		20~30		10~15		70~100	
HRC			~20		20~30		30~40			
N/mm²	~500		500~800		800~1000		1000~1300			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	5600	60	4500	40	4000	35	2200	15	12000	180
3	3500	80	3200	60	2500	45	1600	20	11000	280
4	2800	105	2200	75	1800	50	1100	30	8000	330
5	2200	135	1800	95	1600	65	900	35	6300	350
6	1800	135	1600	110	1200	65	800	45	5600	350
8	1400	150	1100	120	900	80	560	50	4000	440
10	1100	150	900	120	800	90	450	50	3100	450
12	900	165	800	135	630	90	400	55	2500	430
14	800	165	700	120	560	90	350	55	2200	400
16	700	165	560	120	450	80	280	50	2000	400
18	630	150	500	120	400	80	250	50	1800	400
20	550	150	450	120	400	80	220	50	1600	360
22	500	150	450	120	350	80	220	50	1400	340
25	450	135	400	110	310	65	180	35	1200	320
28	400	120	350	95	280	60	160	30	1100	300
30	350	105	310	80	250	55	160	30	1100	300
S ap x ae	1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D	

*WL3: Vf=-50%;
**TAW... : n & Vf = +30%~+50%

WS3 (TAWS3**) - WL3* (TAWL3**)										
GROUP GRUPPO GRUPPE GROUPE	1 13		2 3 4 13 14		4 5		6 9 10		15 16 17	
Vc [m/min]	30~40		25~35		20~30		10~15		70~100	
HRC			~20		20~30		30~40			
N/mm²	~500		500~800		800~1000		1000~1300			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	5600	60	4500	45	4000	45	2200	20	12000	240
3	3500	80	3200	65	2500	60	1600	30	11000	380
4	2800	105	2200	80	1800	65	1100	45	8000	440
5	2200	135	1800	105	1600	90	900	50	6300	470
6	1800	135	1600	120	1200	90	800	60	5600	470
8	1400	150	1100	135	900	105	560	65	4000	580
10	1100	150	900	135	800	120	450	65	3100	600
12	900	165	800	150	630	120	400	75	2500	570
14	800	165	700	135	560	120	350	75	2200	530
16	700	165	560	135	450	105	280	65	2000	530
18	630	150	500	135	400	105	250	65	1800	530
20	550	150	450	135	400	105	220	65	1600	480
22	500	150	450	135	350	105	220	65	1400	450
25	450	135	400	120	310	90	180	50	1200	420
28	400	120	350	105	280	80	160	45	1100	400
30	350	105	310	90	250	75	160	45	1100	400
SM ap x ae	0.5DxD		0.5DxD		0.5DxD		0.5DxD			

*WL3: Vf=-50%;
**TAW... : n & Vf = +30%~+50%
↓ Z axis : Vf = -50%

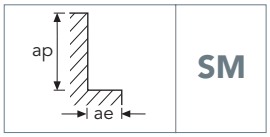


WSH3 (TAWSH3*)						
GROUP GRUPPO GRUPPE GROUPE	2 3 13 14		4 5 13 14		6 9 10	
Vc [m/min]	30~40		25~35		20~30	
HRC	~20		20~30		30~40	
N/mm²	500~800		800~1000		1000~1300	
Ø mm.	n	Vf	n	Vf	n	Vf
6	1800	85	1300	55	900	35
8	1200	95	1000	65	600	40
10	1000	95	900	70	500	40
12	900	110	700	70	450	45
14	800	95	600	70	400	45
16	600	95	500	65	300	40
18	550	95	450	65	280	40
20	500	95	450	65	250	40
25	450	85	350	55	200	30
30	350	65	280	45	180	25
SM ap x ae	1.5Dx0.1D		1.5Dx0.1D		1.5Dx0.1D	

