

2FL

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

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER					TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
		~30HRC	30~45HRC	45HRC~	INOX	INCONEL				
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

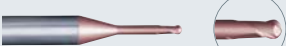
○ suitable / adatto / geeignet / indiqué

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

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER					TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
		~30HRC	30~45HRC	45HRC~	INOX	INCONEL				
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		●		○	○	○	●	○	

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2FL BALL		MG PV200			MDTACSB2	
		MG PV200			MDTA250	
		HSS/Co BR			WSB2	
		HSS/Co PV200			TAWSB2	
		HSS/Co BR			WLB2	
		HSS/Co PV200			TAWLB2	
2FL BALL MICRO		UMG ENDLESS ORANGE			MEXMB2	 
		MG DIAMOND			MDC2253	 
2FL BALL RIB PROCESSING		NMG UH RED			UHCRB2	 
		UMG ENDLESS ORANGE			MEXCRB2	 
3FL		MG DIAMOND			MDC3311	
		MG LAPPED	ALU		MDCSA3	
		MG LAPPED	ALU		MDA310	
		MG LAPPED	ALU		MDA311	
		MG LAPPED	ALU		MDA312	
		UMG ENDLESS	VA		MEFCSH3	
		MG BR	N		GB305	
		MG PV200	N		G2CSH3	
		MG PV200	N		G2310	
		MG PV200	N		G2311	

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER					TITANIUM	CAST IRON	ALUMINIUM	GRAPHITE
		~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIO TITAN TITANIUM	GHISA GUSS FONTE	ALLUMINIO ALUMINUM ALUMINIUM	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	●	●		○	○	○	●	○	

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

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER					TITANIUM	CAST IRON	ALUMINIUM	GRAPHITE
		~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIO TITAN TITANIUM	GHISA GUSS FONTE	ALLUMINIO ALUMINUM ALUMINIUM	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	●	●		○			●	○	

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

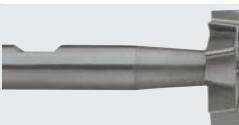
Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER					TITANIUM	CAST IRON	ALUMINIUM	GRAPHITE
		~30HRC	30~45HRC	45HRC~	INOX	INCONEL	TITANIO TITAN TITANIUM	GHISA GUSS FONTE	ALLUMINIO ALUMINIUM ALUMINIUM	GRAFITE GRAPHIT GRAPHITE
1~20	166	●	●		○	○	○	●	○	
2~6	166	●	●		○	○	○	●	○	
5~12	166	●	●		○	○	○	●	○	
8~20	166	●	●		○	○	○	●	○	
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	○	●	●	○			○		

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MULTI FLUTES		UMG ENDLESS ORANGE	MEX		MEXCLHM	
		UMG ENDLESS ORANGE	MEX RADIUS		MEX610R	
		UMG ENDLESS ORANGE	MEX RADIUS		MEX611R	
		UMG ENDLESS	VA		MEF600	
		MG PV200	N		G2CSHM	
ROUGHING		UMG ENDLESS	MEX HR FINE		MEXCSFR	
		UMG ENDLESS	VA HR FINE		MEF901	
		UMG ENDLESS	VA HR FINE		MEF902	
		HSS/Co BR	ALU WR COARSE		WSAR	
		MG PV200	HR FINE		G2CSFR	
		MG PV200	NR COARSE		MDTAWSR	
		HSS-P PV200	UM HR FINE		UMWSFR	
		HSS/Co BR	NR COARSE		WSR	
		HSS/Co PV200	NR COARSE		TAWSR	
		HSS/Co BR	HR FINE		WSFR	
		HSS/Co PV200	HR FINE		TAWSFR	
		HSS/Co BR	HR FINE		WLFR	
		HSS/Co PV200	HR FINE		TAWLFR	
VARIOUS		HSS/Co BR	N		FM	
		HSS/Co PV200	N		TAFM	

Ø RANGE		STEEL / ACCIAIO / STAHL / ACIER					TITANIUM TITANIO TITAN TITANIUM	CAST IRON GHISA GUSS FONTE	ALUMINIUM ALLUMINIO ALUMINUM ALUMINIUM	GRAPHITE GRAFITE GRAPHIT GRAPHITE
		~30HRC	30~45HRC	45HRC~	INOX	INCONEL				
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	●	○		○			○		

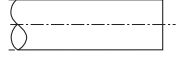
● most suitable / molto adatto / am besten geeignete / le plus indiqué
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VARIOUS	 Z6-Z12	HSS/Co BR	 HR FINE	 30°	FFR	
	 Z6-Z12	HSS/Co PV200	 HR FINE	 30°	TAFFR	
	 Z4	HSS/Co BR	N	 0°	WCR	
	 Z6-Z12	HSS/Co BR	N	 α 45°	WDC	
	 Z6-Z12	HSS/Co BR	N	 α 45°	WDD	
	 Z6-Z8	HSS/Co BR	N	 15°	WTM	
	 Z8-Z14	HSS/Co BR	N	 10°	WWK	

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

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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 / raggata / runder Stirn / bout hémisphérique
	corner radius / torica / Eckradius / torique

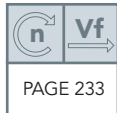
GEOMETRY / GEOMETRIA / GEOMETRIE / GÉOMÉTRIE	
MEX	~HRC65 for hardened steel / per acciai temprati / für Hartstahl / pour acier trempé
UH	HRC50~70 for hardened steel / per acciai temprati / für Hartstahl / pour acier trempé
MDC	for graphite / per grafite / für Graphit / pour graphite
ALU	for aluminium / 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	
	roughing coarse pitch / sgrossare passo grosso / Schruppfräser Regelgewinde / ébauche pas gros
	roughing fine pitch / sgrossare passo fine / Schruppfräser Feingewinde / ébauche pas fin
	roughing for light alloy / sgrossare per leghe leggere / Schruppfräser für weiche Werkstoffe / ébauche pour alliages légers

MATERIAL / MATERIALE / WERKSTOFF / MATIÈRE	
	ultra fine micrograin / micrograna ultra fine / ultrafeine Mikrokörnung / micrograin ultra-fin
	nano micrograin / nano micrograna / nano Mikrokörnung / nano micrograin
	micrograin / micrograna / Mikrokörnung / micrograin
	powder steel / acciaio sinterizzato / Sinterstahl / acier fritté
	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						
						
HARDNESS (HV) / DUREZZA (HV) HÄRTE (HV) / DURETÉ (HV)	3000	3300	3500	3300	4500	5000 - 8000
FRICTION COEFFICIENT / COEFFICIENTE D'ATTRITO REIBUNGSKOEFFIZIENT / COEFFICIENT 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 / PARAMÈTRES	
	parameters reference / riferimento parametri / Parameter Hinweis / référence des paramètres



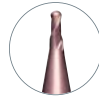
MEXMB2 - MEXCLSB2 - MEX253

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

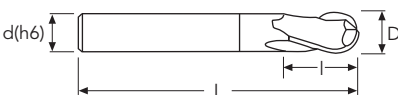
MEXMB2 MEXCSB2 MEXCLSB2 MEX253



MEXMB2



MEXCSB2
MEXCLSB2
MEX253



D	d	l	L	Stock	Stock	Stock	Stock
mm							
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



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			○		

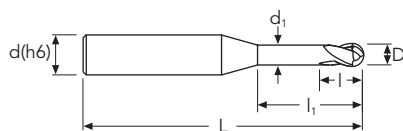
● stock standard ○ non-standard stock EX stock exhaustion



