FEATURING THE LATEST PRODUCTS FROM WIDIA™ AND HANITA™

ADVANCES

INCH | 2021

INTRODUCING...

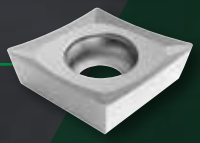
NEW PRODUCTS

TDMX

pages 56–63

AL Inserts

pages 88–95

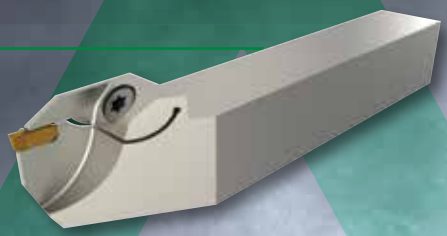


RU Geometry

pages 82–86

WGC

pages 64–81



Railway Tools

pages 96–107

WIRIA™

HANITA

WIDIA

VariMill™ XTREME™

pages 4–23

ALUFLASH™

pages 24–51

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.

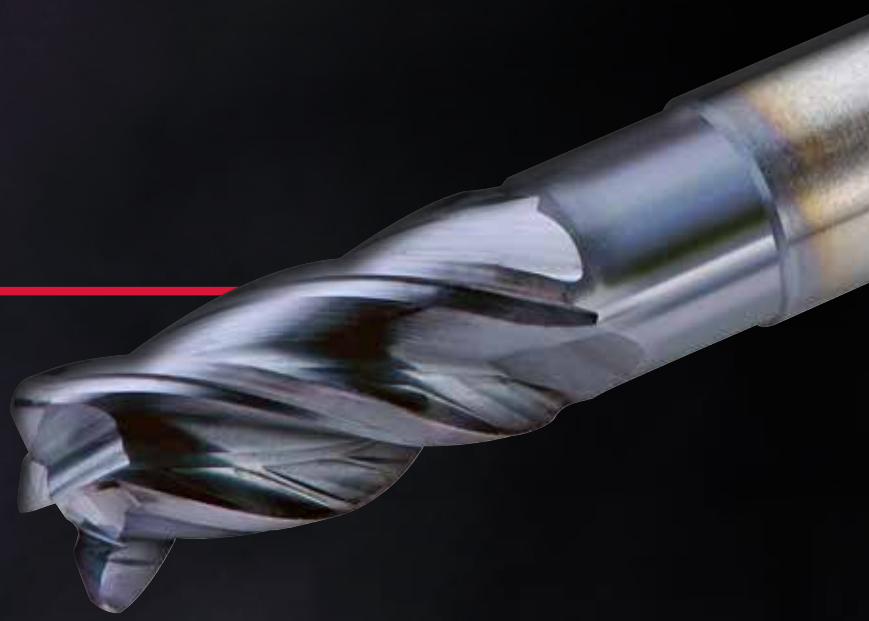
Hanita **high-performance solid carbide end mill solutions** are developed for customers who have a passion for performance.

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

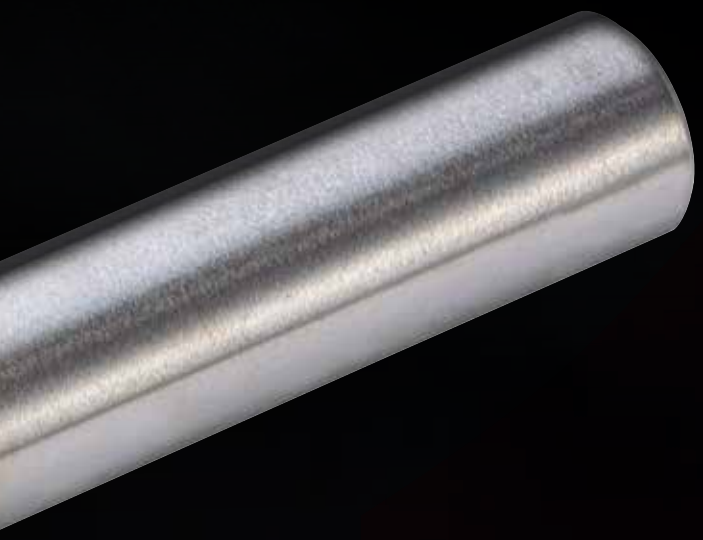
- Slotting
- Side Milling/ Shoulder Milling
- Ramping
- Helical Interpolation
- Plunge Milling
- Trochoidal Milling
- Drilling

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.

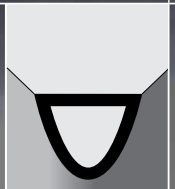
Twisted End Face to improve edge stability, which enables aggressive ramping angles and helical capability.

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.

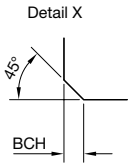
Parabolic Core for increased tool stability and reduced deflection.

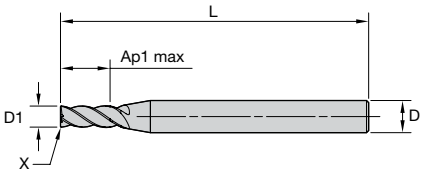
wear resistance ← → toughness

Coating		Grade Description		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

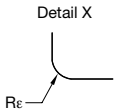
SERIES 4X0E • CHAMFERED • 4 FLUTES • CYLINDRICAL SHANK • METRIC

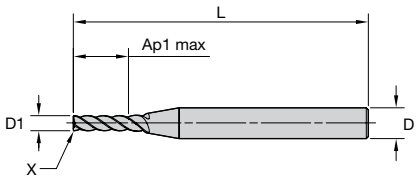




order #	catalog #	D1	D	length of cut Ap1 max	length L	BCH
	grade WS15PE AlTiN					
6829315	4X0EM04002CST	4,0	6	8,00	57	0,10
6829320	4X0EM05002CST	5,0	6	10,00	57	0,10
6829695	4X0EM06002CST	6,0	6	12,00	57	0,10
6829881	4X0EM08003CAT	8,0	8	16,00	63	0,20
6829888	4X0EM10004CAT	10,0	10	20,00	72	0,20
6830075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

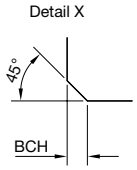
SERIES 4X0E • RADIUSED • 4 FLUTES • CYLINDRICAL SHANK • METRIC

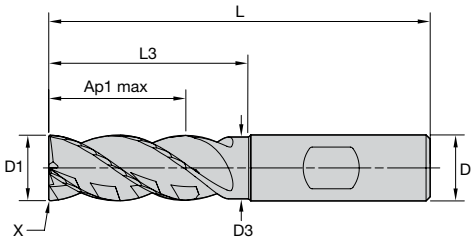




order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε
	grade WS15PE AlTiN					
6829314	4X0EM03002RAT	3,0	6	9,50	57	0,20
6830480	4X0EM25008RKT	25,0	25	50,00	121	1,50
6830671	4X0EM25008RPT	25,0	25	50,00	121	3,00

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

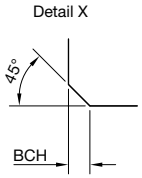


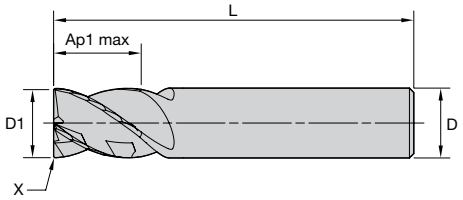


grade WS15PE
AlTiN

order #	catalog #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH
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

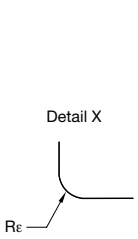


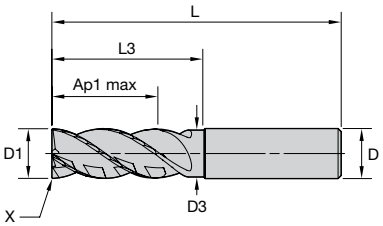


grade WS15PE
AlTiN

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

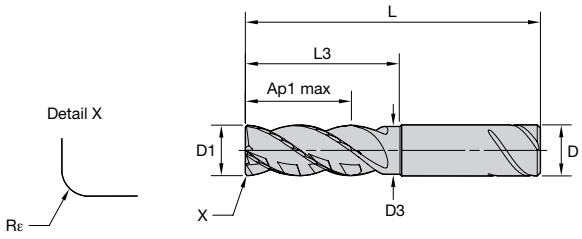
SERIES 4XNE • RADIUSED • 4 FLUTES • NECKED • CYLINDRICAL SHANK • METRIC





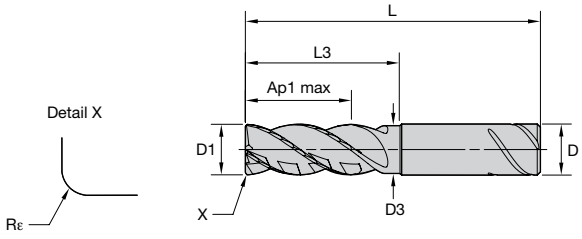
grade WS15PE AlTiN								
order #	catalog #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
6829317	4XNEM04002RAT	4,0	6	3,76	8,00	12,00	57	0,20
6829318	4XNEM04002RET	4,0	6	3,76	8,00	12,00	57	0,50
6829692	4XNEM05002RAT	5,0	6	4,70	10,00	15,00	57	0,20
6829693	4XNEM05002RET	5,0	6	4,70	10,00	15,00	57	0,50
6829697	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



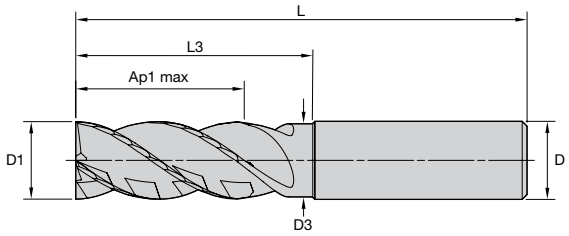
grade WS15PE AlTiN order #	catalog #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
6830078	4XNEM12005RJV	12,0	12	11,28	24,00	36,00	83	1,00
6830287	4XNEM16006RJV	16,0	16	15,04	32,00	48,00	92	1,00
6830475	4XNEM20007RJV	20,0	20	18,80	40,00	60,00	115	1,00

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



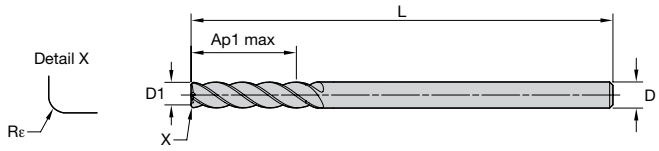
grade WS15PE AlTiN order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε
6830479	4X0EM25018RJV	25,0	25	50,00	135	1,00

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



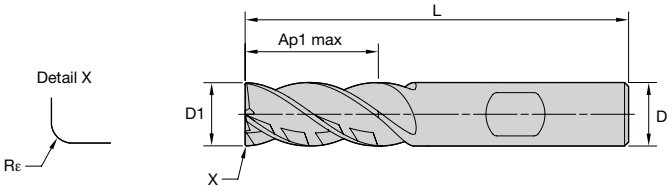
grade WS15PE AlTiN							
order #	catalog #	D1	D	D3	length of cut Ap1 max	L3	length L
6829316	4XNEM04002SZT	4,0	6	3,76	8,00	12,00	57
6829691	4XNEM05002SZT	5,0	6	4,70	10,00	15,00	57
6829696	4XNEM06002SZT	6,0	6	5,64	12,00	18,00	57
6829882	4XNEM08003SZT	8,0	8	7,52	16,00	24,00	63
6829889	4XNEM10004SZT	10,0	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

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



grade WS15PE AlTiN							
order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	ZU
6827747	4X0EE03001RAT	1/8	1/8	1/2	2	.015	4
6828401	4X0EE05000RAT	3/16	3/16	5/8	2 1/4	.015	4
6828402	4X0EE05000RBT	3/16	3/16	5/8	2 1/4	.030	4
6828406	4X0EE07002RAT	1/4	1/4	3/4	2 1/2	.015	4
6828407	4X0EE07002RBT	1/4	1/4	3/4	2 1/2	.030	4
6828601	4X0EE08003RAT	5/16	5/16	3/4	2 1/2	.015	4
6828603	4X0EE08003RBT	5/16	5/16	3/4	2 1/2	.030	4
6828610	4X0EE10004RAT	3/8	3/8	7/8	2 1/2	.015	4
6828771	4X0EE10004RBT	3/8	3/8	7/8	2 1/2	.030	4

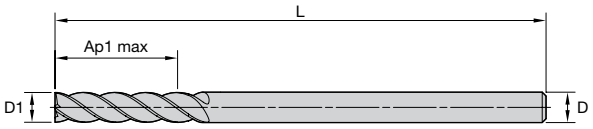
SERIES 4X0E • RADIUSED • 4 FLUTES • WELDON® SHANK • INCH



grade WS15PE AlTiN							
order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	ZU
6828776	4X0EE13005RAW	1/2	1/2	1	3	.015	4
6828778	4X0EE13015RAW	1/2	1/2	1 1/4	3 1/4	.015	4
6828779	4X0EE13015RBW	1/2	1/2	1 1/4	3 1/4	.030	4
6828780	4X0EE13015RCW	1/2	1/2	1 1/4	3 1/4	.060	4
6828971	4X0EE13015REW	1/2	1/2	1 1/4	3 1/4	.120	4
6828975	4X0EE16006RAW	5/8	5/8	1 1/4	3 1/2	.015	4
6828978	4X0EE19007RAW	3/4	3/4	1 1/2	4	.015	4
6828979	4X0EE19007RBW	3/4	3/4	1 1/2	4	.030	4
6829168	4X0EE25008RAW	1	1	1 1/2	4 1/2	.015	4
6829169	4X0EE25008RBW	1	1	1 1/2	4 1/2	.030	4

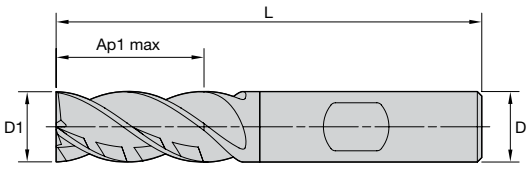
HANITA

SERIES 4X0E • SQUARE END • 4 FLUTES • CYLINDRICAL SHANK • INCH



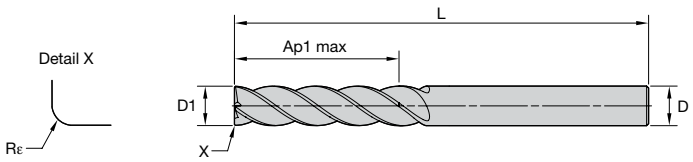
grade WS15PE AlTiN						
order #	catalog #	D1	D	length of cut Ap1 max	length L	ZU
6827746	4X0EE03001SZT	1/8	1/8	1/2	2	4
6827750	4X0EE05000SZT	3/16	3/16	5/8	2 1/4	4
6828405	4X0EE07002SZT	1/4	1/4	3/4	2 1/2	4
6828410	4X0EE08003SZT	5/16	5/16	3/4	2 1/2	4
6828609	4X0EE10004SZT	3/8	3/8	7/8	2 1/2	4

SERIES 4X0E • SQUARE END • 4 FLUTES • WELDON® SHANK • INCH



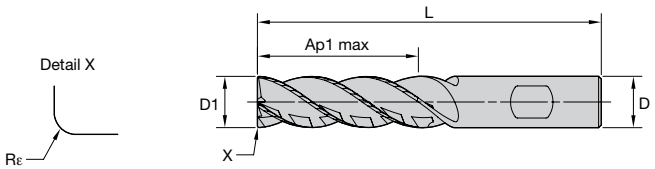
grade WS15PE AlTiN						
order #	catalog #	D1	D	length of cut Ap1 max	length L	ZU
6828775	4X0EE13005SZW	1/2	1/2	1	3	4
6828777	4X0EE13015SZW	1/2	1/2	1 1/4	3 1/4	4
6828974	4X0EE16006SZW	5/8	5/8	1 1/4	3 1/2	4
6828977	4X0EE19007SZW	3/4	3/4	1 1/2	4	4
6829167	4X0EE25008SZW	1	1	1 1/2	4 1/2	4

SERIES 4X1E • RADIUSED • 4 FLUTES • CYLINDRICAL SHANK • INCH



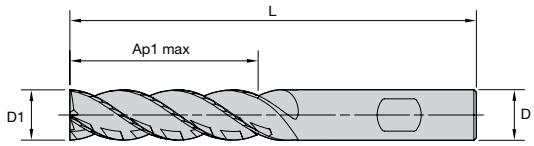
order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	ZU
grade WS15PE AlTiN							
6828605	4X1EE08003RAT	5/16	5/16	1.25	3 1/4	.015	4
6828606	4X1EE08003RBT	5/16	5/16	1.25	3 1/4	.030	4

SERIES 4X1E • RADIUSED • 4 FLUTES • WELDON® SHANK • INCH



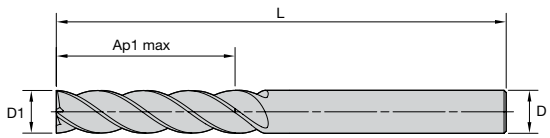
order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	ZU
grade WS15PE AlTiN							
6828973	4X1EE13005RBW	1/2	1/2	2	4	.030	4
6829161	4X1EE19007RAW	3/4	3/4	2 1/4	5	.015	4
6829164	4X1EE19007RBW	3/4	3/4	2 1/4	5	.030	4
6829312	4X1EE25008RAW	1	1	2 1/4	5	.015	4
6829313	4X1EE25008RBW	1	1	2 1/4	5	.030	4

SERIES 4X1E • SQUARE END • 4 FLUTES • WELDON® SHANK • INCH



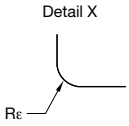
order #	catalog #	D1	D	length of cut Ap1 max	length L	ZU
	grade WS15PE AlTiN					
6828972	4X1EE13005SZW	1/2	1/2	2	4	4
6828976	4X1EE16006SZW	5/8	5/8	2 1/4	5	4
6828980	4X1EE19007SZW	3/4	3/4	2 1/4	5	4
6829311	4X1EE25008SZW	1	1	2 1/4	5	4

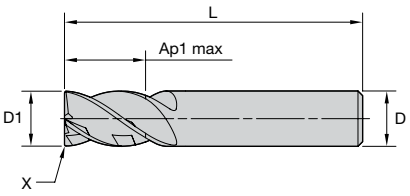
SERIES 4X1E • SQUARE END • 4 FLUTES • CYLINDRICAL SHANK • INCH



order #	catalog #	D1	D	length of cut Ap1 max	length L	ZU
	grade WS15PE AlTiN					
6828604	4X1EE08003SZT	5/16	5/16	1.25	3 1/4	4

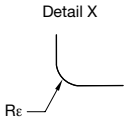
SERIES 4X4E • RADIUSED • 4 FLUTES • CYLINDRICAL SHANK • INCH

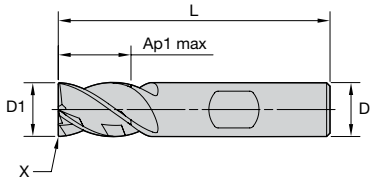




order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	ZU
grade WS15PE AlTiN							
6827745	4X4EE03001RAT	1/8	1/8	1/4	1 1/2	.015	4
6827749	4X4EE05000RAT	3/16	3/16	5/16	1 1/2	.015	4
6828404	4X4EE07002RAT	1/4	1/4	3/8	2	.015	4
6828409	4X4EE08003RAT	5/16	5/16	1/2	2	.015	4
6828608	4X4EE10004RAT	3/8	3/8	1/2	2	.015	4

SERIES 4X4E • RADIUSED • 4 FLUTES • WELDON® SHANK • INCH

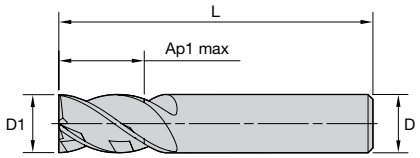




order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	ZU
grade WS15PE AlTiN							
6828773	4X4EE13005RAW	1/2	1/2	5/8	2 1/2	.015	4
6828774	4X4EE13005RBW	1/2	1/2	5/8	2 1/2	.030	4
6828772	4X4EE13005SZW	1/2	1/2	5/8	2 1/2	—	4

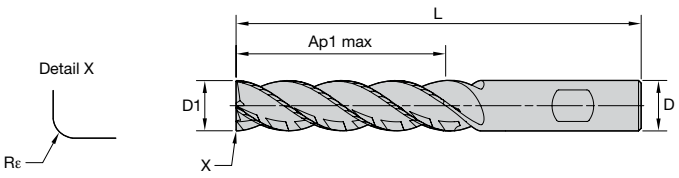
HANITA

SERIES 4X4E • SQUARE END • 4 FLUTES • CYLINDRICAL SHANK • INCH



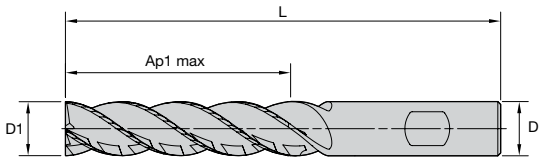
grade WS15PE AlTiN						
order #	catalog #	D1	D	length of cut Ap1 max	length L	ZU
6827744	4X4EE03001SZT	1/8	1/8	1/4	1 1/2	4
6827748	4X4EE05000SZT	3/16	3/16	5/16	1 1/2	4
6828403	4X4EE07002SZT	1/4	1/4	3/8	2	4
6828408	4X4EE08003SZT	5/16	5/16	1/2	2	4
6828607	4X4EE10004SZT	3/8	3/8	1/2	2	4

SERIES 4X6E • RADIUSED • 4 FLUTES • WELDON® SHANK • INCH



grade WS15PE AlTiN							
order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	ZU
6829166	4X6EE19007RAW	3/4	3/4	3	6	.015	4

SERIES 4X6E • SQUARE END • 4 FLUTES • WELDON® SHANK • INCH



grade WS15PE AlTiN						
order #	catalog #	D1	D	length of cut Ap1 max	length L	ZU
6829165	4X6EE19007SZW	3/4	3/4	3	6	4
6829170	4X6EE25018SZW	1	1	2	5	4

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

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

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	in	1/8	5/32	3/16	1/4	9/32	5/16	3/8	1/2	5/8	3/4	1	
P	0	1.5 x D1	0.5 x D1	1.25 x D1	490	580	660	IPT	.0009	.0012	.0016	.0019	.0022	.0026	.0031	.0036	.0044	.0049	.0054	
	1	1.5 x D1	0.5 x D1	1.25 x D1	490	580	660	IPT	.0009	.0012	.0016	.0019	.0022	.0026	.0031	.0036	.0044	.0049	.0054	
	2	1.5 x D1	0.5 x D1	1.25 x D1	460	540	620	IPT	.0009	.0012	.0016	.0019	.0022	.0026	.0031	.0036	.0044	.0049	.0054	
	3	1.5 x D1	0.5 x D1	1.25 x D1	390	450	520	IPT	.0007	.0010	.0013	.0016	.0019	.0022	.0026	.0030	.0038	.0044	.0049	
	4	1.5 x D1	0.5 x D1	1.25 x D1	300	400	490	IPT	.0007	.0009	.0012	.0014	.0017	.0019	.0023	.0027	.0033	.0038	.0042	
	5	1.5 x D1	0.5 x D1	1.25 x D1	200	260	330	IPT	.0006	.0008	.0011	.0013	.0015	.0017	.0021	.0024	.0030	.0035	.0039	
	6	1.5 x D1	0.5 x D1	1.25 x D1	160	200	250	IPT	.0005	.0007	.0009	.0011	.0013	.0015	.0017	.0020	.0025	.0028	.0031	
M	1	1.5 x D1	0.5 x D1	1.25 x D1	300	340	380	IPT	.0007	.0010	.0013	.0016	.0019	.0022	.0026	.0030	.0038	.0044	.0049	
	2	1.5 x D1	0.5 x D1	1.25 x D1	200	230	260	IPT	.0006	.0008	.0011	.0013	.0015	.0017	.0021	.0024	.0030	.0035	.0039	
	3	1.5 x D1	0.5 x D1	1.0 x D1	200	210	230	IPT	.0005	.0007	.0009	.0011	.0013	.0015	.0017	.0020	.0025	.0028	.0031	
K	1	1.5 x D1	0.5 x D1	1.0 x D1	390	440	490	IPT	.0009	.0012	.0016	.0019	.0022	.0026	.0031	.0036	.0044	.0049	.0054	
	2	1.5 x D1	0.5 x D1	1.0 x D1	360	410	460	IPT	.0007	.0010	.0013	.0016	.0019	.0022	.0026	.0030	.0038	.0044	.0049	
	3	1.5 x D1	0.5 x D1	1.0 x D1	360	390	430	IPT	.0006	.0008	.0011	.0013	.0015	.0017	.0021	.0024	.0030	.0035	.0039	
S	1	1.5 x D1	0.5 x D1	0.75 x D1	160	230	300	IPT	.0007	.0010	.0013	.0016	.0019	.0022	.0026	.0030	.0038	.0044	.0049	
	2	1.5 x D1	0.5 x D1	0.75 x D1	160	210	260	IPT	.0006	.0008	.0011	.0013	.0015	.0017	.0021	.0024	.0030	.0035	.0039	
	3	1.5 x D1	0.5 x D1	0.5 x D1	80	100	130	IPT	.0004	.0006	.0007	.0008	.0010	.0011	.0014	.0016	.0020	.0023	.0027	
	4	1.5 x D1	0.5 x D1	1.25 x D1	160	180	200	IPT	.0005	.0007	.0009	.0011	.0014	.0016	.0019	.0022	.0028	.0032	.0036	
H	1	1.5 x D1	0.5 x D1	1.0 x D1	260	360	460	IPT	.0007	.0009	.0012	.0014	.0017	.0019	.0023	.0027	.0033	.0038	.0042	
	2	1.5 x D1	0.5 x D1	1.0 x D1	230	310	390	IPT	.0005	.0007	.0009	.0011	.0013	.0015	.0017	.0020	.0025	.0028	.0031	

NOTE: See page 23 for more information on VARIMILL™ XTREME™ adjustment factors for feed calculations.

