FEATURING THE LATEST PRODUCTS FROM WIDIA™ AND HANITA™

ADVANCES

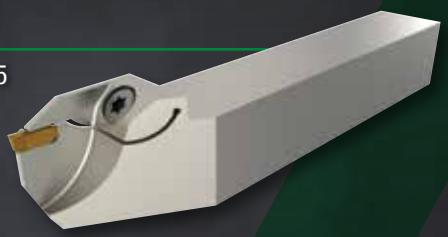
METRIC | 2021

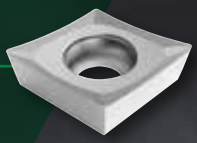
WIDIA™

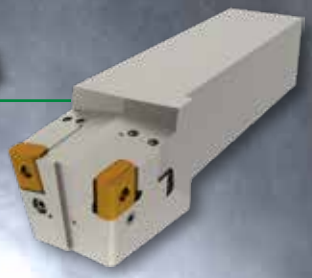
HANITA®

INTRODUCING...

NEW PRODUCTS







WIRIA™

HANITA

WIDIA

VariMill™ XTREME™

pages 4–13

ALUFLASH™

pages 14–25

HANITA™


HANITA™

PRODUCTIVITY

Solid end mills in the Hanita portfolio achieve exceptional levels of productivity in complex operations at increased cutting parameters.

DURABILITY

End mills in the Hanita portfolio feature optimized geometries capable of peak performance in high-demand machining strategies.

INNOVATION

Hanita is a brand for innovation enthusiasts who are searching for precision-engineered solid carbide end mill solutions.

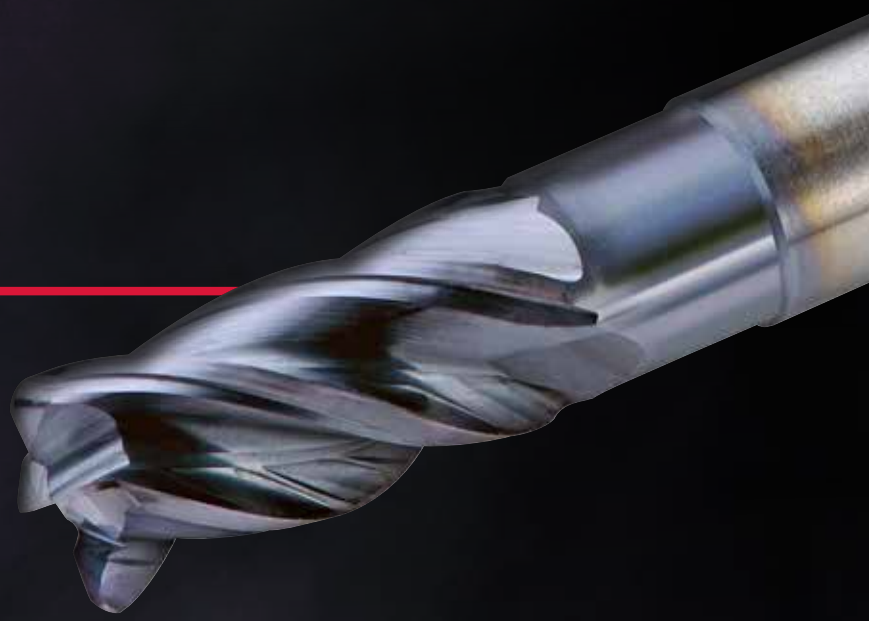
Hanita **high-performance solid carbide end mill solutions** are developed for customers who have a passion for performance.

Offering a comprehensive range of standard and custom end mills spanning a broad range of diameters and lengths, all boasting **unparalleled metal removal rates** through **innovative geometries**. Hanita delivers not only the tool for the job but **the experience** to develop a solution for the customer.

Hanita solutions are available through WIDIA channel partners.

VariMill™ XTREME™

High-Performance Solid End Milling



Materials

P M K S H

Applications

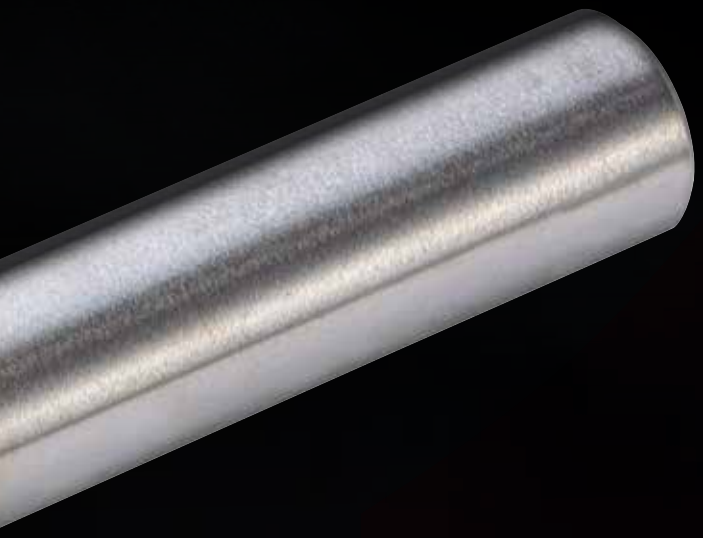
- Slotting
- Side Milling/ Shoulder Milling
- Ramping
- Helical Interpolation
- Plunge Milling
- Trochoidal Milling
- Drilling

WS15PE Grade

4-flute solid carbide end mill, sharp edges, chamfers and corner radii designs available.

HANITA™

WIDIA



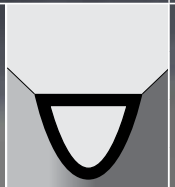
Built-in features to enable aggressive versatility.

Twisted End Face to improve edge stability, which enables aggressive ramping angles and helical capability.

Non-Linear Chip Gashes for improved chip evacuation, enabling the ramping function and z-axis machining.

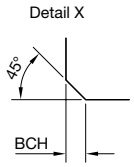
Four Asymmetrical Divided Flutes with Variable Helix Angle to reduce vibrations.

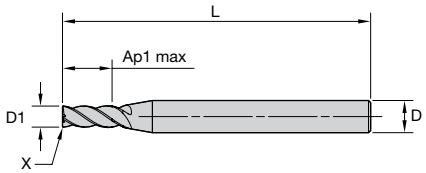
Parabolic Core for increased tool stability and reduced deflection.

Coating	Grade Description	wear resistance ← → toughness	05	10	15	20	25	30	35	40	45
WS15PE 	PVD-coated carbide grade with optimized chemistry and process for increased wear resistance. State-of-the-art, post-coat treatment reduces friction and helps manage heat when cutting super alloys.	P									
		M									
		K									
		S									
		H									

SOLID END MILLING

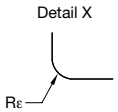
SERIES 4X0E • CHAMFERED • 4 FLUTES • CYLINDRICAL SHANK • METRIC

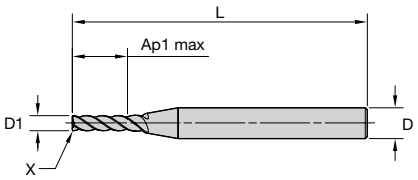




grade WS15PE AlTiN				length of cut	length	
order #	catalogue #	D1	D	Ap1 max	L	BCH
6829315	4X0EM04002CST	4,0	6	8,00	57	0,10
6829320	4X0EM05002CST	5,0	6	10,00	57	0,10
6829695	4X0EM06002CST	6,0	6	12,00	57	0,10
6829881	4X0EM08003CAT	8,0	8	16,00	63	0,20
6829888	4X0EM10004CAT	10,0	10	20,00	72	0,20
6830075	4X0EM12005CCT	12,0	12	24,00	83	0,30

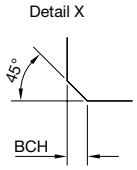
SERIES 4X0E • RADIUSED • 4 FLUTES • CYLINDRICAL SHANK • METRIC

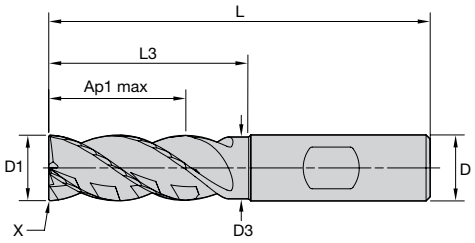




grade WS15PE AlTiN				length of cut	length	
order #	catalogue #	D1	D	Ap1 max	L	Rε
6829314	4X0EM03002RAT	3,0	6	9,50	57	0,20
6830480	4X0EM25008RKT	25,0	25	50,00	121	1,50
6830671	4X0EM25008RPT	25,0	25	50,00	121	3,00

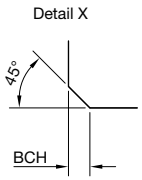
SERIES 4XNE • CHAMFERED • 4 FLUTES • NECKED • WELDON® SHANK • METRIC

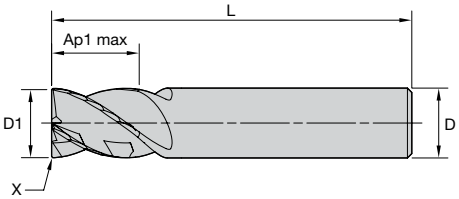




order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH
grade WS15PE AlTiN								
6829319	4XNEM04002CSW	4,0	6	3,76	12,00	16,00	57	0,10
6829694	4XNEM05002CSW	5,0	6	4,70	13,00	18,00	57	0,10
6829700	4XNEM06002CSW	6,0	6	5,64	13,00	21,00	57	0,10
6829887	4XNEM08003CAW	8,0	8	7,52	16,00	27,00	63	0,20
6830074	4XNEM10004CAW	10,0	10	9,40	22,00	32,00	72	0,20
6830282	4XNEM12005CCW	12,0	12	11,28	26,00	36,00	83	0,30
6830285	4XNEM16006CCW	16,0	16	15,04	32,00	48,00	92	0,30
6830473	4XNEM20007CCW	20,0	20	18,80	40,00	60,00	115	0,30

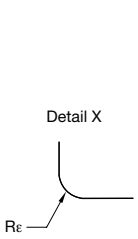
SERIES 4XNE • CHAMFERED • 4 FLUTES • CYLINDRICAL SHANK • METRIC

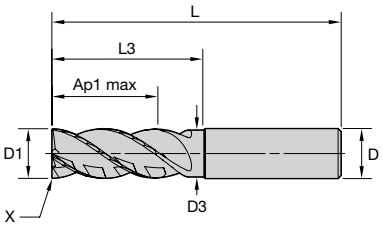




order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
grade WS15PE AlTiN						
6830283	4X0EM16006CCT	16,0	16	18,00	82	0,30

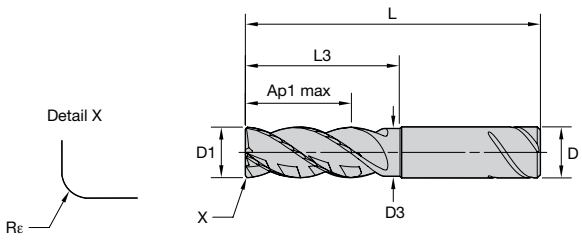
SERIES 4XNE • RADIUSED • 4 FLUTES • NECKED • CYLINDRICAL SHANK • METRIC





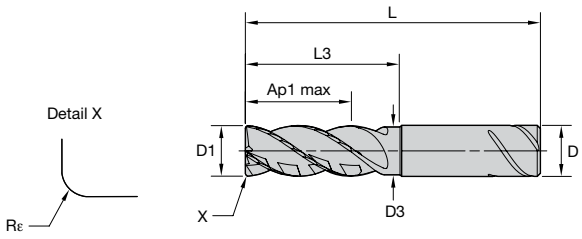
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
		grade WS15PE AlTiN						
6829317	4XNEM04002RAT	4,0	6	3,76	8,00	12,00	57	0,20
6829318	4XNEM04002RET	4,0	6	3,76	8,00	12,00	57	0,50
6829692	4XNEM05002RAT	5,0	6	4,70	10,00	15,00	57	0,20
6829693	4XNEM05002RET	5,0	6	4,70	10,00	15,00	57	0,50
6829697	4XNEM06002RAT	6,0	6	5,64	12,00	18,00	57	0,20
6829698	4XNEM06002RET	6,0	6	5,64	12,00	18,00	57	0,50
6829699	4XNEM06002RJT	6,0	6	5,64	12,00	18,00	57	1,00
6829883	4XNEM08003RAT	8,0	8	7,52	16,00	24,00	63	0,20
6829884	4XNEM08003RET	8,0	8	7,52	16,00	24,00	63	0,50
6829885	4XNEM08003RJT	8,0	8	7,52	16,00	24,00	63	1,00
6829886	4XNEM08003RKT	8,0	8	7,52	16,00	24,00	63	1,50
6829890	4XNEM10004RCT	10,0	10	9,40	20,00	30,00	72	0,30
6830071	4XNEM10004RET	10,0	10	9,40	20,00	30,00	72	0,50
6830072	4XNEM10004RJT	10,0	10	9,40	20,00	30,00	72	1,00
6830073	4XNEM10004RKT	10,0	10	9,40	20,00	30,00	72	1,50
6830077	4XNEM12005RET	12,0	12	11,28	24,00	36,00	83	0,50
6830079	4XNEM12005RKT	12,0	12	11,28	24,00	36,00	83	1,50
6830080	4XNEM12005RMT	12,0	12	11,28	24,00	36,00	83	2,00
6830281	4XNEM12005RPT	12,0	12	11,28	24,00	36,00	83	3,00
6830286	4XNEM16006RET	16,0	16	15,04	32,00	48,00	92	0,50
6830288	4XNEM16006RKT	16,0	16	15,04	32,00	48,00	92	1,50
6830289	4XNEM16006RPT	16,0	16	15,04	32,00	48,00	92	3,00
6830471	4XNEM16006RQT	16,0	16	15,04	32,00	48,00	92	4,00
6830474	4XNEM20007RET	20,0	20	18,80	40,00	60,00	115	0,50
6830476	4XNEM20007RKT	20,0	20	18,80	40,00	60,00	115	1,50
6830477	4XNEM20007RPT	20,0	20	18,80	40,00	60,00	115	3,00
6830478	4XNEM20007RRT	20,0	20	18,80	40,00	60,00	115	5,00

SERIES 4XNE • RADIUSED • 4 FLUTES • NECKED • SAFE-LOCK™ SHANK • METRIC



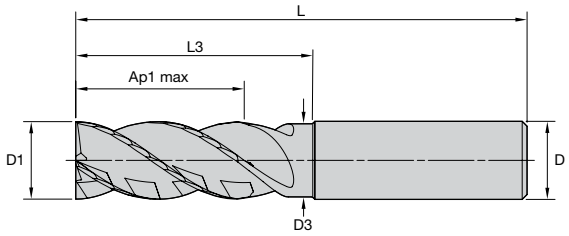
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
grade WS15PE AlTiN								
6830078	4XNEM12005RJV	12,0	12	11,28	24,00	36,00	83	1,00
6830287	4XNEM16006RJV	16,0	16	15,04	32,00	48,00	92	1,00
6830475	4XNEM20007RJV	20,0	20	18,80	40,00	60,00	115	1,00

SERIES 4X0E • RADIUSED • 4 FLUTES • SAFE-LOCK SHANK • METRIC



order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
grade WS15PE AlTiN						
6830479	4X0EM25018RJV	25,0	25	50,00	135	1,00

SERIES 4XNE • SQUARE END • 4 FLUTES • NECKED • CYLINDRICAL SHANK • METRIC



grade WS15PE AlTiN							
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
6829316	4XNEM04002SZT	4,0	6	3,76	8,00	12,00	57
6829691	4XNEM05002SZT	5,0	6	4,70	10,00	15,00	57
6829696	4XNEM06002SZT	6,0	6	5,64	12,00	18,00	57
6829882	4XNEM08003SZT	8,0	8	7,52	16,00	24,00	63
6829889	4XNEM10004SZT	10,0	10	9,40	20,00	30,00	72
6830076	4XNEM12005SZT	12,0	12	11,28	24,00	36,00	83
6830284	4XNEM16006SZT	16,0	16	15,04	32,00	48,00	92
6830472	4XNEM20007SZT	20,0	20	18,80	40,00	60,00	115

VARIMILL™ XTREME™ • SIDE MILLING AND SLOTTING • APPLICATION DATA • METRIC

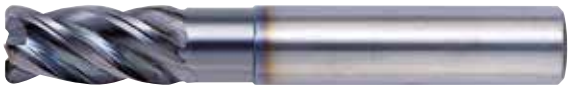
Material Group		Side Milling (A) and Slotting (B)			WS15PE Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B				D1 — Diameter												
		ap	ae	ap	min	Start	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D1	0,5 x D1	1,25 x D1	150	175	200	fz	0,023	0,031	0,040	0,048	0,066	0,079	0,091	0,102	0,111	0,119	0,125	0,136
	1	1,5 x D1	0,5 x D1	1,25 x D1	150	175	200	fz	0,023	0,031	0,040	0,048	0,066	0,079	0,091	0,102	0,111	0,119	0,125	0,136
	2	1,5 x D1	0,5 x D1	1,25 x D1	140	165	190	fz	0,023	0,031	0,040	0,048	0,066	0,079	0,091	0,102	0,111	0,119	0,125	0,136
	3	1,5 x D1	0,5 x D1	1,25 x D1	120	140	160	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	4	1,5 x D1	0,5 x D1	1,25 x D1	90	120	150	fz	0,018	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
	5	1,5 x D1	0,5 x D1	1,25 x D1	60	80	100	fz	0,016	0,021	0,027	0,032	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
	6	1,5 x D1	0,5 x D1	1,25 x D1	50	65	75	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078
M	1	1,5 x D1	0,5 x D1	1,25 x D1	90	100	115	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	2	1,5 x D1	0,5 x D1	1,25 x D1	60	70	80	fz	0,016	0,021	0,027	0,032	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
	3	1,5 x D1	0,5 x D1	1,0 x D1	60	65	70	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078
K	1	1,5 x D1	0,5 x D1	1,0 x D1	120	135	150	fz	0,023	0,031	0,040	0,048	0,066	0,079	0,091	0,102	0,111	0,119	0,125	0,136
	2	1,5 x D1	0,5 x D1	1,0 x D1	110	125	140	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	3	1,5 x D1	0,5 x D1	1,0 x D1	110	120	130	fz	0,016	0,021	0,027	0,032	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
S	1	1,5 x D1	0,5 x D1	0,75 x D1	50	70	90	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	2	1,5 x D1	0,5 x D1	0,75 x D1	50	65	80	fz	0,016	0,021	0,027	0,032	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
	3	1,5 x D1	0,5 x D1	0,5 x D1	25	30	40	fz	0,010	0,014	0,018	0,021	0,029	0,035	0,041	0,046	0,051	0,055	0,059	0,067
	4	1,5 x D1	0,5 x D1	1,25 x D1	50	55	60	fz	0,013	0,017	0,023	0,028	0,040	0,049	0,057	0,064	0,071	0,076	0,082	0,092
H	1	1,5 x D1	0,5 x D1	1,0 x D1	80	110	140	fz	0,018	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
	2	1,5 x D1	0,5 x D1	1,0 x D1	70	90	120	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078

NOTE: See page 11 for more information on VARIMILL™ XTREME™ adjustment factors for feed calculations.