MEXCRB2

Ø mm	~6
tol. D µ	0 / -12
tol. R µ	±10

MEXCRB2



$$d_1 < D$$



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	●

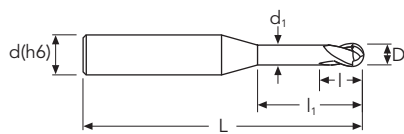
● stock standard ○ non-standard stock EX stock exhaustion



MEXCRB2

Ø mm	~6
tol. D µ	0 / -12
tol. R µ	±10

MEXCRB2



$$d_1 < D$$



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



MEXM2 - MEXCS2

Ø mm	~25
tol. D µ	0 / -12

MEXCL2

Ø mm	~16
tol. D µ	0 / -30



					MEXM2	MEXCS2	MEXCL2
D	d	I	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



MEXM2 - MEXCS2

Ø mm	~25
tol. D µ	0 / -12

MEXCL2

Ø mm	~16
tol. D µ	0 / -30



MEXM2 MEXCS2 MEXCL2								
D	d	I	L		Stock	Stock	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



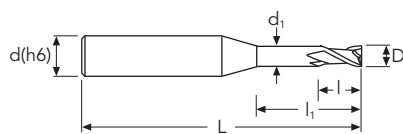
PAGE 236



MEXCR2

Ø mm	~6
tol. D µ	0 / -12

MEXCR2



$d_1 < D$



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	●

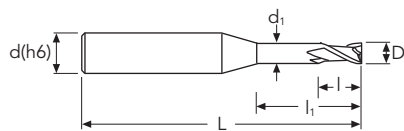
● stock standard ○ non-standard stock EX stock exhaustion



MEXCR2

Ø mm	~6
tol. D µ	0 / -12

MEXCR2



$$d_1 < D$$



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	●

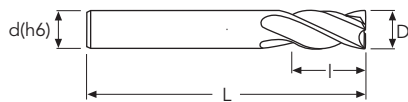
● stock standard ○ non-standard stock EX stock exhaustion



MEXCS4 - MEXCL4

Ø mm	~25
tol. D µ	0 / -30

MEXCS4 MEXCL4



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



MEXCS4 - MEXCL4

Ø mm	~25
tol. D µ	0 / -30



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

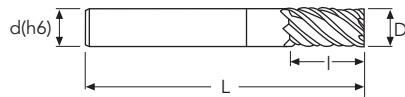
● stock standard ○ non-standard stock EX stock exhaustion



MEXCSHM - MEXCLHM

Ø mm	~25
tol. D µ	0 / -30

MEXCSHM MEXCLHM



D	d	l	L	Stock	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

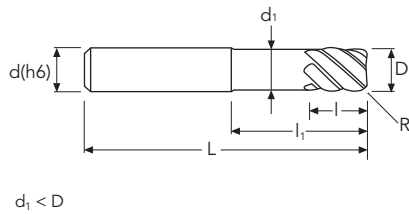
● stock standard ○ non-standard stock EX stock exhaustion



MEX610R - MEX611R

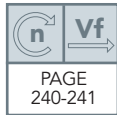
Ø mm	~ 20
tol. D µ	0 / -30
tol. R µ	±20

MEX610R MEX611R



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		○

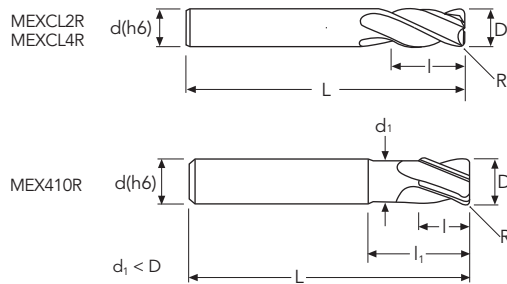
● stock standard ○ non-standard stock EX stock exhaustion



MEXCL2R - MEXCL4R - MEX410R

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

MEXCL2R MEXCL4R MEX410R



D	d	I	I1	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		○	

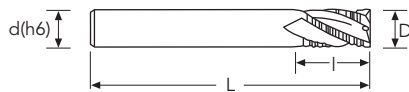
● stock standard ○ non-standard stock EX stock exhaustion



MEXWSFR - MEXCSFR

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

MEXCSFR



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



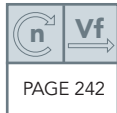
UHCSB2 - UH250

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



					UHCSB2	UH250
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		●

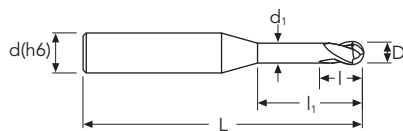
● stock standard ○ non-standard stock EX stock exhaustion



UHCRB2

Ø mm	~6
tol. D µ	0 / -12
tol. R µ	±5

UHCRB2


 $d_1 < D$


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	●	

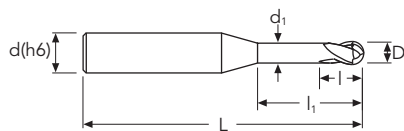
● stock standard ○ non-standard stock EX stock exhaustion



UHCRB2

Ø mm	~6
tol. D µ	0 / -12
tol. R µ	±5

UHCRB2

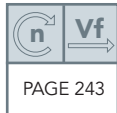


$d_1 < D$



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

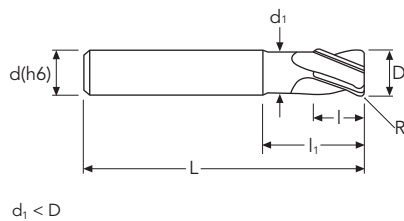


UHF430

Ø mm	~12
tol. D µ	0 / -20
tol. R µ	±5

NEW

UHF430



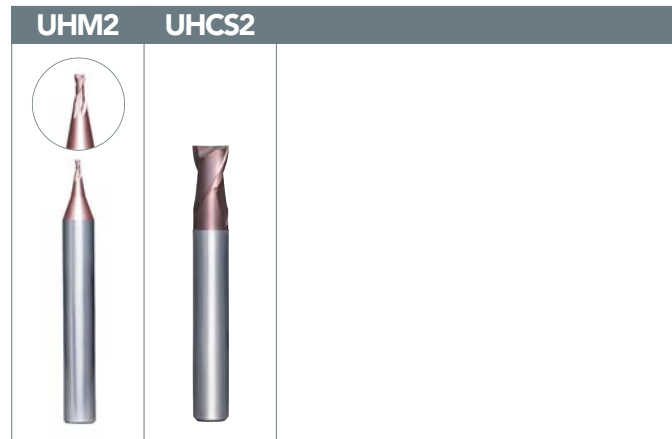
D	d	l	l1	L	Stock
mm 2 R0.5	6	1	6	70	●
3 R0.5	6	1.2	8	70	●
4 R0.5	6	1.5	10	70	●
5 R0.5	6	2	10	70	●
6 R0.5	6	2.5	12	90	●
6 R1	6	2.5	12	90	●
8 R1	8	3.5	16	100	●
8 R2	8	3.5	16	100	●
10 R1	10	4	20	100	●
10 R2	10	4	20	100	●
12 R2	12	5	25	110	●
12 R3	12	5	25	110	●

● stock standard ○ non-standard stock EX stock exhaustion



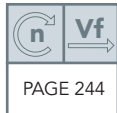
UHM2 - UHCS2

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



UHM2 UHCS2								
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		●		

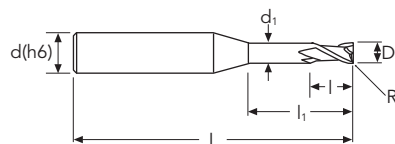
● stock standard ○ non-standard stock EX stock exhaustion