*TAWSH3: n & Vf = +30%~+50%

WS4 (TAWS4**) - WL4* (TAWL4**)										
GROUP GRUPPO GRUPPE GROUPE	1 13		2 3 4 13 14		4 5		6 9 10		15 16 17	
Vc [m/min]	30~40		25~35		20~30		10~15		70~100	
HRC			~20		20~30		30~40			
N/mm²	~500		500~800		800~1000		1000~1300			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
2	5600	80	4500	55	4000	45	2200	20	12000	240
3	3500	110	3200	80	2500	60	1600	30	11000	380
4	2800	140	2200	100	1800	65	1100	45	8000	440
5	2200	180	1800	125	1600	90	900	50	6300	470
6	1800	180	1600	145	1200	90	800	60	5600	470
8	1400	200	1100	160	900	105	560	65	4000	580
10	1100	200	900	160	800	120	450	65	3100	600
12	900	220	800	180	630	120	400	75	2500	570
14	800	220	700	160	560	120	350	75	2200	530
16	700	220	560	160	450	105	280	65	2000	530
18	630	200	500	160	400	105	250	65	1800	530
20	550	200	450	160	400	105	220	65	1600	480
22	500	200	450	160	350	105	220	65	1400	450
25	450	180	400	145	310	90	180	50	1200	420
28	400	160	350	125	280	80	160	45	1100	400
30	350	140	310	110	250	75	160	45	1100	400
32	350	140	280	100	220	65	140	45	1000	360
36	310	120	250	90	200	60	120	35	900	330
40	280	120	220	90	180	60	110	35	800	300
SM ap x ae	0.5Dx1.5D		0.5Dx1.5D		0.5Dx1.5D		0.5Dx1.5D		0.5Dx1.5D	

*WL4: Vf=-50%;
**TAW... : n & Vf = +30%~+50%



SM

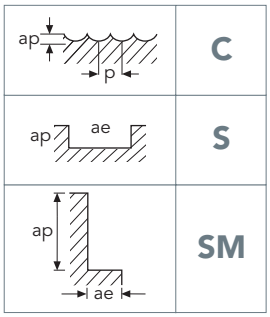
OSAWA

WSB2 (TAWSB2**) - WLB2* (TAWLB2**)										
GROUP GRUPPO GRUPPE GROUPE	1 13		2 3 4 13 14		4 5		6 9 10		15 16 17	
Vc [m/min]	35~45		30~40		15~20		10~15		90~110	
HRC			~20		20~30		30~40			
N/mm²	~500		500~800		800~1000		1000~1300			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
3	4500	95	3400	70	2000	30	1400	20	11000	230
4	3200	115	2400	80	1400	35	1000	25	8000	260
6	2200	135	1700	90	1000	45	700	25	5600	280
8	1600	160	1200	105	700	50	500	30	4000	350
10	1300	180	1000	120	560	60	400	35	3200	360
12	1000	170	800	105	450	55	320	35	2500	340
16	800	150	600	100	350	55	250	35	2000	300
20	600	140	500	85	300	50	200	35	1600	280
25	500	130	400	70	220	40	160	30	1300	250
C ap x p	0.7Dx0.3D		0.7Dx0.3D		0.7Dx0.3D		0.7Dx0.3D		0.7Dx0.3D	

*WLB2: Vf=-50%;
**TAW... : n & Vf = +30%~+50%

WSR (TAWSR**) - WSFR (TAWSFR**) - WLFR* (TAWLFR**)										
GROUP GRUPPO GRUPPE GROUPE	1 13		2 3 4 13 14		4 5		6 9 10		15 16 17	
Vc [m/min]	30~40		25~35		20~30		15~20		70~80	
HRC			~20		20~30		30~40			
N/mm²	~500		500~800		800~1000		1000~1300			
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
6	1800	80	1600	60	1200	55	800	30	4500	200
8	1400	105	1100	75	900	65	560	35	3100	230
10	1100	150	900	120	800	110	450	60	2500	350
12	900	180	800	140	630	110	400	70	2000	400
14	800	180	700	140	560	110	350	70	1800	420
16	700	180	560	140	450	110	280	70	1600	450
18	630	180	500	140	400	110	250	70	1400	470
20	550	180	450	140	400	110	220	70	1200	500
22	500	220	450	170	350	140	220	85	1100	470
25	450	220	400	170	310	140	180	85	1000	450
28	400	210	350	160	280	130	160	85	900	510
30	350	210	310	160	250	130	160	85	900	530
32	350	210	280	160	220	130	140	85	800	500
36	310	210	250	160	200	130	120	85	700	470
40	280	200	220	150	180	120	110	80	630	450
50	220	200	180	170	160	140	90	80	500	370
***S ap x ae	0.5DxD		0.5DxD		0.5DxD		0.5DxD		0.5DxD	
SM ap x ae	1.5Dx0.5D		1.5Dx0.5D		1.5Dx0.5D		1.5Dx0.5D		1.5Dx0.5D	