VARIMILL™ XTREME™ • RAMPING • APPLICATION DATA • METRIC

Material Group		Helical Interpolation/ Ramping 0°–15°	WS15PE Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping — fz x 2												
						Diameter — D1 [Ømin – Ømax]												
						mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
		Max Depth	min	Start	max	min–max	3,5–5.7	4,6–7,6	5,8–9,5	6,9–11,4	9,2–15,2	11,5–19,0	13,8–22,8	16,1–26,6	18,4–30,4	20,7–34,2	23,0–38,0	28,8–47,5
P	0	1,25 x D1	150	175	200	fz	0,023	0,031	0,040	0,048	0,066	0,079	0,091	0,102	0,111	0,119	0,125	0,136
	1	1,25 x D1	150	175	200	fz	0,023	0,031	0,040	0,048	0,066	0,079	0,091	0,102	0,111	0,119	0,125	0,136
	2	1,25 x D1	140	165	190	fz	0,023	0,031	0,040	0,048	0,066	0,079	0,091	0,102	0,111	0,119	0,125	0,136
	3	1,25 x D1	120	140	160	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	4	1,25 x D1	90	120	150	fz	0,018	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
	5	1,25 x D1	60	80	100	fz	0,016	0,021	0,027	0,032	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
	6	1,25 x D1	50	65	75	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078
M	1	1,25 x D1	90	100	115	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	2	1,25 x D1	60	70	80	fz	0,016	0,021	0,027	0,032	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
	3	1,0 x D1	60	65	70	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078
K	1	1,0 x D1	120	135	150	fz	0,023	0,031	0,040	0,048	0,066	0,079	0,091	0,102	0,111	0,119	0,125	0,136
	2	1,0 x D1	110	125	140	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	3	1,0 x D1	110	120	130	fz	0,016	0,021	0,027	0,032	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
S	1	0,75 x D1	50	70	90	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	2	0,75 x D1	50	65	80	fz	0,016	0,021	0,027	0,032	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
	3	0,5 x D1	25	30	40	fz	0,010	0,014	0,018	0,021	0,029	0,035	0,041	0,046	0,051	0,055	0,059	0,067
	4	1,25 x D1	50	55	60	fz	0,013	0,017	0,023	0,028	0,040	0,049	0,057	0,064	0,071	0,076	0,082	0,092
H	1	1,0 x D1	80	110	140	fz	0,018	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
	2	1,0 x D1	70	90	120	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078

VARIMILL™ XTREME™ • RAMPING • APPLICATION DATA • METRIC

Material Group		Max Depth	Helical Interpolation/ Ramping 15°–30°														
																	
			WS15PE			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping — fz x 2											
			Cutting Speed — vc m/min			Diameter — D1 [Ømin – Ømax]											
						mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
						min–max	3,5–5.7	4,6–7,6	5,8–9,5	6,9–11,4	9,2–15,2	11,5–19,0	13,8–22,8	16,1–26,6	18,4–30,4	20,7–34,2	23,0–38,0	28,8–47,5
			min	Start	max													
P	0	1,25 x D1	150	165	175	fz	0,017	0,023	0,030	0,036	0,050	0,059	0,068	0,076	0,083	0,089	0,094	0,102
	1	1,25 x D1	150	165	175	fz	0,017	0,023	0,030	0,036	0,050	0,059	0,068	0,076	0,083	0,089	0,094	0,102
	2	1,25 x D1	140	155	165	fz	0,017	0,023	0,030	0,036	0,050	0,059	0,068	0,076	0,083	0,089	0,094	0,102
	3	1,25 x D1	120	130	140	fz	0,014	0,019	0,025	0,030	0,041	0,050	0,058	0,065	0,072	0,078	0,083	0,094
	4	1,25 x D1	90	105	120	fz	0,013	0,018	0,022	0,027	0,037	0,045	0,051	0,058	0,063	0,068	0,073	0,080
	5	1,25 x D1	60	70	80	fz	0,012	0,016	0,020	0,024	0,033	0,040	0,046	0,052	0,058	0,062	0,067	0,075
	6	1,25 x D1	50	55	65	fz	0,010	0,013	0,017	0,020	0,028	0,033	0,038	0,043	0,047	0,050	0,053	0,059
M	1	1,25 x D1	90	95	100	fz	0,014	0,019	0,025	0,030	0,041	0,050	0,058	0,065	0,072	0,078	0,083	0,094
	2	1,25 x D1	60	65	70	fz	0,012	0,016	0,020	0,024	0,033	0,040	0,046	0,052	0,058	0,062	0,067	0,075
	3	1,0 x D1	60	62	65	fz	0,010	0,013	0,017	0,020	0,028	0,033	0,038	0,043	0,047	0,050	0,053	0,059
K	1	1,0 x D1	120	130	135	fz	0,017	0,023	0,030	0,036	0,050	0,059	0,068	0,076	0,083	0,089	0,094	0,102
	2	1,0 x D1	110	120	125	fz	0,014	0,019	0,025	0,030	0,041	0,050	0,058	0,065	0,072	0,078	0,083	0,094
	3	1,0 x D1	110	115	120	fz	0,012	0,016	0,020	0,024	0,033	0,040	0,046	0,052	0,058	0,062	0,067	0,075
S	1	0,75 x D1	50	60	70	fz	0,014	0,019	0,025	0,030	0,041	0,050	0,058	0,065	0,072	0,078	0,083	0,094
	2	0,75 x D1	50	55	65	fz	0,012	0,016	0,020	0,024	0,033	0,040	0,046	0,052	0,058	0,062	0,067	0,075
	3	0,5 x D1	25	27	30	fz	0,008	0,010	0,013	0,016	0,022	0,026	0,031	0,035	0,038	0,042	0,045	0,051
	4	1,25 x D1	50	52	55	fz	0,009	0,013	0,017	0,021	0,030	0,037	0,043	0,048	0,053	0,057	0,061	0,069
H	1	1,0 x D1	80	95	110	fz	0,013	0,018	0,022	0,027	0,037	0,045	0,051	0,058	0,063	0,068	0,073	0,080
	2	1,0 x D1	70	80	90	fz	0,010	0,013	0,017	0,020	0,028	0,033	0,038	0,043	0,047	0,050	0,053	0,059

Material Group		Max Depth	Helical Interpolation/ Ramping 30°–45°														
																	
			WS15PE			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping — fz x 2											
			Cutting Speed — vc m/min			Diameter — D1 [Ømin – Ømax]											
						mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
						min–max	3,5–5.7	4,6–7,6	5,8–9,5	6,9–11,4	9,2–15,2	11,5–19,0	13,8–22,8	16,1–26,6	18,4–30,4	20,7–34,2	23,0–38,0	28,8–47,5
			min	Start	max													
P	0	1,25 x D1	140	150	165	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,055	0,061	0,067	0,071	0,075	0,082
	1	1,25 x D1	140	150	165	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,055	0,061	0,067	0,071	0,075	0,082
	2	1,25 x D1	140	150	165	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,055	0,061	0,067	0,071	0,075	0,082
	3	1,25 x D1	105	115	120	fz	0,011	0,015	0,020	0,024	0,033	0,040	0,046	0,052	0,058	0,062	0,067	0,075
	4	1,25 x D1	90	100	110	fz	0,011	0,014	0,018	0,022	0,030	0,036	0,041	0,046	0,051	0,055	0,058	0,064
	5	1,25 x D1	70	75	80	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,053	0,060
	6	1,25 x D1	55	60	65	fz	0,008	0,011	0,013	0,016	0,022	0,027	0,031	0,034	0,038	0,040	0,043	0,047
M	1	1,25 x D1	75	85	90	fz	0,011	0,015	0,020	0,024	0,033	0,040	0,046	0,052	0,058	0,062	0,067	0,075
	2	1,25 x D1	50	55	60	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,053	0,060
	3	1,0 x D1	45	50	55	fz	0,008	0,011	0,013	0,016	0,022	0,027	0,031	0,034	0,038	0,040	0,043	0,047
K	1	1,0 x D1	110	120	130	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,055	0,061	0,067	0,071	0,075	0,082
	2	1,0 x D1	100	110	120	fz	0,011	0,015	0,020	0,024	0,033	0,040	0,046	0,052	0,058	0,062	0,067	0,075
	3	1,0 x D1	90	100	110	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,053	0,060
S	1	0,75 x D1	80	85	90	fz	0,011	0,015	0,020	0,024	0,033	0,040	0,046	0,052	0,058	0,062	0,067	0,075
	2	0,75 x D1	55	60	65	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,053	0,060
	3	0,5 x D1	20	25	28	fz	0,006	0,008	0,011	0,013	0,017	0,021	0,025	0,028	0,031	0,033	0,036	0,040
	4	1,25 x D1	35	40	45	fz	0,008	0,010	0,014	0,017	0,024	0,029	0,034	0,038	0,042	0,046	0,049	0,055
H	1	1,0 x D1	75	80	85	fz	0,011	0,014	0,018	0,022	0,030	0,036	0,041	0,046	0,051	0,055	0,058	0,064
	2	1,0 x D1	65	70	75	fz	0,008	0,011	0,013	0,016	0,022	0,027	0,031	0,034	0,038	0,040	0,043	0,047

VARIMILL™ XTREME™ • PLUNGING/DRILLING • APPLICATION DATA • METRIC



Material Group		Plunging/Drilling			WS15PE Cutting Speed — vc m/min			Recommended feed per revolution (fn =mm/rev) for Plunging and Drilling												
								D1 — Diameter												
		Max Depth	Applicable	Coolant	min	Start	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	●	Preferred	140	150	165	fn	0,033	0,040	0,045	0,055	0,065	0,080	0,095	0,110	0,120	0,140	0,160	0,180
	1	1,5 x D	●	Required	140	150	165	fn	0,033	0,040	0,045	0,055	0,065	0,080	0,095	0,110	0,120	0,140	0,160	0,180
	2	1,5 x D	●	Required	140	150	165	fn	0,033	0,040	0,045	0,055	0,065	0,080	0,095	0,110	0,120	0,140	0,160	0,180
	3	1 x D	●	Required	105	115	120	fn	0,020	0,028	0,033	0,040	0,050	0,060	0,070	0,085	0,100	0,110	0,125	0,150
	4	1 x D	●	Required	90	100	110	fn	0,020	0,028	0,033	0,040	0,050	0,060	0,070	0,085	0,100	0,110	0,125	0,150
	5	0,5 x D	●	Required	70	75	80	fn	0,014	0,018	0,020	0,025	0,035	0,040	0,050	0,055	0,065	0,075	0,085	0,100
	6	0,5 x D	●	Required	55	60	65	fn	0,014	0,018	0,020	0,025	0,035	0,040	0,050	0,055	0,065	0,075	0,085	0,100
M	1	0,75 x D	●	Required	75	85	90	fn	0,020	0,028	0,033	0,040	0,050	0,060	0,070	0,085	0,100	0,110	0,125	0,150
	2	0,5 x D	●	Required	50	55	60	fn	0,014	0,018	0,020	0,025	0,035	0,040	0,050	0,055	0,065	0,075	0,085	0,100
	3	0,5 x D	●	Required	45	50	55	fn	0,014	0,018	0,020	0,025	0,035	0,040	0,050	0,055	0,065	0,075	0,085	0,100
K	1	1,5 x D	●	Preferred	110	120	130	fn	0,033	0,040	0,045	0,055	0,065	0,080	0,095	0,110	0,120	0,140	0,160	0,180
	2	1 x D	●	Required	100	110	120	fn	0,020	0,028	0,033	0,040	0,050	0,060	0,070	0,085	0,100	0,110	0,125	0,150
	3	1 x D	●	Required	90	100	110	fn	0,020	0,028	0,033	0,040	0,050	0,060	0,070	0,085	0,100	0,110	0,125	0,150
S	1	0,3 x D	○	Required	80	85	90	fn	0,020	0,028	0,033	0,040	0,050	0,060	0,070	0,085	0,100	0,110	0,125	0,150
	2	0,1 x D	○	Required	55	60	65	fn	0,014	0,018	0,020	0,025	0,035	0,040	0,050	0,055	0,065	0,075	0,085	0,100
	3	0,1 x D	○	Required	20	25	28	fn	0,010	0,012	0,015	0,018	0,022	0,028	0,033	0,040	0,045	0,050	0,060	0,070
	4	0,2 x D	○	Required	35	40	45	fn	0,014	0,018	0,020	0,025	0,035	0,040	0,050	0,055	0,065	0,075	0,085	0,100
H	1	0,3 x D	○	Required	75	80	85	fn	0,020	0,028	0,033	0,040	0,050	0,060	0,070	0,085	0,100	0,110	0,125	0,150
	2	0,2 x D	○	Required	65	70	75	fn	0,014	0,018	0,020	0,025	0,035	0,040	0,050	0,055	0,065	0,075	0,085	0,100

VARIMILL™ XTREME™ • ADJUSTMENT FACTOR TABLE FOR FEED CALCULATION

Metric

	Ae/D	2%	4%	5%	8%	10%	20%	30%	40%	50%
Speed factor	Kv	2	1,5	1,45	1,4	1,35	1,25	1,2	1	1
Feed factor	KFz	2,4	2,3	2,2	2	1,7	1,25	1,02	1	1

To calculate application-specific cutting data, please use KV coefficient table to the right for adaptation of cutting speed and KFz for feed, respectively.

*Vc new = Vc * Kv*
*Fz new = IPT * KFz*

Calculation example:
Application: D = 20mm; M2 material group;
Ae = 2mm
Cutting data recommendation: Vc = 80 m/min;
fz = 0,089 mm/th
Adjustment coefficients: Ae = 2mm equals 10,0%;
Kv = 1,35; KFz = 1,7

Final cutting data recommendation:
*Vc new = 80 * 1,35 = 108 m/min*
*Fz new = 0,089 * 1,7 = 0,15 mm/min*

ALUFLASH™

High-Performance Solid End Milling for Aluminum

Materials

N

Applications

- Slotting
- Side Milling/ Shoulder Milling
- Ramping
- Helical Interpolation
- Plunge Milling
- Trochoidal Milling
- Drilling

UNCOATED

2- and 3-flute solid carbide end mill.
Diameter Range: 1mm–20mm (1/8-1")

HANITA™

WIDIA

Built-in features to enable accelerated aluminum machining.

Balanced by design
to guarantee limited vibration and a low spindle load at very high RPMs.

"W" flute shape
for improved chip formation and evacuation, increasing process security.

Parabolic core
for increased tool stability and reduced deflection and risk of breakage.

Double/Triple rake gashing
for improved chip evacuation and higher ramping capabilities and Z-axis machining.

SOLID END MILLING

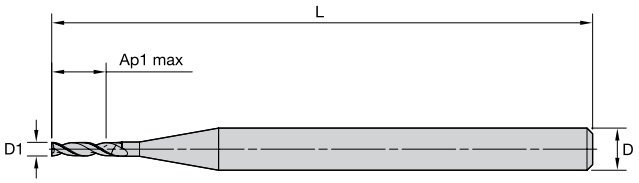
ALUFLASH • CATALOG NUMBERING SYSTEM

Each character in our catalog number signifies a specific trait of that product.
Use the following key columns and corresponding images to easily identify which attributes apply.

3AN9M12006RJT

3A	N	9	M	120	0	6	R	J	T
Platform	Neck and Cutting Length	Shape/ Application	UOM	Cutting Diameter	Overall Length	Shank Size	Corner Style	Corner Size	Shank Style
2A = ALUFLASH 2 Flutes 3A = ALUFLASH 3 Flutes	0 = No Neck and Regular Cutting Length (approx 2 x D) 1 = No Neck - Long Cutting Length (approx 3 x D) 2 = No Neck - Longer Cutting Length (approx 5 x D) 3 = No Neck - Extended Cutting Length (approx 7 x D) N = Regular Neck approx 3 x D - Regular Cutting Length (approx 2 x D) L = Long Neck approx 4 x D - Regular Cutting Length (approx 2 x D) F = Extended Neck approx 5 x D - Regular Cutting Length (approx 2 x D) P = Neck - Longer Cutting Length (approx 3 x D) R = Neck - Extended Cutting Length (approx 5 x D)	9 = Specific for ISO N	M = Metric E = Inch	010 = 1.00mm 015 = 1.50mm 020 = 2.00mm 025 = 2.50mm 030 = 3.00mm (1/8") 035 = 3.50mm 040 = 4.00mm 045 = 4.50mm 050 = 5.00mm (3/16") 060 = 6.00mm 070 = 7.00mm (1/4") 080 = 8.00mm (5/16") 090 = 9.00mm 100 = 10.00mm (3/8") 110 = 7/16" 120 = 12mm 130 = 1/2" 160 = 16.00mm (5/8") 180 = 18.00mm 190 = 3/4" 200 = 20.00mm 250 = 25.00mm (1")	0 = Regular 1 = Extended 2 = Long 3 = Extra Long 4 = Stub	0 = 3.00mm (1/8") 1 = 4.00mm (3/16") 2 = 5.00mm 3 = 6.00mm (1/4") 4 = 8.00mm (5/16") 5 = 10.00mm (3/8") 6 = 12.00mm (1/2") 7 = 14.00mm 8 = 16.00mm (5/8") 9 = 20.00mm (3/4") A = 25.00mm (1")	S = Sharp R = Radius C = Chamfer G = Chamfer End Mill F = Concave Radius	Z = Sharp A = 0.20mm (.015") Y = 0.25mm (.017") E = 0.50mm (.030") G = 0.75mm (.060") J = 1.00mm (.090") H = 1.50mm (.010") K = 2.00mm (.120") M = 2.50mm (.160") P = 3.00mm (.190") Q = 4.00mm (.250") R = 5.00mm (.375") D = 6.00mm (.450") X = Special	T = Cylindrical

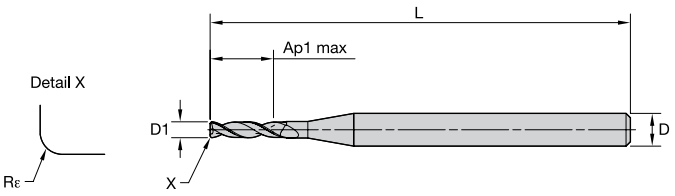
ALUFLASH SERIES 2A09 • SQUARE END • 2 FLUTE • REGULAR LENGTH • CYLINDRICAL SHANK • METRIC



grade UNCOATED

order #	catalogue #	D1	D	length of cut Ap1 max	length L	Z U
6853514	2A09M01000SZT	1,0	3	4,00	38	2
6853515	2A09M01500SZT	1,5	3	6,00	38	2
6853517	2A09M02000SZT	2,0	3	8,00	38	2
6853519	2A09M02500SZT	2,5	3	9,00	38	2
6853542	2A09M04001SZT	4,0	4	12,00	50	2
6853544	2A09M05002SZT	5,0	5	14,00	50	2
6853547	2A09M06003SZT	6,0	6	16,00	50	2
6853549	2A09M08004SZT	8,0	8	20,00	63	2
6853552	2A09M12006SZT	12,0	12	25,00	76	2
6853554	2A09M16008SZT	16,0	16	32,00	89	2
6853556	2A09M20009SZT	20,0	20	40,00	104	2

ALUFLASH SERIES 2A09 • RADIUS • 2 FLUTE • REGULAR LENGTH • CYLINDRICAL SHANK • METRIC



grade UNCOATED

order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6853516	2A09M01500RAT	1,5	3	6,00	38	0,20	2
6853518	2A09M02000RAT	2,0	3	8,00	38	0,20	2
6853520	2A09M02500RAT	2,5	3	9,00	38	0,20	2
6853541	2A09M03000RAT	3,0	3	12,00	38	0,20	2
6853543	2A09M04001RAT	4,0	4	12,00	50	0,20	2
6853546	2A09M05002RAT	5,0	5	14,00	50	0,20	2
6853548	2A09M06003RET	6,0	6	16,00	50	0,50	2
6853550	2A09M08004RET	8,0	8	20,00	63	0,50	2
6853551	2A09M10005RJT	10,0	10	22,00	76	1,00	2
6853553	2A09M12006RJT	12,0	12	25,00	76	1,00	2
6853555	2A09M16008RJT	16,0	16	32,00	89	1,00	2
6853557	2A09M20009RJT	20,0	20	40,00	104	1,00	2

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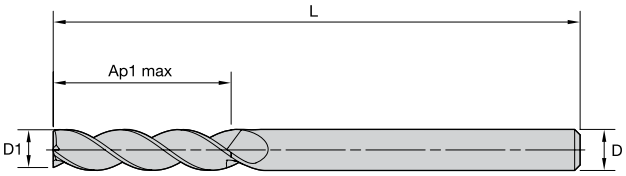
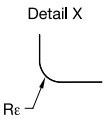
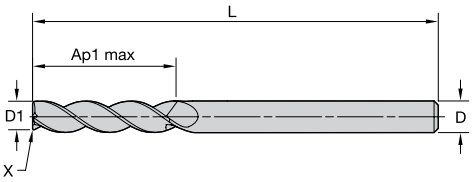
ALUFLASH SERIES 3A09 • SQUARE END • 3 FLUTE • REGULAR LENGTH • CYLINDRICAL SHANK • METRIC



grade UNCOATED						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	Z U
6853511	3A09M03000SZT	3,0	3	12,00	38	3