UHCR2

Ø mm	~4
tol. D µ	0 / -12

UHCR2


 $d_1 < D$


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	●	

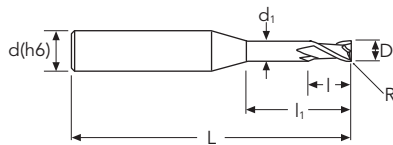
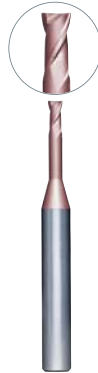
● stock standard ○ non-standard stock EX stock exhaustion



UHCR2

Ø mm	~4
tol. D µ	0 / -12

UHCR2



$$d_1 < D$$



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	○

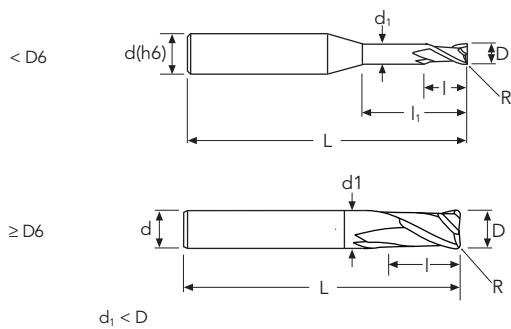
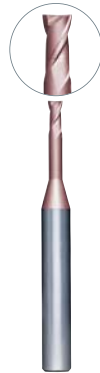
● stock standard ○ non-standard stock EX stock exhaustion



UH211

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

UH211



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	●

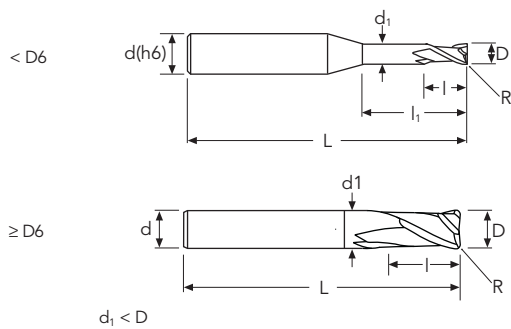
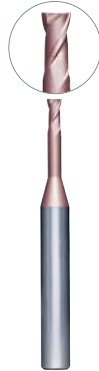
● stock standard ○ non-standard stock EX stock exhaustion



UH211

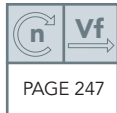
Ø mm	~6	>6
tol. D µ	0 / -12	0 / -15
tol. R µ	±10	±15

UH211



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

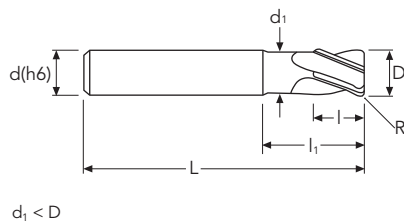


**OSAWA
NORM**

UHCS4

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

UHCS4



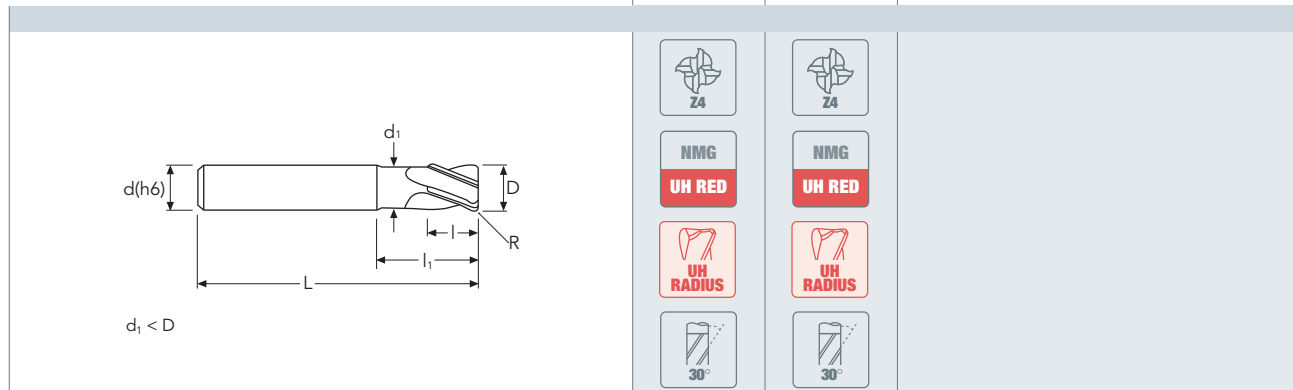
D	d	l	l1	L	Stock
mm 1 R0.1	4	2	3	50	●
1.5 R0.1	4	2.5	4	50	●
2 R0.1	4	3	6	50	●
3 R0.1	6	4	8	55	●
4 R0.1	6	6	10	55	●
5 R0.2	6	6	11	50	●
6 R0.2	6	9	15	60	●
8 R0.2	8	12	20	70	●
10 R0.2	10	15	25	70	●
12 R0.3	12	18	30	80	●

● stock standard ○ non-standard stock EX stock exhaustion



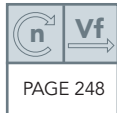
UH411 - UH412

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



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

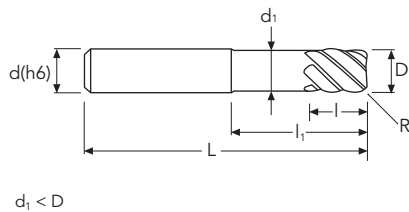


**OSAWA
NORM**

UH610R - UH611R

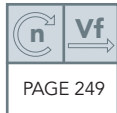
Ø mm	~20
tol. D µ	0 / -30
tol. R µ	±15

UH610R UH611R



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



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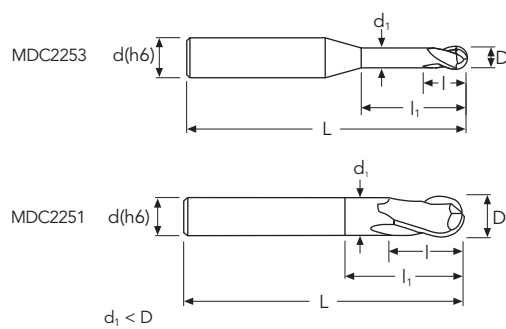
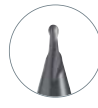
MDC2253 - MDC2251

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

NEW

NEW

MDC2253 MDC2251



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



MDC2203

Ø mm	~2
tol. D µ	0 / -15
tol. R µ	±10

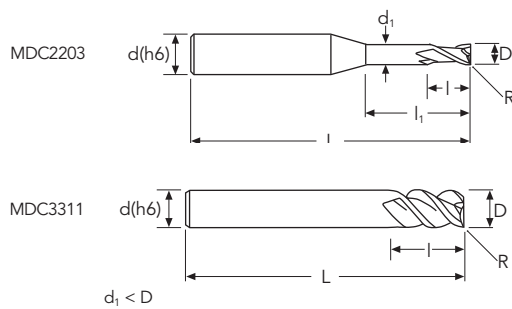
MDC3311

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

NEW

NEW

MDC2203 MDC3311



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

n

Vf

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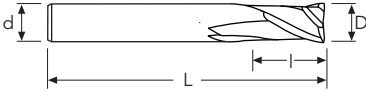
OSAWA

NORM

MDCSA2	
Ø mm	3~20
tol. D µ	0 / -30

MDCSA2



				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

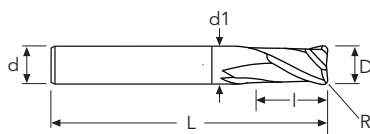


MCA212R



MCA212R

Ø mm	2~12
tol. D µ	0 / -30
tol. R µ	±



$d1 < D$



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



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

NEW

NEW

NEW

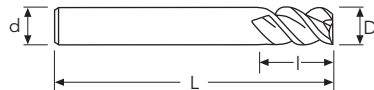
NEW

MDCSA3

MDA310

MDA311

MDA312



d1 < D



D	d(h6)	l	L	Stock	Stock	Stock	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				●