*WLFR: Vf=-50%;
**TAW... : n & Vf = +50%~+30%;
***S: Vf=-25%

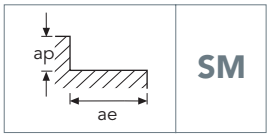


FM (TAFM*)								
GROUP GRUPPO GRUPPE GROUPE	1 13		2 3 4 13 14		4 5		6 9 10	
Vc [m/min]	28~32		23~27		15~19		9~11	
HRC			~20		20~30		30~40	
N/mm²	~500		500~800		800~1000		1000~1300	
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
40	240	135	200	120	140	80	80	50
50	200	125	170	105	120	75	70	45
63	150	110	130	95	90	65	50	40
80	120	120	100	100	80	75	40	40
100	100	115	80	95	60	70	30	35
125	80	115	70	95	50	65	20	35
SM ap x ae	0.25Dx0.75D		0.25Dx0.75D		0.25Dx0.75D		0.25Dx0.75D	

*TAFM: n & Vf = +30%~+50%

FFR (TAFFR*)								
GROUP GRUPPO GRUPPE GROUPE	1 13		2 3 4 13 14		4 5		6 9 10	
Vc [m/min]	28~32		23~27		15~19		9~11	
HRC			~20		20~30		30~40	
N/mm²	~500		500~800		800~1000		1000~1300	
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf
40	240	100	200	85	140	60	80	35
50	200	125	170	105	120	75	70	45
63	150	110	130	95	90	65	50	40
80	120	120	100	100	80	75	40	40
100	100	115	80	95	60	70	30	35
125	80	115	70	95	50	65	20	35
160	60	110	60	100	40	65	20	35
SM ap x ae	0.25Dx0.75D		0.25Dx0.75D		0.25Dx0.75D		0.25Dx0.75D	

*TAFFR: n & Vf = +30%~+50%



OSAWA

WCR				
GROUP GRUPPO GRUPPE GROUPE	1 13	2 3 4 13 14	4 5	15 16
Vc [m/min]	18~22	14~16	11~13	85~95
HRC		~20	20~35	
N/mm²	~550	550~800	800~1100	
Ø mm.	n	n	n	n
8	800	600	480	3580
10	640	480	380	2870
12	530	400	320	2390
14	450	340	270	2050
16	400	300	240	1800
20	320	240	190	1430
25	250	190	150	1150
30	210	160	130	950
34	190	140	110	840
42	150	115	90	690
48	130	100	80	600
56	115	85	70	510

WTM - WWK						
GROUP GRUPPO GRUPPE GROUPE	1 2 3 13 14		4 5 14		15 16 17	
Vc [m/min]	16~20		12~14		90~110	
HRC	~20		20~30		30~40	
N/mm²	~800		800~1000		1000~1300	
Ø mm.	n	Vf	n	Vf	n	Vf
12.5	460	20	320	10	2800	130
16	360	20	250	10	2200	170
18	320	25	230	15	2000	180
19	300	25	220	20	1800	190
21	280	25	190	20	1700	200
22	260	30	180	20	1600	200
25	230	35	160	20	1400	220
28	200	45	140	25	1250	250
32	180	50	120	25	1100	300
36	160	50	110	25	960	280
40	140	45	100	25	880	250

WDC - WDD									
GROUP GRUPPO GRUPPE GROUPE	1 2 3 13 14		4 5 14		6 9 10		15 16 17		
Vc [m/min]	16~20		12~14		8~10		90~110		
HRC	~20		20~30		30~40				
N/mm²	~800		800~1000		1000~1300				
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	
16	370	70	260	50	190	25	2200	400	
20	310	65	220	45	150	20	1600	390	
25	230	55	160	35	120	15	1400	320	
32	190	75	120	50	100	20	1100	450	
38	150	75	110	55	70	20	920	460	

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