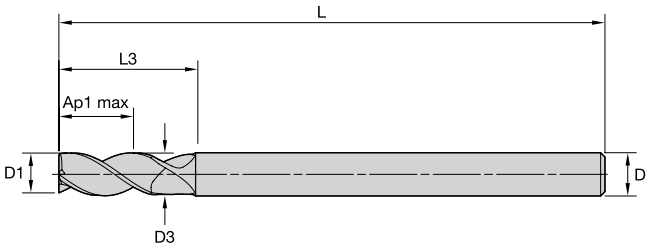
ALUFLASH SERIES 3A09 • RADIUS • 3 FLUTE • REGULAR LENGTH • CYLINDRICAL SHANK • METRIC





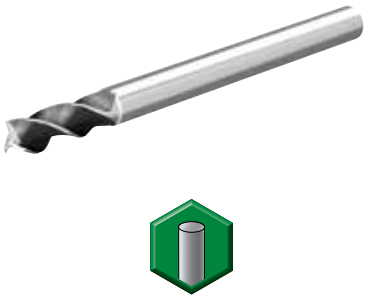
grade UNCOATED							
order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6853512	3A09M03000RAT	3,0	3	12,00	38	0,20	3
6853513	3A09M04001RET	4,0	4	12,00	63	0,50	3

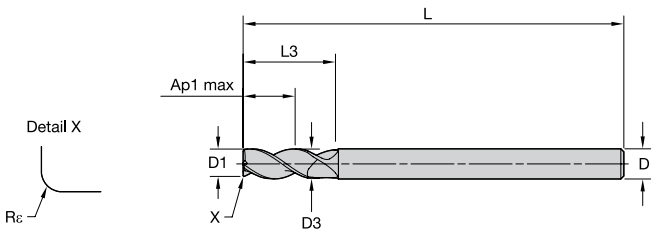
ALUFLASH SERIES 3AN9 • SQUARE END • 3 FLUTE • REGULAR LENGTH • REGULAR NECK • CYLINDRICAL SHANK • METRIC



grade UNCOATED								
order #	catalogue #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6853460	3AN9M04001SZT	4,0	4	3,76	8,00	50	12,00	3
6853462	3AN9M05002SZT	5,0	5	4,70	10,00	63	15,00	3
6853465	3AN9M06003SZT	6,0	6	5,64	13,00	63	18,00	3
6853469	3AN9M08004SZT	8,0	8	7,52	18,00	76	24,00	3
6853474	3AN9M10005SZT	10,0	10	9,40	22,00	76	30,00	3
6853479	3AN9M12006SZT	12,0	12	11,28	25,00	76	36,00	3
6853486	3AN9M16008SZT	16,0	16	15,04	32,00	89	48,00	3
6853494	3AN9M20009SZT	20,0	20	18,80	40,00	115	60,00	3

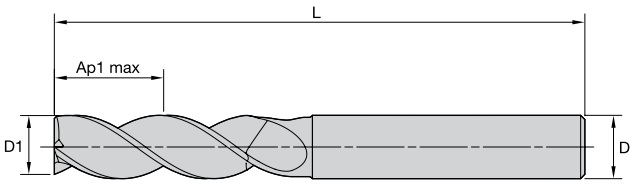
ALUFLASH SERIES 3AN9 • RADIUS • 3 FLUTE • REGULAR LENGTH • REGULAR NECK • CYLINDRICAL SHANK • METRIC





order #	catalogue #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
grade UNCOATED									
6853461	**3AN9M04001RAT**	4,0	4	3,76	8,00	50	12,00	0,20	3
6853463	**3AN9M05002RAT**	5,0	5	4,70	10,00	63	15,00	0,20	3
6853464	**3AN9M05002RET**	5,0	5	4,70	10,00	63	15,00	0,50	3
6853466	**3AN9M06003RAT**	6,0	6	5,64	13,00	63	18,00	0,20	3
6853467	**3AN9M06003RET**	6,0	6	5,64	13,00	63	18,00	0,50	3
6853468	**3AN9M06003RJT**	6,0	6	5,64	13,00	63	18,00	1,00	3
6853470	**3AN9M08004RAT**	8,0	8	7,52	18,00	76	24,00	0,20	3
6853471	**3AN9M08004RET**	8,0	8	7,52	18,00	76	24,00	0,50	3
6853473	**3AN9M08004RHT**	8,0	8	7,52	18,00	76	24,00	1,50	3
6853472	**3AN9M08004RJT**	8,0	8	7,52	18,00	76	24,00	1,00	3
6853475	**3AN9M10005RAT**	10,0	10	9,40	22,00	76	30,00	0,20	3
6853476	**3AN9M10005RET**	10,0	10	9,40	22,00	76	30,00	0,50	3
6853478	**3AN9M10005RHT**	10,0	10	9,40	22,00	76	30,00	1,50	3
6853477	**3AN9M10005RJT**	10,0	10	9,40	22,00	76	30,00	1,00	3
6853480	**3AN9M12006RAT**	12,0	12	11,28	25,00	76	36,00	0,20	3
6853481	**3AN9M12006RET**	12,0	12	11,28	25,00	76	36,00	0,50	3
6853483	**3AN9M12006RHT**	12,0	12	11,28	25,00	76	36,00	1,50	3
6853482	**3AN9M12006RJT**	12,0	12	11,28	25,00	76	36,00	1,00	3
6853484	**3AN9M12006RKT**	12,0	12	11,28	25,00	76	36,00	2,00	3
6853485	**3AN9M12006RPT**	12,0	12	11,28	25,00	76	36,00	3,00	3
6853487	**3AN9M16008RAT**	16,0	16	15,04	32,00	89	48,00	0,20	3
6853488	**3AN9M16008RET**	16,0	16	15,04	32,00	89	48,00	0,50	3
6853490	**3AN9M16008RHT**	16,0	16	15,04	32,00	89	48,00	1,50	3
6853489	**3AN9M16008RJT**	16,0	16	15,04	32,00	89	48,00	1,00	3
6853491	**3AN9M16008RMT**	16,0	16	15,04	32,00	89	48,00	2,50	3
6853492	**3AN9M16008RPT**	16,0	16	15,04	32,00	89	48,00	3,00	3
6853493	**3AN9M16008RQT**	16,0	16	15,04	32,00	89	48,00	4,00	3
6853495	**3AN9M20009RAT**	20,0	20	18,80	40,00	115	60,00	0,20	3
6853496	**3AN9M20009RHT**	20,0	20	18,80	40,00	115	60,00	1,50	3
6853497	**3AN9M20009RKT**	20,0	20	18,80	40,00	115	60,00	2,00	3
6853498	**3AN9M20009RPT**	20,0	20	18,80	40,00	115	60,00	3,00	3
6853499	**3AN9M20009RQT**	20,0	20	18,80	40,00	115	60,00	4,00	3
6853500	**3AN9M20009RRT**	20,0	20	18,80	40,00	115	60,00	5,00	3

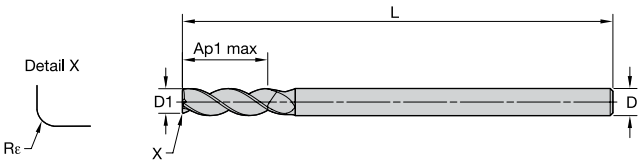
ALUFLASH SERIES 3AP9 • SQUARE END • 3 FLUTE • LONG LENGTH • REGULAR NECK • CYLINDRICAL SHANK • METRIC



grade UNCOATED

order #	catalogue #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6853448	3AP9M12016SZT	12,0	12	11,28	36,00	100	48,00	3

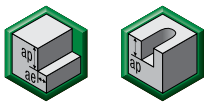
ALUFLASH SERIES 3AP9 • RADIUS • 3 FLUTE • LONG LENGTH • REGULAR NECK • CYLINDRICAL SHANK • METRIC

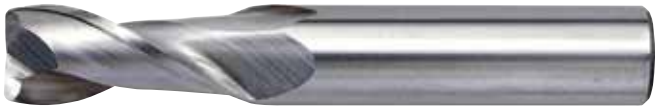


grade UNCOATED

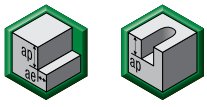
order #	catalogue #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6853439	3AP9M04011RAT	4,0	4	3,76	12,00	63	16,00	0,20	3
6853440	3AP9M05002RAT	5,0	5	4,70	15,00	63	20,00	0,20	3
6853441	3AP9M06013RET	6,0	6	5,64	18,00	76	24,00	0,50	3
6853442	3AP9M06013RJT	6,0	6	5,64	18,00	76	24,00	1,00	3
6853443	3AP9M08014RET	8,0	8	7,52	24,00	76	32,00	0,50	3
6853444	3AP9M08014RJT	8,0	8	7,52	24,00	76	32,00	1,00	3
6853445	3AP9M10015RET	10,0	10	9,40	30,00	89	40,00	0,50	3
6853446	3AP9M10015RHT	10,0	10	9,40	30,00	89	40,00	1,50	3
6853447	3AP9M10015RKT	10,0	10	9,40	30,00	89	40,00	2,00	3
6853449	3AP9M12016RET	12,0	12	11,28	36,00	100	48,00	0,50	3
6853450	3AP9M12016RHT	12,0	12	11,28	36,00	100	48,00	1,50	3
6853451	3AP9M12016RPT	12,0	12	11,28	36,00	100	48,00	3,00	3
6853452	3AP9M16018RET	16,0	16	15,04	48,00	110	64,00	0,50	3
6853453	3AP9M16018RHT	16,0	16	15,04	48,00	110	64,00	1,50	3
6853454	3AP9M16018RPT	16,0	16	15,04	48,00	110	64,00	3,00	3
6853455	3AP9M20019RET	20,0	20	18,80	60,00	150	80,00	0,50	3
6853456	3AP9M20019RHT	20,0	20	18,80	60,00	150	80,00	1,50	3
6853457	3AP9M20019RKT	20,0	20	18,80	60,00	150	80,00	2,00	3
6853458	3AP9M20019RPT	20,0	20	18,80	60,00	150	80,00	3,00	3
6853459	3AP9M20019RQT	20,0	20	18,80	60,00	150	80,00	4,00	3

ALUFLASH • SIDE MILLING AND SLOTTING • APPLICATION DATA • METRIC





Material Group		Side Milling (A) and Slotting (B)			UNCOATED			Recommended feed per tooth (fz = mm/z) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — Vc m/min				D1 — Diameter											
		ap	ae	ap	min	Start	max	mm	2.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
N	1	Ap1 max	0,5 x D1	1 x D	500	600	2000	fz	0.022	0.044	0.055	0.066	0.088	0.110	0.132	0.153	0.176	0.198	0.220	0.275
	2	Ap1 max	0,5 x D1	1 x D	500	600	1500	fz	0.020	0.040	0.048	0.059	0.079	0.099	0.119	0.138	0.158	0.178	0.198	0.247
	3	Ap1 max	0,5 x D1	1 x D	500	600	1500	fz	0.015	0.031	0.038	0.046	0.062	0.077	0.092	0.107	0.123	0.138	0.154	0.192
	4	Ap1 max	0,5 x D1	1 x D	400	450	750	fz	0.015	0.031	0.038	0.046	0.062	0.077	0.092	0.107	0.123	0.138	0.154	0.192
	5	Ap1 max	0,5 x D1	1 x D	250	400	1000	fz	0.020	0.040	0.050	0.059	0.079	0.099	0.119	0.138	0.158	0.178	0.198	0.247



Material Group		Side Milling (A) and Slotting (B)			UNCOATED			Recommended feed per tooth (fz = mm/z) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — Vc m/min				D1 — Diameter											
		ap	ae	ap	min	Start	max	mm	2.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
N	1	Ap1 max	0,5 x D1	1 x D	500	600	2000	fz	0.022	0.044	0.055	0.066	0.088	0.110	0.132	0.153	0.176	0.198	0.220	0.275
	2	Ap1 max	0,5 x D1	1 x D	500	600	1500	fz	0.020	0.040	0.048	0.059	0.079	0.099	0.119	0.138	0.158	0.178	0.198	0.247
	3	Ap1 max	0,5 x D1	1 x D	500	600	1500	fz	0.015	0.031	0.038	0.046	0.062	0.077	0.092	0.107	0.123	0.138	0.154	0.192
	4	Ap1 max	0,5 x D1	1 x D	400	450	750	fz	0.015	0.031	0.038	0.046	0.062	0.077	0.092	0.107	0.123	0.138	0.154	0.192
	5	Ap1 max	0,5 x D1	1 x D	250	400	1000	fz	0.020	0.040	0.050	0.059	0.079	0.099	0.119	0.138	0.158	0.178	0.198	0.247

ALUFLASH • RAMPING 2FL • APPLICATION DATA • METRIC

Material Group		Max Depth	Helical Interpolation / Ramping 0° - 15°															
			UNCOATED			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping												
			Cutting Speed – Vc m/min			Diameter – D1 [Ømin–Ømax]												
						mm	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
			min	Start	max	mm	2.5-4.8	4.6-7.6	5.8-9.5	6.9-11.4	9.2-15.2	11.5-19.0	13.8-22.8	16.1-26.6	18.4-30.4	20.7-34.2	23.0-38.0	28.8-47.5
N	1	1,25 x D1	500	600	2000	fz	0.022	0.044	0.055	0.066	0.088	0.110	0.132	0.153	0.176	0.198	0.220	0.275
	2	1,25 x D1	500	600	1500	fz	0.020	0.040	0.048	0.059	0.079	0.099	0.119	0.138	0.158	0.178	0.198	0.247
	3	1,25 x D1	500	600	1500	fz	0.015	0.031	0.038	0.046	0.062	0.077	0.092	0.107	0.123	0.138	0.154	0.192
	4	1,25 x D1	400	450	750	fz	0.015	0.031	0.038	0.046	0.062	0.077	0.092	0.107	0.123	0.138	0.154	0.192
	5	1,25 x D1	250	400	1000	fz	0.020	0.040	0.050	0.059	0.079	0.099	0.119	0.138	0.158	0.178	0.198	0.247

Material Group		Max Depth	Helical Inter-polation / Ramping 15° - 30°															
			UNCOATED			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping												
			Cutting Speed – Vc m/min			Diameter – D1 [Ømin–Ømax]												
						mm	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
			min	Start	max	mm	2.5-4.8	4.6-7.6	5.8-9.5	6.9-11.4	9.2-15.2	11.5-19.0	13.8-22.8	16.1-26.6	18.4-30.4	20.7-34.2	23.0-38.0	28.8-47.5
N	1	1,25 x D1	500	600	1600	fz	0.017	0.033	0.041	0.050	0.066	0.082	0.099	0.115	0.132	0.148	0.165	0.206
	2	1,25 x D1	500	600	1200	fz	0.015	0.030	0.036	0.045	0.059	0.074	0.089	0.104	0.119	0.134	0.148	0.185
	3	1,25 x D1	500	600	1200	fz	0.012	0.023	0.029	0.035	0.046	0.058	0.069	0.080	0.092	0.104	0.115	0.144
	4	1,25 x D1	400	450	600	fz	0.012	0.023	0.029	0.035	0.046	0.058	0.069	0.080	0.092	0.104	0.115	0.144
	5	1,25 x D1	250	400	800	fz	0.015	0.030	0.038	0.045	0.059	0.074	0.089	0.104	0.119	0.134	0.148	0.185

Material Group		Max Depth	Helical Interpolation / Ramping 30° - 45°															
			UNCOATED			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping												
			Cutting Speed – Vc m/min			Diameter – D1 [Ømin–Ømax]												
						mm	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
			min	Start	max	mm	2.5-4.8	4.6-7.6	5.8-9.5	6.9-11.4	9.2-15.2	11.5-19.0	13.8-22.8	16.1-26.6	18.4-30.4	20.7-34.2	23.0-38.0	28.8-47.5
N	1	1,25 x D1	420	500	800	fz	0.013	0.026	0.033	0.040	0.053	0.066	0.079	0.092	0.106	0.119	0.132	0.165
	2	1,25 x D1	420	500	800	fz	0.012	0.024	0.029	0.036	0.048	0.059	0.071	0.083	0.095	0.107	0.119	0.148
	3	1,25 x D1	420	500	800	fz	0.009	0.018	0.023	0.028	0.037	0.046	0.055	0.064	0.074	0.083	0.092	0.115
	4	1,25 x D1	340	380	450	fz	0.009	0.018	0.023	0.028	0.037	0.046	0.055	0.064	0.074	0.083	0.092	0.115
	5	1,25 x D1	210	340	600	fz	0.012	0.024	0.030	0.036	0.048	0.059	0.071	0.083	0.095	0.107	0.119	0.148

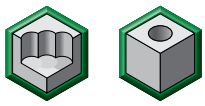
ALUFLASH • RAMPING 3FL • APPLICATION DATA • METRIC

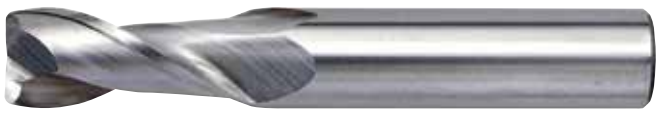
Material Group		Helical Interpolation / Ramping 0° - 15°	UNCOATED			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping – fz x 1											
			Cutting Speed – Vc m/min			Diameter – D1 [Ømin–Ømax]											
						mm	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
		Max Depth	min	Start	max	mm	2.5-4.8	4.6-7.6	5.8-9.5	6.9-11.4	9.2-15.2	11.5-19.0	13.8-22.8	16.1-26.6	18.4-30.4	20.7-34.2	23.0-38.0	28.8-47.5
N	1	1,25 x D1	500	600	2000	fz	0.022	0.044	0.055	0.066	0.088	0.110	0.132	0.153	0.176	0.198	0.220	0.275
	2	1,25 x D1	500	600	1500	fz	0.020	0.040	0.048	0.059	0.079	0.099	0.119	0.138	0.158	0.178	0.198	0.247
	3	1,25 x D1	500	600	1500	fz	0.015	0.031	0.038	0.046	0.062	0.077	0.092	0.107	0.123	0.138	0.154	0.192
	4	1,25 x D1	400	450	750	fz	0.015	0.031	0.038	0.046	0.062	0.077	0.092	0.107	0.123	0.138	0.154	0.192
	5	1,25 x D1	250	400	1000	fz	0.020	0.040	0.050	0.059	0.079	0.099	0.119	0.138	0.158	0.178	0.198	0.247

Material Group		Helical Interpolation / Ramping 15° - 30°	UNCOATED			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping – fz x 1											
			Cutting Speed – Vc m/min			Diameter – D1 [Ømin–Ømax]											
						mm	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
		Max Depth	min	Start	max	mm	2.5-4.8	4.6-7.6	5.8-9.5	6.9-11.4	9.2-15.2	11.5-19.0	13.8-22.8	16.1-26.6	18.4-30.4	20.7-34.2	23.0-38.0	28.8-47.5
N	1	1,25 x D1	500	600	1600	fz	0.017	0.033	0.041	0.050	0.066	0.082	0.099	0.115	0.132	0.148	0.165	0.206
	2	1,25 x D1	500	600	1200	fz	0.015	0.030	0.036	0.045	0.059	0.074	0.089	0.104	0.119	0.134	0.148	0.185
	3	1,25 x D1	500	600	1200	fz	0.012	0.023	0.029	0.035	0.046	0.058	0.069	0.080	0.092	0.104	0.115	0.144
	4	1,25 x D1	400	450	600	fz	0.012	0.023	0.029	0.035	0.046	0.058	0.069	0.080	0.092	0.104	0.115	0.144
	5	1,25 x D1	250	400	800	fz	0.015	0.030	0.038	0.045	0.059	0.074	0.089	0.104	0.119	0.134	0.148	0.185