● stock standard ○ non-standard stock EX stock exhaustion

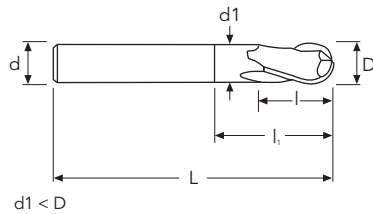


MDCAB2

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

NEW

MDCAB2



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

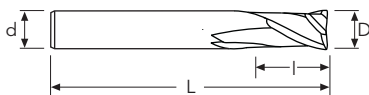


**DIN
844**

WSA2

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

WSA2



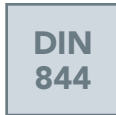
HSS/Co
BR

ALU



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	●	

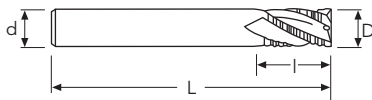
● stock standard ○ non-standard stock EX stock exhaustion



WSAR (js12)

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

WSAR



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	●	

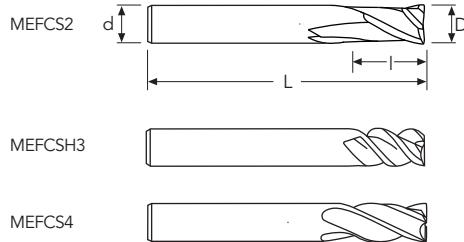
● stock standard ○ non-standard stock EX stock exhaustion



MEFCS2 - MEFCSH3 - MEFCS4

Ø mm	1~20
tol. D µ	0 / -30

MEFCS2 MEFCSH3 MEFCS4



D	d(h6)	I	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



MEF600

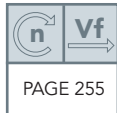
Ø mm	6~20
tol. D µ	0 / -30

MEF600



D	d(h6)	I	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	●	

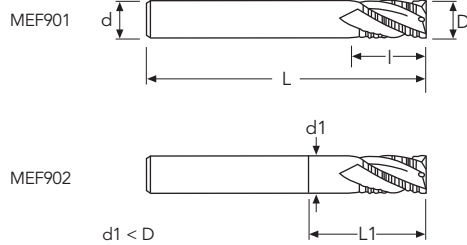
● stock standard ○ non-standard stock EX stock exhaustion



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



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		●

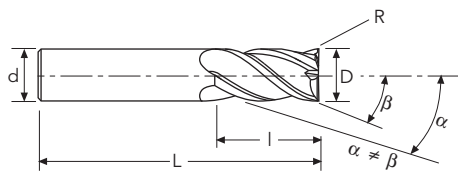
● stock standard ○ non-standard stock EX stock exhaustion



HF400 - HF410R

Ø mm	3~25
tol. D µ	0 / -30

HF400 HF410R



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

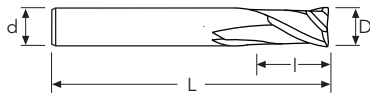


GB205 - G2CS2

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



				Z2 MG BR N 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



GB205 - G2CS2

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

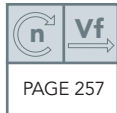
G2210 - G2211 - G2212 - G2213

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



				MG	MG	MG	MG	MG	MG
				BR	PV200	PV200	PV200	PV200	PV200
				N	N	N	N	N	N
D	d	I	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

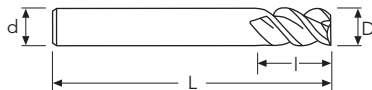


GB305 - G2CSH3

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				
				GB305	G2CSH3	G2310	G2311	G2312
				MG	MG	MG	MG	MG
				BR	PV200	PV200	PV200	PV200
				N	N	N	N	N
D	d	I	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



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



D	d	I	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

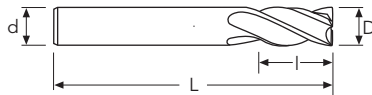


GB405 - G2CS4

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



				Z4	Z4	Z4	Z4	Z4	Z4
				MG	MG	MG	MG	MG	MG
				BR	PV200	PV200	PV200	PV200	PV200
				N	N	N	N	N	N
				30°	30°	30°	30°	30°	30°
D	d	I	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

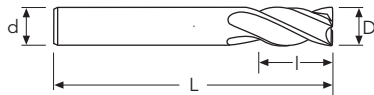


GB405 - G2CS4

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



D	d	I	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						●

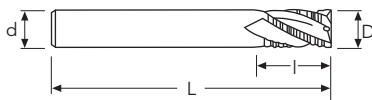
● stock standard ○ non-standard stock EX stock exhaustion



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**OSAWA
NORM**
G2CSFR

Ø mm	~20
tol. D µ	0 / -50

NEW**G2CSFR**

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

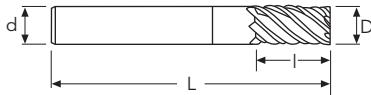


G2CSHM

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

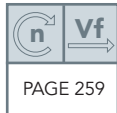
NEW

G2CSHM



D	d	I	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



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

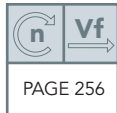
G2250 - G2251

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



				GB255	G2CSB2	G2250	G2251	G2CSB4
				Z2 BALL	Z2 BALL	Z2 BALL	Z2 BALL	Z4 BALL
				MG	MG	MG	MG	MG
				BR	PV200	PV200	PV200	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



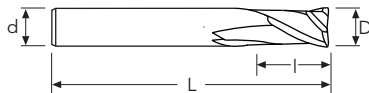
MDTACS2 - MDTA210

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



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



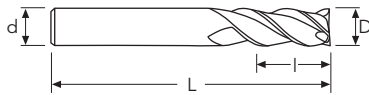
MDTACS3 - MDTAWSH3

Ø mm	1~20
tol. D µ	0 / -30

MDTACS3 MDTAWSH3



MDCS3
MDTACS3

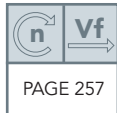


MDTAWSH3



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



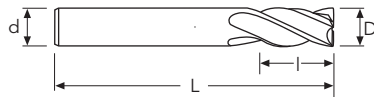
MDTACS4 - MDTA410

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



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			●	○

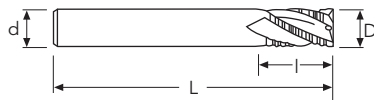
● stock standard ○ non-standard stock EX stock exhaustion



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

MDTAWSR



D(h10)	d(h6)	I	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	●	

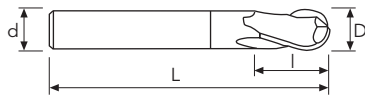
● stock standard ○ non-standard stock EX stock exhaustion



MDTACSB2 - MDTA250

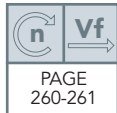
Ø mm	1~20
tol. D µ	0 / -30
tol. R µ	±20

MDTACSB2 MDTA250



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



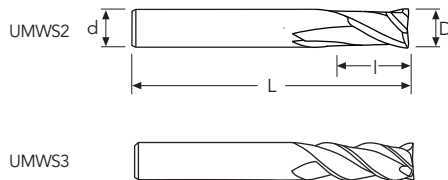
PAGE
260-261

**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



**HSS-P
PV200**

UM



**HSS-P
PV200**

UM



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



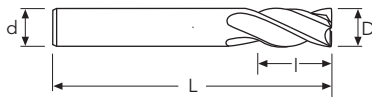
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**DIN
844**