HANITA

VARIMILL™ XTREME™ • RAMPING • APPLICATION DATA • METRIC

Material Group		Helical Interpolation/ Ramping 0°–15°	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
		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

Material Group		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
		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	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

VARIMILL™ XTREME™ • RAMPING • APPLICATION DATA • METRIC

Material Group		Max Depth	Helical Interpolation/ Ramping 30°–45° WS15PE Cutting Speed — vc m/min min	Start	max	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
						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	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™ • RAMPING • APPLICATION DATA • INCH

Material Group		Max Depth	Helical Interpolation/ Ramping 0°–15° WS15PE Cutting Speed — vc m/min min	Start	max	Recommended feed per tooth (fz = ipt) for Helical Interpolation and Ramping — fz x 2 Diameter — D1 [Ømin – Ømax] mm	1/8	5/32	3/16	1/4	9/32	5/16	3/8	1/2	5/8	3/4	1
						min–max	.144–.238	.180–.297	.216–.356	.288–.475	.323–.534	.359–.594	.431–.713	.575–.950	.719–1.188	.863–1.425	1.150–1.900
P	0	1.25 x D1	490	580	660	IPT	.0009	.0012	.0016	.0019	.0023	.0026	.0031	.0036	.0044	.0049	.0054
	1	1.25 x D1	490	580	660	IPT	.0009	.0012	.0016	.0019	.0023	.0026	.0031	.0036	.0044	.0049	.0054
	2	1.25 x D1	460	540	620	IPT	.0009	.0012	.0016	.0019	.0023	.0026	.0031	.0036	.0044	.0049	.0054
	3	1.25 x D1	390	450	520	IPT	.0007	.0010	.0013	.0016	.0019	.0022	.0026	.0030	.0038	.0044	.0049
	4	1.25 x D1	300	400	490	IPT	.0007	.0009	.0012	.0014	.0017	.0019	.0023	.0027	.0033	.0038	.0042
	5	1.25 x D1	200	260	330	IPT	.0006	.0008	.0011	.0013	.0015	.0017	.0021	.0024	.0030	.0035	.0039
	6	1.25 x D1	160	200	250	IPT	.0005	.0007	.0009	.0011	.0013	.0015	.0017	.0020	.0025	.0028	.0031
M	1	1.25 x D1	300	340	380	IPT	.0007	.0010	.0013	.0016	.0019	.0022	.0026	.0030	.0038	.0044	.0049
	2	1.25 x D1	200	230	260	IPT	.0006	.0008	.0011	.0013	.0015	.0017	.0021	.0024	.0030	.0035	.0039
	3	1.0 x D1	200	210	230	IPT	.0005	.0007	.0009	.0011	.0013	.0015	.0017	.0020	.0025	.0028	.0031
K	1	1.0 x D1	390	440	490	IPT	.0009	.0012	.0016	.0019	.0023	.0026	.0031	.0036	.0044	.0049	.0054
	2	1.0 x D1	360	410	460	IPT	.0007	.0010	.0013	.0016	.0019	.0022	.0026	.0030	.0038	.0044	.0049
	3	1.0 x D1	360	390	430	IPT	.0006	.0008	.0011	.0013	.0015	.0017	.0021	.0024	.0030	.0035	.0039
S	1	0.75 x D1	160	230	300	IPT	.0007	.0010	.0013	.0016	.0019	.0022	.0026	.0030	.0038	.0044	.0049
	2	0.75 x D1	160	210	260	IPT	.0006	.0008	.0011	.0013	.0015	.0017	.0021	.0024	.0030	.0035	.0039
	3	0.5 x D1	80	100	130	IPT	.0004	.0006	.0007	.0008	.0010	.0011	.0014	.0016	.0020	.0023	.0027
	4	1.25 x D1	160	180	200	IPT	.0005	.0007	.0009	.0011	.0014	.0016	.0019	.0022	.0028	.0032	.0036
H	1	1.0 x D1	260	360	460	IPT	.0007	.0009	.0012	.0014	.0017	.0019	.0023	.0027	.0033	.0038	.0042
	2	1.0 x D1	230	310	390	IPT	.0005	.0007	.0009	.0011	.0013	.0015	.0017	.0020	.0025	.0028	.0031

HANITA

VARIMILL™ XTREME™ • RAMPING • APPLICATION DATA • INCH

Material Group		Helical Interpolation/ Ramping 15°–30°	WS15PE Cutting Speed — vc m/min			Recommended feed per tooth (fz = ipt) for Helical Interpolation and Ramping — fz x 2 Diameter — D1 [Ømin – Ømax]											
		Max Depth	min	Start	max	mm min–max	1/8 .144–.238	5/32 .180–.297	3/16 .216–.356	1/4 .288–.475	9/32 .323–.534	5/16 .359–.594	3/8 .431–.713	1/2 .575–.950	5/8 .719–1.188	3/4 .863–1.425	1 1.150–1.900
P	0	1.25 x D1	490	530	580	IPT	.0007	.0009	.0012	.0014	.0017	.0020	.0023	.0027	.0033	.0037	.0041
	1	1.25 x D1	490	530	580	IPT	.0007	.0009	.0012	.0014	.0017	.0020	.0023	.0027	.0033	.0037	.0041
	2	1.25 x D1	460	500	540	IPT	.0007	.0009	.0012	.0014	.0017	.0020	.0023	.0027	.0033	.0037	.0041
	3	1.25 x D1	390	420	450	IPT	.0005	.0008	.0010	.0012	.0014	.0017	.0020	.0023	.0029	.0033	.0037
	4	1.25 x D1	300	350	400	IPT	.0005	.0007	.0009	.0011	.0013	.0014	.0017	.0020	.0025	.0029	.0032
	5	1.25 x D1	200	235	260	IPT	.0005	.0006	.0008	.0010	.0011	.0013	.0016	.0018	.0023	.0026	.0029
	6	1.25 x D1	160	180	200	IPT	.0004	.0005	.0007	.0008	.0010	.0011	.0013	.0015	.0019	.0021	.0023
M	1	1.25 x D1	300	320	340	IPT	.0005	.0008	.0010	.0012	.0014	.0017	.0020	.0023	.0029	.0033	.0037
	2	1.25 x D1	200	215	230	IPT	.0005	.0006	.0008	.0010	.0011	.0013	.0016	.0018	.0023	.0026	.0029
	3	1.0 x D1	200	105	210	IPT	.0004	.0005	.0007	.0008	.0010	.0011	.0013	.0015	.0019	.0021	.0023
K	1	1.0 x D1	390	415	440	IPT	.0007	.0009	.0012	.0014	.0017	.0020	.0023	.0027	.0033	.0037	.0041
	2	1.0 x D1	360	380	410	IPT	.0005	.0008	.0010	.0012	.0014	.0017	.0020	.0023	.0029	.0033	.0037
	3	1.0 x D1	360	375	390	IPT	.0005	.0006	.0008	.0010	.0011	.0013	.0016	.0018	.0023	.0026	.0029
S	1	0.75 x D1	160	190	230	IPT	.0005	.0008	.0010	.0012	.0014	.0017	.0020	.0023	.0029	.0033	.0037
	2	0.75 x D1	160	180	210	IPT	.0005	.0006	.0008	.0010	.0011	.0013	.0016	.0018	.0023	.0026	.0029
	3	0.5 x D1	80	90	100	IPT	.0003	.0005	.0005	.0006	.0008	.0008	.0011	.0012	.0015	.0017	.002
	4	1.25 x D1	160	170	180	IPT	.0004	.0005	.0007	.0008	.0011	.0012	.0014	.0017	.0021	.0024	.0027
H	1	1.0 x D1	260	310	360	IPT	.0005	.0007	.0009	.0011	.0013	.0014	.0017	.0020	.0025	.0029	.0032
	2	1.0 x D1	230	270	310	IPT	.0004	.0005	.0007	.0008	.0010	.0011	.0013	.0015	.0019	.0021	.0023

Material Group		Helical Interpolation/ Ramping 30°–45°	WS15PE Cutting Speed — vc m/min			Recommended feed per tooth (fz = ipt) for Helical Interpolation and Ramping — fz x 2 Diameter — D1 [Ømin – Ømax]											
		Max Depth	min	Start	max	mm min–max	1/8 .144–.238	5/32 .180–.297	3/16 .216–.356	1/4 .288–.475	9/32 .323–.534	5/16 .359–.594	3/8 .431–.713	1/2 .575–.950	5/8 .719–1.188	3/4 .863–1.425	1 1.150–1.900
P	0	1.25 x D1	420	450	495	IPT	.0005	.0007	.0010	.0011	.0014	.0016	.0019	.0022	.0026	.0029	.0032
	1	1.25 x D1	420	450	495	IPT	.0005	.0007	.0010	.0011	.0014	.0016	.0019	.0022	.0026	.0029	.0032
	2	1.25 x D1	420	450	495	IPT	.0005	.0007	.0010	.0011	.0014	.0016	.0019	.0022	.0026	.0029	.0032
	3	1.25 x D1	315	345	360	IPT	.0004	.0006	.0008	.0010	.0011	.0013	.0016	.0018	.0023	.0026	.0029
	4	1.25 x D1	270	300	330	IPT	.0004	.0005	.0007	.0008	.0010	.0011	.0014	.0016	.0020	.0023	.0025
	5	1.25 x D1	210	225	240	IPT	.0004	.0005	.0007	.0008	.0009	.0010	.0013	.0014	.0018	.0021	.0023
	6	1.25 x D1	165	180	195	IPT	.0003	.0004	.0005	.0007	.0008	.0009	.0010	.0012	.0015	.0017	.0019
M	1	1.25 x D1	225	255	270	IPT	.0004	.0006	.0008	.0010	.0011	.0013	.0016	.0018	.0023	.0026	.0029
	2	1.25 x D1	150	165	180	IPT	.0004	.0005	.0007	.0008	.0009	.0010	.0013	.0014	.0018	.0021	.0023
	3	1.0 x D1	135	150	165	IPT	.0003	.0004	.0005	.0007	.0008	.0009	.0010	.0012	.0015	.0017	.0019
K	1	1.0 x D1	330	360	390	IPT	.0005	.0007	.0010	.0011	.0014	.0016	.0019	.0022	.0026	.0029	.0032
	2	1.0 x D1	300	330	360	IPT	.0004	.0006	.0008	.0010	.0011	.0013	.0016	.0018	.0023	.0026	.0029
	3	1.0 x D1	270	300	330	IPT	.0004	.0005	.0007	.0008	.0009	.0010	.0013	.0014	.0018	.0021	.0023
S	1	0.75 x D1	240	255	270	IPT	.0004	.0006	.0008	.0010	.0011	.0013	.0016	.0018	.0023	.0026	.0029
	2	0.75 x D1	165	180	195	IPT	.0004	.0005	.0007	.0008	.0009	.0010	.0013	.0014	.0018	.0021	.0023
	3	0.5 x D1	60	75	84	IPT	.0002	.0004	.0004	.0005	.0006	.0007	.0008	.0010	.0012	.0014	.0016
	4	1.25 x D1	105	120	135	IPT	.0003	.0004	.0005	.0007	.0008	.0010	.0011	.0013	.0017	.0019	.0022
H	1	1.0 x D1	225	240	255	IPT	.0004	.0005	.0007	.0008	.0010	.0011	.0014	.0016	.0020	.0023	.0025
	2	1.0 x D1	195	210	225	IPT	.0003	.0004	.0005	.0007	.0008	.0009	.0010	.0012	.0015	.0017	.0019

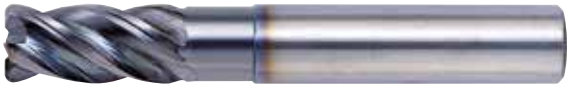
VARIMILL™ XTREME™ • PLUNGING/DRILLING • APPLICATION DATA • METRIC



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™ • PLUNGING/DRILLING • APPLICATION DATA • INCH





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	in	1/8	5/32	3/16	1/4	9/32	5/16	3/8	1/2	5/8	3/4	1
P	0	1.5 x D	●	Preferred	420	450	495	IPR	.0013	.0016	.0450	.0022	.0024	.0026	.0031	.0037	.0047	.0063	.0071
	1	1.5 x D	●	Required	420	450	495	IPR	.0013	.0016	.0450	.0022	.0024	.0026	.0031	.0037	.0047	.0063	.0071
	2	1.5 x D	●	Required	420	450	495	IPR	.0013	.0016	.0450	.0022	.0024	.0026	.0031	.0037	.0047	.0063	.0071
	3	1 x D	●	Required	315	345	360	IPR	.0008	.0011	.0330	.0016	.0018	.0020	.0024	.0028	.0039	.0049	.0059
	4	1 x D	●	Required	270	300	330	IPR	.0008	.0011	.0330	.0016	.0018	.0020	.0024	.0028	.0039	.0049	.0059
	5	0.5 x D	●	Required	210	225	240	IPR	.0006	.0007	.0200	.0010	.0012	.0014	.0016	.0020	.0026	.0033	.0039
	6	0.5 x D	●	Required	165	180	195	IPR	.0006	.0007	.0200	.0010	.0012	.0014	.0016	.0020	.0026	.0033	.0039
M	1	0.75 x D	●	Required	225	255	270	IPR	.0008	.0011	.0330	.0016	.0018	.0020	.0024	.0028	.00239	.0049	.0059
	2	0.5 x D	●	Required	150	165	180	IPR	.0006	.0007	.0200	.0010	.0012	.0014	.0016	.0020	.0026	.0033	.0039
	3	0.5 x D	●	Required	135	150	165	IPR	.0006	.0007	.0200	.0010	.0012	.0014	.0016	.0020	.0026	.0033	.0039
K	1	1.5 x D	●	Preferred	330	360	390	IPR	.0013	.0016	.0450	.0022	.0024	.0026	.0031	.0037	.0047	.0063	.0071
	2	1 x D	●	Required	300	330	360	IPR	.0008	.0011	.0330	.0016	.0018	.0020	.0024	.0028	.0039	.0049	.0059
	3	1 x D	●	Required	270	300	330	IPR	.0008	.0011	.0330	.0016	.0018	.0020	.0024	.0028	.0039	.0049	.0059
S	1	0.3 x D	○	Required	240	255	270	IPR	.0008	.0011	.0330	.0016	.0018	.0020	.0024	.0028	.0039	.0049	.0059
	2	0.1 x D	○	Required	165	180	195	IPR	.0006	.0007	.0200	.0010	.0012	.0014	.0016	.0020	.0026	.0033	.0039
	3	0.1 x D	○	Required	60	75	84	IPR	.0004	.0005	.0150	.0007	.0008	.0009	.0011	.0013	.0018	.0024	.0028
	4	0.2 x D	○	Required	105	120	135	IPR	.0006	.0007	.0200	.0010	.0012	.0014	.0016	.0020	.0026	.0033	.0039
H	1	0.3 x D	○	Required	225	240	255	IPR	.0008	.0011	.0330	.0016	.0018	.0020	.0024	.0028	.0039	.0049	.0059
	2	0.2 x D	○	Required	195	210	225	IPR	.0006	.0007	.0200	.0010	.0012	.0014	.0016	.0020	.0026	.0033	.0039

HANITA

VARIMILL™ XTREME™ • ADJUSTMENT FACTOR TABLE FOR FEED CALCULATION

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*

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

Inch

	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

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

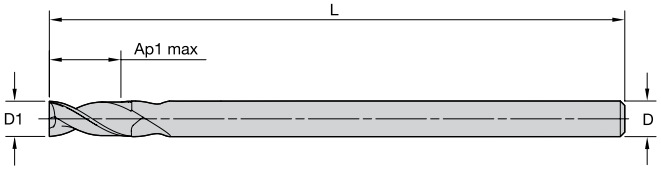
Each character in our catalog number signifies a specific trait of that product.
Use the following key columns and corresponding images to easily identify which attributes apply.

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

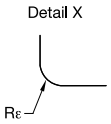
HANITA

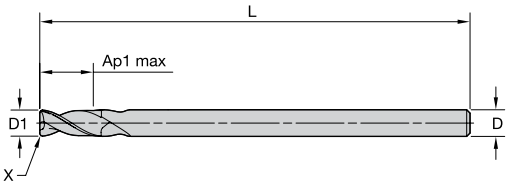
ALUFLASH SERIES 2A09 • SQUARE END • 2 FLUTE • REGULAR LENGTH • CYLINDRICAL SHANK • INCH



grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6853394	2A09E03000SZT	1/8	1/8	1/4	2	2
6853396	2A09E05001SZT	3/16	3/16	5/16	2	2
6853398	2A09E07003SZT	1/4	1/4	3/8	2	2
6853421	2A09E08004SZT	5/16	5/16	5/8	2 1/2	2
6853423	2A09E10005SZT	3/8	3/8	1	3	2
6853426	2A09E13006SZT	1/2	1/2	1 1/4	3 1/2	2
6853431	2A09E19009SZT	3/4	3/4	1 5/8	4 1/4	2
6853435	2A09E2500ASZT	1	1	2 1/2	5 1/2	2

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

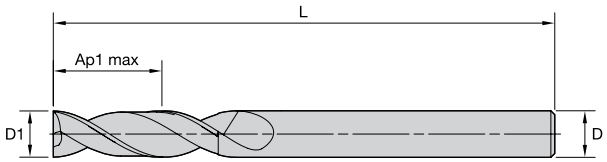




grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6853395	2A09E03000RAT	1/8	1/8	1/4	2	.015	2
6853397	2A09E05001RAT	3/16	3/16	5/16	2	.015	2
6853399	2A09E07003RAT	1/4	1/4	3/8	2	.015	2
6853400	2A09E07003RET	1/4	1/4	3/8	2	.030	2
6853422	2A09E08004RAT	5/16	5/16	5/8	2 1/2	.015	2
6853424	2A09E10005RAT	3/8	3/8	1	3	.015	2
6853425	2A09E10005RET	3/8	3/8	1	3	.030	2
6853427	2A09E13006RAT	1/2	1/2	1 1/4	3 1/2	.015	2
6853428	2A09E13006RET	1/2	1/2	1 1/4	3 1/2	.030	2
6853429	2A09E13006RGT	1/2	1/2	1 1/4	3 1/2	.060	2
6853430	2A09E13006RKT	1/2	1/2	1 1/4	3 1/2	.120	2
6853432	2A09E19009RET	3/4	3/4	1 5/8	4 1/4	.030	2
6853433	2A09E19009RGT	3/4	3/4	1 5/8	4 1/4	.060	2
6853434	2A09E19009RKT	3/4	3/4	1 5/8	4 1/4	.120	2
6853436	2A09E2500ARET	1	1	2 1/2	5 1/2	.030	2
6853437	2A09E2500ARGT	1	1	2 1/2	5 1/2	.060	2
6853438	2A09E2500ARKT	1	1	2 1/2	5 1/2	.120	2

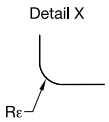
HANITA

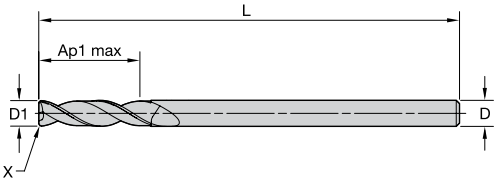
ALUFLASH SERIES 2A19 • SQUARE END • 2 FLUTE • LONG LENGTH • CYLINDRICAL SHANK • INCH



grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6853379	2A19E03010SZT	1/8	1/8	1/2	2	2
6853381	2A19E05011SZT	3/16	3/16	5/8	2	2
6853383	2A19E07013SZT	1/4	1/4	3/4	2 1/2	2
6853386	2A19E08014SZT	5/16	5/16	1 1/4	3	2
6853388	2A19E10015SZT	3/8	3/8	1 1/2	4	2
6853391	2A19E13016SZT	1/2	1/2	2	4	2

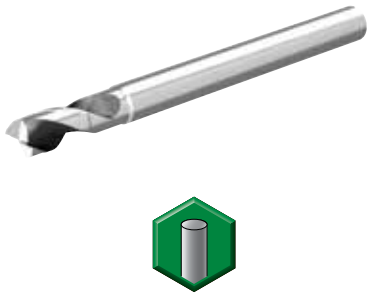
ALUFLASH SERIES 2A19 • RADIUS • 2 FLUTE • LONG LENGTH • CYLINDRICAL SHANK • INCH

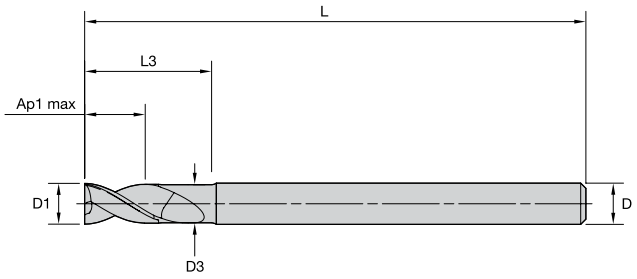




grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6853380	2A19E03010RAT	1/8	1/8	1/2	2	.015	2
6853382	2A19E05011RAT	3/16	3/16	5/8	2	.015	2
6853384	2A19E07013RAT	1/4	1/4	3/4	2 1/2	.015	2
6853385	2A19E07013RET	1/4	1/4	3/4	2 1/2	.030	2
6853387	2A19E08014RAT	5/16	5/16	1 1/4	3	.015	2
6853389	2A19E10015RAT	3/8	3/8	1 1/2	4	.015	2
6853390	2A19E10015RET	3/8	3/8	1 1/2	4	.030	2
6853392	2A19E13016RAT	1/2	1/2	2	4	.015	2
6853393	2A19E13016RET	1/2	1/2	2	4	.030	2

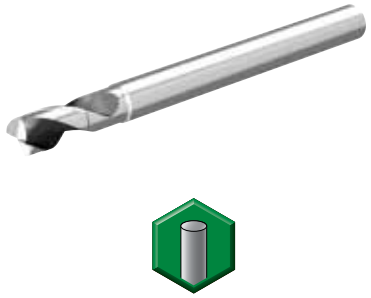
ALUFLASH SERIES 2AN9 • SQUARE END • 2 FLUTE • REGULAR LENGTH • REGULAR NECK • CYLINDRICAL SHANK • INCH