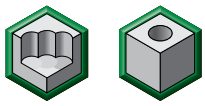
Material Group		Helical Interpolation / Ramping 30° - 45°	UNCOATED			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping – fz x 1											
			Cutting Speed – Vc m/min			Diameter – D1 [Ømin–Ømax]											
						mm	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
		Max Depth	min	Start	max	mm	2.5-4.8	4.6-7.6	5.8-9.5	6.9-11.4	9.2-15.2	11.5-19.0	13.8-22.8	16.1-26.6	18.4-30.4	20.7-34.2	23.0-38.0	28.8-47.5
N	1	1,25 x D1	420	500	800	fz	0.013	0.026	0.033	0.040	0.053	0.066	0.079	0.092	0.106	0.119	0.132	0.165
	2	1,25 x D1	420	500	800	fz	0.012	0.024	0.029	0.036	0.048	0.059	0.071	0.083	0.095	0.107	0.119	0.148
	3	1,25 x D1	420	500	800	fz	0.009	0.018	0.023	0.028	0.037	0.046	0.055	0.064	0.074	0.083	0.092	0.115
	4	1,25 x D1	340	380	450	fz	0.009	0.018	0.023	0.028	0.037	0.046	0.055	0.064	0.074	0.083	0.092	0.115
	5	1,25 x D1	210	340	600	fz	0.012	0.024	0.030	0.036	0.048	0.059	0.071	0.083	0.095	0.107	0.119	0.148

ALUFLASH • PLUNGING • APPLICATION DATA • METRIC





Material Group		Plunging/Drilling			UNCOATED			Recommended feed per revolution (fn =mm/rev) for Plunging 2 flute end mills												
					Cutting Speed – Vc m/min				D1 – Diameter											
		Max Depth	Applicable	Coolant	min	Start	max	mm	2.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
N	1	1,5 x D	●	Required	120	260	400	fn	0.080	0.120	0.135	0.150	0.160	0.200	0.220	0.235	0.250	0.265	0.280	0.300
	2	1,5 x D	●	Required	120	250	280	fn	0.080	0.120	0.135	0.150	0.160	0.200	0.220	0.235	0.250	0.265	0.280	0.300
	3	1,5 x D	●	Required	100	200	260	fn	0.080	0.120	0.135	0.150	0.160	0.200	0.220	0.235	0.250	0.265	0.280	0.300
	4	1 x D	●	Required	60	150	260	fn	0.060	0.080	0.100	0.120	0.140	0.160	0.200	0.210	0.220	0.235	0.250	0.280
	5	1,5 x D	●	Required	60	200	400	fn	0.080	0.120	0.135	0.150	0.160	0.200	0.220	0.235	0.250	0.265	0.280	0.300



Material Group		Plunging/Drilling			UNCOATED			Recommended feed per revolution (fn =mm/rev) for Plunging 3 flute end mills												
					Cutting Speed – Vc m/min				D1 – Diameter											
		Max Depth	Applicable	Coolant	min	Start	max	mm	2.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
N	1	1,5 x D	●	Required	120	260	400	fn	0.056	0.084	0.095	0.105	0.112	0.140	0.154	0.165	0.175	0.186	0.196	0.210
	2	1,5 x D	●	Required	120	250	280	fn	0.056	0.084	0.095	0.105	0.112	0.140	0.154	0.165	0.175	0.186	0.196	0.210
	3	1,5 x D	●	Required	100	200	260	fn	0.056	0.084	0.095	0.105	0.112	0.140	0.154	0.165	0.175	0.186	0.196	0.210
	4	1 x D	●	Required	60	150	260	fn	0.042	0.056	0.070	0.084	0.098	0.112	0.140	0.147	0.154	0.165	0.175	0.196
	5	1,5 x D	●	Required	60	200	400	fn	0.056	0.084	0.095	0.105	0.112	0.140	0.154	0.165	0.175	0.186	0.196	0.210

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The WIDIA™ brand encompasses a variety of standard tooling designed to perform well in a range of typical machine shop operations. A team of experienced application support specialists is readily available to help increase productivity in your shop via WIDIA website chat or over the phone for every step of the way.

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M8065HD

HEAVY DUTY | RELIABLE

Use the M8065HD to easily confront heavy-duty milling jobs in steel and cast-iron materials by applying deep depths of cut while consistently maintaining high metal removal rates.

M8065HD provides reliable cost savings to any machinist, starting at the price tag, ending on the spindle.

GENERAL ENGINEERING

TRANSPORTATION

ENERGY

M8065HD

Shell Mills: 50-315mm

8-Edged Face Mill for Heavy-Duty Applications

- Universal SNMX15 -MM geometry insert in grades WP35CM, WU20PM, WK15CM.
- 64° approach angle of the cutter in combination with a 6.35mm thick insert.
- High DOC capability (9mm Ap1 max).
- Optimized chip gash design.

WIDIA™

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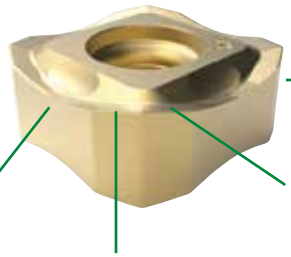
M8065HD

Face Mills • M8065HD Series

- 65° approach angle of the cutter in combination with a 6.35mm-thick insert.
- One universal geometry in latest Victory™ grades WP35CM, WK15CM, WU20PM.
- Extra wide chip gash design for efficient chip evacuation.
- PSTS insert with eight cutting edges.
- Insert with positive rake geometry.
- Large wall area on insert pocket seat stabilizing the insert seat.
- Common insert for RH & LH cutter.
- Strong insert screw (M4.5) for more secure clamping.



One Geometry, Three Grades

One universal geometry in the latest Victory™ grades WP35CM, WK15CM, and WU20PM. With less complexity, more materials can be machined. The proven Victory™ grades cover most target applications.

-MM

WK15CM

K

WK15CM is a wear-resistant grade with balanced toughness for general milling of cast irons. Best results in dry machining, but can also be used wet.

WP35CM

P K

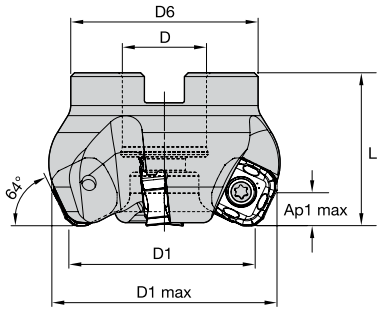
WP35CM has a wide range of applications in general and rough milling of steels and cast iron. Performs best in dry, but can also be used under wet conditions.

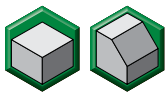
WU20PM

P M K N S H

WU20PM is a universal grade for machining of steel, stainless steel, and high-temperature alloys. Also suitable for machining of grey and nodular irons. Resists breakage and offers improved wear resistance and increased strength. Can be used for both dry and wet machining.

M8065HD • Shell Mills • Heavy-Duty Face Milling





order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	coolant supply	kg
4124248	M8065HD050Z04S22SN15	50	58,9	22	–	49	40	9,0	4	No	0,38
4102270	M8065HD063Z05S22SN15	63	71,9	22	–	49	40	9,0	5	No	0,53
4073639	M8065HD080Z06S27SN15	80	88,8	27	–	60	50	9,0	6	No	1,15
4073640	M8065HD100Z07S32SN15	100	108,8	32	–	78	50	9,0	7	No	1,68
4039413	M8065HD125Z09S40SN15	125	133,8	40	–	89	63	9,0	9	No	3,24
4061110	M8065HD160Z11S40SN15	160	168,8	40	66,7	90	63	9,0	11	No	4,33
4113702	M8065HD200Z14S60SN15	200	208,8	60	101,6	130	63	9,0	14	No	7,13
4113753	M8065HD250Z16S60SN15	250	258,8	60	101,6	130	63	9,0	16	No	11,52
4113754	M8065HD315Z20S60SN15	315	323,8	60	101,6	225	80	9,0	20	No	27,90

Spare Parts

MM#	Description	ANSI = ISO	Required torque (Nm/in.lbs)
2018296	Insert screw M4.5 x 0.75 x 14 T20	MS-2260	4 Nm/35.4 in.lbs
1138446	T20 Torx Key	170_026	

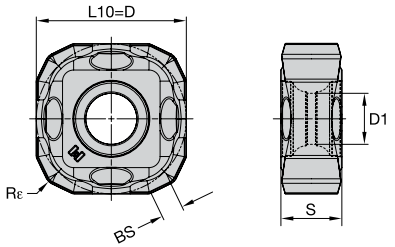
Insert screws included but other hardware is sold separately

Cutter MM#	CAT ID	Lock Screw	Lock Screw MM#
4124248	M8065HD050Z04S22SN15	125.025	1136777
4102270	M8065HD063Z05S22SN15	125.025	1136777
4073639	M8065HD080Z06S27SN15	MS-2038	1841782
4073640	M8065HD100Z07S32SN15	KLS32MPKG (pack of 2 pcs)	1147970
4039413	M8065HD125Z09S40SN15	KLS40M	1016374
4061110	M8065HD160Z11S40SN15	PCD Holes	
4113702	M8065HD200Z14S60SN15		
4113753	M8065HD250Z16S60SN15		
4113754	M8065HD315Z20S30SN15		

M8065

Face Mills • M8065HD Series

Inserts • SNMX -MM • Heavy-Duty Face Milling



● first choice
○ alternate choice

P		●		○					
M		●		○					
K		○	●	○					
N				○					
S		○		○					
H			○						

ISO catalogue number	cutting edges	D	L10	S	BS	Rε	hm	WP35CM	WK15CM	WU20PM
SNMX150612ZNSNMM	8	16	15,88	6,35	2,37	1,20	0,05	-	5649102	-
SNMX150612ZNSNMM	8	16	15,88	6,35	2,37	1,20	0,06	6852432	-	4137987

Inserts

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WU20PM
P3–P4	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WU20PM
P5–P6	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WP35CM
M1–M2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
M3	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WP35CM
K1–K2	.S..MM	WK15CM	**.S..MM**	**WK15CM**	.S..MM	WU20PM
K3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WK15CM
N1–N2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
N3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S1–S2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S4	.S..MM	WP35CM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
H1	.S..MM	WK15CM	–	–	–	–

Recommended Starting Feeds

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.S..MM	0.22	**0.65**	1.07	0.16	**0.47**	0.77	0.12	**0.35**	0.58	0.10	**0.31**	0.50	0.10	**0.28**	0.46	.S..MM

*NOTE: First choice starting feed (fz) is in **bold** type.*
Use corresponding speed (vc).
fz and vc are valid for ae ≥0,4 D1.
For smaller ae, fz and vc should be multiplied by the factor given below:

Recommended Starting Speeds

Material Group		WP35CM			WK15CM			WU20PM		
P	1	455	**395**	370	–	**–**	–	330	**290**	270
	2	280	**255**	230	–	**–**	–	275	**250**	200
	3	255	**230**	205	–	**–**	–	255	**220**	175
	4	190	**175**	160	–	**–**	–	225	**190**	150
	5	260	**230**	210	–	**–**	–	185	**175**	150
	6	160	**135**	–	–	**–**	–	165	**130**	100
M	1	205	**185**	155	–	**–**	–	205	**180**	165
	2	185	**160**	140	–	**–**	–	185	**160**	130
	3	145	**130**	115	–	**–**	–	140	**120**	95
K	1	295	**265**	240	420	**385**	340	250	**220**	185
	2	235	**210**	190	335	**295**	275	200	**180**	150
	3	195	**175**	160	280	**250**	230	180	**150**	120
N	1	–	**–**	–	–	**–**	–	550	**470**	400
	2	–	**–**	–	–	**–**	–	550	**470**	400
	3	–	**–**	–	–	**–**	–	400	**350**	300
S	1	–	**–**	–	–	**–**	–	40	**35**	25
	2	–	**–**	–	–	**–**	–	40	**35**	25
	3	–	**–**	–	–	**–**	–	50	**40**	25
	4	–	**–**	–	–	**–**	–	70	**50**	35
H	1	–	**–**	–	–	**–**	–	110	**80**	70

*NOTE: First choice starting feed (fz) is in **bold** type.*
Use corresponding speed (vc).
fz and vc are valid for ae ≥0,4 D1.
For smaller ae, fz and vc should be multiplied by the factor given below:

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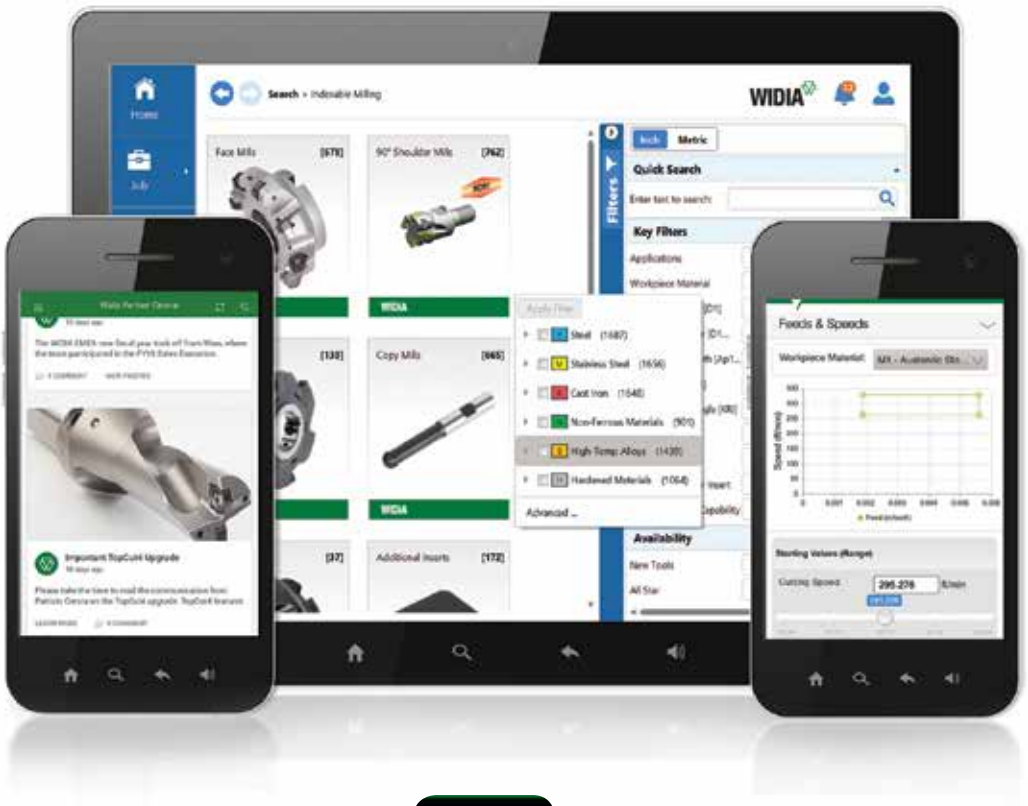

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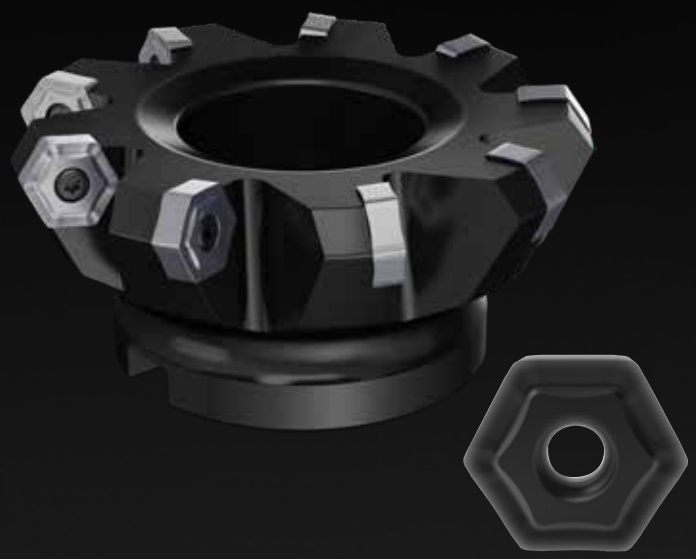
M1200 MAX SCREW CLAMPING

M1200 Max Screw Clamping is for customers who need to run at a higher DOC up to 7,5mm with a tool with the best cost-per-edge.

GENERAL ENGINEERING

TRANSPORTATION

ENERGY



M1200 Max Screw Clamping

Shell Mills: 80-250mm

12-Edged Face Mill for Steel, Stainless Steel, Grey Cast Iron and Nodular Iron

- Universal HNMU11 -MM geometry in grades WP35CM, WU20PM, WK15CM.
- Comprehensive offering: Cutters with 56° lead angle with a 7mm strong and thick insert.
- Pressed-and-sintered-to-size (PSTS) insert in 11mm IC.
- High DOC capability (7,5mm Ap1 max).

WIDIA™

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M1200 Max Screw Clamping

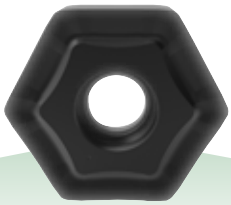
Face Mills • M1200 Max Screw Clamping Series

- Cutters with 56° lead angle with a 7mm strong and thick insert.
- One universal geometry in latest Victory™ milling grades WP35CM, WK15CM, WU20PM.
- PSTS insert with 12 cutting edges.
- Insert with positive rake geometry.
- Suitable for roughing and semi-finish milling of all steels, stainless steels, grey cast iron, and nodular iron.

One Geometry, Three Grades

One universal geometry in the latest Victory™ grades WP35CM, WK15CM, and WU20PM. With less complexity, more materials can be machined. The proven Victory™ grades cover most target applications.

-MM



WK15CM

K

WK15CM is a wear-resistant grade with balanced toughness for general milling of cast irons. Best results in dry machining, but can also be used wet.

WP35CM

P K

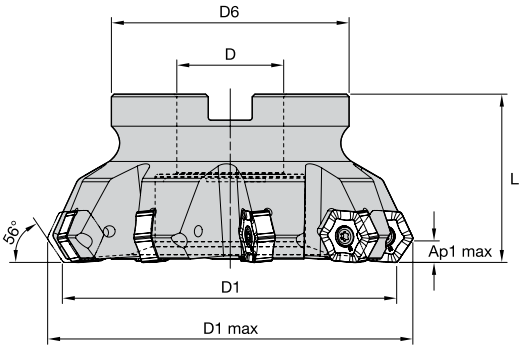
WP35CM has a wide range of applications in general and rough milling of steels and cast iron. Performs best in dry, but can also be used under wet conditions.

WU20PM

P M K N S H

WU20PM is a universal grade for machining of steel, stainless steel, and high-temperature alloys. Also suitable for machining of grey and nodular irons. Resists breakage and offers improved wear resistance and increased strength. Can be used for both dry and wet machining.