UMWS4

Ø mm	1~20
tol. D µ	0 / +30

UMWS4



**HSS-P
PV200**

UM



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



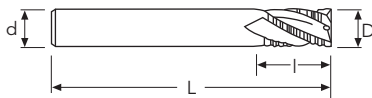
PAGE
262-263

**DIN
844**

UMWSFR (js12)

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

UMWSFR



D(js12)	d(h6)	I	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



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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
WS2 TAWS2							
WSB2 TAWSB2							
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



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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 TAWWS2 WSB2 TAWWSB2				Z2 HSS/Co BR N 30°	Z2 HSS/Co PV200 N 30°	Z2 BALL HSS/Co BR N BALL NOSE 30°	Z2 BALL HSS/Co PV200 N BALL NOSE 30°	
D(e8)	d(h6)	I	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



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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	



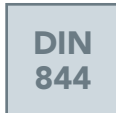
WS3 TAWSH3 WSH3 TAWSH3				
	HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
	N	N	N	N

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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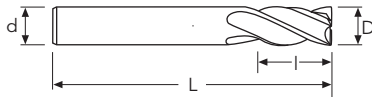
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WS4 - TAWS4

Ø mm	2~40
tol. D µ	0 / +40

WS4 (6) TAWS4 (6)



D	d(h6)	I	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



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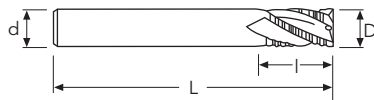
WSR ≤ Ø20
TAWSR ≤ Ø20
WSFR ≤ Ø20
TAWFSR ≤ Ø40



WSR ≥ Ø22
TAWSR ≥ Ø22
WSFR ≥ Ø22

WSR - TAWSR - WSFR - TAWFSR (j12)

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



Z3-Z6



BR

NR
COARSE

30°



Z3-Z6



PV200

NR
COARSE

30°



Z3-Z6



BR

HR
FINE

30°



Z3-Z6



PV200

HR
FINE

30°

D(j12)	d(h6)	I	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



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
WL2 TAWL2 WL2 TAWL2				 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)	I	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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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 (6)	TAWL4 (6)
D	d(h6)	I	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)	○ (Z6)
25	25	90	166	●	○	● (Z6)	● (Z6)
26	25	90	166	●	○	○ (Z6)	○ (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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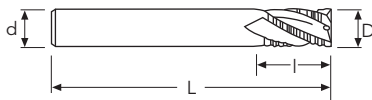
DIN
844



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

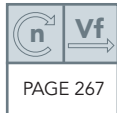
PV200

HR FINE

30°

D(js 12)	d(h6)	I	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

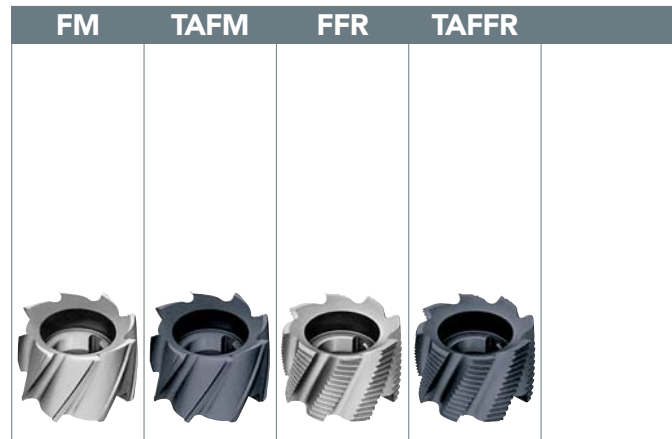


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1880

FM - TAFM - FFR - TAFFR

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



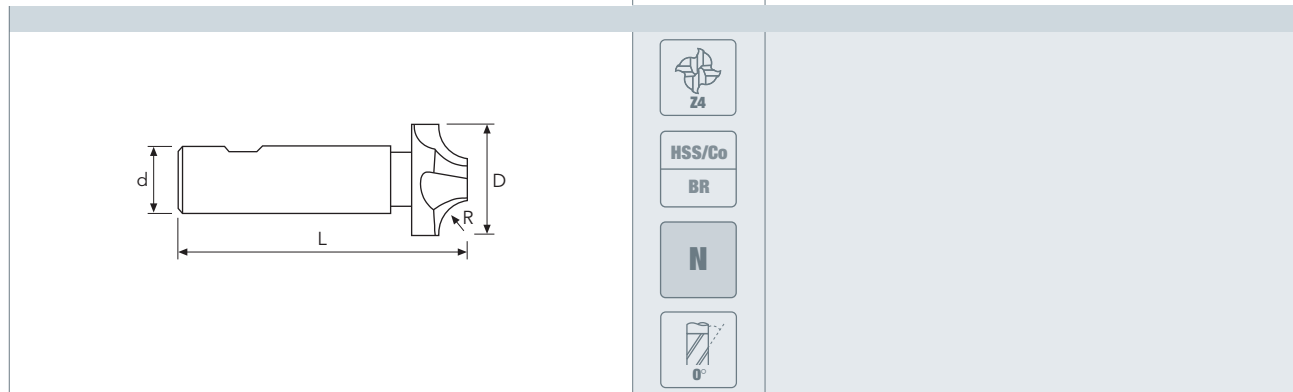
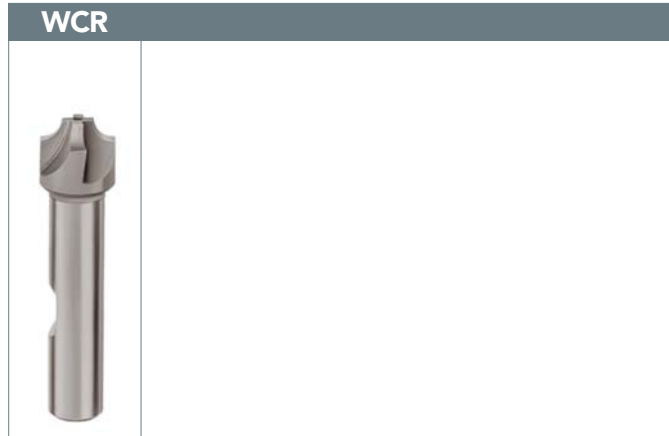
			 Z8-Z14	 Z8-Z14	 Z6-Z12	 Z6-Z12
			HSS/Co BR	HSS/Co PV200	HSS/Co BR	HSS/Co PV200
			N	N	HR FINE	HR FINE
			 30°	 30°	 30°	 30°
D	d1	H	Stock	Stock	Stock	Stock
mm 40	16	32	● (Z8)	● (Z8)	● (Z6)	● (Z6)
50	22	36	● (Z8)	● (Z8)	● (Z8)	● (Z8)
63	27	40	● (Z8)	● (Z8)	● (Z8)	● (Z8)
80	27	45	○ (Z10)	○ (Z10)	○ (Z10)	○ (Z10)
100	32	50	○ (Z10)	○ (Z10)	○ (Z10)	○ (Z10)
160	50	63	○ (Z14)	○ (Z14)	○ (Z12)	○ (Z12)

● stock standard ○ non-standard stock EX stock exhaustion



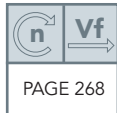
WCR (H11)

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



**DIN
1833**

WDC45 - WDC60 - WDD45 - WDD60 (js16)