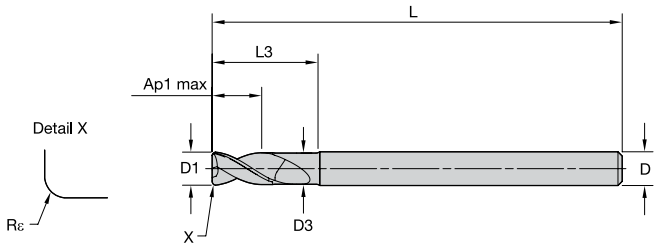




grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6859874	2AN9E03000SZT	1/8	1/8	.118	3/16	1 1/2	3/8	2
6859876	2AN9E05001SZT	3/16	3/16	.176	1/4	2 1/4	9/16	2
6859878	2AN9E07003SZT	1/4	1/4	.235	5/16	2 1/2	3/4	2
6859883	2AN9E08004SZT	5/16	5/16	.294	3/8	2 1/2	1	2
6859886	2AN9E10005SZT	3/8	3/8	.353	1/2	3	1 1/4	2
6859889	2AN9E13006SZT	1/2	1/2	.470	5/8	3 1/2	1 1/2	2
6859892	2AN9E16008SZT	5/8	5/8	.588	3/4	4	2	2
6859895	2AN9E19009SZT	3/4	3/4	.705	1	5	2 1/4	2
6859898	2AN9E2500ASZT	1	1	.940	1 1/4	5 1/2	2 1/2	2

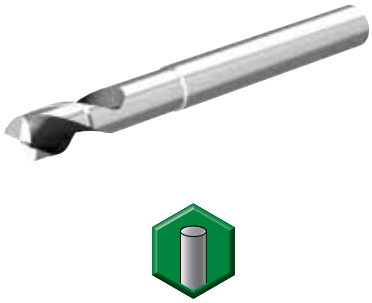
ALUFLASH SERIES 2AN9 • RADIUS • 2 FLUTE • REGULAR LENGTH • REGULAR NECK • CYLINDRICAL SHANK • INCH

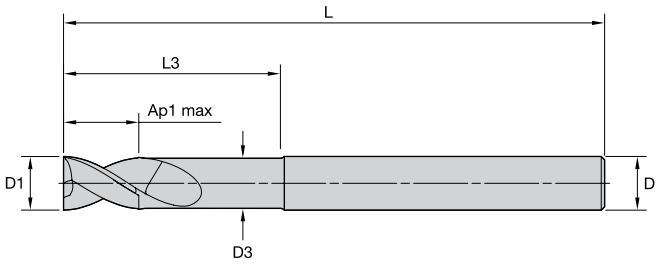




grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6859875	2AN9E03000RAT	1/8	1/8	.118	3/16	1 1/2	3/8	.015	2
6859877	2AN9E05001RAT	3/16	3/16	.176	1/4	2 1/4	9/16	.015	2
6859881	2AN9E07003RET	1/4	1/4	.235	5/16	2 1/2	3/4	.030	2
6859882	2AN9E07003RGT	1/4	1/4	.235	5/16	2 1/2	3/4	.060	2
6859884	2AN9E08004RET	5/16	5/16	.294	3/8	2 1/2	1	.030	2
6859885	2AN9E08004RGT	5/16	5/16	.294	3/8	2 1/2	1	.060	2
6859887	2AN9E10005RET	3/8	3/8	.353	1/2	3	1 1/4	.030	2
6859888	2AN9E10005RGT	3/8	3/8	.353	1/2	3	1 1/4	.060	2
6859890	2AN9E13006RET	1/2	1/2	.470	5/8	3 1/2	1 1/2	.030	2
6859891	2AN9E13006RGT	1/2	1/2	.470	5/8	3 1/2	1 1/2	.060	2
6859893	2AN9E16008RET	5/8	5/8	.588	3/4	4	2	.030	2
6859894	2AN9E16008RGT	5/8	5/8	.588	3/4	4	2	.060	2
6859896	2AN9E19009RET	3/4	3/4	.705	1	5	2 1/4	.030	2
6859897	2AN9E19009RGT	3/4	3/4	.705	1	5	2 1/4	.060	2
6859899	2AN9E2500ARET	1	1	.940	1 1/4	5 1/2	2 1/2	.030	2
6859900	2AN9E2500ARGT	1	1	.940	1 1/4	5 1/2	2 1/2	.060	2

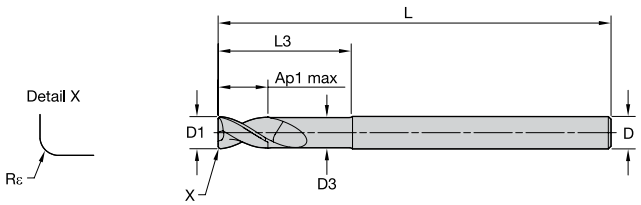
ALUFLASH SERIES 2AL9 • SQUARE END • 2 FLUTE • REGULAR LENGTH • MEDIUM NECK • CYLINDRICAL SHANK • INCH





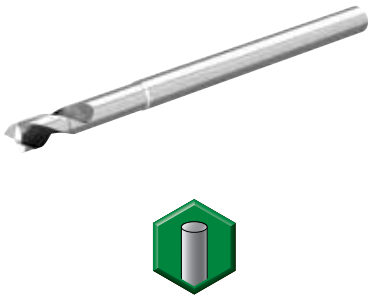
grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6859607	2AL9E07013SZT	1/4	1/4	.235	5/16	2 1/2	1	2
6859651	2AL9E08014SZT	5/16	5/16	.294	3/8	3	1 1/4	2
6859654	2AL9E10015SZT	3/8	3/8	.353	1/2	3	1 1/2	2
6859657	2AL9E13016SZT	1/2	1/2	.470	5/8	4	2	2
6859660	2AL9E16018SZT	5/8	5/8	.588	3/4	5	2 1/2	2
6859673	2AL9E19019SZT	3/4	3/4	.705	1	5	3	2
6859676	2AL9E2501ASZT	1	1	.940	1 1/4	5 1/2	3	2

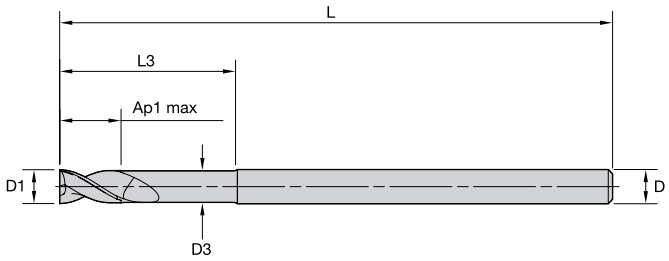
ALUFLASH SERIES 2AL9 • RADIUS • 2 FLUTE • REGULAR LENGTH • MEDIUM NECK • CYLINDRICAL SHANK • INCH



grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6859606	2AL9E05011RAT	3/16	3/16	.176	1/4	2 1/4	3/4	.015	2
6859608	2AL9E07013RET	1/4	1/4	.235	5/16	2 1/2	1	.030	2
6859610	2AL9E07013RGT	1/4	1/4	.235	5/16	2 1/2	1	.060	2
6859652	2AL9E08014RET	5/16	5/16	.294	3/8	3	1 1/4	.030	2
6859653	2AL9E08014RGT	5/16	5/16	.294	3/8	3	1 1/4	.060	2
6859655	2AL9E10015RET	3/8	3/8	.353	1/2	3	1 1/2	.030	2
6859656	2AL9E10015RGT	3/8	3/8	.353	1/2	3	1 1/2	.060	2
6859658	2AL9E13016RET	1/2	1/2	.470	5/8	4	2	.030	2
6859659	2AL9E13016RGT	1/2	1/2	.470	5/8	4	2	.060	2
6859671	2AL9E16018RET	5/8	5/8	.588	3/4	5	2 1/2	.030	2
6859672	2AL9E16018RGT	5/8	5/8	.588	3/4	5	2 1/2	.060	2
6859674	2AL9E19019RET	3/4	3/4	.705	1	5	3	.030	2
6859675	2AL9E19019RGT	3/4	3/4	.705	1	5	3	.060	2
6859677	2AL9E2501ARET	1	1	.940	1 1/4	5 1/2	3	.030	2
6859678	2AL9E2501ARGT	1	1	.940	1 1/4	5 1/2	3	.060	2

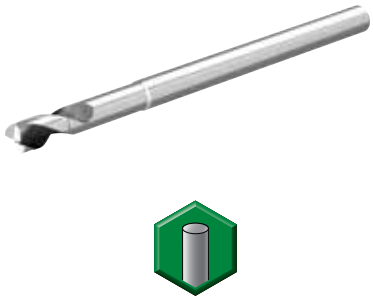
ALUFLASH SERIES 2AF9 • SQUARE END • 2 FLUTE • REGULAR LENGTH • LONG NECK • CYLINDRICAL SHANK • INCH

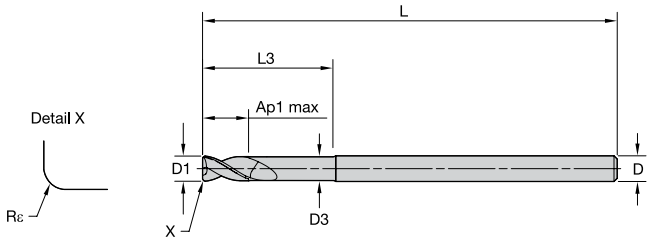




grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6859680	2AF9E03020SZT	1/8	1/8	.118	3/16	2	5/8	2
6859682	2AF9E05021SZT	3/16	3/16	.176	1/4	2 1/4	1	2
6859684	2AF9E07023SZT	1/4	1/4	.235	5/16	3	1 1/4	2
6859687	2AF9E08024SZT	5/16	5/16	.294	3/8	3	1 1/2	2
6859690	2AF9E10025SZT	3/8	3/8	.353	1/2	3 1/2	2	2
6859693	2AF9E13026SZT	1/2	1/2	.470	5/8	4 1/2	2 1/2	2
6859696	2AF9E16028SZT	5/8	5/8	.588	3/4	5	3 1/4	2
6859699	2AF9E19029SZT	3/4	3/4	.705	1	5 1/2	3 1/2	2
6859702	2AF9E2502ASZT	1	1	.940	1 1/4	6 1/2	3 3/4	2

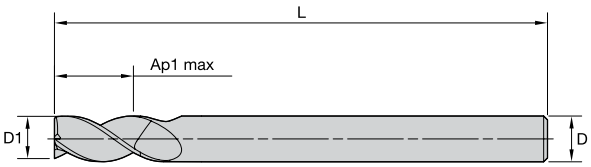
ALUFLASH SERIES 2AF9 • RADIUS • 2 FLUTE • REGULAR LENGTH • LONG NECK • CYLINDRICAL SHANK • INCH





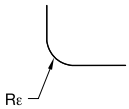
grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6859681	2AF9E03020RAT	1/8	1/8	.118	3/16	2	5/8	.015	2
6859683	2AF9E05021RAT	3/16	3/16	.176	1/4	2 1/4	1	.015	2
6859685	2AF9E07023RET	1/4	1/4	.235	5/16	3	1 1/4	.030	2
6859686	2AF9E07023RGT	1/4	1/4	.235	5/16	3	1 1/4	.060	2
6859688	2AF9E08024RET	5/16	5/16	.176	3/8	3	1 1/2	.030	2
6859689	2AF9E08024RGT	5/16	5/16	.294	3/8	3	1 1/2	.060	2
6859691	2AF9E10025RET	3/8	3/8	.353	1/2	3 1/2	2	.030	2
6859692	2AF9E10025RGT	3/8	3/8	.353	1/2	3 1/2	2	.060	2
6859694	2AF9E13026RET	1/2	1/2	.470	5/8	4 1/2	2 1/2	.030	2
6859695	2AF9E13026RGT	1/2	1/2	.470	5/8	4 1/2	2 1/2	.060	2
6859697	2AF9E16028RET	5/8	5/8	.588	3/4	5	3 1/4	.030	2
6859698	2AF9E16028RGT	5/8	5/8	.588	3/4	5	3 1/4	.060	2
6859700	2AF9E19029RET	3/4	3/4	.705	1	5 1/2	3 1/2	.030	2
6859701	2AF9E19029RGT	3/4	3/4	.705	1	5 1/2	3 1/2	.060	2
6859703	2AF9E2502ARET	1	1	.940	1 1/4	6 1/2	3 3/4	.030	2
6859704	2AF9E2502ARGT	1	1	.940	1 1/4	6 1/2	3 3/4	.060	2

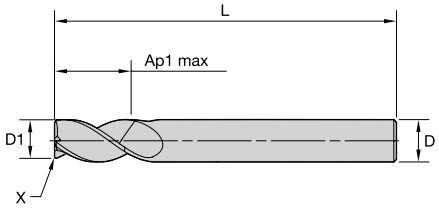
ALUFLASH SERIES 3A09 • SQUARE END • 3 FLUTE • REGULAR LENGTH • CYLINDRICAL SHANK • INCH



grade UNCOATED				length of cut	length	
order #	catalog #	D1	D	Ap1 max	L	Z U
6853347	3A09E05001SZT	3/16	3/16	5/16	2	3
6853349	3A09E07003SZT	1/4	1/4	3/8	2	3
6853352	3A09E08004SZT	5/16	5/16	5/8	2 1/2	3
6853354	3A09E10005SZT	3/8	3/8	1	3	3
6853358	3A09E13006SZT	1/2	1/2	1 1/4	3 1/2	3
6853363	3A09E16008SZT	5/8	5/8	1 1/2	3 1/2	3
6853366	3A09E19009SZT	3/4	3/4	1 5/8	4	3
6853371	3A09E2500ASZT	1	1	2 1/2	5 1/2	3

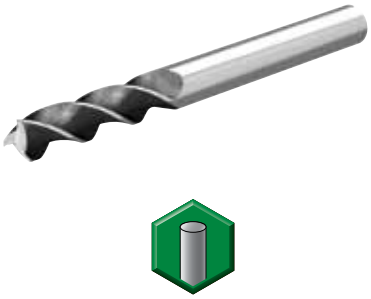
ALUFLASH SERIES 3A09 • RADIUS • 3 FLUTE • REGULAR LENGTH • CYLINDRICAL SHANK • INCH

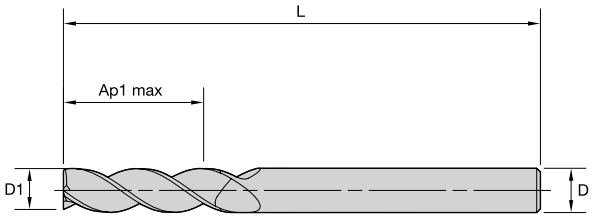




grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6853348	3A09E05001RAT	3/16	3/16	5/16	2	.015	3
6853350	3A09E07003RAT	1/4	1/4	3/8	2	.015	3
6853351	3A09E07003RET	1/4	1/4	3/8	2	.030	3
6853353	3A09E08004RAT	5/16	5/16	5/8	2 1/2	.015	3
6853355	3A09E10005RAT	3/8	3/8	1	3	.015	3
6853356	3A09E10005RET	3/8	3/8	1	3	.030	3
6853357	3A09E10005RGT	3/8	3/8	1	3	.060	3
6853359	3A09E13006RAT	1/2	1/2	1 1/4	3 1/2	.015	3
6853360	3A09E13006RET	1/2	1/2	1 1/4	3 1/2	.030	3
6853361	3A09E13006RGT	1/2	1/2	1 1/4	3 1/2	.060	3
6853362	3A09E13006RKT	1/2	1/2	1 1/4	3 1/2	.120	3
6853364	3A09E16008RGT	5/8	5/8	1 1/2	3 1/2	.060	3
6853365	3A09E16008RKT	5/8	5/8	1 1/2	3 1/2	.120	3
6853367	3A09E19009RET	3/4	3/4	1 5/8	4	.030	3
6853368	3A09E19009RGT	3/4	3/4	1 5/8	4	.060	3
6853369	3A09E19009RKT	3/4	3/4	1 5/8	4	.120	3
6853370	3A09E19009RPT	3/4	3/4	1 5/8	4	.190	3
6853372	3A09E2500ARET	1	1	2 1/2	5 1/2	.030	3
6853373	3A09E2500ARGT	1	1	2 1/2	5 1/2	.060	3
6853374	3A09E2500ARJT	1	1	2 1/2	5 1/2	.090	3
6853375	3A09E2500ARKT	1	1	2 1/2	5 1/2	.120	3
6853376	3A09E2500ARPT	1	1	2 1/2	5 1/2	.190	3
6853377	3A09E2500ARQT	1	1	2 1/2	5 1/2	.250	3

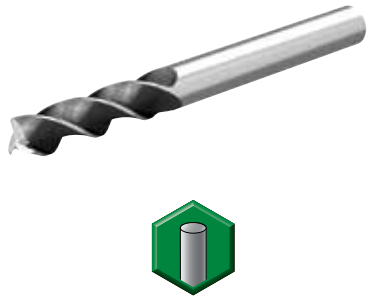
ALUFLASH SERIES 3A19 • SQUARE END • 3 FLUTE • MEDIUM LENGTH • CYLINDRICAL SHANK • INCH

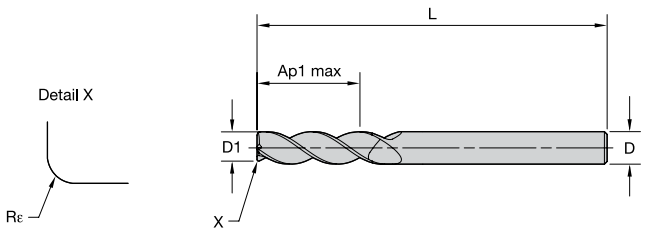




grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6853307	3A19E05011SZT	3/16	3/16	5/8	2	3
6853309	3A19E07013SZT	1/4	1/4	3/4	2 1/2	3
6853323	3A19E10015SZT	3/8	3/8	1 1/2	4	3
6853327	3A19E13016SZT	1/2	1/2	2	4	3
6853331	3A19E16018SZT	5/8	5/8	2	5	3
6853335	3A19E19019SZT	3/4	3/4	2 1/2	5	3
6853339	3A19E2501ASZT	1	1	3 1/4	6 1/2	3

ALUFLASH SERIES 3A19 • RADIUS • 3 FLUTE • MEDIUM LENGTH • CYLINDRICAL SHANK • INCH

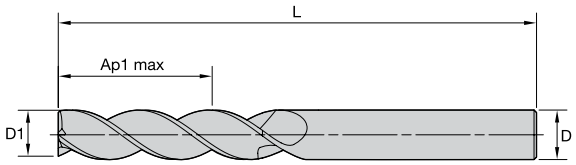




grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6853308	3A19E05011RAT	3/16	3/16	5/8	2	.015	3
6853310	3A19E07013RAT	1/4	1/4	3/4	2 1/2	.015	3
6853321	3A19E07013RET	1/4	1/4	3/4	2 1/2	.030	3
6853322	3A19E07013RGT	1/4	1/4	3/4	2 1/2	.060	3
6853324	3A19E10015RAT	3/8	3/8	1 1/2	4	.015	3
6853325	3A19E10015RET	3/8	3/8	1 1/2	4	.030	3
6853326	3A19E10015RGT	3/8	3/8	1 1/2	4	.060	3
6853328	3A19E13016RET	1/2	1/2	2	4	.030	3
6853329	3A19E13016RGT	1/2	1/2	2	4	.060	3
6853330	3A19E13016RKT	1/2	1/2	2	4	.120	3
6853332	3A19E16018RET	5/8	5/8	2	5	.030	3
6853333	3A19E16018RGT	5/8	5/8	2	5	.060	3
6853334	3A19E16018RKT	5/8	5/8	2	5	.120	3
6853336	3A19E19019RET	3/4	3/4	2 1/2	5	.030	3
6853337	3A19E19019RGT	3/4	3/4	2 1/2	5	.060	3
6853338	3A19E19019RKT	3/4	3/4	2 1/2	5	.120	3
6853340	3A19E2501ARET	1	1	3 1/4	6 1/2	.030	3
6853341	3A19E2501ARGT	1	1	3 1/4	6 1/2	.060	3
6853342	3A19E2501ARJT	1	1	3 1/4	6 1/2	.090	3
6853343	3A19E2501ARKT	1	1	3 1/4	6 1/2	.120	3
6853344	3A19E2501ARPT	1	1	3 1/4	6 1/2	.190	3
6853345	3A19E2501ARQT	1	1	3 1/4	6 1/2	.250	3

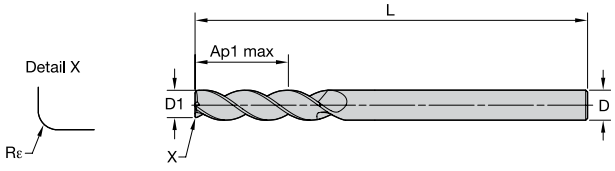
HANITA

ALUFLASH SERIES 3A29 • SQUARE END • 3 FLUTE • LONG LENGTH • CYLINDRICAL SHANK • INCH



grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6853216	3A29E07023SZT	1/4	1/4	1	3 1/4	3
6853220	3A29E08024SZT	5/16	5/16	1 1/4	3	3
6853282	3A29E10025SZT	3/8	3/8	1 3/4	4	3
6853285	3A29E13026SZT	1/2	1/2	2 1/4	4 1/2	3
6853289	3A29E19029SZT	3/4	3/4	3	5 1/2	3
6853303	3A29E2502ASZT	1	1	4	7	3

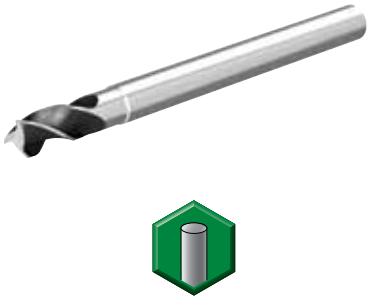
ALUFLASH SERIES 3A29 • RADIUS • 3 FLUTE • LONG LENGTH • CYLINDRICAL SHANK • INCH

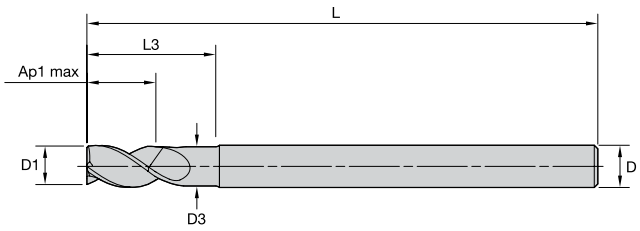


grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6853217	3A29E07023RAT	1/4	1/4	1	3 1/4	.015	3
6853218	3A29E07023RET	1/4	1/4	1	3 1/4	.030	3
6853219	3A29E07023RGT	1/4	1/4	1	3 1/4	.060	3
6853281	3A29E08024RAT	5/16	5/16	1 1/4	3	.015	3
6853283	3A29E10025RET	3/8	3/8	1 3/4	4	.030	3
6853284	3A29E10025RGT	3/8	3/8	1 3/4	4	.060	3
6853286	3A29E13026RET	1/2	1/2	2 1/4	4 1/2	.030	3
6853287	3A29E13026RGT	1/2	1/2	2 1/4	4 1/2	.060	3
6853288	3A29E13026RKT	1/2	1/2	2 1/4	4 1/2	.120	3
6853290	3A29E19029RET	3/4	3/4	3	5 1/2	.030	3
6853301	3A29E19029RGT	3/4	3/4	3	5 1/2	.060	3
6853302	3A29E19029RKT	3/4	3/4	3	5 1/2	.120	3
6853304	3A29E2502ARET	1	1	4	7	.030	3
6853305	3A29E2502ARGT	1	1	4	7	.060	3
6853306	3A29E2502ARKT	1	1	4	7	.120	3

HANITA

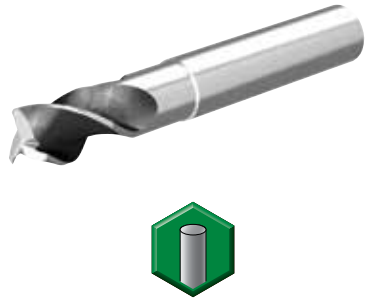
ALUFLASH SERIES 3AN9 • SQUARE END • 3 FLUTE • REGULAR LENGTH • REGULAR NECK • CYLINDRICAL SHANK • INCH

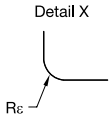


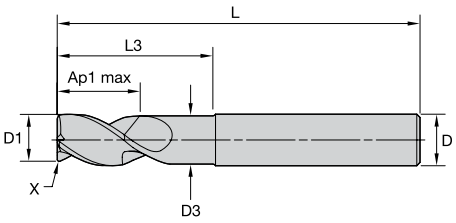


grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6859706	3AN9E05001SZT	3/16	3/16	.176	1/4	2 1/4	9/16	3
6859708	3AN9E07003SZT	1/4	1/4	.235	5/16	2 1/2	3/4	3
6859711	3AN9E08004SZT	5/16	5/16	.294	3/8	2 1/2	1	3
6859715	3AN9E10005SZT	3/8	3/8	.353	1/2	3	1 1/4	3
6859718	3AN9E13006SZT	1/2	1/2	.470	5/8	3 1/2	1 1/2	3
6859721	3AN9E16008SZT	5/8	5/8	.588	3/4	4	2	3
6859724	3AN9E19009SZT	3/4	3/4	.705	1	5	2 1/4	3
6859727	3AN9E2500ASZT	1	1	.940	1 1/4	5 1/2	2 1/2	3