M1200 Max Screw Clamping • Shell Mills



order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	coolant supply	kg
6581490	M1200D080Z05S27HN11	80	91,8	27	–	60	50	7,5	5	No	0,99
6495103	M1200D100Z07S32HN11	100	111,8	19	–	78	50	7,5	7	No	1,49
6495104	M1200D125Z09S40HN11	125	136,7	40	–	89	63	7,5	9	No	2,72
6581561	M1200D160Z10S40HN11	160	171,7	40	66,7	90	63	7,5	10	No	3,81
6626921	M1200D200Z12S60HN11	200	211,7	60	101,6	130	63	7,5	12	No	6,88
6852419	M1200D250Z14S60HN11	250	261,7	60	101,6	130	63	7,5	14	No	6,88

Spare Parts

MM#	Description	ANSI = ISO	Required torque (Nm/in.lbs)
1136819	INSERT SCREW M5-0.8 x 17 T20	199.123	5.1 Nm/45 in.lbs
1138446	TORX WRENCH T20	170.026	

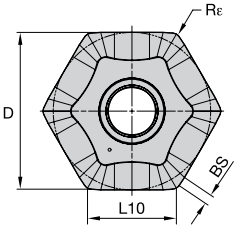
Insert screws included but other hardware is sold separately

Cutter MM#	CAT ID	Lock Screw	Lock Screw MM#
6581490	M1200D080Z05S27HN10	MS-2038	1841782
6495103	M1200D100Z07S32HN10	KLS32MPKG (pack of 2 pcs)	1147970
6495104	M1200D125Z09S40HN10	KLS40M	1016374
6581561	M1200D160Z10S40HN10	PCD Holes	
6626921	M1200D200Z12S60HN10		
6852419	M1200D250Z14S60HN10		

M1200 Max Screw Clamping

Face Mills • M1200 Max Screw Clamping Series

Inserts • HNMU -MM • Universal Geometry Targeting a Variety of Applications



● first choice
○ alternate choice

P		●		○						
M		●		○						
K		○	●	○						
N				○						
S		○		○						
H			○							

ISO catalogue number	cutting edges	D	L10	S	BS	Rε	hm	WP35CM	WK15CM	WU20PM
HNMU110710ZNSNMM	12	19	10,75	6,92	1,20	1,00	0,06	6495105	6495106	6852420

Inserts

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WU20PM
P3–P4	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WU20PM
P5–P6	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WP35CM
M1–M2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
M3	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WP35CM
K1–K2	.S..MM	WK15CM	**.S..MM**	**WK15CM**	.S..MM	WU20PM
K3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WK15CM
N1–N2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
N3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S1–S2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S4	.S..MM	WP35CM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
H1	.S..MM	WU20PM	–	–	–	–

Recommended Starting Feeds

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.S..MM	0.22	**0.71**	1.15	0.16	**0.51**	0.82	0.12	**0.38**	0.61	0.10	**0.33**	0.54	0.09	**0.31**	0.49	.S..MM

*NOTE: First choice starting feed (fz) is in **bold** type.*
Use corresponding speed (vc).
fz and vc are valid for ae ≥0,4 D1.
For smaller ae, fz and vc should be multiplied by the factor given below:

M1200 Max Screw Clamping

Face Mills • M1200 Max Screw Clamping Series

Recommended Starting Speeds

Material Group		WP35CM			WK15CM			WU20PM		
P	1	455	**395**	370	–	**–**	–	330	**290**	270
	2	280	**255**	230	–	**–**	–	275	**250**	200
	3	255	**230**	205	–	**–**	–	255	**220**	175
	4	190	**175**	160	–	**–**	–	225	**190**	150
	5	260	**230**	210	–	**–**	–	185	**175**	150
	6	160	**135**	–	–	**–**	–	165	**130**	100
M	1	205	**185**	155	–	**–**	–	205	**180**	165
	2	185	**160**	140	–	**–**	–	185	**160**	130
	3	145	**130**	115	–	**–**	–	140	**120**	95
K	1	295	**265**	240	420	**385**	340	250	**220**	185
	2	235	**210**	190	335	**295**	275	200	**180**	150
	3	195	**175**	160	280	**250**	230	180	**150**	120
N	1	–	**–**	–	–	**–**	–	550	**470**	400
	2	–	**–**	–	–	**–**	–	550	**470**	400
	3	–	**–**	–	–	**–**	–	400	**350**	300
S	1	–	**–**	–	–	**–**	–	40	**35**	25
	2	–	**–**	–	–	**–**	–	40	**35**	25
	3	–	**–**	–	–	**–**	–	50	**40**	25
	4	–	**–**	–	–	**–**	–	70	**50**	35
H	1	–	**–**	–	–	**–**	–	110	**80**	70

*NOTE: First choice starting feed (fz) is in **bold** type.*
Use corresponding speed (vc).
fz and vc are valid for ae ≥0,4 D1.
For smaller ae, fz and vc should be multiplied by the factor given below:

ALL-STAR

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THE ALL-STAR PROGRAMME PROVIDES PROVEN SOLUTIONS THAT ARE EASY TO FIND AND ALWAYS AVAILABLE.

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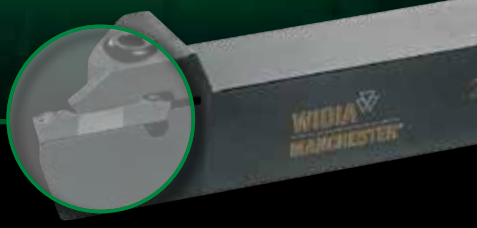
Indexable Milling

Solid End Milling



Turning

WIDIA™

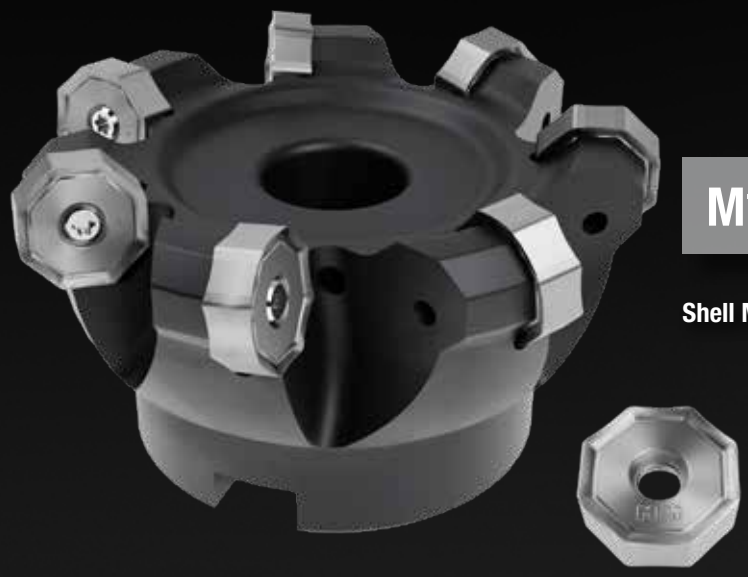
M1600

This face mill with a 16-edged insert provides smooth cutting action and low power consumption to steel, stainless steel, and cast iron medium roughing and semi-finishing jobs.

GENERAL ENGINEERING

TRANSPORTATION

ENERGY



M1600

Shell Mills: 50-160mm

16-Edged Face Mill for Medium Roughing and Semi-Finishing of Steels, Stainless Steels, and Cast Iron.

- Universal -MM geometry in grades WP35CM, WU20PM, WK15CM.
- Comprehensive offering: Cutters with 44° lead angle.
- Precision ground insert.
- Maximum depth of cut: 4mm.
- Smart insert design engineered to resist shock loads resulting in longer tool life.

WIDIA™

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M1600

Face Mills • M1600 Series

- Cutters with 44° lead angle.
- One universal geometry in latest Victory™ milling grades WP35CM, WK15CM, WU20PM.
- Precision ground insert in 6mm IC 16 true cutting edges.
- Insert with positive geometry.
- Suitable for medium roughing and semi-finish milling of all steels, stainless steels, and cast iron.

One Geometry, Three Grades

One universal geometry in the latest Victory™ grades WP35CM, WK15CM, and WU20PM. With less complexity, more materials can be machined. The proven Victory™ grades cover most target applications.

-MM

WK15CM

K

WK15CM is a wear-resistant grade with balanced toughness for general milling of cast irons. Best results in dry machining, but can also be used wet.

WP35CM

P K

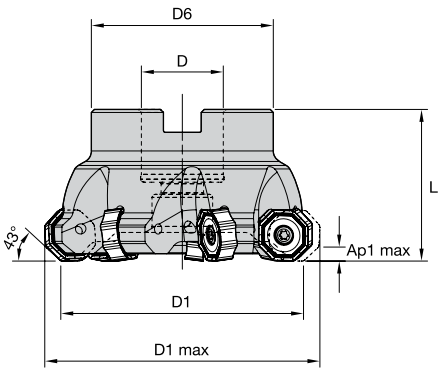
WP35CM has a wide range of applications in general and rough milling of steels and cast iron. Performs best in dry, but can also be used under wet conditions.

WU20PM

P M K N S H

WU20PM is a universal grade for machining of steel, stainless steel, and high-temperature alloys. Also suitable for machining of grey and nodular irons. Resists breakage and offers improved wear resistance and increased strength. Can be used for both dry and wet machining.

M1600 • Shell Mills • Steel and Cast Iron Face Mills at Low Cost per Edge



order number	catalogue number	D1	D1 max	D	D4	D6	L	LBX	Ap1 max	Z	coolant supply	kg
4002796	M1600D050Z04S22ON06	50	60,7	22	–	40	40	40	3,7	4	Yes	0,28
4002797	M1600D063Z05S22ON06	63	73,7	22	–	40	40	40	3,7	5	Yes	0,43
3837977	M1600D080Z07S27ON06	80	90,7	27	–	60	50	50	3,7	7	Yes	0,97
3860336	M1600D100Z09S32ON06	100	110,7	32	–	78	50	50	3,7	9	Yes	1,52
3837978	M1600D125Z11S40ON06	125	135,7	40	–	89	63	63	3,7	11	Yes	2,70
4002798	M1600D160Z13S40ON06	160	170,7	40	66,7	90	63	63	3,7	13	Yes	3,83

Spare Parts

MM#	Description	ANSI = ISO	Required torque (Nm/in.lbs)
1756815	INSERT SCR M4-0.7 x 11.5 T15	193.332	4 Nm/35.4 in.lbs
2029596	TORX WRENCH T15	12148082400	

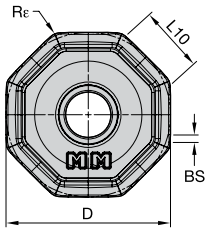
Insert screws included but other hardware is sold separately

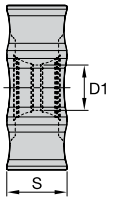
Cutter MM#	CAT ID	Lock Screw	Lock Screw MM#
4002796	M1600D050Z04S22ON06	125.025	1136777
4002797	M1600D063Z05S22ON06	125.025	1136777
3837977	M1600D080Z07S27ON06	MS-2038	1841782
3860336	M1600D100Z09S32ON06	MS-2189-C	3450356
3837978	M1600D125Z11S40ON06	420.200	1016374
4002798	M1600D160Z13S40ON06	PCD Holes	

M1600

Face Mills • M1600 Series

Inserts • ONGX -MM • Machining at Low Cost per Edge





● first choice
○ alternate choice

P	●		○
M	●		○
K	○	●	○
N			○
S	○		○
H		○	

ISO catalogue number	cutting edges	D	L10	S	BS	Rε	hm	WP35CM	WK15CM	WU20PM
ONGX060512ANSNMM	16	17	6,87	5,47	0,77	1,20	0,04	-	6072424	-
ONGX060512ANSNMM	16	17	6,87	5,47	0,77	1,20	0,06	6852431	-	3778942

Inserts

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WU20PM
P3–P4	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WU20PM
P5–P6	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WP35CM
M1–M2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
M3	.S..MM	WP35CM	**.S..MM**	**WP35CM**	.S..MM	WP35CM
K1–K2	.S..MM	WK15CM	**.S..MM**	**WK15CM**	.S..MM	WU20PM
K3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WK15CM
N1–N2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
N3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S1–S2	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S3	.S..MM	WU20PM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
S4	.S..MM	WP35CM	**.S..MM**	**WU20PM**	.S..MM	WU20PM
H1	.S..MM	WU20PM	–	–	–	–

Recommended Starting Feeds

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.S..MM	0.26	**0.85**	1.42	0.19	**0.62**	1.01	0.14	**0.46**	0.75	0.12	**0.40**	0.66	0.11	**0.37**	0.60	.S..MM

*NOTE: First choice starting feed (fz) is in **bold** type.*
Use corresponding speed (vc).
fz and vc are valid for ae ≥0,4 D1.
For smaller ae, fz and vc should be multiplied by the factor given below:

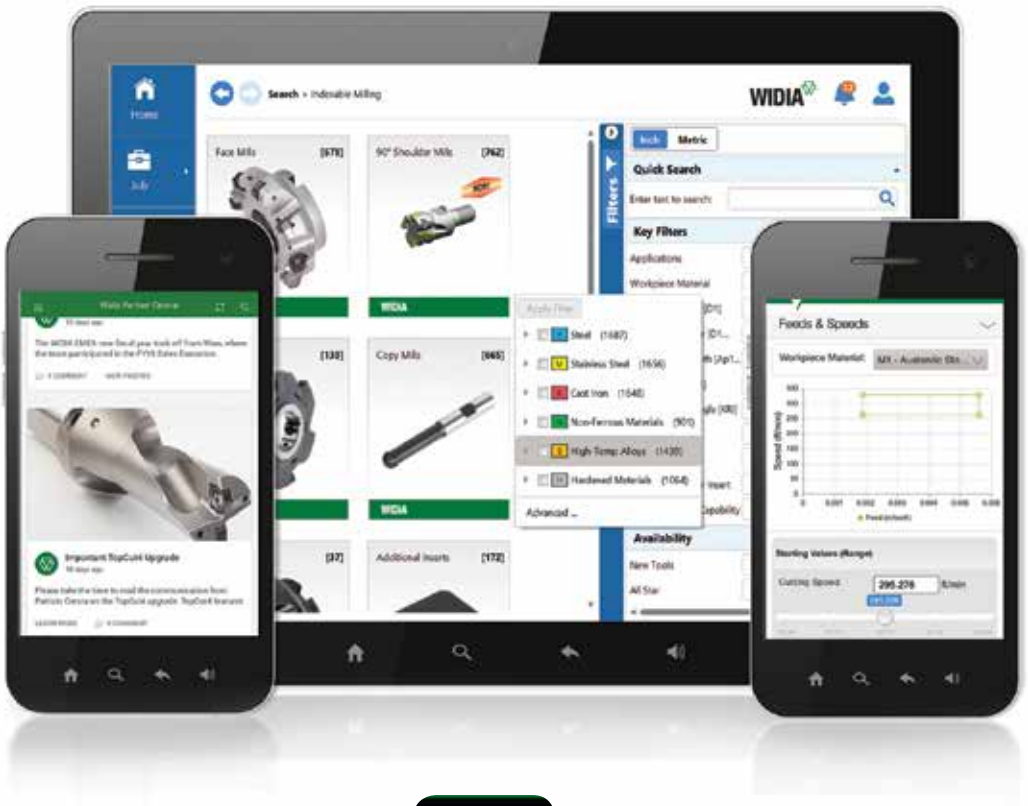
Recommended Starting Speeds

Material Group		WP35CM			WK15CM			WU20PM		
P	1	455	**395**	370	–	**–**	–	330	**290**	270
	2	280	**255**	230	–	**–**	–	275	**250**	200
	3	255	**230**	205	–	**–**	–	255	**220**	175
	4	190	**175**	160	–	**–**	–	225	**190**	150
	5	260	**230**	210	–	**–**	–	185	**175**	150
	6	160	**135**	–	–	**–**	–	165	**130**	100
M	1	205	**185**	155	–	**–**	–	205	**180**	165
	2	185	**160**	140	–	**–**	–	185	**160**	130
	3	145	**130**	115	–	**–**	–	140	**120**	95
K	1	295	**265**	240	420	**385**	340	250	**220**	185
	2	235	**210**	190	335	**295**	275	200	**180**	150
	3	195	**175**	160	280	**250**	230	180	**150**	120
N	1	–	**–**	–	–	**–**	–	550	**470**	400
	2	–	**–**	–	–	**–**	–	550	**470**	400
	3	–	**–**	–	–	**–**	–	400	**350**	300
S	1	–	**–**	–	–	**–**	–	40	**35**	25
	2	–	**–**	–	–	**–**	–	40	**35**	25
	3	–	**–**	–	–	**–**	–	50	**40**	25
	4	–	**–**	–	–	**–**	–	70	**50**	35
H	1	–	**–**	–	–	**–**	–	110	**80**	70

*NOTE: First choice starting feed (fz) is in **bold** type.*
Use corresponding speed (vc).
fz and vc are valid for ae ≥0,4 D1.
For smaller ae, fz and vc should be multiplied by the factor given below:

WIDIA™ Digital Solutions

Tools and Resources at Your Fingertips



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WIDIA™

TDMX

TOP DRILL™ MODULAR X

STABILITY AND RELIABILITY COMBINED INTO ONE MODULAR DRILL SYSTEM

TDMX modular drills now have modular, material-specific inserts for steel, cast iron, stainless steel, and super alloys. This expansion will extend the capability of the TDMX modular drilling portfolio to drill inclined entry/exit, stacked plates, and cross holes.

GENERAL ENGINEERING

ENERGY

TRANSPORTATION

Platform

Standard drill bodies: 1.5 x D, 3 x D, 5xD, 8 x D, 12 x D.

Insert diameter range: 16-40mm

Easy to Apply

Front clamping design to easily change the insert without disassembling the holder from the body.

Easy-insert nomenclature logic to identify the targeted material group.

Increased Stability and Performance

Highly engineered pocket seat design to ensure maximum stability, even in challenging applications like cross hole, inclined entry/exit, and interrupted cuts.

Suitable for high feed rates.

Flanged shank for higher rigidity.

Polished flutes for improved chip evacuation.

NEW!

MS(M) insert geometry for Stainless Steel and Super Alloys.

WIDIA™

widia.com

TDMX — TOP DRILL™ Modular X

Modular Drills • TOP DRILL Modular X

- Augmented insert stability thanks to the highly engineered pocket seat design.
- Front clamping for an easy insert change, without disassembling the holder from the machine spindle.

TDMX is a stable modular drilling platform delivering predictable performance and continuous productivity via three material-specific insert types.

PK(M)

P K

First choice for Steel and Cast Iron drilling.

FPE(M)

P M K

Flat bottom drilling, stacked plates, piloting for deep-hole drilling.

MS(M) NEW!

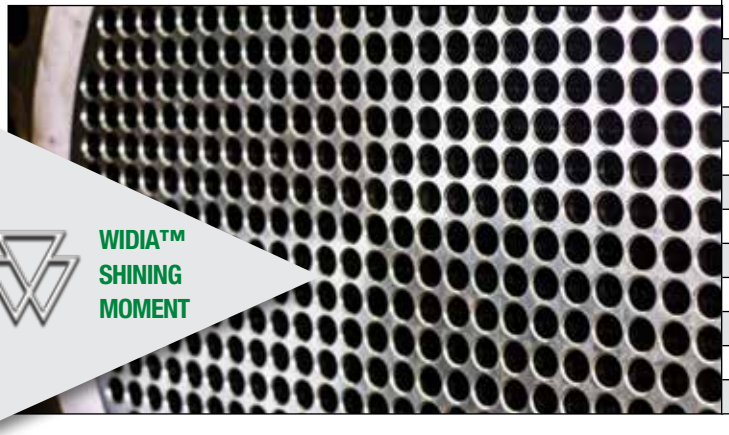
M S

First choice for stainless steel and super alloys.