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



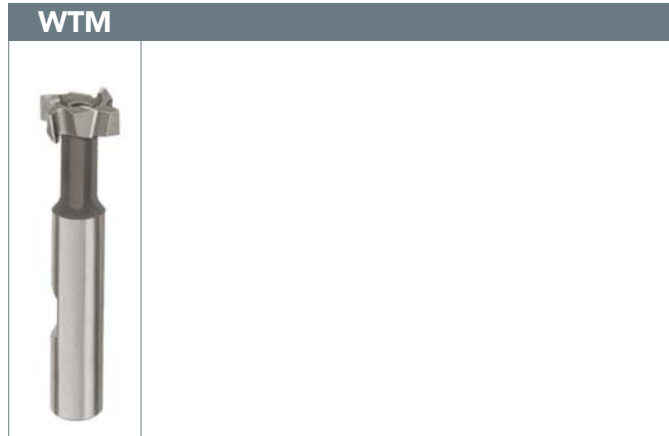
					Z6~Z12	Z6~Z12	Z6~Z12	Z6~Z12
					HSS/Co	HSS/Co	HSS/Co	HSS/Co
					BR	BR	BR	BR
					N	N	N	N
					α	α	α	α
					45°	60°	45°	60°
D(js16)	d(h6)	H	L	Z	Stock	Stock	Stcok	Stock
mm 16	12	4	60	6	●		●	
20	12	5	63	6	●		●	
22	12	6	67	6	●		●	
25	16	6.3	67	8	●		●	
28	16	7.5	67	8	●		●	
32	16	8	71	10	●		●	
38	16	10	80	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



WTM (d11)

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



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

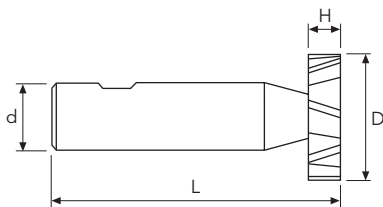


**DIN
850**

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

WWK



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

Parameters

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 FLUSSSTÄHLE 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 KOHLENSTOFFFREICHE 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	-	55Si8	-	-	-
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/mm ² 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/mm ² 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/mm ² (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 MARTENSITQUES 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	-	-	-	-

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
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 GEWALTZTES 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	-	-	-	-	-	-

GROUPS / GRUPPI / GRUPE / 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

GROUPS / GRUPPI / GRUPE / 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	-
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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CAPTION-FORMULAS / LEGENDA-FORMULE / FORMELN / FORMULE

Vc (m/min)	speed / velocità / Geschwindigkeit / vitesse	$Vc (m/min) = \frac{\pi \times D \times n}{1000}$ $n (rev/min) = \frac{1000 \times Vc}{\pi \times D}$ $Vf (mm/min) = n \times Zn \times fz$ $fn (mm/rev) = Zn \times fz$
D (mm)	diameter / diametro / Durchmesser / diamètre	
n (rev/min)	revolutions per minute / nr di giri al minuto	
	U/min (Umdrehungen pro Minute) / tours par minute	
π	3,14	
Vf (mm/min)	feed / avanzamento / Vorschub / avance	
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)	

NEW TYPHOON DRILLS											
343TA - 318N* - 353TA - 355TA - 353HTA - 353SUH - 353ALH - 355HTA - 355SUH - 355ALH - 3584HTA											
GROUP GRUPPO GRUPPE GROUPE	ISO	N/mm ²	L	fn (mm/rev) - Ø						Vc (m/min)	
1 2 3 4				3~5	5~8	8~11	11~14	14~17	17~20		
3 4 5	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	P	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	P	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	0.25~0.31	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	M		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/mm ²	L	fn (mm/rev) - Ø							
1 2 3 4				1~1.5	1.5~2	2~2.5	2.5~2.9				
3 4 5	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	P	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	P	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	M		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	0.063~0.090	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	17	
												18	19	20	
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	17	
												18	19	20	
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	12		234		45		56		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	0.200	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	13	14	13	14					
Vc [m/min]	15~18		12~14		24~28		10~12						
HRC	~30		20~40										
N/mm ²	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 SCHNEIDGESCHWINDIGKEIT 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/mm ²				
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/mm ²				
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/mm ²	~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 13	4 14	5	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*		
C ap x p			0.05Dx0.3mm*		0.05x0.03mm*		

HSC

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

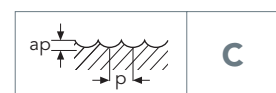
*~Ø6 ap=0.2mm

**MEX253: n & Vf = -20%

MEXMB2					
GROUP GRUPPO GRUPPE GROUPE	67		78		
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	
C ap x p	0.15Dx0.05D		0.1Dx0.05D		
C ap x p	0.15Dx0.075D		0.15Dx0.05D		

Ø<1

Ø≥1

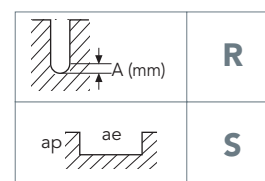


MEXCRB2									
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14			6 7			8		
Vc [m/min]	40~140			30~90			20~65		
HRC	~30			30~45			45~55		
N/mm ²	~1000			1000~1500			1500~		
Ø mm.	n	Vf	A	n	Vf	A	n	Vf	A
0.4	31000~40000	180~490	0.018~0.036	22500~28000	85~270	0.018~0.036	14500~18000	85~180	0.004~0.007
0.5	31000~40000	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 13	4 14	5	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%



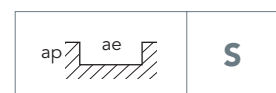
MEXM2					
GROUP GRUPPO GRUPPE GROUPE	6 7		8		
Vc [m/min]	35~55		28~42		
HRC	30~45		45~55		
N/mm ²	1000~1500		1500~		
Ø mm.	n	Vf	n	Vf	
0.4	30000	90	23000	50	
0.8	24000	150	18000	65	
1	20000	160	15000	75	
1.2	16000	160	12000	75	
1.5	12000	150	9000	70	
S ap x ae	0.25DxD		0.05D**xD		

*~Ø1 ap=0.15D

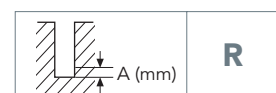
**~Ø1 ap=0.02D

MEXCL2							
GROUP GRUPPO GRUPPE GROUPE	3 4 5		6 7		8		
	13 14						
Vc [m/min]	45~65		35~55		22~32		
HRC	~30		30~45		45~55		
N/mm ²	~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	0.3DxD		0.3DxD		0.05DxD		

*~Ø3 ap=0.4mm



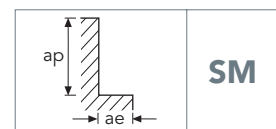
MEXCR2									
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14			6 7			8		
Vc [m/min]	40~90			30~65			20~50		
HRC	~30			30~45			45~55		
N/mm ²	~1000			1000~1500			1500~		
Ø mm.	n	Vf	A	n	Vf	A	n	Vf	A
0.4	31000~40000	200~440	0.007~0.018	22500~28000	85~340	0.007~0.018	14300~17000	30~90	0.004~0.008
0.5	31000~40000	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/mm ²	~1000	1000~1500				1500~				
Ø mm.	n Vf	n Vf	n Vf	n Vf	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

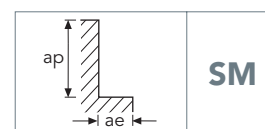
MEXCL4									
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		8		
Vc [m/min]	55~75	30~45		20~28		16~22			
HRC	~30	30~45		45~55		55~65			
N/mm ²	~1000	1000~1500		1500~					
Ø mm.	n Vf	n Vf	n Vf	n Vf	n Vf	n Vf	n Vf	n Vf	n Vf
2	8850 200	5050 80	3150 45	2700 25					
3	6200 230	3600 100	2200 55	1900 30					
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		



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/mm ²	~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/mm ²	~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		