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

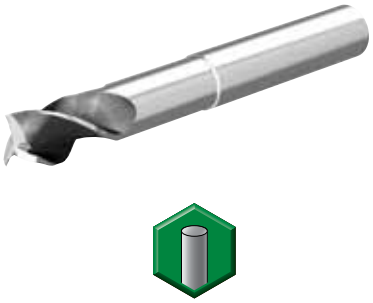


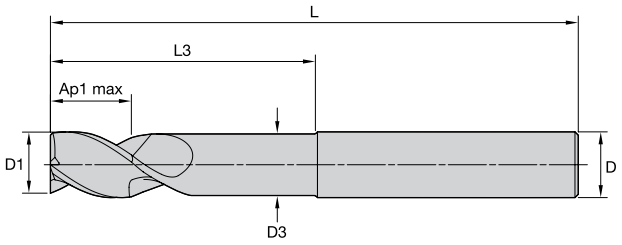




grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6859707	3AN9E05001RAT	3/16	3/16	.176	1/4	2 1/4	9/16	.015	3
6859709	3AN9E07003RET	1/4	1/4	.235	5/16	2 1/2	3/4	.030	3
6859710	3AN9E07003RGT	1/4	1/4	.235	5/16	2 1/2	3/4	.060	3
6859712	3AN9E08004RET	5/16	5/16	.294	3/8	2 1/2	1	.030	3
6859714	3AN9E08004RGT	5/16	5/16	.294	3/8	2 1/2	1	.060	3
6859716	3AN9E10005RET	3/8	3/8	.353	1/2	3	1 1/4	.030	3
6859717	3AN9E10005RGT	3/8	3/8	.353	1/2	3	1 1/4	.060	3
6859719	3AN9E13006RET	1/2	1/2	.470	5/8	3 1/2	1 1/2	.030	3
6859720	3AN9E13006RGT	1/2	1/2	.470	5/8	3 1/2	1 1/2	.060	3
6859722	3AN9E16008RET	5/8	5/8	.588	3/4	4	2	.030	3
6859723	3AN9E16008RGT	5/8	5/8	.588	3/4	4	2	.060	3
6859725	3AN9E19009RET	3/4	3/4	.705	1	5	2 1/4	.030	3
6859726	3AN9E19009RGT	3/4	3/4	.705	1	5	2 1/4	.060	3
6859728	3AN9E2500ARET	1	1	.940	1 1/4	5 1/2	2 1/2	.030	3
6859729	3AN9E2500ARGT	1	1	.940	1 1/4	5 1/2	2 1/2	.060	3

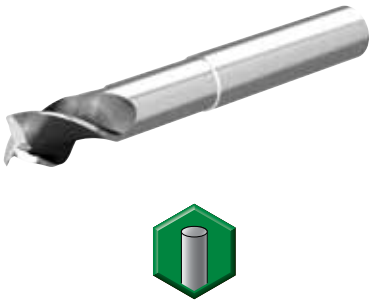
ALUFLASH SERIES 3AL9 • SQUARE END • 3 FLUTE • REGULAR LENGTH • MEDIUM NECK • CYLINDRICAL SHANK • INCH

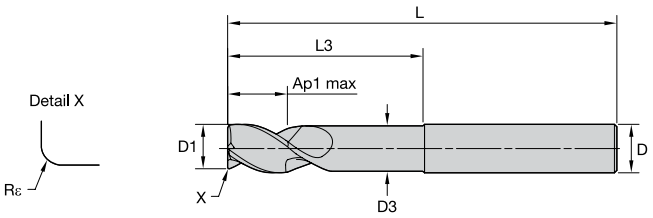




grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6859740	3AL9E05011SZT	3/16	3/16	.176	1/4	2 1/4	3/4	3
6859783	3AL9E07013SZT	1/4	1/4	.235	5/16	2 1/2	1	3
6859786	3AL9E08014SZT	5/16	5/16	.294	3/8	3	1 1/4	3
6859789	3AL9E10015SZT	3/8	3/8	.353	1/2	3	1 1/2	3
6859802	3AL9E13016SZT	1/2	1/2	.470	5/8	4	2	3
6859805	3AL9E16018SZT	5/8	5/8	.588	3/4	5	2 1/2	3
6859808	3AL9E19019SZT	3/4	3/4	.705	1	5	3	3
6859811	3AL9E2501ASZT	1	1	.940	1 1/4	5 1/2	3	3

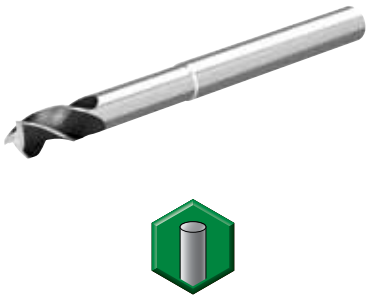
ALUFLASH SERIES 3AL9 • RADIUSED • 3 FLUTE • REGULAR LENGTH • MEDIUM NECK • CYLINDRICAL SHANK • INCH

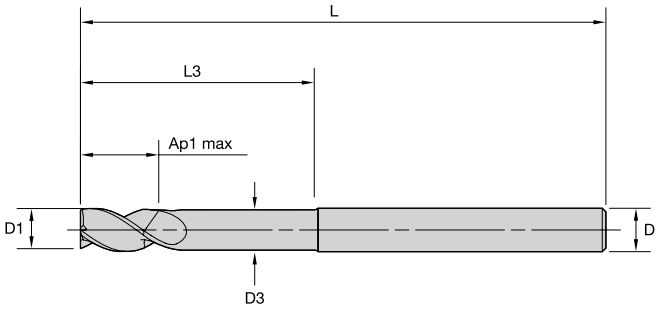




grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6859781	3AL9E05011RAT	3/16	3/16	.176	1/4	2 1/4	3/4	.015	3
6859784	3AL9E07013RET	1/4	1/4	.235	5/16	2 1/2	1	.030	3
6859785	3AL9E07013RGT	1/4	1/4	.235	5/16	2 1/2	1	.060	3
6859787	3AL9E08014RET	5/16	5/16	.294	3/8	3	1 1/4	.030	3
6859788	3AL9E08014RGT	5/16	5/16	.294	3/8	3	1 1/4	.060	3
6859790	3AL9E10015RET	3/8	3/8	.353	1/2	3	1 1/2	.030	3
6859801	3AL9E10015RGT	3/8	3/8	.353	1/2	3	1 1/2	.060	3
6859803	3AL9E13016RET	1/2	1/2	.470	5/8	4	2	.030	3
6859804	3AL9E13016RGT	1/2	1/2	.470	5/8	4	2	.060	3
6859806	3AL9E16018RET	5/8	5/8	.588	3/4	5	2 1/2	.030	3
6859807	3AL9E16018RGT	5/8	5/8	.588	3/4	5	2 1/2	.060	3
6859809	3AL9E19019RET	3/4	3/4	.705	1	5	3	.030	3
6859810	3AL9E19019RGT	3/4	3/4	.705	1	5	3	.060	3
6859812	3AL9E2501ARET	1	1	.940	1 1/4	5 1/2	3	.030	3
6859813	3AL9E2501ARGT	1	1	.940	1 1/4	5 1/2	3	.060	3

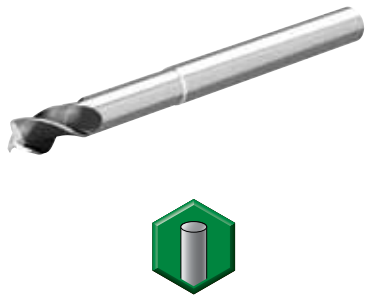
ALUFLASH SERIES 3AF9 • SQUARE END • 3 FLUTE • REGULAR LENGTH • LONG NECK • CYLINDRICAL SHANK • INCH

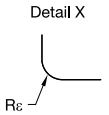


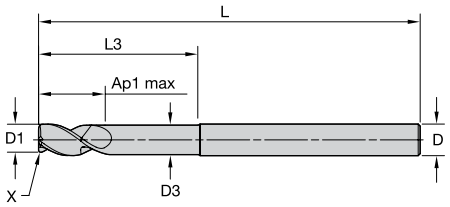


grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6859818	3AF9E05021SZT	3/16	3/16	.176	1/4	2 1/4	1	3
6859820	3AF9E07023SZT	1/4	1/4	.235	5/16	3	1 1/4	3
6859843	3AF9E08024SZT	5/16	5/16	.294	3/8	3	1 1/2	3
6859846	3AF9E10025SZT	3/8	3/8	.353	1/2	3 1/2	2	3
6859849	3AF9E13026SZT	1/2	1/2	.470	5/8	4 1/2	2 1/2	3
6859862	3AF9E16028SZT	5/8	5/8	.588	3/4	5	3 1/4	3
6859866	3AF9E19029SZT	3/4	3/4	.705	1	5 1/2	3 1/2	3
6859869	3AF9E2502ASZT	1	1	.940	1 1/4	6 1/2	3 3/4	3

ALUFLASH SERIES 3AF9 • RADIUS • 3 FLUTE • REGULAR LENGTH • LONG NECK • CYLINDRICAL SHANK • INCH

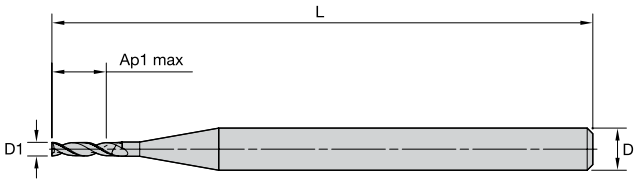






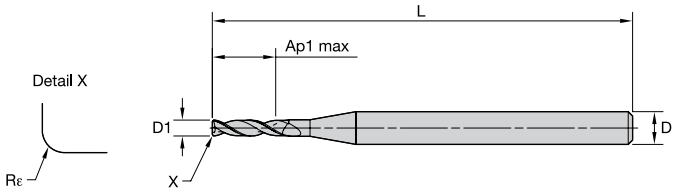
grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6859819	3AF9E05021RAT	3/16	3/16	.176	1/4	2 1/4	1	.015	3
6859841	3AF9E07023RET	1/4	1/4	.235	5/16	3	1 1/4	.030	3
6859842	3AF9E07023RGT	1/4	1/4	.235	5/16	3	1 1/4	.060	3
6859844	3AF9E08024RET	5/16	5/16	.294	3/8	3	1 1/2	.030	3
6859845	3AF9E08024RGT	5/16	5/16	.294	3/8	3	1 1/2	.060	3
6859847	3AF9E10025RET	3/8	3/8	.353	1/2	3 1/2	2	.030	3
6859848	3AF9E10025RGT	3/8	3/8	.353	1/2	3 1/2	2	.060	3
6859850	3AF9E13026RET	1/2	1/2	.470	5/8	4 1/2	2 1/2	.030	3
6859861	3AF9E13026RGT	1/2	1/2	.470	5/8	4 1/2	2 1/2	.060	3
6859864	3AF9E16028RET	5/8	5/8	.588	3/4	5	3 1/4	.030	3
6859865	3AF9E16028RGT	5/8	5/8	.588	3/4	5	3 1/4	.060	3
6859867	3AF9E19029RET	3/4	3/4	.705	1	5 1/2	3 1/2	.030	3
6859868	3AF9E19029RGT	3/4	3/4	.705	1	5 1/2	3 1/2	.060	3
6859870	3AF9E2502ARET	1	1	.940	1 1/4	6 1/2	3 3/4	.030	3
6859871	3AF9E2502ARGT	1	1	.940	1 1/4	6 1/2	3 3/4	.060	3

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



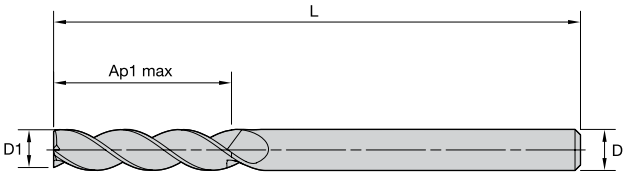
grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6853514	2A09M01000SZT	1,0	3	4,00	38	2
6853515	2A09M01500SZT	1,5	3	6,00	38	2
6853517	2A09M02000SZT	2,0	3	8,00	38	2
6853519	2A09M02500SZT	2,5	3	9,00	38	2
6853542	2A09M04001SZT	4,0	4	12,00	50	2
6853544	2A09M05002SZT	5,0	5	14,00	50	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



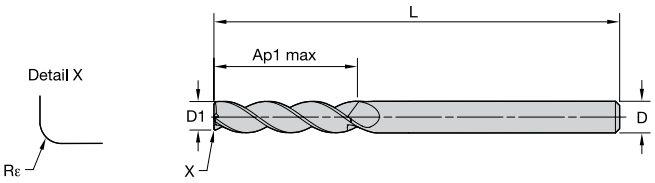
grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Rε	Z U
6853516	2A09M01500RAT	1,5	3	6,00	38	0,20	2
6853518	2A09M02000RAT	2,0	3	8,00	38	0,20	2
6853520	2A09M02500RAT	2,5	3	9,00	38	0,20	2
6853541	2A09M03000RAT	3,0	3	12,00	38	0,20	2
6853543	2A09M04001RAT	4,0	4	12,00	50	0,20	2
6853546	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

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



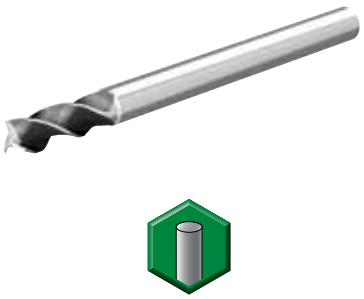
grade UNCOATED order #	catalog #	D1	D	length of cut Ap1 max	length L	Z U
6853511	3A09M03000SZT	3,0	3	12,00	38	3

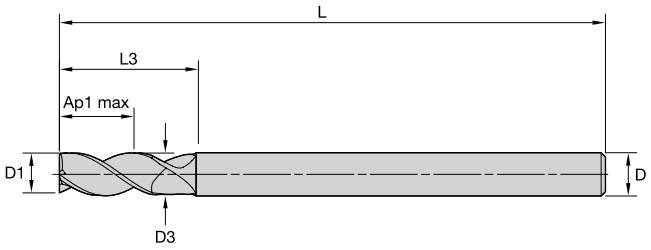
ALUFLASH SERIES 3A09 • RADIUS • 3 FLUTE • REGULAR LENGTH • CYLINDRICAL SHANK • METRIC



grade UNCOATED order #	catalog #	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

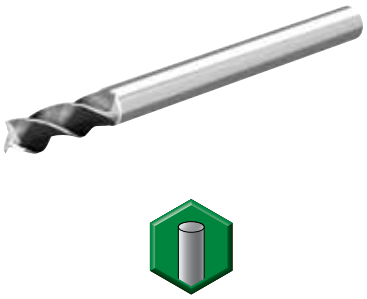
ALUFLASH SERIES 3AN9 • SQUARE END • 3 FLUTE • REGULAR LENGTH • REGULAR NECK • CYLINDRICAL SHANK • METRIC

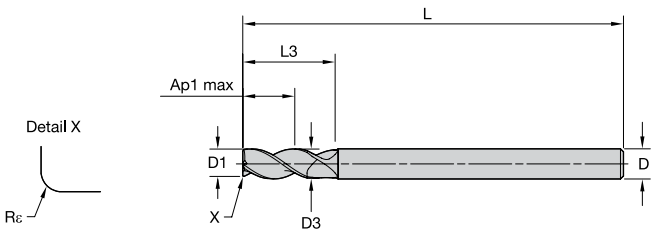




grade UNCOATED					length of cut	length		
order #	catalog #	D1	D	D3	Ap1 max	L	L3	Z U
6853460	3AN9M04001SZT	4,0	4	3,76	8,00	50	12,00	3
6853462	3AN9M05002SZT	5,0	5	4,70	10,00	63	15,00	3
6853465	3AN9M06003SZT	6,0	6	5,64	13,00	63	18,00	3
6853469	3AN9M08004SZT	8,0	8	7,52	18,00	76	24,00	3
6853474	3AN9M10005SZT	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

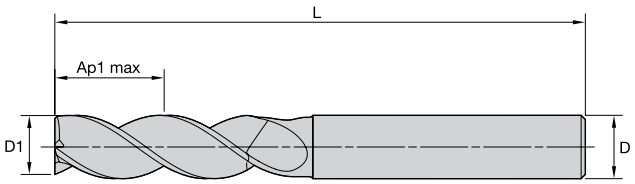
ALUFLASH SERIES 3AN9 • RADIUS • 3 FLUTE • REGULAR LENGTH • REGULAR NECK • CYLINDRICAL SHANK • METRIC





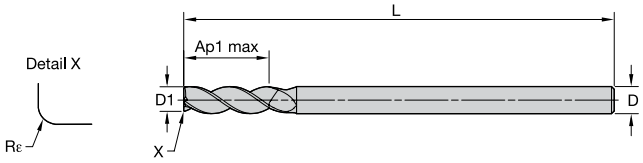
grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6853461	3AN9M04001RAT	4,0	4	3,76	8,00	50	12,00	0,20	3
6853463	3AN9M05002RAT	5,0	5	4,70	10,00	63	15,00	0,20	3
6853464	3AN9M05002RET	5,0	5	4,70	10,00	63	15,00	0,50	3
6853466	3AN9M06003RAT	6,0	6	5,64	13,00	63	18,00	0,20	3
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



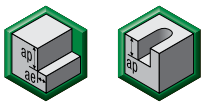
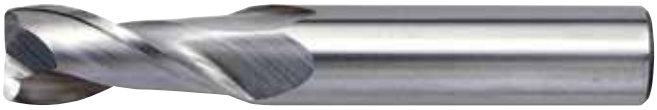
grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Z U
6853448	3AP9M12016SZT	12,0	12	11,28	36,00	100	48,00	3

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

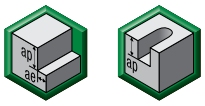


grade UNCOATED order #	catalog #	D1	D	D3	length of cut Ap1 max	length L	L3	Rε	Z U
6853439	3AP9M04011RAT	4,0	4	3,76	12,00	63	16,00	0,20	3
6853440	3AP9M05002RAT	5,0	5	4,70	15,00	63	20,00	0,20	3
6853441	3AP9M06013RET	6,0	6	5,64	18,00	76	24,00	0,50	3
6853442	3AP9M06013RJT	6,0	6	5,64	18,00	76	24,00	1,00	3
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 • INCH

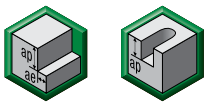



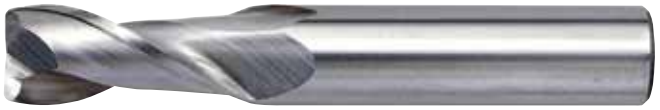
Material Group		Side Milling (A) and Slotting (B) A ap	A ae	B ap	UNCOATED Cutting Speed — Vc SFM min	Start	max	Recommended feed per tooth (Fz = IPT) for side milling (A). For slotting (B), reduce Fz by 20%. Fraction	D1 — Diameter 1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
N	1	Ap1 max	0,5 x D1	1 x D1	1500	1800	6000	IPT	.0009	.0017	.0022	.0026	.0035	.0043	.0052	.0060	.0069	.0078	.0087	.0108
	2	Ap1 max	0,5 x D1	1 x D1	1500	1800	4500	IPT	.0008	.0016	.0019	.0023	.0031	.0039	.0047	.0054	.0062	.0070	.0078	.0097
	3	Ap1 max	0,5 x D1	1 x D1	1500	1800	4500	IPT	.0006	.0012	.0015	.0018	.0024	.0030	.0036	.0042	.0048	.0054	.0061	.0076
	4	Ap1 max	0,5 x D1	1 x D1	1200	1350	2250	IPT	.0006	.0012	.0015	.0018	.0024	.0030	.0036	.0042	.0048	.0054	.0061	.0076
	5	Ap1 max	0,5 x D1	1 x D1	750	1200	3000	IPT	.0008	.0016	.0020	.0023	.0031	.0039	.0047	.0054	.0062	.0070	.0078	.0097



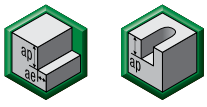

Material Group		Side Milling (A) and Slotting (B) A ap	A ae	B ap	UNCOATED Cutting Speed — Vc SFM min	Start	max	Recommended feed per tooth (Fz = IPT) for side milling (A). For slotting (B), reduce Fz by 20%. Fraction	D1 — Diameter 1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
N	1	Ap1 max	0,5 x D1	1 x D	1500	1800	6000	IPT	.0009	.0017	.0022	.0026	.0035	.0043	.0052	.0060	.0069	.0078	.0087	.0108
	2	Ap1 max	0,5 x D1	1 x D	1500	1800	4500	IPT	.0008	.0016	.0019	.0023	.0031	.0039	.0047	.0054	.0062	.0070	.0078	.0097
	3	Ap1 max	0,5 x D1	1 x D	1500	1800	4500	IPT	.0006	.0012	.0015	.0018	.0024	.0030	.0036	.0042	.0048	.0054	.0061	.0076
	4	Ap1 max	0,5 x D1	1 x D	1200	1350	2250	IPT	.0006	.0012	.0015	.0018	.0024	.0030	.0036	.0042	.0048	.0054	.0061	.0076
	5	Ap1 max	0,5 x D1	1 x D	750	1200	3000	IPT	.0008	.0016	.0020	.0023	.0031	.0039	.0047	.0054	.0062	.0070	.0078	.0097

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

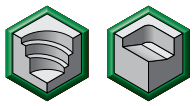
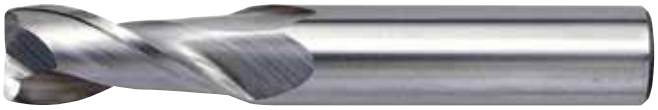
ALUFLASH • RAMPING 2FL • APPLICATION DATA • INCH

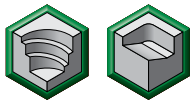
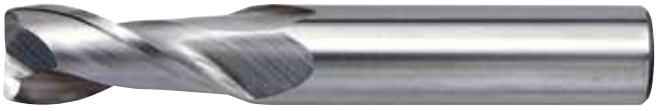
Material Group		Helical Interpolation / Ramping 0° - 15°	UNCOATED			Recommended feed per tooth (fz = IPT) for Helical Interpolation and Ramping											
			Cutting Speed – Vc SFM			Diameter – D1 [Ømin–Ømax]											
						Fraction	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
		Max Depth	min	Start	max	Decimals	.180-.180	.180-.297	.216-.356	.288-.475	.359-.594	.431-.713	.575-.950	.633-1.047	.719-1.188	.814-1.346	.863-1.425	1.150-1.900
N	1	1.25 x D1	1500	1800	6000	IPT	.0009	.0017	.0022	.0026	.0035	.0043	.0052	.0060	.0069	.0078	.0087	.0108
	2	1.25 x D1	1500	1800	4500	IPT	.0008	.0016	.0019	.0023	.0031	.0039	.0047	.0054	.0062	.0070	.0078	.0097
	3	1.25 x D1	1500	1800	4500	IPT	.0006	.0012	.0015	.0018	.0024	.0030	.0036	.0042	.0048	.0054	.0061	.0076
	4	1.25 x D1	1200	1350	2250	IPT	.0006	.0012	.0015	.0018	.0024	.0030	.0036	.0042	.0048	.0054	.0061	.0076
	5	1.25 x D1	750	1200	3000	IPT	.0008	.0016	.0020	.0023	.0031	.0039	.0047	.0054	.0062	.0070	.0078	.0097