TDMX — Drilling Stainless Steel

M 13-8 hyper chrome 110 KSI

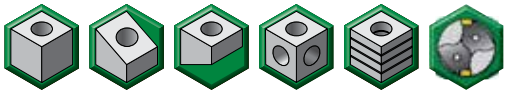
pre-machined surface

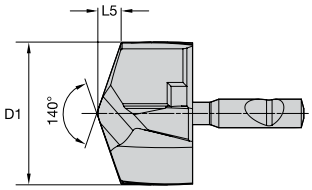


WIDIA™ SHINING MOMENT

	Competitor	WIDIA
Head	–	TDMX6813780MS(M)
Diameter, mm	19.05	19.05
Grade	–	WM15PD
Drill body	–	TDMX0749RSL100
Lenght	3 x D	3 x D
Vc, m/min	65	75
n, rev/min	815	1225
Fn, mm/min	0.127	0.127
Vf, mm/min	118	155
Depth	56	56
Tool Life, m	6.3	10.6 m

TDMX • Inserts • MS(M)





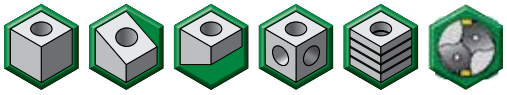
● first choice
○ alternate choice

P		
M		●
K		○
N		○
S		●
H		

catalogue number	D1	L5	SSC	WM15PD
TDMX16000MSM	16,00	2,84	A	6568922
TDMX16200MSM	16,20	2,88	A	6568923
TDMX16281MSM	16,28	2,89	A	6568924
TDMX16500MSM	16,50	2,93	A	6568925
TDMX16667MSM	16,67	2,96	A	6568926
TDMX17000MSM	17,00	3,01	B	6568927
TDMX17064MSM	17,06	3,02	B	6568929
TDMX17463MSM	17,46	3,09	B	6568930
TDMX17500MSM	17,50	3,10	B	6568931
TDMX17600MSM	17,60	3,12	B	6568932
TDMX17800MSM	17,80	3,15	B	6568933
TDMX17859MSM	17,86	3,16	B	6568934
TDMX18000MSM	18,00	3,19	C	6568935
TDMX18255MSM	18,26	3,24	C	6568938
TDMX18500MSM	18,50	3,28	C	6568939
TDMX18651MSM	18,65	3,30	C	6568940
TDMX18800MSM	18,80	3,33	C	6568941
TDMX19000MSM	19,00	3,36	D	6568942
TDMX19050MSM	19,05	3,37	D	6568943
TDMX19200MSM	19,20	3,40	D	6568944
TDMX19270MSM	19,27	3,41	D	6568945
TDMX19450MSM	19,45	3,44	D	6568946
TDMX19500MSM	19,50	3,45	D	6568947
TDMX19700MSM	19,70	3,48	D	6568948
TDMX19840MSM	19,84	3,51	D	6568949
TDMX20000MSM	20,00	3,54	E	6568961
TDMX20100MSM	20,10	3,56	E	6568962
TDMX20200MSM	20,20	3,57	E	6568963
TDMX20239MSM	20,24	3,58	E	6568964
TDMX20300MSM	20,30	3,59	E	6568965
TDMX20400MSM	20,40	3,61	E	6568966
TDMX20500MSM	20,50	3,63	E	6568967
TDMX20600MSM	20,60	3,64	E	6568968
TDMX20650MSM	20,65	3,65	E	6568969
TDMX20700MSM	20,70	3,66	E	6568973
TDMX20800MSM	20,80	3,68	E	6568980

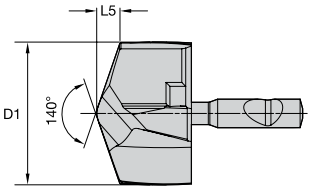
TDMX • Inserts • MS(M)

(continued)



● first choice
○ alternate choice

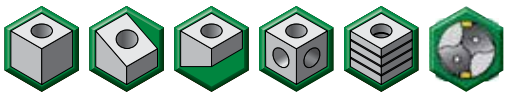
P		
M		●
K		○
N		○
S		●
H		

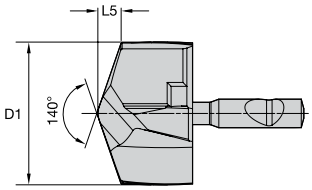


catalogue number	D1	L5	SSC	WM15PD
TDMX20900MSM	20,90	3,69	E	6568981
TDMX21000MSM	21,00	3,71	F	6568982
TDMX21430MSM	21,43	3,79	F	6568983
TDMX21500MSM	21,50	3,80	F	6568984
TDMX22000MSM	22,00	3,89	G	6568985
TDMX22225MSM	22,23	3,93	G	6568986
TDMX22450MSM	22,45	3,97	G	6568987
TDMX22500MSM	22,50	3,97	G	6568988
TDMX23000MSM	23,00	4,06	H	6568989
TDMX23500MSM	23,50	4,15	H	6568990
TDMX23813MSM	23,81	4,20	H	6568991
TDMX24000MSM	24,00	4,24	I	6568993
TDMX24500MSM	24,50	4,32	I	6568994
TDMX24605MSM	24,61	4,34	I	6568995
TDMX25000MSM	25,00	4,41	J	6568996
TDMX25400MSM	25,40	4,48	J	6568998
TDMX25500MSM	25,50	4,49	J	6568999
TDMX25670MSM	25,67	4,52	J	6569000
TDMX25700MSM	25,70	4,53	J	6569001
TDMX25760MSM	25,76	4,54	J	6569002
TDMX25796MSM	25,80	4,55	J	6569003
TDMX26000MSM	26,00	4,59	K	6569006
TDMX26192MSM	26,19	4,62	K	6569007
TDMX26400MSM	26,40	4,65	K	6569008
TDMX26500MSM	26,50	4,67	K	6569009
TDMX26589MSM	26,59	4,69	K	6569010
TDMX27000MSM	27,00	4,76	L	6569502
TDMX27500MSM	27,50	4,84	L	6569503
TDMX27780MSM	27,78	4,89	L	6569504
TDMX28000MSM	28,00	4,93	M	6569505
TDMX28176MSM	28,18	4,96	M	6569506
TDMX28500MSM	28,50	5,02	M	6569507
TDMX28575MSM	28,58	5,03	M	6569508
TDMX29000MSM	29,00	5,11	N	6569509
TDMX29367MSM	29,37	5,17	N	6569510
TDMX29500MSM	29,50	5,19	N	6569521

TDMX • Inserts • MS(M)

(continued)





● first choice
○ alternate choice

P		
M		●
K		○
N		○
S		●
H		

catalogue number	D1	L5	SSC	WM15PD
TDMX29764MSM	29,76	5,24	N	**6569522**
TDMX30000MSM	30,00	5,28	O	**6569523**
TDMX30163MSM	30,16	5,31	O	**6569524**
TDMX30500MSM	30,50	5,37	O	**6569525**
TDMX30955MSM	30,96	5,45	O	**6569526**
TDMX31000MSM	31,00	5,45	P	**6569527**
TDMX31500MSM	31,50	5,54	P	**6569528**
TDMX31750MSM	31,75	5,58	P	**6569529**
TDMX32000MSM	32,00	5,63	Q	**6569530**
TDMX32500MSM	32,50	5,72	Q	**6569531**
TDMX33000MSM	33,00	5,80	Q	**6569532**
TDMX33338MSM	33,34	5,86	Q	**6569533**
TDMX34000MSM	34,00	5,98	R	**6569534**
TDMX34130MSM	34,13	6,00	R	**6569535**
TDMX34925MSM	34,93	6,13	R	**6569536**
TDMX35000MSM	35,00	6,15	R	**6569537**
TDMX35500MSM	35,50	6,23	R	**6569538**
TDMX36000MSM	36,00	6,33	S	**6569539**
TDMX36500MSM	36,50	6,41	S	**6569540**
TDMX37000MSM	37,00	6,50	S	**6569551**
TDMX37500MSM	37,50	6,59	S	**6569552**
TDMX38000MSM	38,00	6,67	T	**6569553**
TDMX38100MSM	38,10	6,69	T	**6569554**
TDMX38289MSM	38,29	6,72	T	**6569557**
TDMX38500MSM	38,50	6,76	T	**6569555**
TDMX39000MSM	39,00	6,84	T	**6569556**
TDMX39500MSM	39,50	6,93	T	**6569558**
TDMX40000MSM	40,00	7,01	T	**6569559**

NOTE: SSC = Pocket Seat Reference. To correspond with the SSC on the toolholder.

	Metric	
Insert Type	**TDMX...PK:MS**	**TDMX...FPE**
D1	**Tolerance k7**	**Tolerance s7**
16–18	+0,001/+0,019	+0,028/+0,046
>18–30	+0,002/+0,023	+0,035/+0,056
>30–40	+0,002/+0,027	+0,043/+0,068

Application Data • MS(M) • WM15PD • Metric

Material Group		Cutting Speed — Vc Range — m/min			Recommended Feed Rate (f) by Diameter					
		min	Starting Value	max	Tool Diameter (mm)	16,0	20,0	25,4	32,0	40,0
M	1	40	**80**	110	mm/r	0,11 – 0,26	0,13 – 0,28	0,13 – 0,32	0,14 – 0,35	0,15 – 0,37
	2	35	**55**	75	mm/r	0,11 – 0,26	0,13 – 0,28	0,13 – 0,32	0,14 – 0,35	0,15 – 0,37
	3	20	**35**	50	mm/r	0,11 – 0,26	0,13 – 0,28	0,13 – 0,32	0,14 – 0,35	0,15 – 0,37
K	1	90	**135**	175	mm/r	0,19 – 0,25	0,22 – 0,29	0,29 – 0,38	0,32 – 0,43	0,33 – 0,50
	2	80	**120**	140	mm/r	0,19 – 0,25	0,22 – 0,29	0,29 – 0,38	0,32 – 0,43	0,33 – 0,50
	3	70	**110**	125	mm/r	0,18 – 0,26	0,21 – 0,29	0,23 – 0,37	0,25 – 0,42	0,27 – 0,46
N	1	90	**155**	220	mm/r	0,25 – 0,50	0,28 – 0,56	0,32 – 0,63	0,32 – 0,70	0,32 – 0,70
	2	90	**155**	220	mm/r	0,25 – 0,50	0,28 – 0,56	0,32 – 0,63	0,32 – 0,70	0,32 – 0,70
	3	80	**120**	160	mm/r	0,25 – 0,50	0,28 – 0,56	0,32 – 0,63	0,32 – 0,70	0,32 – 0,70
	4	90	**155**	220	mm/r	0,25 – 0,50	0,28 – 0,56	0,32 – 0,63	0,32 – 0,70	0,32 – 0,70
	5	160	**200**	240	mm/r	0,25 – 0,50	0,28 – 0,56	0,32 – 0,63	0,32 – 0,70	0,32 – 0,70
	6	160	**200**	240	mm/r	0,25 – 0,50	0,28 – 0,56	0,32 – 0,63	0,32 – 0,70	0,32 – 0,70
S	1	20	**40**	60	mm/r	0,07 – 0,12	0,09 – 0,14	0,11 – 0,17	0,13 – 0,20	0,16 – 0,25
	2	15	**30**	45	mm/r	0,07 – 0,12	0,09 – 0,14	0,11 – 0,17	0,13 – 0,20	0,16 – 0,25
	3	15	**30**	45	mm/r	0,07 – 0,12	0,09 – 0,14	0,11 – 0,17	0,13 – 0,20	0,16 – 0,25
	4	10	**25**	40	mm/r	0,07 – 0,12	0,13 – 0,20	0,16 – 0,25	0,18 – 0,28	0,21 – 0,31

DON'T LET MONEY DRILL HOLES IN YOUR POCKETS

TDMX
MODULAR DRILL

Quick, Easy Insert change
without disassembling tool from machine; regrindable.

TDMX is a featured product in the All-Star program. Take advantage of same-day shipping on select line items today!

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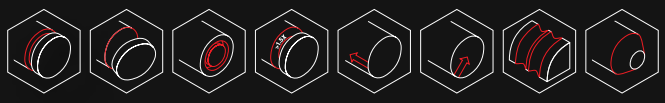
WGC



THE MOST VERSATILE TOOL IN THE MARKET FOR GROOVING, PROFILING, AND CUT-OFF OPERATIONS

4 BENEFITS IN 1

VERSATILE
GROOVING, PROFILING, AND CUT-OFF OPERATIONS

SIMPLE
EASY TO SELECT AND APPLY

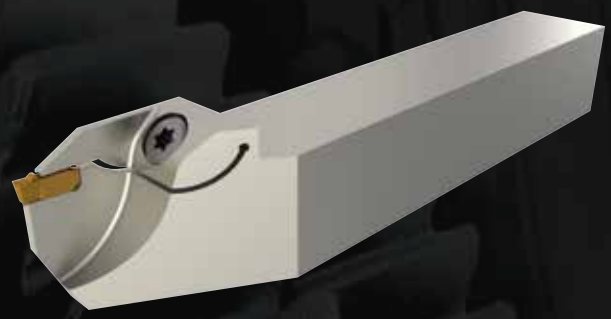
STABLE
TRIPLE-V SEATING FOR SECURE CLAMPING

PRODUCTIVE
LOW CUTTING FORCES IN THROUGH COOLANT FOR BETTER CHIP EVACUATION

GENERAL ENGINEERING

ENERGY

TRANSPORTATION



Grooving

NEW!

New integral reinforced clamp tool holders.

New front clamping for seat size: 2-3mm, shank size from 10-20mm.

First choice for external grooving applications in most workpiece materials.

Through coolant capability and efficient coolant delivery for enhanced productivity.

Available in integral and modular style toolholders.

Full Portfolio Groove Width: 2–10mm.

Cut-Off

Specially engineered chipbreakers for effective parting/cut-off and deep grooving.

Positive geometry for lower forces.

Secure seating offers greatest stability.

Groove width: 1,4–8mm.

Profiling

Full radius chipbreaker for multi-directional turning and generating complex profiles.

Rigid design ensures smooth surface finish.

Groove width: 2–8mm.

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WGC • Integral Reinforced Front Clamp Toolholders

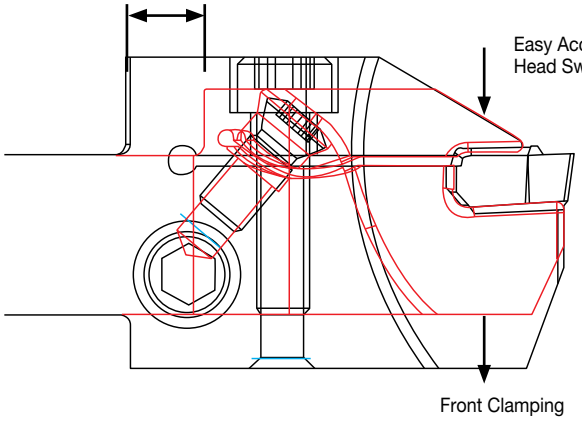
Each character in our catalog number signifies a specific trait of that product.
Use the following key columns and corresponding images to easily identify which attributes apply.

WGCSCFL2020K316C
WGCSCFL12316C

WGC	S	C	F	L	2020K	3	16	C
WGC	S	C	F	L	12	3	16	C
Family Name	Tool Style	Support Type	Clamping Screw Position	Hand	Shank Size	Seat Size	Cut-Off Depth	Coolant
Widia Grooving and Cut-Off	S: Straight Mount	C: Reinforced maximum support width circular clearance	F: Front	L: Left Hand R: Right Hand	Metric: Height x Width in mm Letter Indicates Tool Length according to ISO Inch: Height x Width in 1/16 inch increment	1B 1F 2 3 4 5 6 8 10	in Millimeters	Through Coolant Capability

Benefits of Front Clamp Compared to Top Clamp

Reduced Head Length for Added Stability.

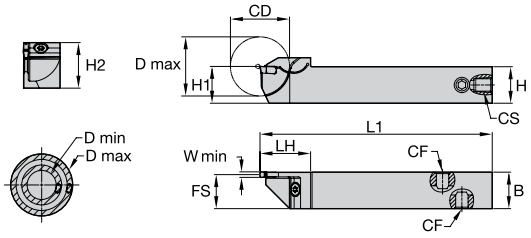


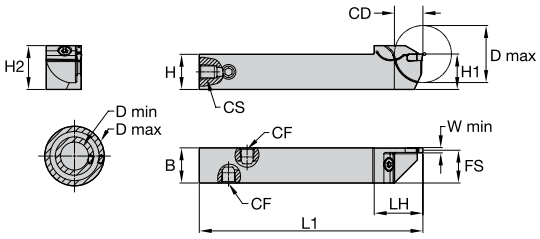
Integral reinforced Front Clamp Holders provide greater rigidity and stability.

Easy access to clamp and unclamp screw.

Available in small shank sizes and suitable for shorter CD's.

WGCSCF • Integral Reinforced Front Clamp Toolholders • Metric





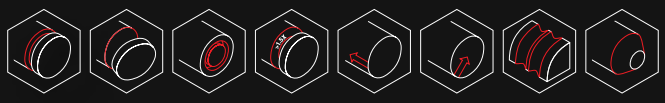
order number	catalogue number	SSC	CD	D max	H1	H	B	H2	L1	FS	LH	CF
right hand												
6765977	**WGCSCFR1010K0210**	2	10	20	10	10	10	14	125	9	21	–
6765978	**WGCSCFR1212K0216**	2	16	32	12	12	12	16	125	11	27	–
6765980	**WGCSCFR1616K0216**	2	16	32	16	16	16	21	125	15	27	–
6766062	**WGCSCFR2020K0216**	2	16	32	20	20	20	25	125	19	27	–
6765979	**WGCSCFR1212K0316C**	3	16	32	12	12	12	17	125	11	28	M8X1
6766061	**WGCSCFR1616K0316C**	3	16	32	16	16	16	18	125	15	28	M8X1
6766063	**WGCSCFR2020K0316C**	3	16	32	20	20	20	25	125	19	28	M8X1
left hand												
6766064	**WGCSCFL1010K0210**	2	10	20	10	10	10	14	125	9	21	–
6766065	**WGCSCFL1212K0216**	2	16	32	12	12	12	16	125	11	27	–
6766067	**WGCSCFL1616K0216**	2	16	32	16	16	16	21	125	15	27	–
6766069	**WGCSCFL2020K0216**	2	16	32	20	20	20	25	125	19	27	–
6766066	**WGCSCFL1212K0316C**	3	16	32	12	12	12	17	125	11	28	M8X1
6766068	**WGCSCFL1616K0316C**	3	16	32	16	16	16	21	125	15	28	M8X1
6766070	**WGCSCFL2020K0316C**	3	16	32	20	20	20	25	125	19	28	M8X1

NOTE: SSC = Pocket Seat Reference. To correspond with the SSC on the insert.

WGC • Spare Parts

screw	screw	torque				wrench	wrench
catalog number	order number	Nm	in. lbs.	thread	socket	catalog number	order number
MS1160	**1099645**	9	62	M5	T20	**KT20**	**1022703**
MS1162	**1127019**	7	80	M6	T25	**KT25**	**1022725**
MS1163	**1124104**	18	159	M8	T30	**KT30L**	**3782185**
MS1273	**1020977**	4	35.4	M4	T15	**KT15**	**1022701**
MS1490	**2263299**	17	151	M8	T45	**KT45**	**1018227**
MS1595	**1094300**	12	106	M6	T30	**KT30**	**1099676**
MS1970	**1106668**	12	106	M6	T30	**KT30**	**1099676**
MS2002	**1621087**	9	80	M6	T25	**KT25**	**1022725**
MS2091	**1931147**	9	80	M5	25IP	**K25IP**	**2050113**

RU: ROUGHING UNIVERSAL-POSITIVE



A SPECIALLY ENGINEERED GEOMETRY IN VICTORY GRADES FOR ROUGH TO MEDIUM TURNING OF A VARIETY OF WORKPIECE MATERIALS.

GENERAL ENGINEERING

ENERGY

TRANSPORTATION

RU: Roughing Universal-Positive

CNMG12/WNMG08/TNMG16 in corner radii 0.8 and 1.2mm.

Victory CVD grades for turning all types of steel, stainless steel, and cast iron materials.

Features and Benefits

Positive geometry for smooth cutting.

Positive T-land with rake angle to lower cutting forces and improve DOCN resistance.

Post-coat grinding of seating surface for secure seating surface.

Good edge strength for interrupted cuts, forging skin, and casting surfaces.

Post-coat treatment
- Improves edge toughness.
- Long, predictable tool life.
- Reduces depth-of-cut notching.
- Wide range of applications.

New geometry identification system.

Improved edge toughness
- Provides smooth outer surface to reduce forces, friction, and workpiece sticking.

Post-coat grinding
- Provides secure seating surface.

Alpha aluminia layer
- Provides coating integrity at elevated speeds.
- Higher productivity and dependability at high cutting temperatures.