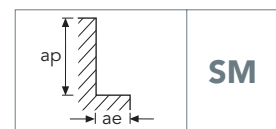


MEX610R									
GROUP GRUPPO GRUPPE GROUPE	3 13	4 14	5	6 7	8	8			
Vc [m/min]	115~130		70~80 (HSC 300~320)		40~50 (HSC 150~170)		22~26 (HSC 75~85)		
HRC	~30		30~45		45~55		55~65		
N/mm ²	~1000		1000~1500		1500~				
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	
6	6700	790	4100	490	2400	95	1350	70	
6 HSC			16800	6100	8400	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		Dx0.03D		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/mm ²									
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

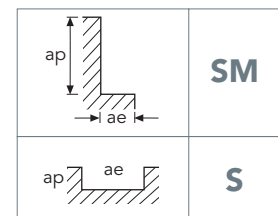


MEX410R									
GROUP GRUPPO GRUPPE GROUPE	3 13	4 14	5	6 7	8	8			
Vc [m/min]	90~130		55~85 (HSC180~240)		40~55 (HSC100~125)		20~25 (HSC70~90)		
HRC	~30		30~45		45~55		55~65		
N/mm ²	~1000		1000~1500		1500~				
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	
2	13900	340	9100	210	6100	60	3000	50	
2 HSC			29000	590	15500	310	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

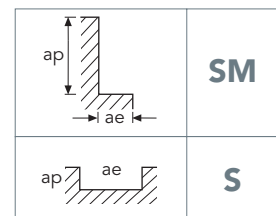
MEXCL2R									
GROUP GRUPPO GRUPPE GROUPE	3 13	4 14	5	6 7	8	8			
Vc [m/min]	60~80		40~55		25~35		18~22		
HRC	~30		30~45		45~55		55~65		
N/mm ²	~1000		1000~1500		1500~				
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	
3	6600	140	4300	70	2650	35	1900	20	
4	5350	170	3400	85	2150	40	1500	20	
5	4600	210	2900	100	1900	50	1250	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%



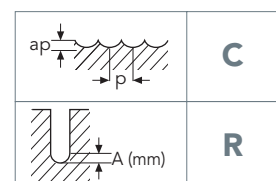
MEXCL4R									
GROUP GRUPPO GRUPPE GROUPE	3 4 5 13 14		6 7		8		8		
Vc [m/min]	60~20		40~55		25~35		18~22		
HRC	~30		30~45		45~55		55~65		
N/mm ²	~1000		1000~1500		1500~				
Ø mm.	n Vf		n Vf		n Vf		n Vf		
3	6600 170		4300 130		2650 65		1900 30		
4	5350 210		3400 180		2150 70		1500 35		
5	4600 220		2900 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/mm ²	~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	



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/mm ²	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/mm ²	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	Ax D			Ax D			Ax D		



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		

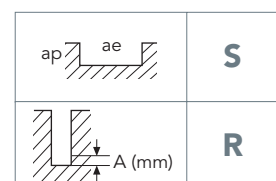
GROUP GRUPPO GRUPPE GROUPE	17		
Vc [m/min]	30~160		
HRC			
N/mm ²			
Ø mm.	n	Vf	A
0.2	50000	450~530	0.010~0.020
0.3	50000	690~790	0.005~0.025
0.4	50000	1000~1150	0.020~0.050
0.5	48000~50000	1100~1400	0.010~0.040
0.6	43000~49000	1100~1700	0.010~0.050
0.8	32000~45000	1100~2250	0.025~0.095
1	25000~45000	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		

	SM
	R

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		

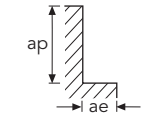
↓ Z axis : Vf = -50%

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/mm ²	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	Ax D			Ax D			Ax D		



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		

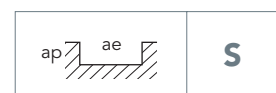
GROUP GRUPPO GRUPPE GROUPE	17		
Vc [m/min]	30~125		
HRC			
N/mm ²			
Ø mm.	n	Vf	A
0.2	50000	450~530	0.010~0.020
0.3	50000	550~650	0.010~0.025
0.4	50000	800~920	0.010~0.045
0.5	50000	800~1150	0.010~0.060
0.6	38000~50000	780~1250	0.010~0.050
0.8	29000~47000	780~1300	0.015~0.070
1	23000~35000	800~1300	0.020~0.050
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		

	SM
	R

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/mm ²	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		

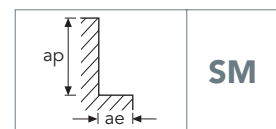
UH211													
GROUP GRUPPO GRUPPE GROUPE	6 7		7 8		8		8		8		8		
Vc [m/min]	70~250		70~200		60~130		50~100		40~75		30~70		
HRC	30~40		40~50		50~55		55~60		60~65		65~70		
N/mm ²	1000~1250		1250~										
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	
0.5	50000	290	45000	220	40000	170	33000	110	26000	60	20000	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	67		78		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	67		78		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		



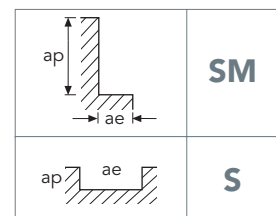
SM

UH411 - UH412															
GROUP GRUPPO GRUPPE GROUPE			67		78		8		8		8		8		
Vc [m/min] HRC N/mm² Ø mm.	150~250		120~200		80~130		65~100		50~75		40~70				
	30~40		40~50		50~55		55~60		60~65		65~70				
	1000~1250		1250~												
	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	67		78		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/mm ²													
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%

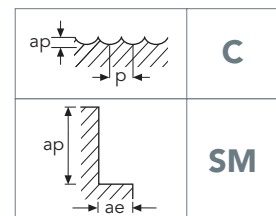


MDC2251			
GROUP GRUPPO GRUPPE GROUPE	GRAPHITE		
Vc [m/min]	180~360		
HRC			
N/mm ²			
Ø mm.	n	Vf	
2	30000	1600	
2.5	27000	1650	
3	24000	1700	
3.5	22500	1800	
4	21000	1900	
5	18000	2400	
6	16000	2800	
8	13000	2600	
10	11500	2500	
12	9500	2400	
C ap x p	0.2Dx0.1D		

MDC2253			
GROUP GRUPPO GRUPPE GROUPE	GRAPHITE		
Vc [m/min]	80~250		
HRC			
N/mm ²			
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/mm ²			
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%



MDCSA2			
GROUP GRUPPO GRUPPE GROUPE	15 16		
Vc [m/min]	100~250		
HRC			
N/mm ²			
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		

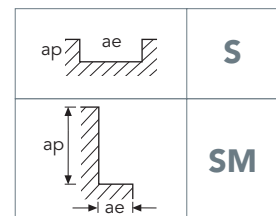
*≤Ø10 ae=0.25D

↓ Z axis : Vf = -50%

MCA212R			
GROUP GRUPPO GRUPPE GROUPE	15 16		
Vc [m/min]	130~380		
HRC			
N/mm ²			
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%



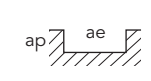
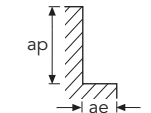
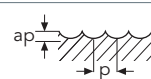
MDCSA3 - MDA310* - MDA311** - MDA312**			
GROUP GRUPPO GRUPPE GROUPE	15 16		
Vc [m/min]	150~250		
HRC			
N/mm ²			
Ø mm.	n Vf		
3	21200 950		
4	16000 960		
5	12800 960		
6	10600 960		
8	8000 960		
10	6400 1150		
12	5300 1200		
16	4000 1200		
20	3200 1200		
S ap x ae	0.5DxD		
SM ap x ae	1.5Dx0.2D		

*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/mm ²			
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		