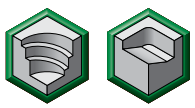
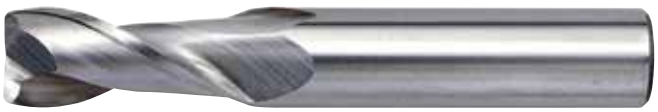
Material Group		Helical Inter-polation / Ramping 15° - 30°	UNCOATED			Recommended feed per tooth (fz = IPT) for Helical Interpolation and Ramping											
			Cutting Speed – Vc SFM			Diameter – D1 [Ømin–Ømax]											
						Fraction	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
		Max Depth	min	Start	max	Decimals	.180-.180	.180-.297	.216-.356	.288-.475	.359-.594	.431-.713	.575-.950	.633-1.047	.719-1.188	.814-1.346	.863-1.425	1.150-1.900
N	1	1.25 x D1	1500	1800	4800	IPT	.0006	.0013	.0016	.0019	.0026	.0032	.0039	.0045	.0052	.0058	.0065	.0081
	2	1.25 x D1	1500	1800	3600	IPT	.0006	.0012	.0014	.0018	.0023	.0029	.0035	.0041	.0047	.0053	.0058	.0073
	3	1.25 x D1	1500	1800	3600	IPT	.0005	.0009	.0011	.0014	.0018	.0023	.0027	.0032	.0036	.0041	.0045	.0057
	4	1.25 x D1	1200	1350	1800	IPT	.0005	.0009	.0011	.0014	.0018	.0023	.0027	.0032	.0036	.0041	.0045	.0057
	5	1.25 x D1	750	1200	2400	IPT	.0006	.0012	.0015	.0018	.0023	.0029	.0035	.0041	.0047	.0053	.0058	.0073

Material Group		Helical Interpolation / Ramping 30° - 45°	UNCOATED			Recommended feed per tooth (fz = IPT) for Helical Interpolation and Ramping											
			Cutting Speed – Vc SFM			Diameter – D1 [Ømin–Ømax]											
						Fraction	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
		Max Depth	min	Start	max	Decimals	.180-.180	.180-.297	.216-.356	.288-.475	.359-.594	.431-.713	.575-.950	.633-1.047	.719-1.188	.814-1.346	.863-1.425	1.150-1.900
N	1	1.25 x D1	1260	1500	2400	IPT	.0005	.0010	.0013	.0016	.0021	.0026	.0031	.0036	.0042	.0047	.0052	.0065
	2	1.25 x D1	1260	1500	2400	IPT	.0005	.0009	.0011	.0014	.0019	.0023	.0028	.0033	.0037	.0042	.0047	.0058
	3	1.25 x D1	1260	1500	2400	IPT	.0004	.0007	.0009	.0011	.0015	.0018	.0022	.0025	.0029	.0033	.0036	.0045
	4	1.25 x D1	1020	1140	1350	IPT	.0004	.0007	.0009	.0011	.0015	.0018	.0022	.0025	.0029	.0033	.0036	.0045
	5	1.25 x D1	630	1020	1800	IPT	.0005	.0009	.0012	.0014	.0019	.0023	.0028	.0033	.0037	.0042	.0047	.0058

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
							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
	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
N	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
							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
	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
N	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
							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
	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
N	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 • INCH

Material Group		Helical Interpolation / Ramping 0° - 15°	UNCOATED			Recommended feed per tooth (fz = IPT) for Helical Interpolation and Ramping – fz x 1											
			Cutting Speed — Vc m/min			Diameter – D1 [Ømin–Ømax]											
						Fraction	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
		Max Depth	min	Start	max	Decimals	.180-.180	.180-.297	.216-.356	.288-.475	.359-.594	.431-.713	.575-.950	.633-1.047	.719-1.188	.814-1.346	.863-1.425	1.150-1.900
N	1	1.25 x D1	1500	1800	6000	IPT	.0009	.0017	.0022	.0026	.0035	.0043	.0052	.0060	.0069	.0078	.0087	.0108
	2	1.25 x D1	1500	1800	4500	IPT	.0008	.0016	.0019	.0023	.0031	.0039	.0047	.0054	.0062	.0070	.0078	.0097
	3	1.25 x D1	1500	1800	4500	IPT	.0006	.0012	.0015	.0018	.0024	.0030	.0036	.0042	.0048	.0054	.0061	.0076
	4	1.25 x D1	1200	1350	2250	IPT	.0006	.0012	.0015	.0018	.0024	.0030	.0036	.0042	.0048	.0054	.0061	.0076
	5	1.25 x D1	750	1200	3000	IPT	.0008	.0016	.0020	.0023	.0031	.0039	.0047	.0054	.0062	.0070	.0078	.0097

Material Group		Helical Interpolation / Ramping 15° - 30°	UNCOATED			Recommended feed per tooth (fz = IPT) for Helical Interpolation and Ramping – fz x 1											
			Cutting Speed — Vc m/min			Diameter – D1 [Ømin–Ømax]											
						Fraction	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
		Max Depth	min	Start	max	Decimals	.180-.180	.180-.297	.216-.356	.288-.475	.359-.594	.431-.713	.575-.950	.633-1.047	.719-1.188	.814-1.346	.863-1.425	1.150-1.900
N	1	1.25 x D1	1500	1800	4800	IPT	.0006	.0013	.0016	.0019	.0026	.0032	.0039	.0045	.0052	.0058	.0065	.0081
	2	1.25 x D1	1500	1800	3600	IPT	.0006	.0012	.0014	.0018	.0023	.0029	.0035	.0041	.0047	.0053	.0058	.0073
	3	1.25 x D1	1500	1800	3600	IPT	.0005	.0009	.0011	.0014	.0018	.0023	.0027	.0032	.0036	.0041	.0045	.0057
	4	1.25 x D1	1200	1350	1800	IPT	.0005	.0009	.0011	.0014	.0018	.0023	.0027	.0032	.0036	.0041	.0045	.0057
	5	1.25 x D1	750	1200	2400	IPT	.0006	.0012	.0015	.0018	.0023	.0029	.0035	.0041	.0047	.0053	.0058	.0073

Material Group		Helical Interpolation / Ramping 30° - 45°	UNCOATED			Recommended feed per tooth (fz = IPT) for Helical Interpolation and Ramping – fz x 1											
			Cutting Speed — Vc m/min			Diameter – D1 [Ømin–Ømax]											
						Fraction	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
		Max Depth	min	Start	max	Decimals	.180-.180	.180-.297	.216-.356	.288-.475	.359-.594	.431-.713	.575-.950	.633-1.047	.719-1.188	.814-1.346	.863-1.425	1.150-1.900
N	1	1.25 x D1	1260	1500	2400	IPT	.0005	.0010	.0013	.0016	.0021	.0026	.0031	.0036	.0042	.0047	.0052	.0065
	2	1.25 x D1	1260	1500	2400	IPT	.0005	.0009	.0011	.0014	.0019	.0023	.0028	.0033	.0037	.0042	.0047	.0058
	3	1.25 x D1	1260	1500	2400	IPT	.0004	.0007	.0009	.0011	.0015	.0018	.0022	.0025	.0029	.0033	.0036	.0045
	4	1.25 x D1	1020	1140	1350	IPT	.0004	.0007	.0009	.0011	.0015	.0018	.0022	.0025	.0029	.0033	.0036	.0045
	5	1.25 x D1	630	1020	1800	IPT	.0005	.0009	.0012	.0014	.0019	.0023	.0028	.0033	.0037	.0042	.0047	.0058

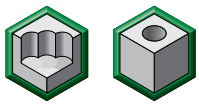
ALUFLASH • RAMPING 3FL • APPLICATION DATA • METRIC

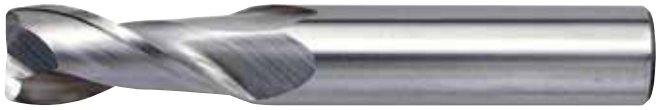
Material Group		Max Depth	Helical Interpolation / Ramping 0° - 15°														
			UNCOATED			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping – fz x 1											
			Cutting Speed – Vc m/min			Diameter – D1 [Ømin–Ømax]											
						mm	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
			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
N	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
N	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
N	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
N	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 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
			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
N	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
N	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
N	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
N	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

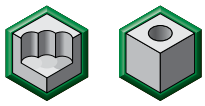
Material Group		Max Depth	Helical Interpolation / Ramping 30° - 45°														
			UNCOATED			Recommended feed per tooth (fz = mm/z) for Helical Interpolation and Ramping – fz x 1											
			Cutting Speed – Vc m/min			Diameter – D1 [Ømin–Ømax]											
						mm	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	25.0
			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
N	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
N	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
N	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
N	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 • INCH



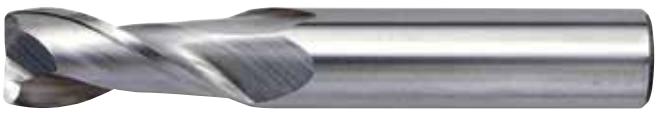


Material Group		Plunging/Drilling			UNCOATED			Recommended feed per revolution (fn =IPR) for Plunging 2 flute end mills												
					Cutting Speed — Vc SFM				D1 — Diameter											
		Max Depth	Applicable	Coolant	min	Start	max	Fraction	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
N	1	1.5 x D	●	Required	360	780	1200	IPR	.0031	.0047	.0053	.0059	.0063	.0079	.0087	.0093	.0098	.0104	.0110	.0118
	2	1.5 x D	●	Required	360	750	840	IPR	.0031	.0047	.0053	.0059	.0063	.0079	.0087	.0093	.0098	.0104	.0110	.0118
	3	1.5 x D	●	Required	300	600	780	IPR	.0031	.0047	.0053	.0059	.0063	.0079	.0087	.0093	.0098	.0104	.0110	.0118
	4	1 x D	●	Required	180	450	780	IPR	.0024	.0031	.0039	.0047	.0055	.0063	.0079	.0083	.0087	.0093	.0098	.0110
	5	1.5 x D	●	Required	180	600	1200	IPR	.0031	.0047	.0053	.0059	.0063	.0079	.0087	.0093	.0098	.0104	.0110	.0118



Material Group		Plunging/Drilling			UNCOATED			Recommended feed per revolution (fn =IPR) for Plunging 3 flute end mills												
					Cutting Speed — Vc SFM				D1 — Diameter											
		Max Depth	Applicable	Coolant	min	Start	max	Fraction	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	23/32	3/4	1
N	1	1,5 x D	●	Required	360	780	1200	IPR	.0022	.0033	.0037	.0041	.0044	.0055	.0061	.0065	.0069	.0073	.0077	.0083
	2	1,5 x D	●	Required	360	750	840	IPR	.0022	.0033	.0037	.0041	.0044	.0055	.0061	.0065	.0069	.0073	.0077	.0083
	3	1,5 x D	●	Required	300	600	780	IPR	.0022	.0033	.0037	.0041	.0044	.0055	.0061	.0065	.0069	.0073	.0077	.0083
	4	1 x D	●	Required	180	450	780	IPR	.0017	.0022	.0028	.0033	.0039	.0044	.0055	.0058	.0061	.0065	.0069	.0077
	5	1,5 x D	●	Required	180	600	1200	IPR	.0022	.0033	.0037	.0041	.0044	.0055	.0061	.0065	.0069	.0073	.0077	.0083

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

TO SEE ALL PRODUCT LINES, VISIT OUR DIGITAL RESOURCES

WIDIA NOVO™ Application
Download to your desktop or tablet:
widia.com/novo

WIDIA™ Machining Central Mobile App
Download for iOS or Android:
widia.com/en/featured/WidiaMobileApp

youtube.com/WIDIASolutions linkedin.com/WIDIAProductGrp facebook.com/WIDIAProductGrp

To learn more, visit widia.com

Speed

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.

Simplicity

Machinists can rely on the NOVO machining advisor or **widia.com** to easily select the right tool for the job.

Reliability

Trust our network of authorized distributors to put WIDIA tools to work for you — in your industry, in your region, and in your business. Together we will keep your machine running through the night.

For more than 90 years, the WIDIA brand has delivered quality milling, turning, holemaking, tapping, and systems tooling to metal-cutting customers across the globe. Customers experience reliability from selection to post-delivery support through product availability, digital connectivity, and an accessible network of authorized distribution partners.

Test WIDIA tooling today by selecting tools from the All-Star program. The All-Star program is comprised of proven tooling solutions that are easy to find and always available. This includes solid end mills, turning tools, drills, and taps from our most popular platforms, grades, and sizes grouped into one program and guaranteed to be in stock with same-day shipping on orders placed before 6pm ET.

Visit widia.com to see what products are available for same-day shipping through All-Star.

WIDIA™

widia.com

ALL-STAR

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

All-Star includes products from our most popular platforms, grades, and sizes grouped into our program and guaranteed to be in stock with same-day shipping on orders placed before 6pm ET.

Visit widia.com to see what products are available for same-day shipping through All-Star.

Turning

Tapping

Holemaking

TO SEE ALL PRODUCT LINES, VISIT OUR DIGITAL RESOURCES

WIDIA NOVO™ Application
Download to your desktop or tablet:
widia.com/novo

WIDIA™ Machining Central Mobile App
Download for iOS or Android:
widia.com/en/featured/WidiaMobileApp

youtube.com/WIDIASolutions linkedin.com/WIDIAProductGrp facebook.com/WIDIAProductGrp

To learn more, visit widia.com

Proven Solutions

Easy to Find

Always Available

Indexable Milling

Solid End Milling

WIDIA™

widia.com

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, 5 x D, 8 x D, 12 x D.

Insert diameter range from .629" up to 1.574".

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!

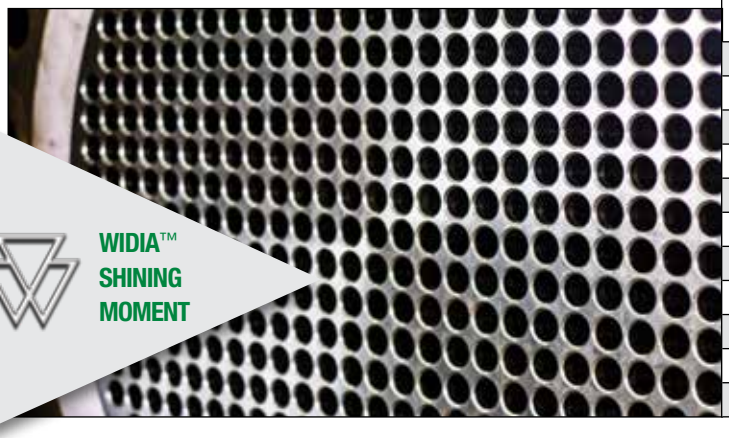
M S

First choice for stainless steel and super alloys.

TDMX — Drilling Stainless Steel

M 13-8 hyper chrome 110 KSI

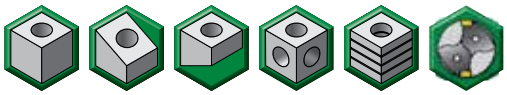
pre-machined surface

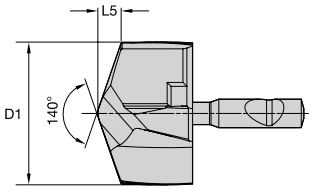


WIDIA™ SHINING MOMENT

	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)





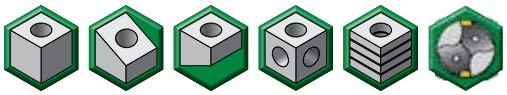
● first choice
○ alternate choice

P		
M		●
K		○
N		○
S		●
H		

	D1		L5			
catalog number	mm	in	mm	in	SSC	WM15PD
TDMX16000MSM	16,00	.630	2,84	.112	A	6568922
TDMX16200MSM	16,20	.638	2,88	.113	A	6568923
TDMX16281MSM	16,28	.641	2,89	.114	A	6568924
TDMX16500MSM	16,50	.650	2,93	.115	A	6568925
TDMX16667MSM	16,67	.656	2,96	.117	A	6568926
TDMX17000MSM	17,00	.669	3,01	.119	B	6568927
TDMX17064MSM	17,06	.672	3,02	.119	B	6568929
TDMX17463MSM	17,46	.688	3,09	.122	B	6568930
TDMX17500MSM	17,50	.689	3,10	.122	B	6568931
TDMX17600MSM	17,60	.693	3,12	.123	B	6568932
TDMX17800MSM	17,80	.701	3,15	.124	B	6568933
TDMX17859MSM	17,86	.703	3,16	.124	B	6568934
TDMX18000MSM	18,00	.709	3,19	.126	C	6568935
TDMX18255MSM	18,26	.719	3,24	.128	C	6568938
TDMX18500MSM	18,50	.728	3,28	.129	C	6568939
TDMX18651MSM	18,65	.734	3,30	.130	C	6568940
TDMX18800MSM	18,80	.740	3,33	.131	C	6568941
TDMX19000MSM	19,00	.748	3,36	.132	D	6568942
TDMX19050MSM	19,05	.750	3,37	.133	D	6568943
TDMX19200MSM	19,20	.756	3,40	.134	D	6568944
TDMX19270MSM	19,27	.759	3,41	.134	D	6568945
TDMX19450MSM	19,45	.766	3,44	.135	D	6568946
TDMX19500MSM	19,50	.768	3,45	.136	D	6568947
TDMX19700MSM	19,70	.776	3,48	.137	D	6568948
TDMX19840MSM	19,84	.781	3,51	.138	D	6568949
TDMX20000MSM	20,00	.787	3,54	.139	E	6568961
TDMX20100MSM	20,10	.791	3,56	.140	E	6568962
TDMX20200MSM	20,20	.795	3,57	.141	E	6568963
TDMX20239MSM	20,24	.797	3,58	.141	E	6568964
TDMX20300MSM	20,30	.799	3,59	.141	E	6568965
TDMX20400MSM	20,40	.803	3,61	.142	E	6568966
TDMX20500MSM	20,50	.807	3,63	.143	E	6568967
TDMX20600MSM	20,60	.811	3,64	.143	E	6568968
TDMX20650MSM	20,65	.813	3,65	.144	E	6568969
TDMX20700MSM	20,70	.815	3,66	.144	E	6568973
TDMX20800MSM	20,80	.819	3,68	.145	E	6568980

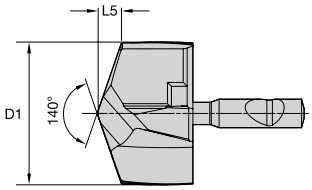
TDMX • Inserts • MS(M)

(continued)



● first choice
○ alternate choice

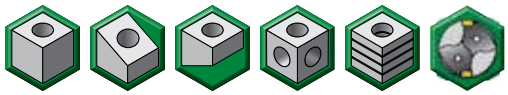
P		
M		●
K		○
N		○
S		●
H		



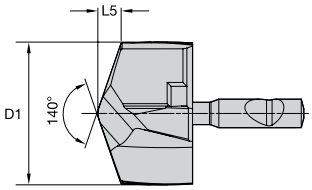
catalog number	D1 mm	D1 in	L5 mm	L5 in	SSC	WM15PD
TDMX20900MSM	20,90	.823	3,69	.145	E	**6568981**
TDMX21000MSM	21,00	.827	3,71	.146	F	**6568982**
TDMX21430MSM	21,43	.844	3,79	.149	F	**6568983**
TDMX21500MSM	21,50	.847	3,80	.150	F	**6568984**
TDMX22000MSM	22,00	.866	3,89	.153	G	**6568985**
TDMX22225MSM	22,23	.875	3,93	.155	G	**6568986**
TDMX22450MSM	22,45	.884	3,97	.156	G	**6568987**
TDMX22500MSM	22,50	.886	3,97	.156	G	**6568988**
TDMX23000MSM	23,00	.906	4,06	.160	H	**6568989**
TDMX23500MSM	23,50	.925	4,15	.163	H	**6568990**
TDMX23813MSM	23,81	.938	4,20	.165	H	**6568991**
TDMX24000MSM	24,00	.945	4,24	.167	I	**6568993**
TDMX24500MSM	24,50	.965	4,32	.170	I	**6568994**
TDMX24605MSM	24,61	.969	4,34	.171	I	**6568995**
TDMX25000MSM	25,00	.984	4,41	.174	J	**6568996**
TDMX25400MSM	25,40	1.000	4,48	.176	J	**6568998**
TDMX25500MSM	25,50	1.004	4,49	.177	J	**6568999**
TDMX25670MSM	25,67	1.011	4,52	.178	J	**6569000**
TDMX25700MSM	25,70	1.012	4,53	.178	J	**6569001**
TDMX25760MSM	25,76	1.014	4,54	.179	J	**6569002**
TDMX25796MSM	25,80	1.016	4,55	.179	J	**6569003**
TDMX26000MSM	26,00	1.024	4,59	.181	K	**6569006**
TDMX26192MSM	26,19	1.031	4,62	.182	K	**6569007**
TDMX26400MSM	26,40	1.039	4,65	.183	K	**6569008**
TDMX26500MSM	26,50	1.043	4,67	.184	K	**6569009**
TDMX26589MSM	26,59	1.047	4,69	.185	K	**6569010**
TDMX27000MSM	27,00	1.063	4,76	.187	L	**6569502**
TDMX27500MSM	27,50	1.083	4,84	.191	L	**6569503**
TDMX27780MSM	27,78	1.094	4,89	.193	L	**6569504**
TDMX28000MSM	28,00	1.102	4,93	.194	M	**6569505**
TDMX28176MSM	28,18	1.109	4,96	.195	M	**6569506**
TDMX28500MSM	28,50	1.122	5,02	.198	M	**6569507**
TDMX28575MSM	28,58	1.125	5,03	.198	M	**6569508**
TDMX29000MSM	29,00	1.142	5,11	.201	N	**6569509**
TDMX29367MSM	29,37	1.156	5,17	.204	N	**6569510**
TDMX29500MSM	29,50	1.161	5,19	.204	N	**6569521**

TDMX • Inserts • MS(M)

(continued)



● first choice
○ alternate choice



P	
M	●
K	○
N	○
S	●
H	

catalog number	D1 mm	D1 in	L5 mm	L5 in	SSC	WM15PD
TDMX29764MSM	29,76	1.172	5,24	.206	N	**6569522**
TDMX30000MSM	30,00	1.181	5,28	.208	O	**6569523**
TDMX30163MSM	30,16	1.188	5,31	.209	O	**6569524**
TDMX30500MSM	30,50	1.201	5,37	.211	O	**6569525**
TDMX30955MSM	30,96	1.219	5,45	.215	O	**6569526**
TDMX31000MSM	31,00	1.221	5,45	.215	P	**6569527**
TDMX31500MSM	31,50	1.240	5,54	.218	P	**6569528**
TDMX31750MSM	31,75	1.250	5,58	.220	P	**6569529**
TDMX32000MSM	32,00	1.260	5,63	.222	Q	**6569530**
TDMX32500MSM	32,50	1.280	5,72	.225	Q	**6569531**
TDMX33000MSM	33,00	1.299	5,80	.228	Q	**6569532**
TDMX33338MSM	33,34	1.313	5,86	.231	Q	**6569533**
TDMX34000MSM	34,00	1.339	5,98	.235	R	**6569534**
TDMX34130MSM	34,13	1.344	6,00	.236	R	**6569535**
TDMX34925MSM	34,93	1.375	6,13	.241	R	**6569536**
TDMX35000MSM	35,00	1.378	6,15	.242	R	**6569537**
TDMX35500MSM	35,50	1.398	6,23	.245	R	**6569538**
TDMX36000MSM	36,00	1.417	6,33	.249	S	**6569539**
TDMX36500MSM	36,50	1.437	6,41	.252	S	**6569540**
TDMX37000MSM	37,00	1.457	6,50	.256	S	**6569551**
TDMX37500MSM	37,50	1.476	6,59	.259	S	**6569552**
TDMX38000MSM	38,00	1.496	6,67	.263	T	**6569553**
TDMX38100MSM	38,10	1.500	6,69	.263	T	**6569554**
TDMX38289MSM	38,29	1.507	6,72	.265	T	**6569557**
TDMX38500MSM	38,50	1.516	6,76	.266	T	**6569555**
TDMX39000MSM	39,00	1.535	6,84	.269	T	**6569556**
TDMX39500MSM	39,50	1.555	6,93	.273	T	**6569558**
TDMX40000MSM	40,00	1.575	7,01	.276	T	**6569559**

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

Inch

Insert Type D1	TDMX...PK:MS Tolerance k7	TDMX...FPE Tolerance s7
0.600–.709	+.0000/+0.0008	+.0011/+0.0018
>.709–1.1181	+.0000/+0.0009	+.0014/+0.0022
>1.1181–1.575	+.0000/+0.0010	+.0017/+0.0027

Metric

Insert Type D1	TDMX...PK:MS Tolerance k7	TDMX...FPE 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

TDMX — TOP DRILL™ Modular X

Modular Drills • TOP DRILL Modular X

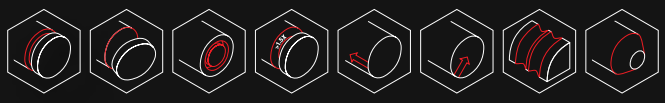
Application Data • MS(M) • WM15PD • Metric

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

Application Data • MS(M) • WM15PD • Inch

Material Group		Cutting Speed — Vc Range — SFM			Recommended Feed Rate (f) by Diameter					
		min	Starting Value	max	Tool Diameter (inch)	0.630	0.787	1.000	1.260	1.575
M	1	131	**262**	361	IPR	.004 – .010	.005 – .012	.005 – .013	.006 – .014	.006 – .015
	2	115	**180**	246	IPR	.004 – .010	.005 – .012	.005 – .013	.006 – .014	.006 – .015
	3	66	**115**	164	IPR	.004 – .010	.005 – .012	.005 – .013	.006 – .014	.006 – .015
K	1	295	**443**	574	IPR	.007 – .010	.009 – .019	.011 – .015	.013 – .017	.013 – .020
	2	262	**394**	459	IPR	.007 – .010	.009 – .019	.011 – .015	.013 – .017	.013 – .020
	3	230	**361**	410	IPR	.007 – .010	.009 – .019	.009 – .015	.010 – .017	.011 – .020
N	1	295	**508**	722	IPR	.010 – .020	.011 – .022	.013 – .025	.013 – .028	.013 – .028
	2	295	**508**	722	IPR	.010 – .020	.011 – .022	.013 – .025	.013 – .028	.013 – .028
	3	262	**394**	525	IPR	.010 – .020	.011 – .022	.013 – .025	.013 – .028	.013 – .028
	4	295	**508**	722	IPR	.010 – .020	.011 – .022	.013 – .025	.013 – .028	.013 – .028
	5	525	**656**	787	IPR	.010 – .020	.011 – .022	.013 – .025	.013 – .028	.013 – .028
	6	525	**656**	787	IPR	.010 – .020	.011 – .022	.013 – .025	.013 – .028	.013 – .028
S	1	66	**131**	197	IPR	.003 – .005	.004 – .006	.004 – .007	.005 – .008	.006 – .010
	2	49	**98**	148	IPR	.003 – .005	.004 – .006	.004 – .007	.005 – .008	.006 – .010
	3	49	**98**	148	IPR	.003 – .005	.004 – .006	.004 – .007	.005 – .008	.006 – .010
	4	33	**82**	131	IPR	.003 – .005	.005 – .008	.006 – .010	.007 – .011	.008 – .012

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

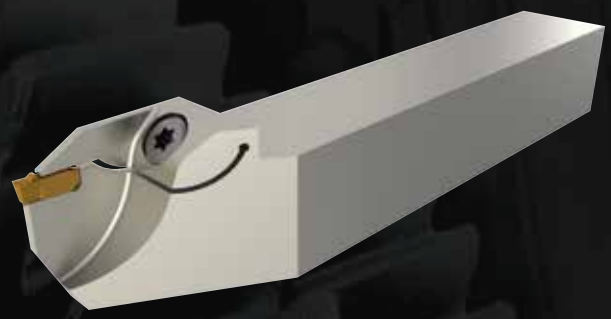
PRODUCTIVE
LOW CUTTING FORCES IN THROUGH COOLANT FOR BETTER CHIP EVACUATION

GENERAL ENGINEERING

ENERGY

TRANSPORTATION

Grooving



NEW!