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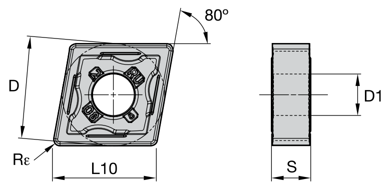
CNMG-RU

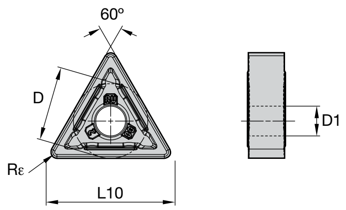


● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
P	●	●	●	○	○	○	○	○	○
M			○	●	●	●			
K	○	○					●	●	●
N									
S					○				
H									

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
CNMG120408RU	12,70	12,90	4,76	0,8	5,16	6690250	6690247	-	6817522	6817756	-	-	6678403	6690253
CNMG120412RU	12,70	12,90	4,76	1,2	5,16	6690251	6690248	-	6817523	6817757	-	-	6678404	6690254

TNMG-RU

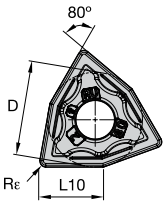


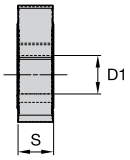
● first choice
○ alternate choice

	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
P	●	●	●	○	○	○	○	○	○
M			○	●	●	●			
K	○	○					●	●	●
N									
S					○				
H									

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
TNMG160408RU	9,53	16,50	4,76	0,8	3,81	6776800	6776799	-	6817524	6777051	-	-	6746845	6817450
TNMG160412RU	9,53	16,50	4,76	1,2	3,81	6776936	6776935	-	6817525	6776937	-	-	6746846	6817521

WNMG-RU





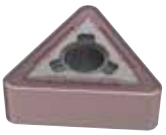
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
P		●	●	●	○	○	○	○	○	○
M				○	●	●	●			
K		○	○					●	●	●
N										
S						○				
H										

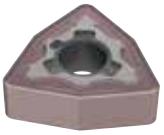
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
WNMG080408RU	12,70	8,69	4,76	0,8	5,16	6696886	6696887	-	6711599	6817758	-	-	6696885	6583558
WNMG080412RU	12,70	8,69	4,76	1,2	5,16	6690252	6690249	-	6817526	6817759	-	-	6678405	6690255

Chip Control Chart

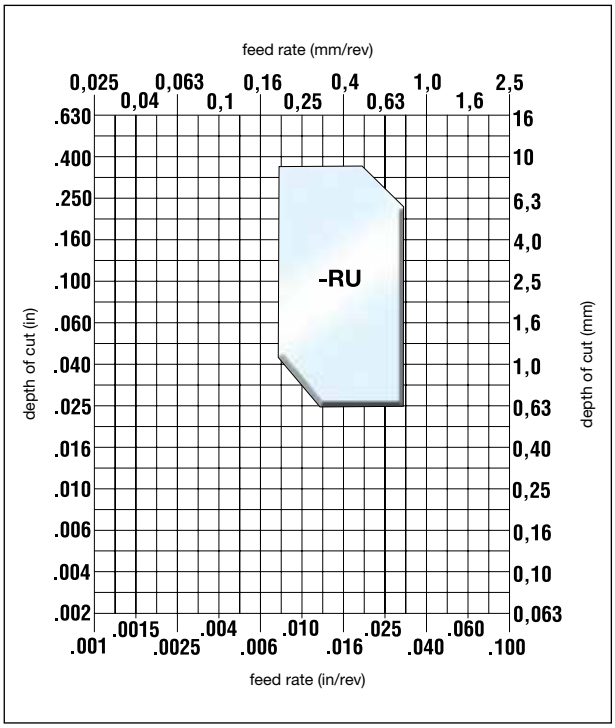
CNMG-RU



TNMG-RU



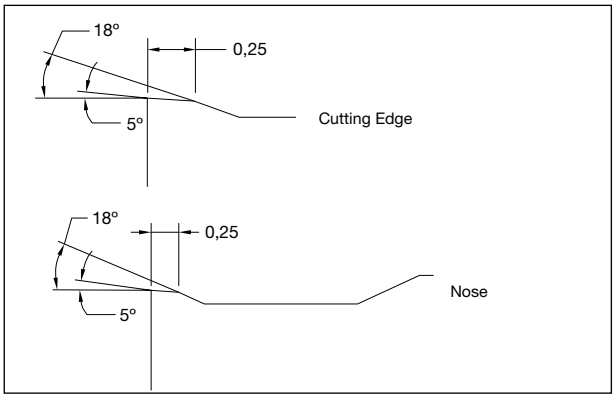
WNMG-RU



Insert Geometry

Feed: 0,2– 0,6mm
Depth of cut: 1,0 – 6,4mm

Chipbreaker Profile



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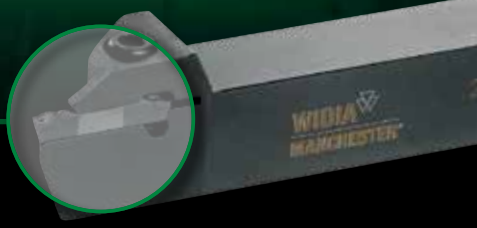
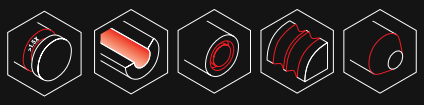


Turning

WIDIA™

INSERTS FOR ALUMINUM



WIDIA OFFERS INSERTS SPECIALLY DESIGNED FOR MACHINING ALUMINUM AND NON-FERROUS MATERIALS.

GENERAL ENGINEERING

AEROSPACE

TRANSPORTATION

-AL Geometry

Universal geometry for aluminum and non-ferrous materials.

Periphery ground with rake face polished.

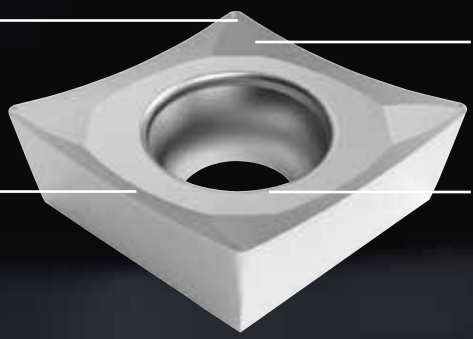
Features and Benefits

Polished rake surface for smooth flow of chips.

High positive rake on the nose and CE.

Positive, sharp cutting edge for low cutting forces and no built-up edge.

Microfine uncoated carbide for a long tool life.



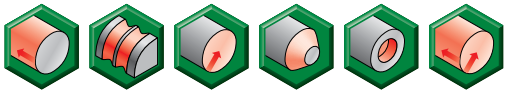
WIDIA™

widia.com

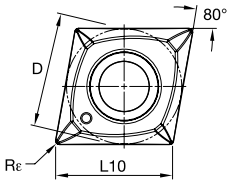
ALUMINUM

ISO/ANSI Carbide Inserts

WIDIA™ Inserts • CCGT-AL • Machining Aluminum



● first choice
○ alternate choice



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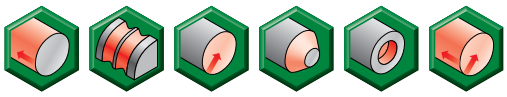
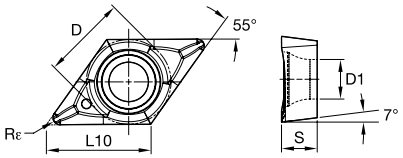
ISO catalogue number	D	L10	S	Rε	D1	WU10HT
CCGT060202AL	6,35	6,45	2,38	0,2	2,79	6846528
CCGT060204AL	6,35	6,47	2,38	0,4	2,79	6846529
CCGT060208AL	6,35	6,45	2,38	0,8	2,80	6846530
CCGT09T302AL	9,53	9,67	3,97	0,2	4,40	6846581
CCGT09T304AL	9,53	9,67	3,97	0,4	4,40	6846582
CCGT09T308AL	9,53	9,67	3,97	0,8	4,40	6846583
CCGT120402AL	12,70	12,90	4,76	0,2	5,50	6846584
CCGT120404AL	12,70	12,90	4,76	0,4	5,50	6846585
CCGT120408AL	12,70	12,90	4,76	0,8	5,50	6846586

WIDIA™ Inserts • DCGT-AL • Machining Aluminum



● first choice
○ alternate choice



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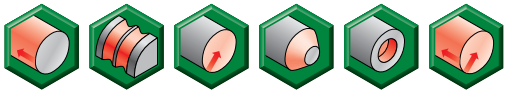
ISO catalogue number	D	L10	S	Rε	D1	WU10HT
DCGT070202AL	6,35	7,75	2,38	0,2	2,90	6846587
DCGT070204AL	6,35	7,75	2,38	0,4	2,90	6846588
DCGT11T302AL	9,53	11,63	3,97	0,2	4,40	6846589
DCGT11T304AL	9,53	11,59	3,97	0,4	4,40	6846590
DCGT11T308AL	9,53	11,63	3,97	0,8	4,40	6846591

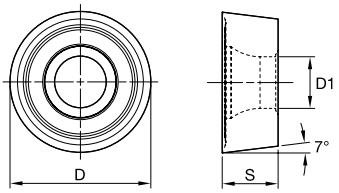
ALUMINUM

ISO/ANSI Carbide Inserts

WIDIA™ Inserts • RCGT-AL • Machining Aluminum



● first choice
○ alternate choice



P	
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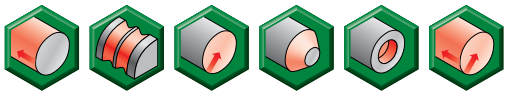
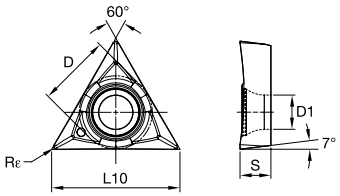
ISO catalogue number	D	S	D1	WU10HT
RCGT1204M0AL	12,00	4,76	4,40	6846592

WIDIA™ Inserts • TCGT-AL • Machining Aluminum



● first choice
○ alternate choice



P	
M	
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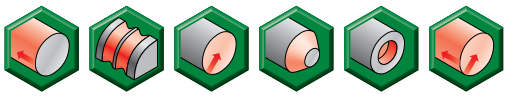
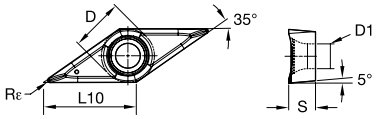
ISO catalogue number	D	L10	S	Rε	D1	WU10HT
TCGT110204AL	6,35	11,00	2,38	0,4	2,80	6846593
TCGT16T304AL	9,53	16,51	3,97	0,4	4,40	6846594
TCGT16T308AL	9,53	16,50	3,97	0,8	4,40	6846595

WIDIA™ Inserts • VBGT-AL • Machining Aluminum



● first choice
○ alternate choice



P		
M		
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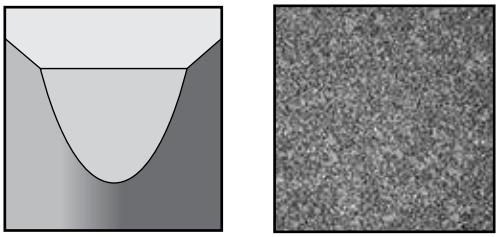
N		●
S		
H		

ISO catalogue number	D	L10	S	Rε	D1	WU10HT
VBGT160404AL	9,53	16,61	4,76	0,4	4,40	6846596
VBGT160408AL	9,53	16,46	4,76	0,8	4,40	6846597

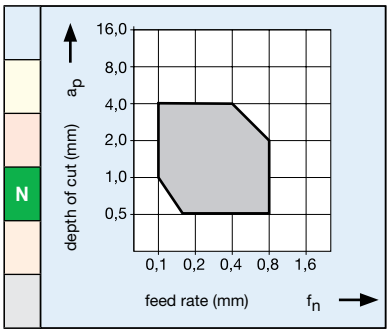
WU10HT • Grade Information

A hard, un-alloyed, low binder content with fine grained carbide. It is a wear resistant, uncoated carbide for machining of aluminum and other non-ferrous materials.



WU10HT

	Geometry
Conditions	**AL**
Lightly Interrupted Cut	WU10HT
Varying Depth of Cut	WU10HT
Smooth Cut	WU10HT



For cost-effective machining of aluminum, non-ferrous metals and plastics. Extremely sharp cutting edges result in optimum part finishes with low cutting forces and short chips.

Cutting Speed Recommendation

High-Silicon Aluminum Alloys (hypereutectic >12,2% Si) and Magnesium Alloys

material group	grade	Speed — m/min 250	500	750	1000	1250	1500	1750	2000	2250	2500	Starting Conditions m/min
N1	WU10HT		◁▷									488

Low-Silicon Aluminum Alloys (hypoeutectic <12,2% Si) and Magnesium Alloys

material group	grade	Speed — m/min 250	500	750	1000	1250	1500	1750	2000	2250	2500	Starting Conditions m/min
N1	WU10HT		◁▷									488

Copper-, Brass-, Zinc-Based on a Machinability Index Range of 70–100

material group	grade	Speed — m/min 250	500	750	1000	Starting Conditions m/min
N1	WU10HT	◁▷				259

Nylon, Plastics, Rubbers, Phenolics, Resins, Fibreglass, and Glass

material group	grade	Speed — m/min 250	500	750	1000	Starting Conditions m/min
N1	WU10HT	◁▷				107

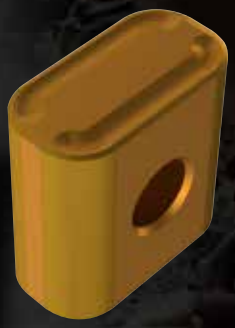
MMCs (Aluminum-Based Metal Matrix Composites)

material group	grade	Speed — m/min 250	500	750	1000	Starting Conditions m/min
N1	WU10HT	◁▷				180

TOOLS FOR RAILWAY WHEELSET RECONDITIONING

WIDIA OFFERS TOOLHOLDERS AND INDEXABLE INSERTS FOR ALL TYPES OF WHEEL LATHES USED IN THE RAILROAD INDUSTRY.

This offering of railway tooling was developed in close cooperation with machine tool builders and railway workshops to ensure productivity in typical heavy-duty operations.



Toolholders

- Robust lever clamping design with no top clamp to interfere with chip flow.
- Toolholders are made from heat-treated alloy steel, providing rigid support to the insert to withstand severe roughing cuts on work-hardened wheels.

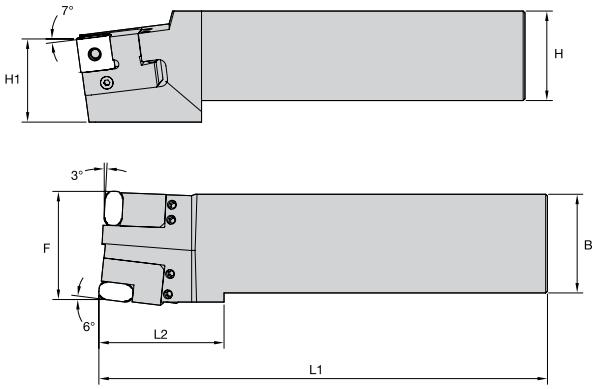
Inserts

- Upended inserts are neutral and common for either hand of the toolholder.
- Different chipbreaker profile and highly wear resistant coated carbide grades
- Grades are available to machine the wheels in a range of wear conditions.

WIDIA™

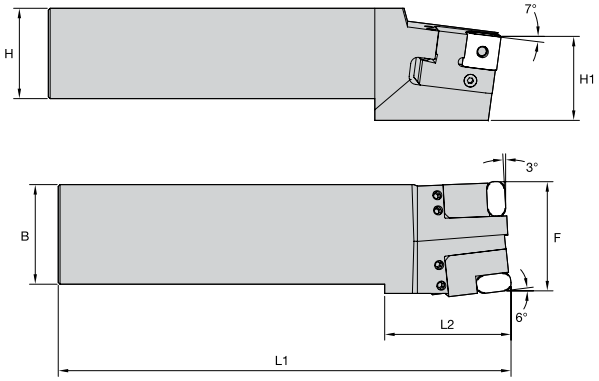
widia.com

Railway Toolholder • Wheel Turning Lathe



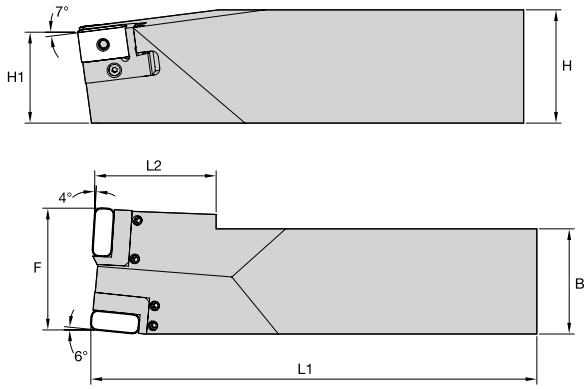
order number	catalogue number	B	F	H	H1	L1	L2
right hand							
2552321	**6939143110**	55,00	60,00	50,00	46,00	250,00	70,00

Railway Toolholder • Wheel Turning Lathe



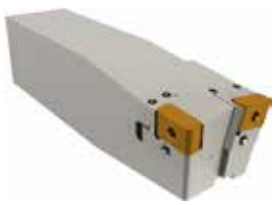
order number	catalogue number	B	F	H	H1	L1	L2
left hand							
2552320	**6939143120**	55,00	60,00	50,00	46,00	250,00	70,00

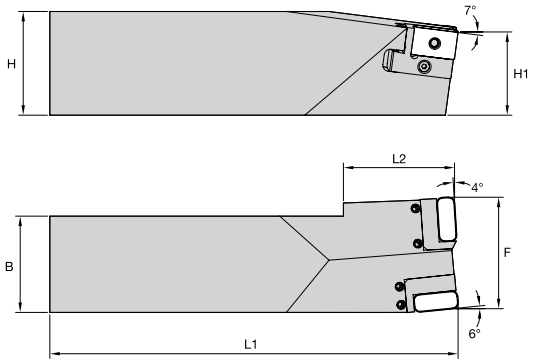
Railway Toolholder • Wheel Turning Lathe



order number	catalogue number	B	F	H	H1	L1	L2
right hand							
2552319	**6939145810**	65,00	75,00	70,00	56,00	276,00	77,80

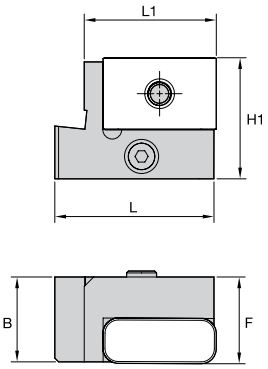
Railway Toolholder • Wheel Turning Lathe





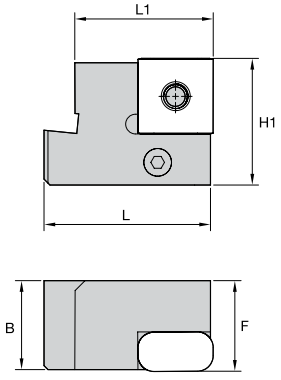
order number	catalogue number	B	F	H	H1	L1	L2
left hand							
2552318	**6939145820**	65,00	75,00	70,00	56,00	276,00	77,80

Railway Turning Cassette • Wheel Turning Lathe



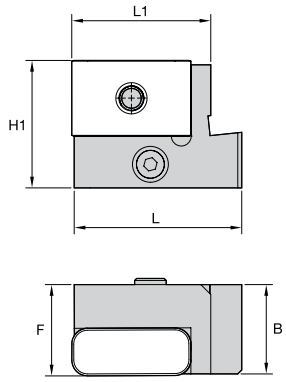
order number	catalogue number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
left hand														
2035331	**6939318620**	22,50	.886	23,00	.906	42,20	1.660	35,00	1.378	32,00	1.260	LNUX301940	**12148562700**	**12148566700**

Railway Turning Cassette • Wheel Turning Lathe



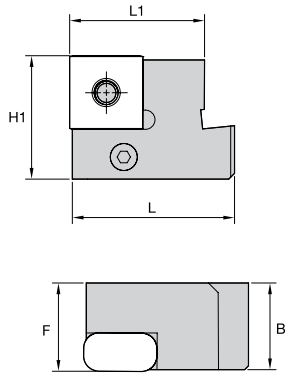
order number	catalogue number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
left hand														
2276948	**6939318820**	22,50	.886	23,00	.906	42,20	1.660	35,00	1.378	32,00	1.260	LNUX191940	**12148562700**	**12148566700**

Railway Turning Cassette • Wheel Turning Lathe



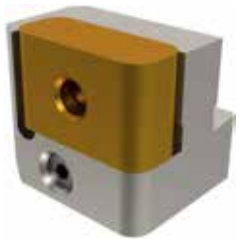
order number	catalogue number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
right hand														
2039208	**6939318610**	22,50	.886	23,00	.906	42,20	1.660	35,00	1.378	32,00	1.260	LNUX301940	**12148562700**	**12148566700**