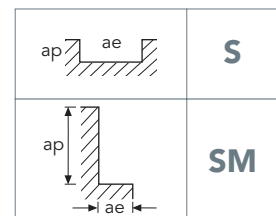
	S
	SM
	C

WSA2			
GROUP GRUPPO GRUPPE GROUPE	15 16		
Vc [m/min]	80~150		
HRC			
N/mm ²			
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/mm ²	~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		

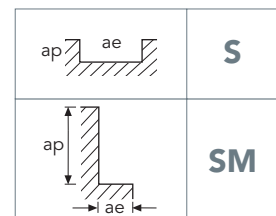


MEFCS2						
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6	6 7	9 10 26			
Vc [m/min]	60~90	40~55	35~45			
HRC	~30	30~45				
N/mm ²	~1000	1000~1500				
Ø mm.	n Vf	n Vf	n Vf			
2	9300 190	6100 120	5100 90			
3	7200 210	4500 140	3700 120			
4	6100 300	3700 180	3100 150			
5	5100 320	3000 190	2550 160			
6	4500 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%

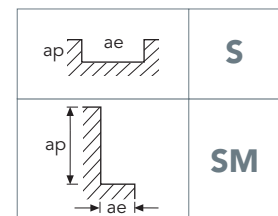
MEFCS4						
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6	6 7	9 10 26			
Vc [m/min]	60~90	40~55	35~45			
HRC	~30	30~45				
N/mm ²	~1000	1000~1500				
Ø mm.	n Vf	n Vf	n Vf			
2	9300 280	6100 170	5100 140			
3	7200 320	4500 200	3700 170			
4	6100 570	3700 350	3100 280			
5	5100 600	3000 360	2550 300			
6	4500 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			



MEFCSH3									
GROUP GRUPPO GRUPPE GROUPE	123 456	67		91026		2223			
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%

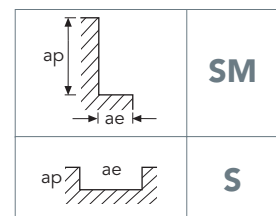
MEFCSH3									
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 5 6	6 7		9 10 26		22 23			
Vc [m/min]	90~110		60~70		50~55		22~26		
HRC	~30		30~45						
N/mm²	~1000		1000~1500						
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	
6	5500	650	3400	510	2850	240	1300	80	
8	4200	710	2500	460	2100	240	920	80	
10	3300	630	2000	360	1700	210	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/mm ²	~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/mm ²	~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



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%

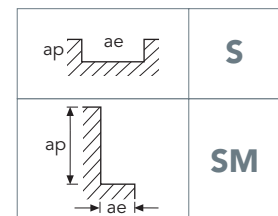
G2 - MDTA 2FL													
GROUP GRUPPO GRUPPE GROUPE	1 3	2 4	5 6		9 10 11		13 14		16		17 18 19		
Vc [m/min]	70~85		60~75		30~40		55~65		140~150		120~140		
HRC	~25		25~40										
N/mm²	~850		850~1250										
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	
1	24850	250	21650	170	11150	70	19100	190	47750	480	41400	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/mm ²	~850	850~1250										
Ø mm.	n Vf	n Vf	n Vf	n Vf	n Vf	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%

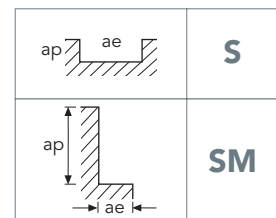
↓ Z axis : Vf = -50%

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/mm ²	~850	850~1250										
Ø mm.	n Vf	n Vf	n Vf	n Vf	n Vf	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%

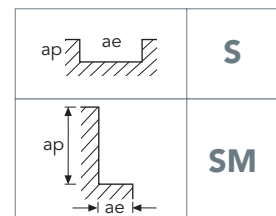
G2412 - G2413 - MDTA4L4 n & Vf = -50%

GB405 - G2213 - MDCL4 n & Vf = -30%



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/mm ²	~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/mm ²	~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					



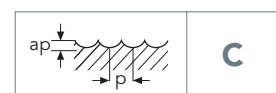
G2 - MDTA SFL BALL													
GROUP GRUPPO GRUPPE GROUPE	1 3	2 4	5 6	7	9 10 11	13 14	16 17 18 19						
Vc [m/min]	90~110		85~105		75~85		55~65		90~110		140~160		
HRC	~25		25~40		40~45								
N/mm ²	~850		850~1250		1250~1500								
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	
1	31850	320	30250	240	25500	150	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		0.5Dx0.2D		
Ø>1	C ap x p		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 3	2 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/mm ²	~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				
Ø>1	C ap x p		0.2Dx0.1D		0.2Dx0.1D		0.2Dx0.1D		0.2Dx0.1D				

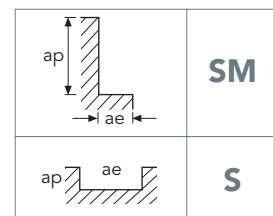


C

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/mm ²	~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/mm ²	~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		

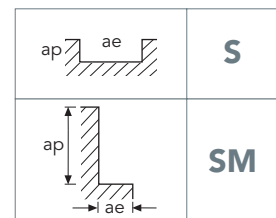
↓ Z axis : Vf = -50%



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/mm ²	~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		

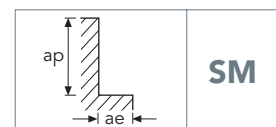
↓ Z axis : Vf = -50%

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/mm ²	~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/mm ²	~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/mm ²	~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				



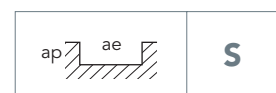
UMWSFR									
GROUP GRUPPO GRUPPE GROUPE	1 2 3 4 13 14	4 5	6	9 10					
Vc [m/min]	50~60		40~50		30~35		25~30		
HRC	~20		20~30		30~35				
N/mm ²	~800		800~1000		1000~1100				
Ø mm.	n	Vf	n	Vf	n	Vf	n	Vf	
6	2700	150	2100	120	1500	80	1300	70	
8	2300	190	1800	150	1300	110	1000	80	
10	1800	270	1400	210	1000	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 (TAW2**) - 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/mm ²	~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%



WS3 (TAW3**) - 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/mm ²	~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%;

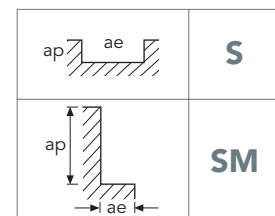
**TAW... : n & Vf = +30%~+50%

WS3 (TAW3**) - 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/mm ²	~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%



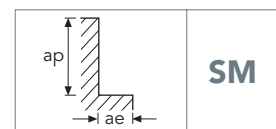
WSH3 (TAWSH3*)						
GROUP GRUPPO GRUPPE GROUPE	2 3 13 14	4 5 13 14	6 9 10			
Vc [m/min]	30~40	25~35	20~30			
HRC	~20	20~30	30~40			
N/mm ²	500~800	800~1000	1000~1300			
Ø mm.	n Vf	n Vf	n Vf			
6	1800 85	1300 55	900 35			
8	1200 95	1000 65	600 40			
10	1000 95	900 70	500 40			
12	900 110	700 70	450 45			
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 (TAW4**) - 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/mm ²	~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%



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/mm ²	~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 (TAWSR**) - WLF2* (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/mm ²	~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	1.5DxD		1.5DxD		1.5DxD		1.5DxD		1.5DxD		

*WLF2: Vf=-50%;

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

***S: Vf=-25%

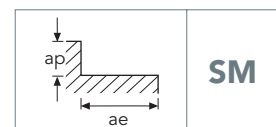
	C
	S
	SM

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/mm ²	~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/mm ²	~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%



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/mm ²	~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/mm ²	~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/mm ²	~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					