New integral reinforced clamp tool holders.

New front clamping for seat size: 2 and 3, shank size 0.375-0.75".

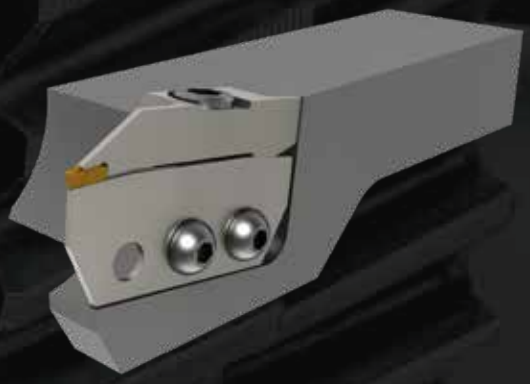
First choice for external grooving applications in most workpiece materials.

Through coolant capability and efficient coolant delivery for enhanced productivity.

Available in integral and modular style toolholders.

Full Portfolio Groove Width: .079–.399".

Cut-Off



NEW!

Cut-off up to 3" bar capacity.

Quick, reliable insert indexing.

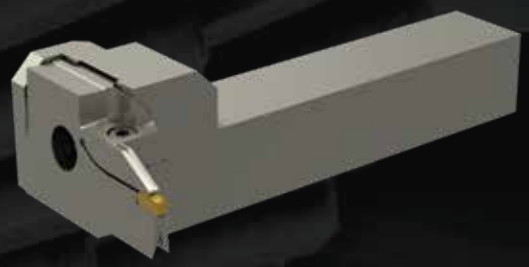
Positive mechanical clamping.

Common blade for RH and LH holders.

Inserts in proven PVD grades WU10PT, WU25PT, and WU35PT.

Insert Widths: .094–.188".

Face Grooving



NEW!

The industry's only fully adjustable face grooving platform.

The system can produce face groove diameters from 2.25–16" (57,2-406mm).

Versatile selection of both curve-in and curve-out blades to produce external and internal face groove styles.

The same blades can be used on square-shank toolholders and round-shank bars.

Insert Widths: .125", .188", and .250".

WIDIA™

widia.com

WGC • Integral Reinforced Front Clamp Toolholders

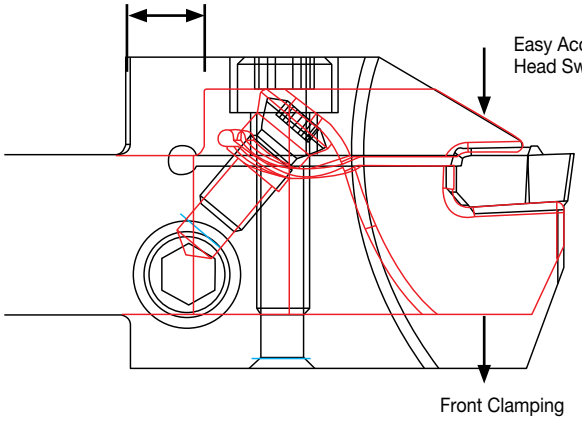
Each character in our catalog number signifies a specific trait of that product.
Use the following key columns and corresponding images to easily identify which attributes apply.

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.

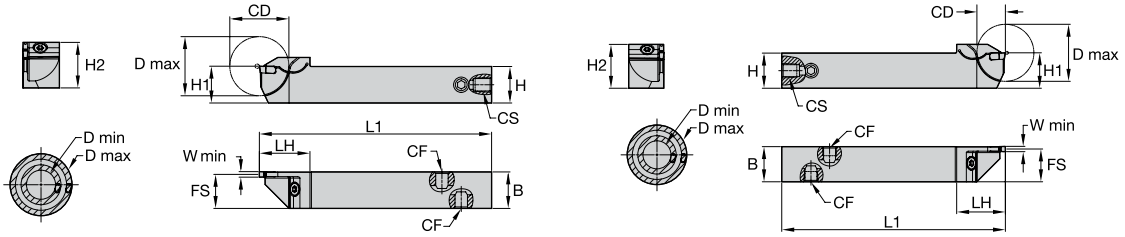


Integral reinforced Front Clamp Holders provide greater rigidity and stability.

Easy access to clamp and unclamp screw.

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

WGCSCF • Integral Reinforced Front Clamp Toolholders • Inch



order number	catalog number	SSC	CD	D max	H1	H	B	H2	L1	FS	LH	CF
right hand												
6765342	**WGCSCFR060210**	2	.39	.787	.375	.375	.375	.53	4.50	.34	.81	–
6765348	**WGCSCFR080216**	2	.63	1.260	.500	.500	.500	.66	4.50	.46	1.04	–
6765350	**WGCSCFR100216**	2	.63	1.260	.625	.625	.625	.80	4.50	.59	1.04	–
6765402	**WGCSCFR120216**	2	.63	1.260	.750	.750	.750	.93	4.50	.71	1.04	–
6765349	**WGCSCFR080316C**	3	.63	1.260	.500	.500	.500	.69	4.50	.44	1.08	M8X1
6765401	**WGCSCFR100316C**	3	.63	1.260	.625	.625	.625	.81	4.50	.57	1.08	M8X1
6765403	**WGCSCFR120316C**	3	.63	1.260	.750	.750	.750	.94	4.50	.69	1.08	M8X1
left hand												
6765325	**WGCSCFL060210**	2	.39	.787	.375	.375	.375	.53	4.50	.34	.81	–
6765326	**WGCSCFL080216**	2	.63	1.260	.500	.500	.500	.66	4.50	.46	1.04	–
6765327	**WGCSCFL100216**	2	.63	1.260	.625	.625	.625	.82	4.50	.59	1.04	–
6765330	**WGCSCFL120216**	2	.63	1.260	.750	.750	.750	.93	4.50	.71	1.04	–
6656188	**WGCSCFL080316C**	3	.63	1.260	.500	.500	.500	.69	4.50	.44	1.08	M8X1
6765329	**WGCSCFL100316C**	3	.63	1.260	.625	.625	.625	.81	4.50	.57	1.08	M8X1
6765341	**WGCSCFL120316C**	3	.63	1.260	.750	.750	.750	.94	4.50	.69	1.08	M8X1

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

WGC • Spare Parts

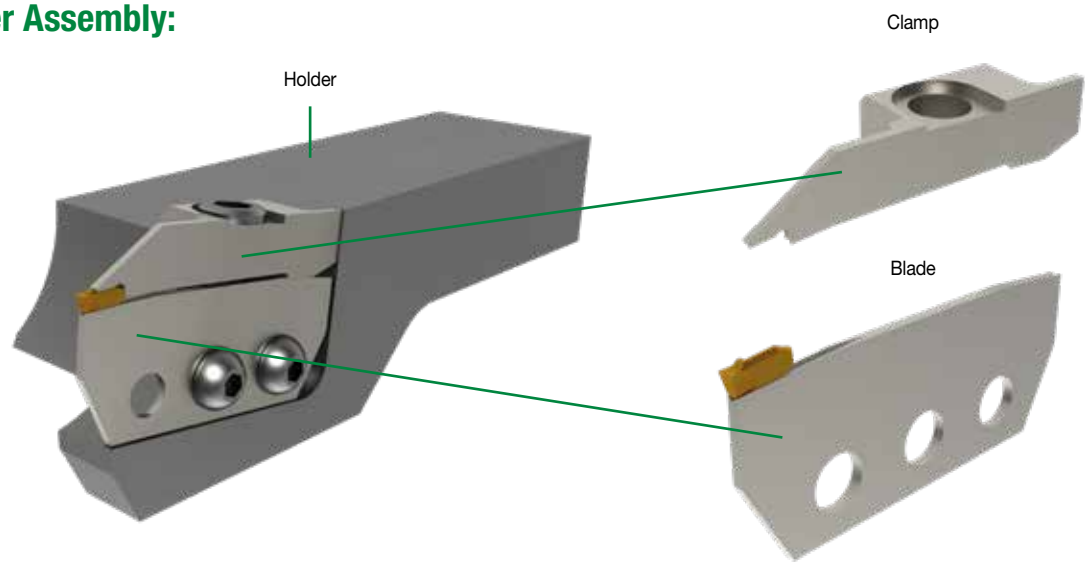
screw	screw	torque				wrench	wrench
catalog number	order number	Nm	in. lbs.	thread	socket	catalog number	order number
MS1160	**1099645**	9	62	M5	T20	**KT20**	**1022703**
MS1162	**1127019**	7	80	M6	T25	**KT25**	**1022725**
MS1163	**1124104**	18	159	M8	T30	**KT30L**	**3782185**
MS1273	**1020977**	4	35.4	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**

WGC

WGC Separator Blades and Clamps for Universal Style Holders

- Cut-off up to 3" bar capacity.
- Insert widths .094-.188" (2.38–4.76mm).
- Quick, reliable insert indexing.
- Positive mechanical clamping.
- Common blade for RH and LH holders.
- Inserts in proven PVD grades WU10PT, WU25PT, and WU35PT.

Toolholder Assembly:



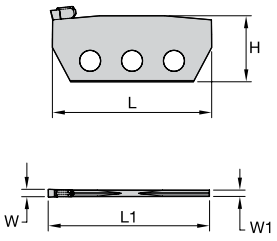
WGC Separator Blades and Clamps for Universal Style Holders

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.

WGCSUN0228B

WGC	SU	N	02	28	B
Platform (WIDIA Grooving and Cut-Off)	Separator Universal	Hand	Pocket Seat Size	CD (mm)	
		N: Neutral R: Right L: Left			B: Blade K:Clamp

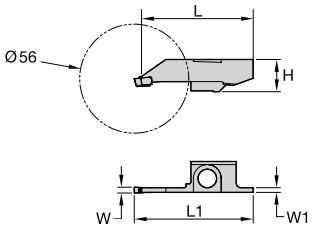
WGCMSU-B • WGC Separator Universal Blade • for 2¼" Bar Capacity



order number	catalog number	SSC	H	FS	L	LPR
neutral hand						
6788445	**WGCSUN0228B**	2	25,40	,825	60,325	60,325
6788446	**WGCSUN0328B**	3	25,00	1,200	60,325	60,325
6788447	**WGCSUN0428B**	4	24,70	1,700	60,325	60,325

NOTE: SSC = Pocket Seat Reference. To correspond with the SSC on the insert.
Through the pocket coolant available in seat sizes 3 and higher.

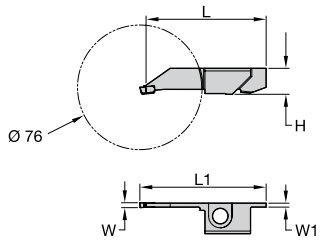
WGCMSUR-K • WGC Separator Universal Clamp • Right Hand • for 2¼"



order number	catalog number	SSC	L
right hand			
6788448	**WGCSUR0228K**	2	58
6788449	**WGCSUR0328K**	3	57
6788450	**WGCSUR0428K**	4	57

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

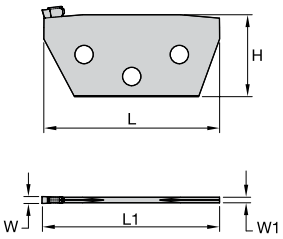
WGCMSUL-K • WGC Separator Universal Clamp • Left Hand • for 2¼" Bar Capacity



order number	catalog number	SSC	L
left hand			
6788442	**WGCSUL0228K**	2	58
6788443	**WGCSUL0328K**	3	57
6788444	**WGCSUL0428K**	4	57

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

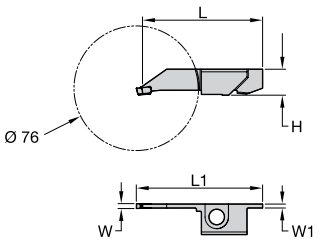
WGCMSU-B • WGC Separator Universal Blade • for 3" Bar Capacity



order number	catalog number	SSC	H	FS	L	LPR
neutral hand						
6788453	**WGCSUN0338B**	3	35,50	1,200	76,200	76,200
6788454	**WGCSUN0438B**	4	35,20	1,700	76,200	76,200

NOTE: SSC = Pocket Seat Reference. To correspond with the SSC on the insert.
Through the pocket coolant available in seat sizes 3 and higher.

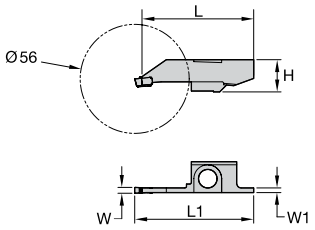
WGCMSUL-K • WGC Separator Universal Clamp • Left Hand • for 3" Bar Capacity • Metric



order number	catalog number	SSC	L
left hand			
6788451	**WGCSUL0338K**	3	73
6788452	**WGCSUL0438K**	4	73

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

WGCMSUR-K • WGC Separator Universal Clamp • Right Hand • for 3" Bar Capacity • Metric



order number	catalog number	SSC	L
right hand			
6788455	**WGCSUR0338K**	3	73
6788456	**WGCSUR0438K**	4	73

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

WGC Separator Blades and Clamps – Cross Reference to Old Separator Blade and Clamp

Ø56 (2¼") BAR CAPACITY - WGC Separator Blades and Clamps for Separator Universal Style Holder

Insert Size	Type	Catalog Number	WGC Order Number	Old Separator Catalog Number	Old Separator Order Number
2	BLADE	WGCSUN0228B	6788445	310.109	3539441
	RH CLAMP	WGCSUR0228K	6788448	435.148	3539859
	LH CLAMP	WGCSUL0228K	6788442	435.149	3539860
3	BLADE	WGCSUN0328B	6788446	310.102	3539439
	RH CLAMP	WGCSUR0328K	6788449	435.101	3539825
	LH CLAMP	WGCSUL0328K	6788443	435.104	3539828
4	BLADE	WGCSUN0428B	6788447	310.108	3539440
	RH CLAMP	WGCSUR0428K	6788450	435.102	3539826
	LH CLAMP	WGCSUL0428K	6788444	435.105	3539829

Ø76 (3") BAR CAPACITY - WGC Separator Blades and Clamps for Separator Universal Style Holder

Insert Size	Type	Catalog Number	WGC Order Number	Old Separator Catalog Number	Old Separator Order Number
3	BLADE	WGCSUN0338B	6788453	309.111	3539432
	RH CLAMP	WGCSUR0338K	6788455	435.136	3539849
	LH CLAMP	WGCSUL0338K	6788451	435.137	3539850
4	BLADE	WGCSUN0438B	6788454	309.105	3539428
	RH CLAMP	WGCSUR0438K	6788456	435.103	3539827
	LH CLAMP	WGCSUL0438K	6788452	435.106	3539830

Selection Of WGC Separator Blades and Clamps

Ø56 (2¼") BAR CAPACITY

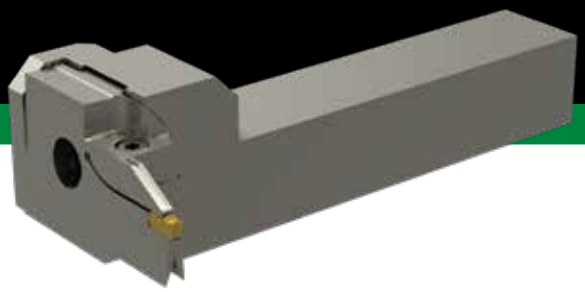
Separator Universal Style Tool Holder Catalog Number	Separator Universal Style Tool Holder Order Number	Hand of Holder	WGC Separator Blade Catalog Number	WGC Separator Blade Order Number	WGC Clamp Catalog Number	WGC Clamp Order Number
206113	3538658	RH	WGCSUN0228B	6788445	WGCSUR0228K	6788448
		RH	WGCSUN0328B	6788446	WGCSUR0328K	6788449
		RH	WGCSUN0428B	6788447	WGCSUR0428K	6788450
206114	3538659	RH	WGCSUN0228B	6788445	WGCSUR0228K	6788448
		RH	WGCSUN0328B	6788446	WGCSUR0328K	6788449
		RH	WGCSUN0428B	6788447	WGCSUR0428K	6788450
206123	3538665	RH	WGCSUN0228B	6788445	WGCSUR0228K	6788448
		RH	WGCSUN0328B	6788446	WGCSUR0328K	6788449
		RH	WGCSUN0428B	6788447	WGCSUR0428K	6788450
206136	3538668	LH	WGCSUN0228B	6788445	WGCSUL0228K	6788442
		LH	WGCSUN0328B	6788446	WGCSUL0328K	6788443
		LH	WGCSUN0428B	6788447	WGCSUL0428K	6788444
206108	3563798	LH	WGCSUN0228B	6788445	WGCSUL0228K	6788442
		LH	WGCSUN0328B	6788446	WGCSUL0328K	6788443
		LH	WGCSUN0428B	6788447	WGCSUL0428K	6788444

Ø76 (3") BAR CAPACITY

Separator Universal Style Tool Holder Catalog Number	Separator Universal Style Tool Holder Order Number	Hand of Holder	WGC Separator Blade Catalog Number	WGC Separator Blade Order Number	WGC Clamp Catalog Number	WGC Clamp Order Number
206110	3563799	LH	WGCSUN0338B	6788453	WGCSUR0338K	6788451
		LH	WGCSUN0438B	6788454	WGCSUR0438K	6788452
206115	3538660	RH	WGCSUN0338B	6788453	WGCSUR0338K	6788455
		RH	WGCSUN0438B	6788454	WGCSUR0438K	6788456
206116	3538661	RH	WGCSUN0338B	6788453	WGCSUR0338K	6788455
		RH	WGCSUN0438B	6788454	WGCSUR0438K	6788456
206119	3538663	LH	WGCSUN0338B	6788453	WGCSUR0338K	6788451
		LH	WGCSUN0438B	6788454	WGCSUR0438K	6788452
206121	3587587	RH	WGCSUN0338B	6788453	WGCSUR0338K	6788455
		RH	WGCSUN0438B	6788454	WGCSUR0438K	6788456

WGC Ranger™

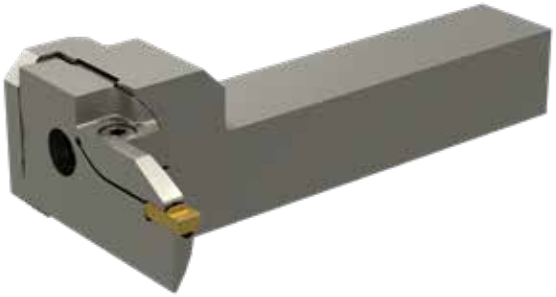
WIDIA™ WGC Ranger Adjustable Face Grooving System



WGC Ranger is the industry's only fully adjustable face grooving platform. The system can produce face groove diameters from 2.25–16" (57,2–406mm).

Square Shank Toolholders

- Compact, right angle design with full 1" depth of cut capability when using .188"- and .250"-wide inserts.
- Versatile selection of curve-out cartridges, featuring .125", .188", and .250" widths.
- Inserts in grades for steels, stainless steels, non-ferrous materials, and cast iron.



Round Shank Bars

- Available in 1", 1.25", and 1.50" round shanks with added flexibility to use both right-hand and left-hand cartridges in the same shank.
- Versatile selection of both curve-in and curve-out cartridges to produce external and internal (through the bore) face groove styles.
- Insert widths of .125", .188", and .250" with choice of square front inserts for plunge and groove, or full nose radii for plunge, groove, and profile.

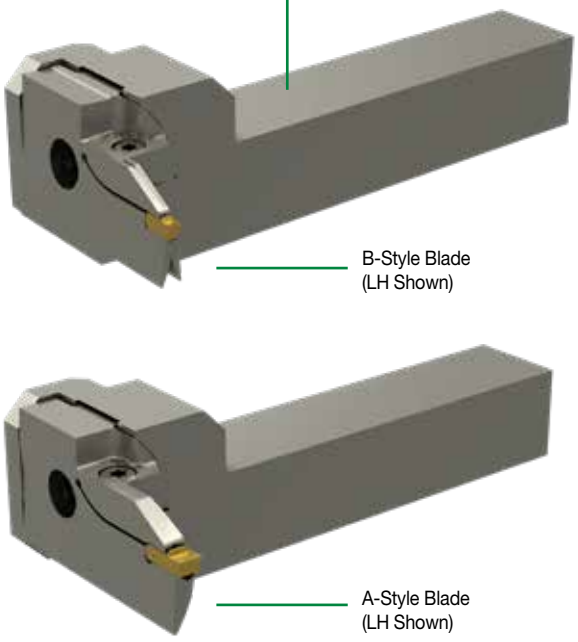
WGC Ranger™ • Nomenclature

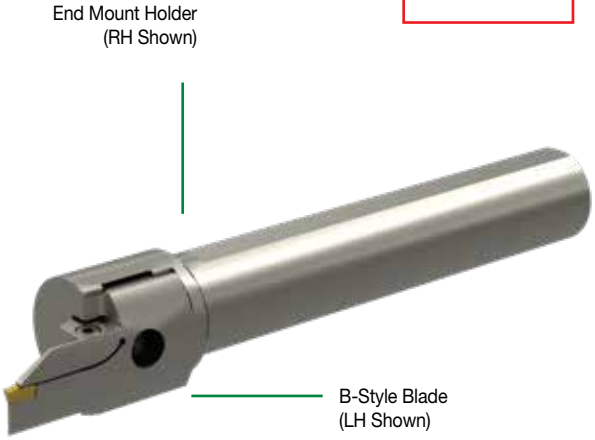
Each character in our catalog number signifies a specific trait of that product.
Use the following key columns and corresponding images to easily identify which attributes apply.