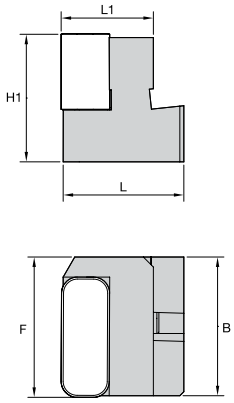
Railway Turning Cassette • Wheel Turning Lathe



order number	catalogue number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
right hand														
2276947	**6939318710**	22,50	.886	23,00	.906	42,20	1.660	35,00	1.378	32,00	1.260	LNUX191940	**12148562700**	**12148566700**

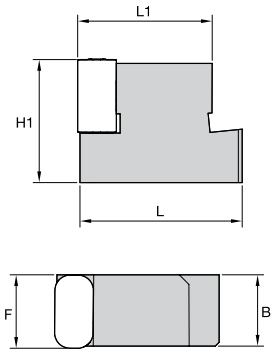
Railway Facing Cassette • Wheel Turning Lathe





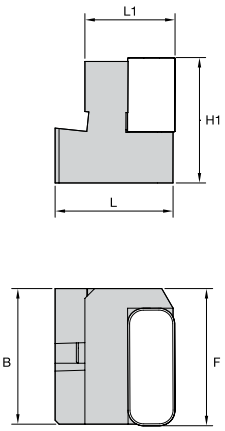
order number	catalogue number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
left hand														
2403738	**6939322020**	34,60	1.362	35,00	1.378	30,10	1.185	23,00	.906	32,00	1.260	LNUX301940	**12148562700**	**12148566700**

Railway Facing Cassette • Wheel Turning Lathe



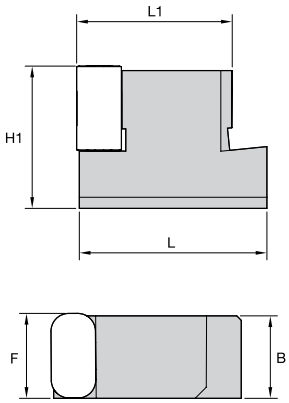
order number	catalogue number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
left hand														
2576256	**6939318920**	18,55	.730	19,05	.750	42,20	1.660	35,00	1.378	32,00	1.260	LNUX191940	**12148562700**	**12148566700**

Railway Facing Cassette • Wheel Turning Lathe



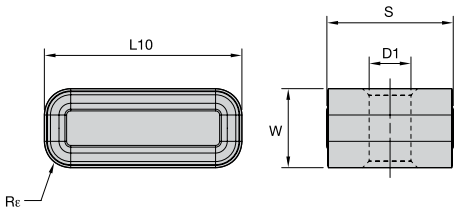
order number	catalogue number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
right hand														
2403739	**6939322110**	34,60	1.362	35,00	1.378	30,10	1.185	23,00	.906	32,00	1.260	LNUX301940	**12148562700**	**12148566700**

Railway Facing Cassette • Wheel Turning Lathe



order number	catalogue number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
right hand														
2576255	**6939319010**	18,55	.730	19,05	.750	42,20	1.660	35,00	1.378	32,00	1.260	LNUX191940	**12148562700**	**12148566700**

LNUX



● first choice
○ alternate choice

P	●	○
M		
K	○	●
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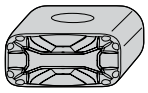
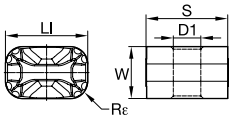
H		

ISO catalogue number	W	L10	S	Rε	D1	WP15CT	WK20CT
LNUX30194016	12,00	30,00	19,05	4,0	6,35	6128295	-

LNUX-13



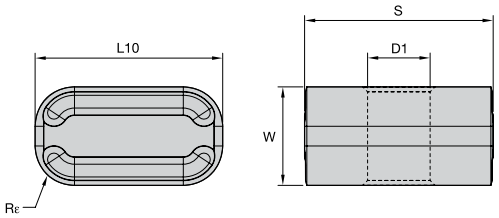


● first choice
○ alternate choice

P	●	○
M		
K	○	●
N		
S		
H		

ISO catalogue number	W	L10	S	Rε	D1	WP15CT	WK20CT
LNUX19194013	10,00	19,05	19,05	4,0	6,35	-	4170966
LNUX30194013	12,00	30,00	19,05	4,0	6,35	-	4170968

ISO/ANSI Carbide Inserts

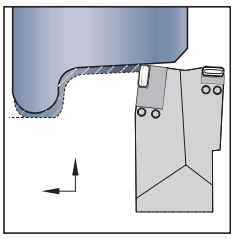


● first choice
○ alternate choice

P	●	○
M		
K	○	●
N		
S		
H		

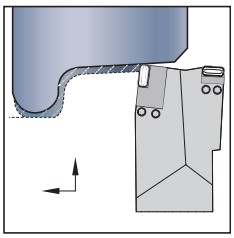
ISO catalogue number	W	L10	S	Rε	D1	WP15CT	WK20CT
LNUX191940T	10,00	19,05	19,05	4,0	6,35	6128294	4170967
LNUX301940T	12,00	30,00	19,05	4,0	6,35	-	4170969

Compound Toolholder • Spare Parts



toolholder	turning cassette	facing cassette	l	retaining screw	hex 1	locking screw	hex 2	adjusting screw
69.391.458.10	69.393.186.10	69.393.221.10	LNUX301940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.458.20	69.393.186.20	69.393.220.20	LNUX301940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.458.10	69.393.187.10	—	LNUX191940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.458.20	69.393.188.20	—	LNUX191940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577

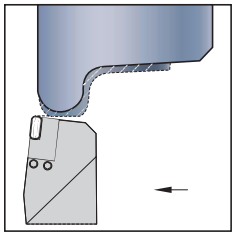
Compound Toolholder • Spare Parts



toolholder	turning cassette	facing cassette	l	retaining screw	hex	adjusting screw
69.391.431.10	69.393.186.10	—	LNUX301940	73.085.863	73.398.965	73.398.577
69.391.431.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965	73.398.577
69.391.431.10	69.393.187.10	69.393.190.10	LNUX191940	73.085.863	73.398.965	73.398.577
69.391.431.20	69.393.188.20	69.393.189.20	LNUX191940	73.085.863	73.398.965	73.398.577

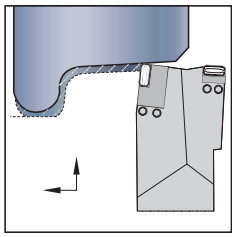
NOTE: The toolholders are supplied without the cassettes and inserts. However, the necessary screws for clamping the cassettes, locking and adjusting screws, and hex wrenches are supplied with the toolholders. Products avaliable upon request.

Turining Cassette • Spare Parts



Cassette	l	lever	clamp screw	hex
69.393.186.10	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.186.20	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.187.10	LNUX191940	214.85.667	214.85.627	73.398.965
69.393.188.20	LNUX191940	214.85.667	214.85.627	73.398.965

Facing Cassette • Spare Parts



Cassette	l	lever	clamp screw	hex
69.393.220.10	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.221.20	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.189.10	LNUX191940	214.85.667	214.85.627	73.398.965
69.393.190.20	LNUX191940	214.85.667	214.85.627	73.398.965

NOTE: The cassettes are supplied without the inserts, which should be ordered separately.
Products available upon request.

Informational Icons Guide

Indexable Milling Icons

 Counterboring	 Spiral Circular	 Face Milling	 Helical Milling	 Plunge Milling
 Ramping	 Slotting: Square End	 Side Milling/ Shoulder Milling: Square End	 3D Profiling: Inclined Square End Mill	 Pocketing
 Cylindrical/Plain Shank	 Weldon® Shank	 Screw-On Shank	 Shell Mill	 Through Coolant

Solid End Milling Icons

 Ramping: Blank	 Slotting: Square End	 Slotting: Square End with AP Dimension	 Side Milling/ Shoulder Milling: Square End	 Side Milling/ Shoulder Milling: Square End with AE/AP Dimension
 3D Profiling	 3D Profiling: 3D Profiling with AE/AP Dimensions	 Trochoidal Milling	 Corner Style: Corner Radius	 Corner Style: Square End
 Corner Style: Torus	 Cylindrical/Plain Shank	 Helix Angle: 20°	 Helix Angle: 30°	 Helix Angle: 40°
 Helix Angle: 45°	 DIN 6527	 Tool Dimensions: Flute Configuration: X (Variable)	 Tool Dimensions: Flute Configuration: 3	 Tool Dimensions: Flute Configuration: 6

Informational Icons Guide

Holemaking Icons

 Drilling	 Drilling: Inclined Entry	 Drilling: Inclined Exit	 Drilling: X-Offset	 Drilling: Stacked Plates
 Drilling: Convex	 Drilling: Blind	 Chain Drilling	 Drilling: Cross Hole	 Drilling: Half Cylinder
 Drilling: Corner Drilling 45°	 Drilling Depth: 1x	 Drilling Depth: 3x	 Drilling Depth: 5x	 Drilling Depth: 8x
 Drilling Depth: 12x	 Flat Shank	 Shank: Cylindrical Plain	 Through Coolant: Radial: Drilling	 Through Coolant: Radial: Indexable Drilling
 Tool Dimensions: 2-Flute/2-Margin/ Coolant				

Turning Icons

 Turning	 Profiling	 Facing	 Face Grooving	 Chamfering
 Grooving	 Cut-off	 Deep Grooving	 Through Coolant: Grooving	

DIN — German Institute for Standardisation
ISO — International Standardisation Organisation

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- Troubleshooting.
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Belgium	English/French	0800 80410	0049-911-9735-429 *	eu.techsupport@widia.com
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Finland	English	0800 919413	001-724-539-6830 *	na.techsupport@widia.com
France	French	080 5540 379	0049-911-9735-429 *	eu.techsupport@widia.com
Germany	German	0800 1015774	0911-9735-429*	eu.techsupport@widia.com
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Russia (cell phone)	Russian	+7 8005556395	0048 6166 56504 *	eu.techsupport@widia.com
Singapore	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
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United Kingdom	English	0800 028 2996	001-724-539-6830 *	na.techsupport@widia.com
Ukraine	Russian	800502665	0048 6166 56504 *	eu.techsupport@widia.com
USA	English	888 539 5145	001-724-539-6830 *	na.techsupport@widia.com

*Noted phone and fax numbers are not toll free.

Material Overview • DIN

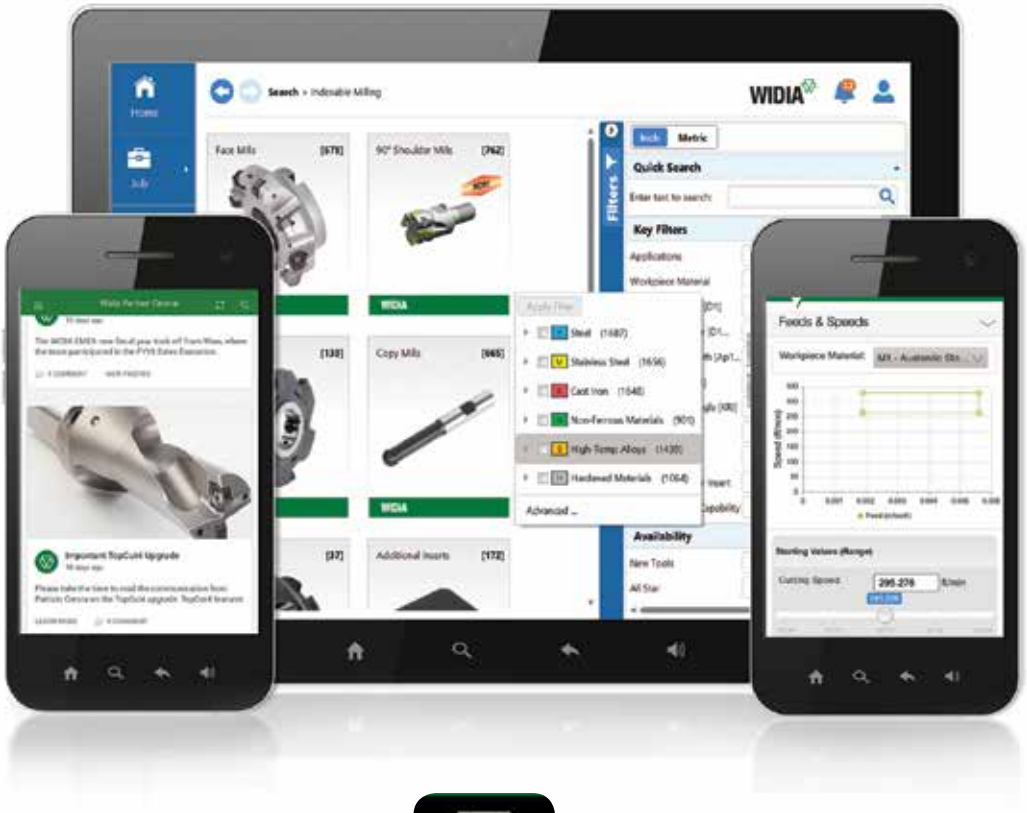
DIN

P Steel
M Stainless Steel
K Cast Iron
N Non-Ferrous
S High-Temp Alloys
H Hardened Materials

material group	description	content	tensile strength RM (MPa)*	hardness (HB)	hardness (HRC)	material number
P0	Low-Carbon Steels, Long Chipping	C <0,25%	<530	<125	–	–
P1	Low-Carbon Steels, Short Chipping, Free Machining	C <0,25%	<530	<125	–	C15, Ck22, ST37-2, S235JR, 9SMnPb28, GS38
P2	Medium- and High-Carbon Steels	C >0,25%	>530	<220	<25	ST52, S355JR, C35, GS60, Cf53
P3	Alloy Steels and Tool Steels	C >0,25%	600–850	<330	<35	16MnCr5, Ck45, 21CrMoV5-7, 38SMn28
P4	Alloy Steels and Tool Steels	C >0,25%	850–1400	340–450	35–48	100Cr6, 30CrNiMo8, 42CrMo4, C70W2, S6525, X120Mn12
P5	Ferritic, Martensitic, and PH Stainless Steels	–	600–900	<330	<35	100Cr6, 30CrNiMo8, 42CrMo4, C70W2, S6525, X120Mn12
P6	High-Strength Ferritic, Martensitic, and PH Stainless Steels	–	900–1350	350–450	35–48	X102CrMo17, G-X120Cr29
M1	Austenitic Stainless Steel	–	<600	130–200	–	X5CrNi 18 10, X2CrNiMo 17 13 2, G-X25CrNiSi18 9, X15CrNiSi 20 12
M2	High-Strength Austenitic Stainless and Cast Stainless Steels	–	600–800	150–230	<25	X2CrNiMo 13 4, X5NiCr 32 21, X5CrNiNb 18 10, G-X15CrNi 25-20
M3	Duplex Stainless Steel	–	<800	135–275	<30	X8CrNiMo27 5, X2CrNiMoN22 5 3, X20CrNiSi25 4, G-X40CrNiSi27 4
K1	Grey Cast Iron	–	125–500	120–290	<32	GG15, GG25, GG30, GG40, GTW40
K2	Low- and Medium-Strength Ductile Irons (Nodular Irons) and Compacted Graphite Irons (CGI)	–	<600	130–260	<28	GGG40, GTS35
K3	High-Strength Ductile Irons and Austempered Ductile Iron (ADI)	–	>600	180–350	<43	GGG60, GTW55, GTS65
N1	Wrought Aluminum	–	–	–	–	AlMg1, Al99.5, AlCuMg1, AlCuBiPb, AlMgSi1, ALMgSiPb
N2	Low-Silicon Aluminum Alloys and Magnesium Alloys	Si <12,2%	–	–	–	GAlSiCu4, GDAlSi10Mg
N3	High-Silicon Aluminum Alloys and Magnesium Alloys	Si >12,2%	–	–	–	G-ALSi12, G-AlSi17Cu4, G-AlSi21CuNiMg
N4	Copper-, Brass-, Zinc-Based on Machinability Index Range of 70–100	–	–	–	–	CuZn40, Ms60, G-CuSn5ZnPb, CuZn37, CuSi3Mn
N5	Nylon, Plastics, Rubbers, Phenolics, Resins, Fibreglass	–	–	–	–	LEXAN®, Hostalen™, Polystyrol®, MAKROLON®
N6	Carbon, Graphite Composites, CFRP	–	–	–	–	CFK, GFK
N7	Metal Matrix Composites (MMC)	–	–	–	–	–
S1	Iron-Based, Heat-Resistant Alloys	–	500–1200	160–260	25–48	X1NiCrMoCu32 28 7, X12NiCrSi36 16, X5NiCrAlTi31 20, X40CoCrNi20 20
S2	Cobalt-Based, Heat-Resistant Alloys	–	1000–1450	250–450	25–48	Haynes® 188, Stellite® 6,21,31
S3	Nickel-Based, Heat-Resistant Alloys	–	600–1700	160–450	<48	INCONEL® 690, INCONEL 625, Hastelloy®, NIMONIC® 75
S4	Titanium and Titanium Alloys	–	900–1600	300–400	33–48	Ti1, TiAl5Sn2, TiAl6V4, TiAl4Mo4Sn2
H1	Hardened Materials	–	–	–	44–48	GX260NiCr42, GX330NiCr42, GX300CrNiSi952, GX300CrMo153, Hardox® 400
H2	Hardened Materials	–	–	–	48–55	–
H3	Hardened Materials	–	–	–	56–60	–
H4	Hardened Materials	–	–	–	>60	–

WIDIA™ Digital Solutions

Tools and Resources at Your Fingertips



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Notes

Notes

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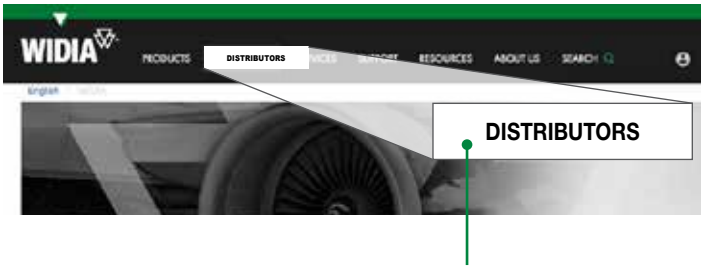

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IMPORTANT SAFETY INSTRUCTIONS: READ BEFORE USING THE TOOLS IN THIS CATALOG

METALCUTTING SAFETY

Projectile and Fragmentation Hazards

Modern metalcutting operations involve high spindle and cutter speeds and high temperatures and cutting forces. Hot metal chips may fly off the workpiece during metalcutting. Although cutting tools are designed and manufactured to withstand high cutting forces and temperatures, they can sometimes fragment, particularly if they are subjected to over-stress, severe impact, or other abuse.

To avoid injury:

- Always wear appropriate personal protective equipment, including safety goggles, when operating metalcutting machines or working nearby.
- Always make sure all machine guards are in place.

Breathing and Skin Contact Hazards

Grinding carbide or other advanced cutting tool materials produces dust or mist containing metallic particles. Breathing this dust or mist — especially over an extended period — can cause temporary or permanent lung disease or make existing medical conditions worse. Contact with this dust or mist can irritate eyes, skin, and mucous membranes and may make existing skin conditions worse.

To avoid injury:

- Always wear breathing protection and safety goggles when grinding.
- Provide ventilation control and collect and properly dispose of dust, mist, or sludge from grinding.
- Avoid skin contact with dust or mist.

For more information, read the applicable Material Safety Data Sheet provided by WIDIA and consult General Industry Safety and Health Regulations, Part 1910, Title 29 of the Code of Federal Regulations.

These safety instructions are general guidelines. Many variables affect machining operations. It is impossible to cover every specific situation. The technical information included in this catalog and recommendations on machining practices may not apply to your particular operation.

For more information, consult the WIDIA Metalcutting Safety booklet, available free from WIDIA at +1 724 539 5747 or fax +1 724 539 5439. For specific product safety and environmental questions, contact our Corporate Environmental Health and Safety Office at +1 724 539 5066 or fax +1 724 539 5372.

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METRIC | 2021

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