WGCMRAL0319B317

WGC	M	RA	L	3	19	B	317
Platform (WIDIA Grooving and Cut-Off)	Modular	Ranger	Hand	Pocket Seat Size	CD [mm]	Style	Minimum Insert Width
			L: Left Hand R: Right Hand	3 4 6		A: Inboard B: Outboard	317: 3.17 [0.125] 476: 4.76 [0.187] 635: 6.35 [0.250]

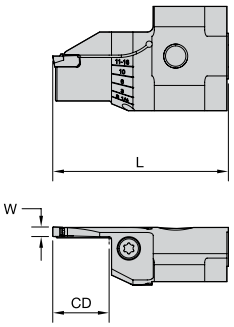
Use only recommend insert width or higher for a particular pocket seat size.

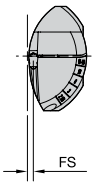


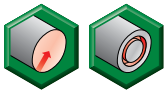


Use LH Blade for RH Holder and vice versa.

WGCRM-A • WGC Ranger™ Single-Ended Modular Blades

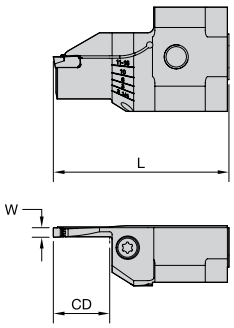


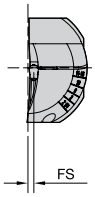


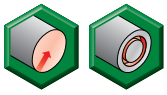


order number	catalog number	SSC	W	CD	D min	D max	FS	L
right hand								
6740385	**WGCMRAR0319A317**	3	.125	19,1	2.25	16.00	-1,63	2.30
6740386	**WGCMRAR0425A476**	4	.188	25,4	2.25	16.00	-2,42	2.55
6740387	**WGCMRAR0625A635**	6	.250	25,4	2.25	16.00	-3,23	2.55
left hand								
6740382	**WGCMRAL0319A317**	3	.125	19,1	2.25	16.00	-1,63	2.30
6740383	**WGCMRAL0425A476**	4	.188	25,4	2.25	16.00	-2,42	2.55
6740384	**WGCMRAL0625A635**	6	.250	25,4	2.25	16.00	-3,23	2.55

WGCRM-B • WGC Ranger™ Single-Ended Modular Blades







order number	catalog number	SSC	W	CD	D min	D max	FS	L
right hand								
6740411	**WGCMRAR0319B317**	3	.125	19,1	2.25	16.00	-1,55	2.30
6740412	**WGCMRAR0425B476**	4	.188	25,4	2.25	16.00	-2,34	2.55
6740413	**WGCMRAR0625B635**	6	.250	25,4	2.25	16.00	-3,13	2.55
left hand								
6740388	**WGCMRAL0319B317**	3	.125	19,1	2.25	16.00	-1,55	2.30
6740389	**WGCMRAL0425B476**	4	.188	25,4	2.25	16.00	-2,34	2.55
6740390	**WGCMRAL0625B635**	6	.250	25,4	2.25	16.00	-,31	2.55

NOTE: SSC = Pocket Seat Reference. To correspond with the SSC on the insert.
Through the pocket coolant available in seat sizes 3 and higher.

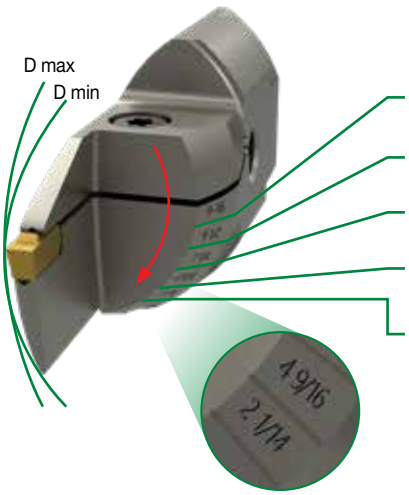
WGC Ranger™

WGC Ranger™ - Technical Information

Application Information:

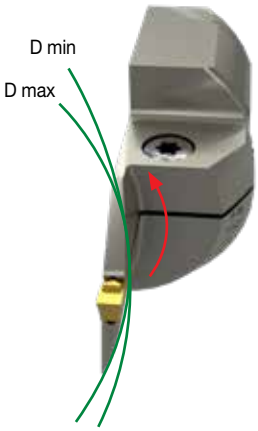
- When changing inserts, be sure the new insert locates against the positive stop on the blade.
- Never tighten the insert clamping screw without an insert in the pocket. Permanent damage to the clamp could occur.
- Toolholder projection length out of the tool block should be as short as possible to maintain rigidity.
- Slower speeds and feeds are recommended compared to O.D. grooving.

A-Style Blade
(LH Shown)



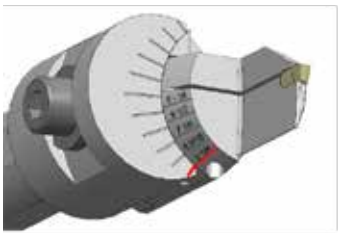
Blade Marking	D min [Inch] Metric	D max [Inch] Metric
9-16	[9]	[16]
	228.6	406.4
9 ½	[8]	[11]
	203.2	279.4
7 ¼	[5]	[9.5]
	127	241.3
4 9/16	[3.375]	[5.75]
	85.725	146.05
2 ¼	[2.25]	[3.5]
	57.15	88.9

B-Style Blade
(LH Shown)

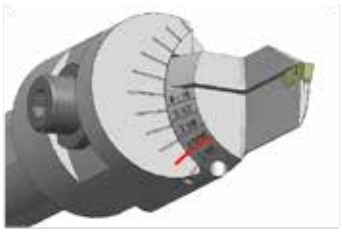


NOTE: Align Each Blade Marking Against Holder Marking to get the Right D min-D max. Tool Pre-setting recommended after each setting.

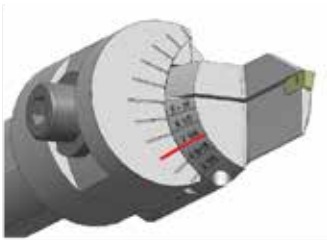
WGC Ranger™ Blade Setting positions



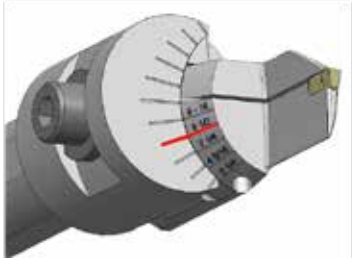
Mark = 2 ¼ setting,
D min = 2.25" D max = 3.5"



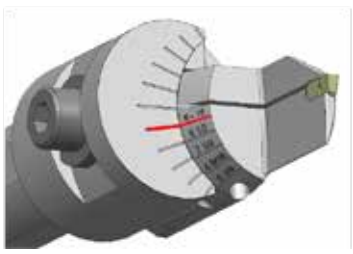
Mark = 4 9/16 setting,
D min= 3.375" D max = 5.75"



Mark = 7 ¼ setting,
D min = 5" D max = 9.5"



Mark = 9 ½ setting,
D min= 8" D max = 11"

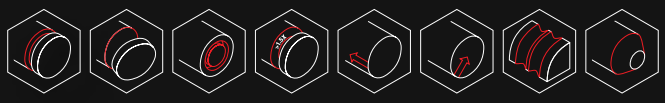


Mark = 9-16 setting,
D min = 9" D max = 16"

WGC Ranger™ Blade vs Old Ranger Blade Cross-Reference

WGC Ranger Blade mm#	ANSI Catalog #	ISO Catalog #	Ranger Blade mm#	Ranger Blade Catalog #
6740382	WGCMRAL0319A317	WGCMRAL0319A317	3539537	338-123
6740383	WGCMRAL0425A476	WGCMRAL0425A476	3539538	338-124
6740384	WGCMRAL0625A635	WGCMRAL0625A635	3539546	338-132
6740385	WGCMRAR0319A317	WGCMRAR0319A317	3539535	338-121
6740386	WGCMRAR0425A476	WGCMRAR0425A476	3539536	338-122
6740387	WGCMRAR0625A635	WGCMRAR0625A635	3539545	338-131
6740388	WGCMRAL0319B317	WGCMRAL0319B317	3539539	338-125
6740389	WGCMRAL0425B476	WGCMRAL0425B476	3539540	338-126
6740390	WGCMRAL0625B635	WGCMRAL0625B635	3539541	338-127
6740411	WGCMRAR0319B317	WGCMRAR0319B317	3539542	338-128
6740412	WGCMRAR0425B476	WGCMRAR0425B476	3539543	338-129
6740413	WGCMRAR0625B635	WGCMRAR0625B635	3539544	338-130

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.

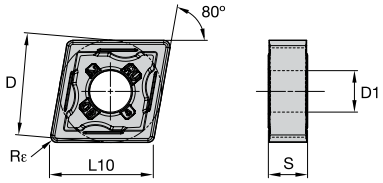
Post-coat grinding
- Provides secure seating surface.

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

WIDIA™

widia.com

CNMG-RU

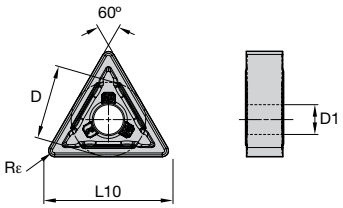


● first choice
○ alternate choice

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

ISO catalog number	ANSI catalog number	D mm	D in	L10 mm	L10 in	S mm	S in	Rε mm	Rε in	D1 mm	D1 in	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
CNMG120408RU	CNMG432RU	12,70	1/2	12,90	.508	4,76	3/16	0,8	1/32	5,16	.203	6690250	6690247	-	6817522	6817756	-	-	6678403	6690253
CNMG120412RU	CNMG433RU	12,70	1/2	12,90	.508	4,76	3/16	1,2	3/64	5,16	.203	6690251	6690248	-	6817523	6817757	-	-	6678404	6690254

TNMG-RU

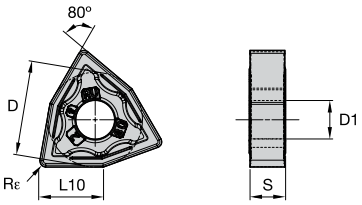


● first choice
○ alternate choice

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

ISO catalog number	ANSI catalog number	D mm	D in	L10 mm	L10 in	S mm	S in	Rε mm	Rε in	D1 mm	D1 in	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
TNMG160408RU	TNMG332RU	9,53	3/8	16,50	.650	4,76	3/16	0,8	1/32	3,81	.150	6776800	6776799	-	6817524	6777051	-	-	6746845	6817450
TNMG160412RU	TNMG333RU	9,53	3/8	16,50	.650	4,76	3/16	1,2	3/64	3,81	.150	6776936	6776935	-	6817525	6776937	-	-	6746846	6817521

WNMG-RU



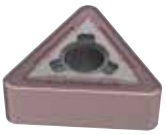
● first choice
○ alternate choice

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

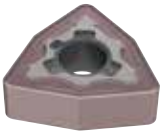
ISO catalog number	ANSI catalog number	D mm	D in	L10 mm	L10 in	S mm	S in	Rε mm	Rε in	D1 mm	D1 in	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK15CT	WK20CT
WNMG080408RU	WNMG432RU	12,70	1/2	8,69	.342	4,76	3/16	0,8	1/32	5,16	.203	6696886	6696887	-	6711599	6817758	-	-	6696885	6583558
WNMG080412RU	WNMG433RU	12,70	1/2	8,69	.342	4,76	3/16	1,2	3/64	5,16	.203	6690252	6690249	-	6817526	6817759	-	-	6678405	6690255

Chip Control Chart

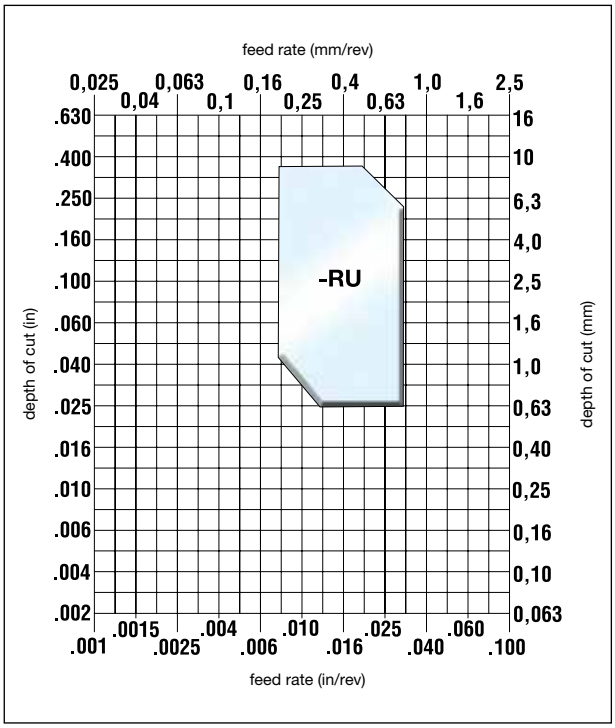
CNMG-RU



TNMG-RU



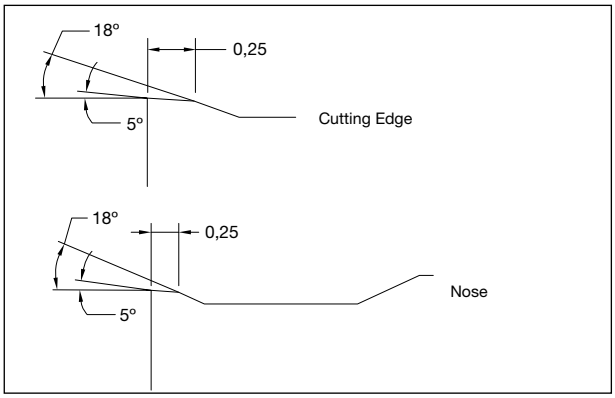
WNMG-RU



Insert Geometry

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

Chipbreaker Profile



ALL-STAR

visit widia.com

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

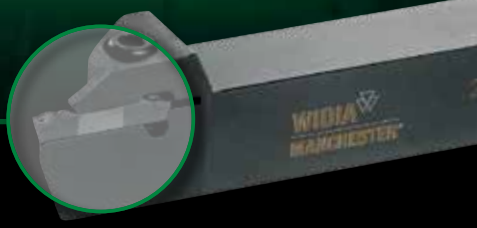
Proven Solutions **Easy to Find** **Always Available**

Holemaking

Tapping

Indexable Milling

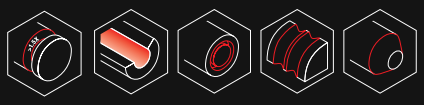
Solid End Milling



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.

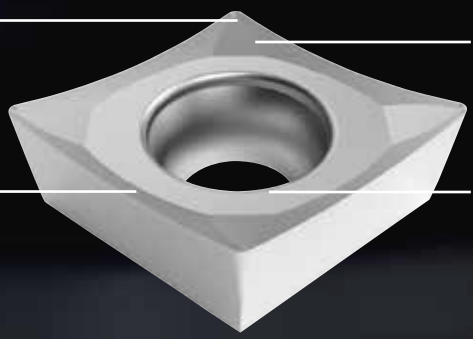
Features and Benefits

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.



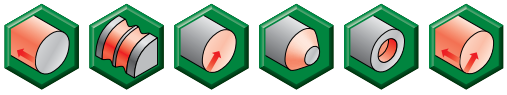
WIDIA™

widia.com

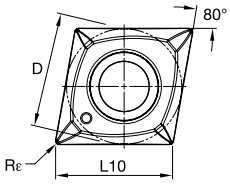
ALUMINUM

ISO/ANSI Carbide Inserts

WIDIA™ Inserts • CCGT-AL • Machining Aluminum



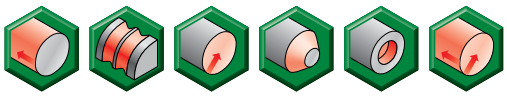
● first choice
○ alternate choice



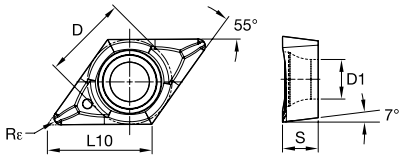
P		
M		
K		
N		●
S		
H		

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		WU10HT
		mm	in	mm	in	mm	in	mm	in	mm	in	
CCGT060202AL	CCGT21505AL	6,35	1/4	6,45	.254	2,38	3/32	0,2	.008	2,79	.110	6846528
CCGT060204AL	CCGT2151AL	6,35	1/4	6,47	.255	2,38	3/32	0,4	.016	2,79	.110	6846529
CCGT060208AL	CCGT2152AL	6,35	1/4	6,45	.254	2,38	3/32	0,8	.031	2,80	.110	6846530
CCGT09T302AL	CCGT32505AL	9,53	3/8	9,67	.381	3,97	5/32	0,2	.008	4,40	.173	6846581
CCGT09T304AL	CCGT3251AL	9,53	3/8	9,67	.381	3,97	5/32	0,4	.016	4,40	.173	6846582
CCGT09T308AL	CCGT3252AL	9,53	3/8	9,67	.381	3,97	5/32	0,8	.031	4,40	.173	6846583
CCGT120402AL	CCGT4305AL	12,70	1/2	12,90	.508	4,76	3/16	0,2	.008	5,50	.217	6846584
CCGT120404AL	CCGT431AL	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,50	.217	6846585
CCGT120408AL	CCGT432AL	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,50	.217	6846586

WIDIA™ Inserts • DCGT-AL • Machining Aluminum



● first choice
○ alternate choice



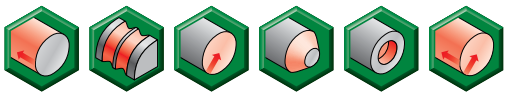
P		
M		
K		
N		●
S		
H		

ISO catalog number	ANSI catalog number	D mm	D in	L10 mm	L10 in	S mm	S in	Rε mm	Rε in	D1 mm	D1 in	WU10HT
DCGT070202AL	DCGT21505AL	6,35	1/4	7,75	.305	2,38	3/32	0,2	.008	2,90	.114	6846587
DCGT070204AL	DCGT2151AL	6,35	1/4	7,75	.305	2,38	3/32	0,4	.016	2,90	.114	6846588
DCGT11T302AL	DCGT32505AL	9,53	3/8	11,63	.458	3,97	5/32	0,2	.008	4,40	.173	6846589
DCGT11T304AL	DCGT3251AL	9,53	3/8	11,59	.457	3,97	5/32	0,4	.016	4,40	.173	6846590
DCGT11T308AL	DCGT3252AL	9,53	3/8	11,63	.458	3,97	5/32	0,8	.031	4,40	.173	6846591

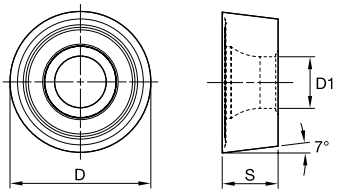
ALUMINUM

ISO/ANSI Carbide Inserts

WIDIA™ Inserts • RCGT-AL • Machining Aluminum



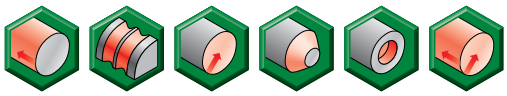
● first choice
○ alternate choice



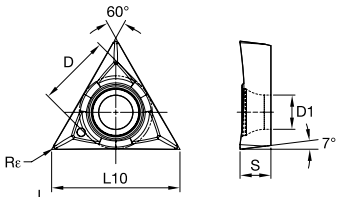
P	
M	
K	
N	●
S	
H	

ISO catalog number	ANSI catalog number	D mm	D in	S mm	S in	D1 mm	D1 in	WU10HT
RCGT1204M0AL	RCGT1204M0AL	12,00	.4724	4,76	3/16	4,40	.173	6846592

WIDIA™ Inserts • TCGT-AL • Machining Aluminum



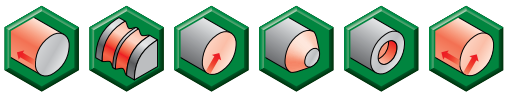
● first choice
○ alternate choice



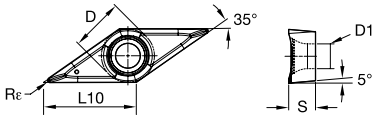
P	
M	
K	
N	●
S	
H	

ISO catalog number	ANSI catalog number	D mm	D in	L10 mm	L10 in	S mm	S in	Rε mm	Rε in	D1 mm	D1 in	WU10HT
TCGT110204AL	TCGT2151AL	6,35	1/4	11,00	.433	2,38	3/32	0,4	.016	2,80	.110	6846593
TCGT16T304AL	TCGT3251AL	9,53	3/8	16,51	.650	3,97	5/32	0,4	.016	4,40	.173	6846594
TCGT16T308AL	TCGT3252AL	9,53	3/8	16,50	.650	3,97	5/32	0,8	.031	4,40	.173	6846595

WIDIA™ Inserts • VBGT-AL • Machining Aluminum



● first choice
○ alternate choice

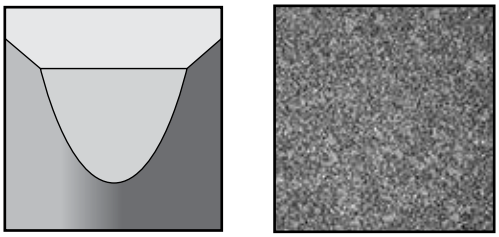


P		
M		
K		
N		●
S		
H		

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		WU10HT
		mm	in	mm	in	mm	in	mm	in	mm	in	
VBGT160404AL	VBGT331AL	9,53	3/8	16,61	.654	4,76	3/16	0,4	.016	4,40	.173	6846596
VBGT160408AL	VBGT332AL	9,53	3/8	16,46	.648	4,76	3/16	0,8	.031	4,40	.173	6846597

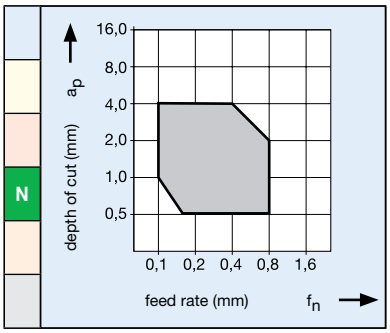
WU10HT • Grade Information

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

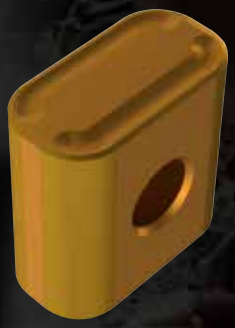
MMCs (Aluminum-Based Metal Matrix Composites)

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.

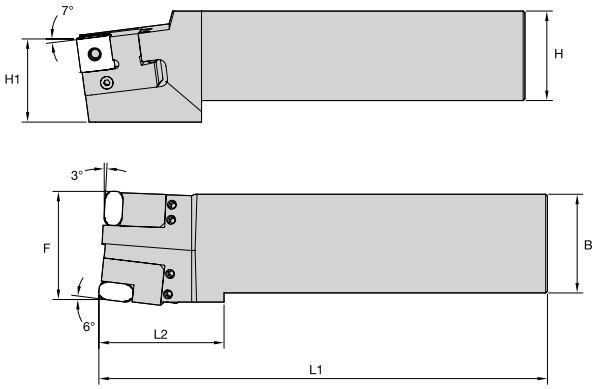
Inserts

- 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™

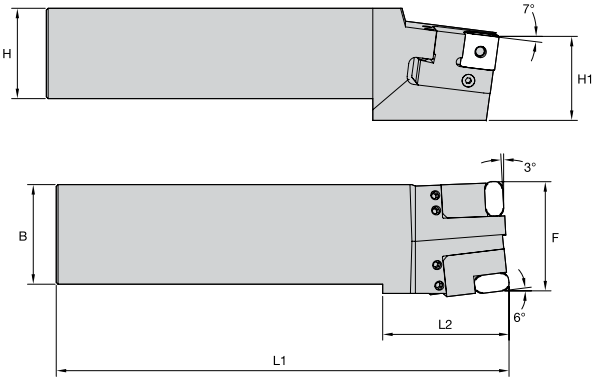
widia.com

Railway Toolholder • Wheel Turning Lathe



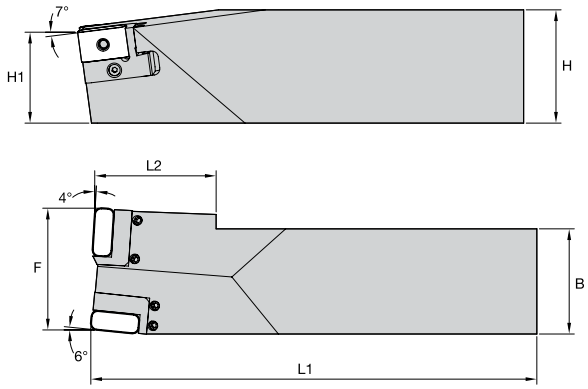
order number	catalog number	B		F		H		H1		L1		L2	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
right hand													
2552321	**6939143110**	55,00	2.162	60,00	2.362	50,00	1.969	46,00	1.339	250,00	9.843	70,00	2.756

Railway Toolholder • Wheel Turning Lathe



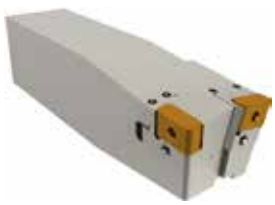
order number	catalog number	B		F		H		H1		L1		L2	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
left hand													
2552320	**6939143120**	55,00	2.162	60,00	2.362	50,00	1.969	46,00	1.339	250,00	9.843	70,00	2.756

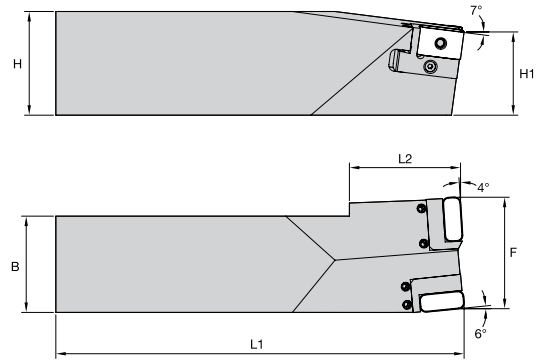
Railway Toolholder • Wheel Turning Lathe



order number	catalog number	B		F		H		H1		L1		L2	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
right hand													
2552319	**6939145810**	65,00	2.559	75,00	2.953	70,00	2.756	56,00	2.205	276,00	10.866	77,80	3.063

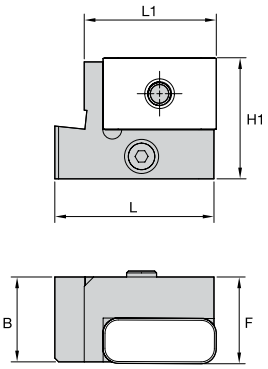
Railway Toolholder • Wheel Turning Lathe





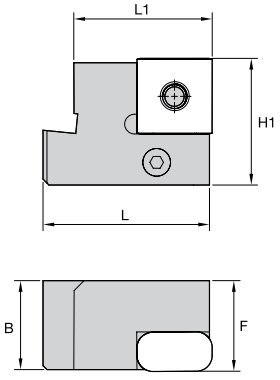
order number	catalog number	B		F		H		H1		L1		L2	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
left hand													
2552318	**6939145820**	65,00	2.559	75,00	2.953	70,00	2.756	56,00	2.205	276,00	10.866	77,80	3.063

Railway Turning Cassette • Wheel Turning Lathe



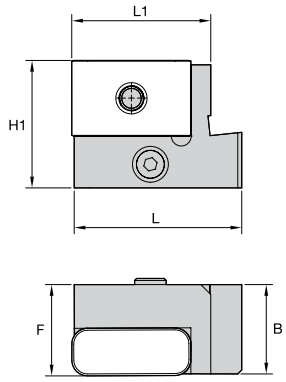
order number	catalog number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
left hand														
2035331	**6939318620**	22,50	.886	23,00	.906	42,20	1.660	35,00	1.378	32,00	1.260	LNUX301940	**12148562700**	**12148566700**

Railway Turning Cassette • Wheel Turning Lathe



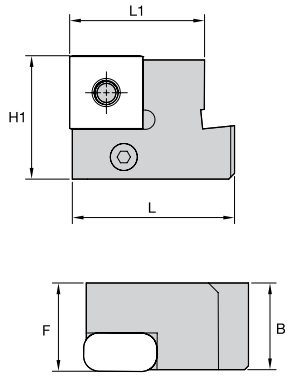
order number	catalog number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
left hand														
2276948	**6939318820**	22,50	.886	23,00	.906	42,20	1.660	35,00	1.378	32,00	1.260	LNUX191940	**12148562700**	**12148566700**

Railway Turning Cassette • Wheel Turning Lathe



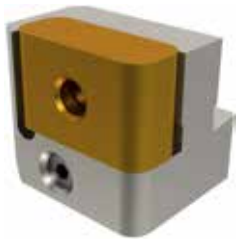
order number	catalog number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
right hand														
2039208	**6939318610**	22,50	.886	23,00	.906	42,20	1.660	35,00	1.378	32,00	1.260	LNUX301940	**12148562700**	**12148566700**

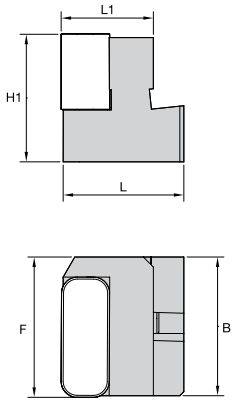
Railway Turning Cassette • Wheel Turning Lathe



order number	catalog 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**

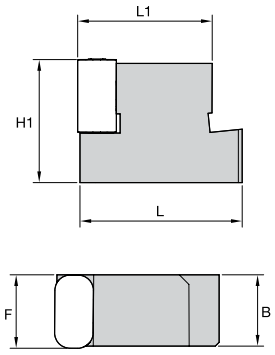
Railway Facing Cassette • Wheel Turning Lathe





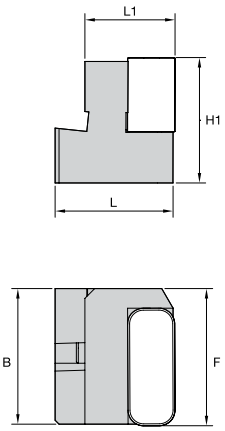
order number	catalog number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
left hand														
2403738	**6939322020**	34,60	1.362	35,00	1.378	30,10	1.185	23,00	.906	32,00	1.260	LNUX301940	**12148562700**	**12148566700**

Railway Facing Cassette • Wheel Turning Lathe



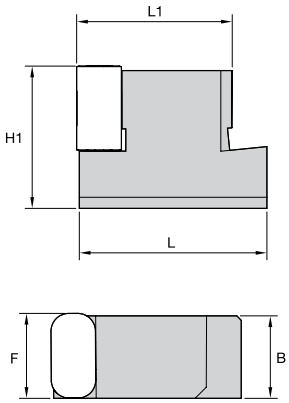
order number	catalog number	B mm	B in	F mm	F in	L mm	L in	L1 mm	L1 in	H1 mm	H1 in	gage insert	clamp screw	lever
left hand														
2576256	**6939318920**	18,55	.730	19,05	.750	42,20	1.660	35,00	1.378	32,00	1.260	LNUX191940	**12148562700**	**12148566700**

Railway Facing Cassette • Wheel Turning Lathe



order number	catalog 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**

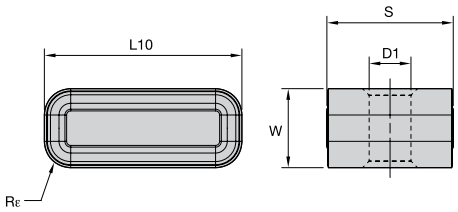
Railway Facing Cassette • Wheel Turning Lathe



order number	catalog 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

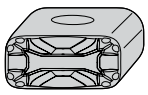
● first choice
○ alternate choice

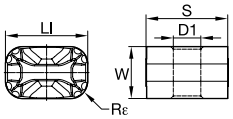


		W		L10		S		Rε		D1		P	WP15CT	WK20CT
ISO catalog number	ANSI catalog number	mm	in	mm	in	mm	in	mm	in	mm	in	M		
												K		
												N		
												S		
												H		
LNUX30194016	LNUX30194016	12,00	.472	30,00	1.181	19,05	3/4	4,0	.158	6,35	.250		6128295	▪

LNUX-13

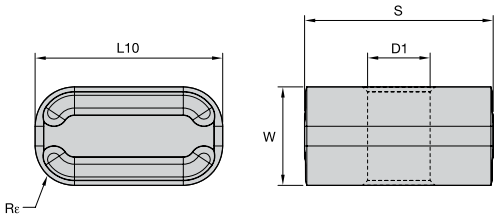
● first choice
○ alternate choice





		W		L10		S		Rε		D1		P	WP15CT	WK20CT
ISO catalog number	ANSI catalog number	mm	in	mm	in	mm	in	mm	in	mm	in	M		
												K		
												N		
												S		
												H		
LNUX19194013	LNUX19194013	10,00	.394	19,05	.750	19,05	3/4	4,0	.158	6,35	.250		▪	4170966
LNUX30194013	LNUX30194013	12,00	.472	30,00	1.181	19,05	3/4	4,0	.158	6,35	.250		▪	4170968

ISO/ANSI Carbide Inserts

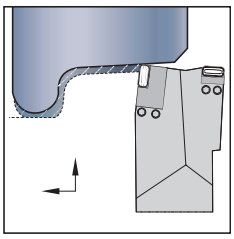


● first choice
○ alternate choice

P	●	○
M		
K	○	●
N		
S		
H		

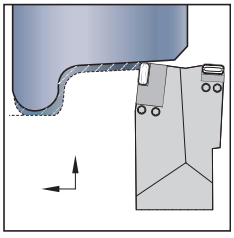
ISO catalog number	ANSI catalog number	W mm	W in	L10 mm	L10 in	S mm	S in	Rε mm	Rε in	D1 mm	D1 in	WP15CT	WK20CT
LNUX191940T	**LNUX191940T**	10,00	.394	19,05	.750	19,05	3/4	4,0	.158	6,35	.250	6128294	4170967
LNUX301940T	**LNUX301940T**	12,00	.472	30,00	1.181	19,05	3/4	4,0	.158	6,35	.250	-	4170969

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

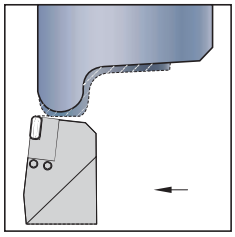
Compound Toolholder • Spare Parts



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

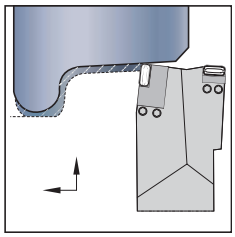
NOTE: The toolholders are supplied without the cassettes and inserts. However, the necessary screws for clamping the cassettes, locking and adjusting screws, and hex wrenches are supplied with the toolholders. Products avaliable upon request.

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
 Weldon® 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: 45°	 Tool Dimensions: Flute Configuration: X (Variable)
 Tool Dimensions: Flute Configuration: 6				

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				

Informational Icons Guide

Turning Icons

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

Tapping Icons

 Threading: Through Hole	 HSS-E: High-Speed Steel with Cobalt Alloy for Materials with Higher Hardness	 Chamfer Form B (3.5–5.5)	 Multipurpose Taps: Spiral Point	 Unified Fine Thread
 Unified Course Thread	 ANSI	 Flood Coolant: Tapping		

DIN — German Institute for Standardization
ISO — International Standardization Organization

Customer Application Support (CAS)

Get fast and reliable answers to your toughest metal-cutting problems.

Our Customer Application Support (CAS) Team is the metalworking industry's leading help desk resource for tooling application solutions and problem resolution.

- Easy access to proven metalworking expertise.
- Service level excellence.
- Best-in-class application support tools and technology.

Easy access to proven metalworking expertise!

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

Service Level Excellence:

- Fast telephone response.
- Quick technical solutions.
- Efficient case management.

Services Provided:

- Tooling selection.
- Operating parameters.
- Troubleshooting.
- Process optimization.
- Hardware support.

Best-in-Class Support Tools and Technology:

- Tooling performance experts.
- Materials database.
- Application calculators.

ORIGINATING COUNTRY	LANGUAGE	TEL	FAX	EMAIL
Australia	English	001-724-539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Austria	German	0800 291630	0049-911-9735-429 *	eu.techsupport@widia.com
Belgium	English/French	0800 80410	0049-911-9735-429 *	eu.techsupport@widia.com
China	Chinese	400-889-2237	+86-21-58999985 *	w-cn.techsupport@widia.com
Denmark	English	808 89295	001-724-539-6830 *	na.techsupport@widia.com
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
India	English	1 800 103 5227	—	in.techsupport@widia.com
Israel	English	1809 449907	001-724-539-6830 *	na.techsupport@widia.com
Italy	Italian	800 916568	02 89512146 *	eu.techsupport@widia.com
Japan	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Korea (South)	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Malaysia	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Netherlands	English	0800 0201131	001-724-539-6830 *	na.techsupport@widia.com
New Zealand	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Norway	English	800 10081	001-724-539-6830 *	na.techsupport@widia.com
Poland	Polish	00800 4411943	06166 56504 *	eu.techsupport@widia.com
Russia (landline)	Russian	8800 5556395	0048 6166 56504 *	eu.techsupport@widia.com
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
South Africa	English	0800 981644	001-724-539-6830 *	na.techsupport@widia.com
Sweden	English	020798794	001-724-539-6830 *	na.techsupport@widia.com
Taiwan	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Thailand	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
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 • ANSI

ANSI

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	–	A36, 1008, 1010, 1018 through 1029; 1108, 1117
P1	Low-Carbon Steels, Short Chipping, Free Machining	C <0,25%	<530	<125	–	10L18, 1200 Series, 1213, 12L14
P2	Medium- and High-Carbon Steels	C >0,25%	>530	<220	<25	1035, 1045, 10L45, 1050, 10L50, 1080, 1137, 1144, 11L44, 1525, 1545, 1572
P3	Alloy Steels and Tool Steels	C >0,25%	600–850	<330	<35	1300, 2000, 3000, 4000, 5000, 8000, P20, SAE: A, D, H, O, S, M, T
P4	Alloy Steels and Tool Steels	C >0,25%	850–1400	340–450	35–48	1300, 2000, 3000, 4000, 5000, 8000, P20, SAE: A, D, H, O, S, M, T
P5	Ferritic, Martensitic, and PH Stainless Steels	–	600–900	<330	<35	15–5 PH, 13–8 PH, 17–4 PH, 400 and 500 Series
P6	High-Strength Ferritic, Martensitic, and PH Stainless Steels	–	900–1350	350–450	35–48	15–5 PH, 13–8 PH, 17–4 PH, 400 and 500 Series
M1	Austenitic Stainless Steel	–	<600	130–200	–	200 Series, 301, 302, 304, 304L, 309
M2	High-Strength Austenitic Stainless and Cast Stainless Steels	–	600–800	150–230	<25	310, 316, 316L, 321, 347, 384 ASTM Cast XM-1, XM-5, XM-7, XM-21
M3	Duplex Stainless Steel	–	<800	135–275	<30	323, 329, F55, 2205, S329000
K1	Gray Cast Iron	–	125–500	120–290	<32	class 20, 25, 30, 35, 40, 45, 50, 55, 60, G1800, G3000, G3500, G4000
K2	Low- and Medium-Strength Ductile Irons (Nodular Irons) and Compacted Graphite Irons (CGI)	–	<600	130–260	<28	60-40-18, 65-45-12, 80-55-06, SAE J434:D4018, D4512, D5506, ASTM A47: Grade 32510, 35018, SAE J158: Grade M3210, M4504, M5003, M5503, M7002, ASTMA842: Grade 250, 300, 350, 400, 450
K3	High-Strength Ductile Irons and Austempered Ductile Iron (ADI)	–	>600	180–350	<43	ASTM A536:100-70-03, 120-90-02, SAE J434: D7003, SAE J158: Grade M8501AST A897: 125-80-10, 150-100-7, 175-125-4, 200-150-1, 230-185
N1	Wrought Aluminum	–	–	–	–	2025, 5050, 7050, 1000, 2017
N2	Low-Silicon Aluminum Alloys and Magnesium Alloys	Si <12,2%	–	–	–	2024, 6061, 7075
N3	High-Silicon Aluminum Alloys and Magnesium Alloys	Si >12,2%	–	–	–	–
N4	Copper-, Brass-, Zinc-Based on Machinability Index Range of 70–100	–	–	–	–	C81500
N5	Nylon, Plastics, Rubbers, Phenolics, Resins, Fiberglass	–	–	–	–	–
N6	Carbon, Graphite Composites, CFRP	–	–	–	–	Graphite, CFK, CFRP
N7	Metal Matrix Composites (MMC)	–	–	–	–	C63000
S1	Iron-Based, Heat-Resistant Alloys	–	500–1200	160–260	25–48	A-286, INCOLOY® 800 Series, A608, A567, Discaloy™, INVAR®, N-155, 16-25-6, 19-9 DL; Cast: ASTM A-297, A-351, A-567, A-608
S2	Cobalt-Based, Heat-Resistant Alloys	–	1000–1450	250–450	25–48	Haynes® 25 (L605), Haynes 188, J-1570, Stellite®, AiResist 213; Cast: AiResist 13, Haynes 21, MAR-M302, MAR-M509, NASA Co-W-Re, WI-52
S3	Nickel-Based, Heat-Resistant Alloys	–	600–1700	160–450	<48	Astroloy™, Hastelloy® B/C/ C-276 /X, INCONEL® 600 and 700 Series, IN102, INCOLOY 900 Series, Rene 41, Waspalloy®, MONEL®, K-500, MAR-M20, NIMONIC®, UDIMET®
S4	Titanium and Titanium Alloys	–	900–1600	300–400	33–48	Pure: Ti 98.8, Ti 98.9,Ti 99.9; Alloyed: Ti 5Al-2.5Sn, Ti6Al-4V, Ti6Al-2Sn-4Zr-2Mo, Ti-3Al-8V-6Cr-4Mo-4Zr, Ti-10V-2Fe-3Al, Ti-13V-11Cr-3Al
H1	Hardened Materials	–	–	–	44–48	Tool Steel H10, H11, H13, D2, D3, 4340, P20
H2	Hardened Materials	–	–	–	48–55	Tool Steel H10, H11, H13, D2, D3, 4340, P20
H3	Hardened Materials	–	–	–	56–60	Tool Steel H10, H11, H13, D2, D3, 4340, P20
H4	Hardened Materials	–	–	–	>60	Tool Steel H10, H11, H13, D2, D3, 4340, P20

Material Overview • DIN

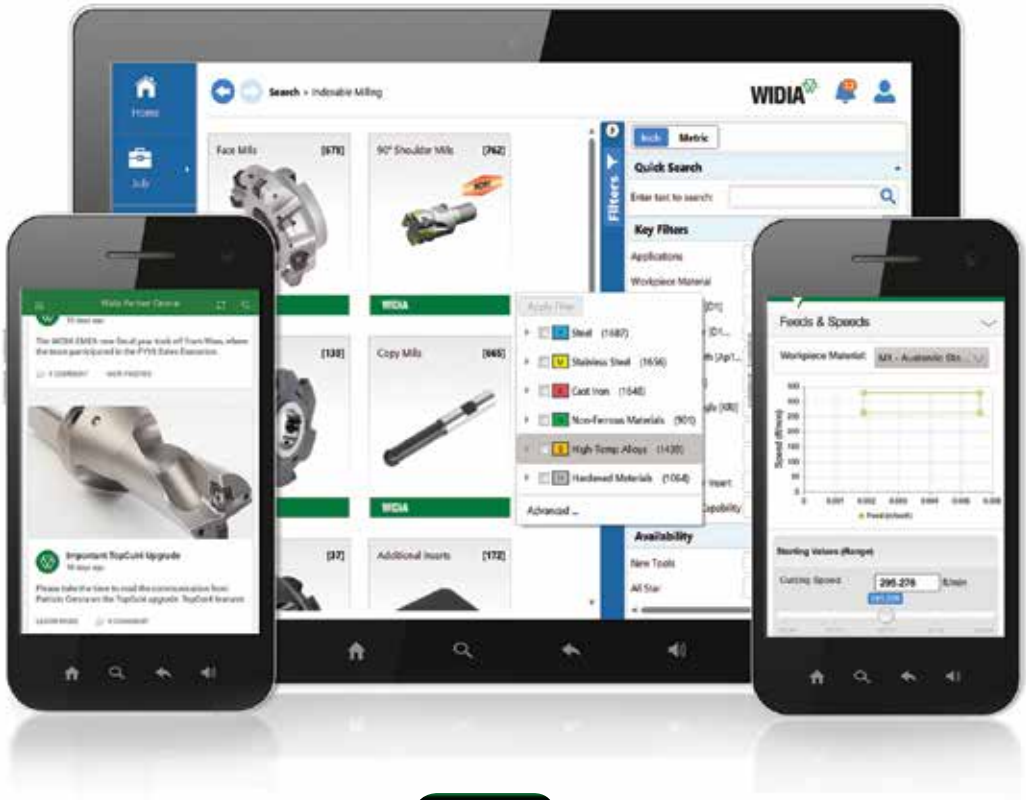
DIN

P	Steel	K	Cast Iron	S	High-Temp Alloys
M	Stainless Steel	N	Non-Ferrous	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	Gray 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, Fiberglass	–	–	–	–	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



WIDIA Machining Central

PRODUCT DATA

- Tooling Dimensional Data
- Feeds and Speeds
- Inventory Availability
- ...and More!

DOWNLOAD THE **WIDIA MOBILE APPS** TODAY!

Download on the App Store GET IT ON Google Play

WIDIA.COM

facebook.com/WIDIAProductGrp youtube.com/WIDIASolutions twitter.com/WIDIAProductGrp

WIDIA™

Notes

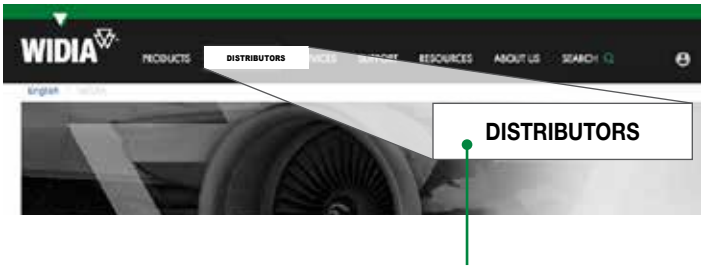
Find Your Local WIDIA Authorized Distributor

WIDIA™ brand cutting tools are available exclusively through a specialized network of Authorized Distributor partners whom you can count on to deliver much more than products. Our distributors know us, and more importantly, they know you. They know better than anyone in the industry how to put the global power of WIDIA to work for you — in your industry, in your region, and for your business.

WIDIA distributor partners provide technical expertise that you can count on. They will show you how to:

- Significantly reduce cycle time.
- Improve machine tool utilization.
- Achieve measurable productivity improvements.
- Take advantage of proven supply chain solutions.
- Access local inventory and best-in-class technical support.
- Request onsite demonstrations of the latest tooling technology.

And with thousands of turning, milling, holemaking, tapping, and tooling systems products available from WIDIA, you'll find everything you need from one single source.



Find your Local WIDIA Authorized Distributor by accessing our distributor finder at widia.com.

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.

WIDIA™

WIDIA

ADVANCES

INCH | 2021

WORLD HEADQUARTERS

WIDIA Products Group
Kennametal Inc.
1600 Technology Way
Latrobe, PA 15650 USA
Tel: 1 800 979 4342
w-na.service@widia.com

EUROPEAN HEADQUARTERS

WIDIA Products Group
Kennametal Europe GmbH
Rheingoldstrasse 50
CH 8212 Neuhausen am Rheinfall
Switzerland
Tel: +41 52 6750 100
w-ch.service@widia.com

ASIA-PACIFIC HEADQUARTERS

WIDIA Products Group
Kennametal (Singapore) Pte. Ltd.
3A International Business Park
Unit #01-02/03/05, ICON@IBP
Singapore 609935
Tel: +65 6265 9222
w-sg.service@widia.com

INDIA HEADQUARTERS

WIDIA Products Group
REGD OFFICE: WIDIA India Tooling Pvt Ltd
CIN: U28110KA2018PTC119396
Survey No 11 Nagasandra
Adjacent to Nagasandra Metro Station
Bengaluru - Pune National Highway
Bengaluru - 560073 India
Tel: +91 80 2839 4321
w-in.service@widia.com

HANITA

widia.com