

Hommel Hercules Werkzeughandel

Valid until 31.12.2016
00 080 654



Aluminium machining

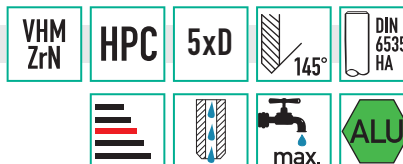
// High-speed milling and drilling tools

HHW

www.hhw.de

99115 001-042

Solid carbide high-speed inner coolant drill

**HHW**

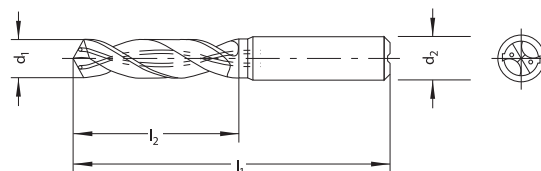
Type

- Solid carbide drill with optimised and polished chip spaces for reliable swarf handling
- Special coating for machining aluminium

Application

For high-speed drilling into aluminium materials.

99115 001-042



d ₁ mm	l ₂ mm	l ₁ mm	D ₂ h ₆ mm	5 x D 99115	...
3.0	28	66	6		001
3.3	28	66	6		002
3.5	28	66	6		003
3.7	28	66	6		004
3.8	36	74	6		005
4.0	36	74	6		006
4.2	36	74	6		007
4.5	36	74	6		008
4.6	36	74	6		009
4.8	44	82	6		010
5.0	44	82	6		011
5.5	44	82	6		012
5.8	44	82	6		013
6.0	44	82	6		014
6.5	53	91	8		015
6.8	53	91	8		016
7.0	53	91	8		017
7.4	53	91	8		018
7.5	53	91	8		019
7.8	53	91	8		020
8.0	53	91	8		021

d ₁ mm	l ₂ mm	l ₁ mm	D ₂ h ₆ mm	5 x D 99115	...
8.5	61	103	10		022
8.8	61	103	10		023
9.0	61	103	10		024
9.3	61	103	10		025
9.5	61	103	10		026
9.8	61	103	10		027
10.0	61	103	10		028
10.2	71	118	12		029
10.5	71	118	12		030
11.0	71	118	12		031
11.2	71	118	12		032
11.5	71	118	12		033
11.8	71	118	12		034
12.0	71	118	12		035
12.5	77	124	14		036
13.0	77	124	14		037
14.0	77	124	14		038
15.0	83	133	16		039
16.0	83	133	16		040
18.0	93	143	18		041
20.0	101	153	20		042

ISO	Material	Cutting sp. VC m/min	3.0 - 5.0	5.0 - 8.0	8.0 - 12.0	12.0 - 16.0	16.0 - 20.0
N	Aluminium, unalloyed	360	0.30	0.40	0.50	0.60	0.65
	Aluminium wrought alloy non-hardened	360	0.30	0.40	0.50	0.60	0.65
	Aluminium wrought alloy hardened	400	0.30	0.40	0.50	0.60	0.65
	Aluminium cast alloy 6% Si	400	0.35	0.45	0.55	0.65	0.70
	Aluminium cast alloy 12% Si	360	0.35	0.45	0.55	0.65	0.70
	Aluminium cast alloy > 12% Si	350	0.30	0.40	0.50	0.60	0.65
	CU unalloyed	160	0.23	0.3	0.38	0.45	0.52
	CU wrought alloy non-hardened	160	0.23	0.3	0.38	0.45	0.52
	CU wrought alloy hardened	160	0.23	0.3	0.38	0.45	0.52
	CuNi alloy	160	0.23	0.3	0.38	0.45	0.52
	CuNi alloy long-chipping	160	0.23	0.3	0.38	0.45	0.52
	CuZn long-chipping	200	0.23	0.3	0.38	0.45	0.52
	CuZn short-chipping	200	0.23	0.3	0.38	0.45	0.52
	CuSn long-chipping	200	0.23	0.3	0.38	0.45	0.52

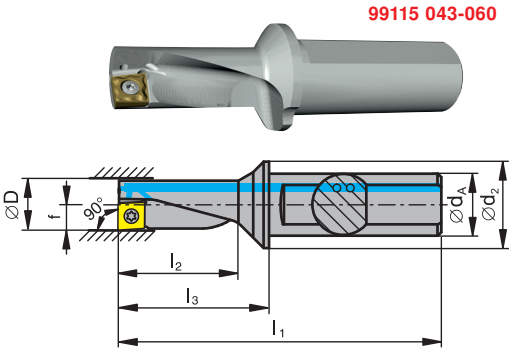


Type

- Spiral chip flute
- Optimised, axial collar
- Drilling and turning in one
- Multi-function tool with reversible cutting insert
- Made of high-quality tool steel with hard&tough coating
- Chip booster borehole for coolant supply

Application

- For boring depths of up to 2.25 x D.
- For drilling into solid material with flat borehole bottom
- For face machining
- For external and internal turning



99115 043-060

2.25 x D									right		left	
Ø D mm	Designation	Ø d _A mm	Ø d ₂ mm	l ₁ mm	l ₂ mm	l ₃ mm	f mm	Reversible cutting inserts	99115	...	99115	...
8	ECC 08R/L-2.25D 04	10	15	60.0	18.0	22.0	4	XC.. 0401..	043		052	
10	ECC 10R/L-2.25D 05	12	18	69.5	22.5	27.5	5	XC.. 0502..	044		053	
12	ECC 12R/L-2.25D 06	16	22	78.0	27.0	33.0	6	XC.. 0602..	045		054	
14	ECC 14R/L-2.25D 07	16	23	83.5	31.5	38.5	7	XC.. 0703..	046		055	
16	ECC 16R/L-2.25D 08	20	28	94.0	36.0	44.0	8	XC.. 0803..	047		056	
18	ECC 18R/L-2.25D 09	25	36	109.5	40.5	53.5	9	XC.. 09T3..	048		057	
20	ECC 20R/L-2.25D 10	25	35	111.0	45.0	55.0	10	XC.. 10T3..	049		058	
25	ECC 25R/L-2.25D 13	32	44	129.0	56.5	69.0	12.5	XC.. 1304..	050		059	
32	ECC 32R/L-2.25D 17	40	54	158.0	72.0	88.0	16	XC.. 1705..	051		060	

Application
Carbide quality
Coating
Designation

N
H216T
uncoated
XCET ..



99115 061-074

	r mm		99115	...
040102FR-27P	0.2	10 ea.	061	
040104FR-27P	0.4	10 ea.	062	
050202FN-27P	0.2	10 ea.	063	
050204FN-27P	0.4	10 ea.	064	
060202FN-27P	0.2	10 ea.	065	
060204FN-27P	0.4	10 ea.	066	
070304FN-27P	0.4	10 ea.	067	
080304FN-27P	0.4	10 ea.	068	
09T304FN-27P	0.4	10 ea.	069	
10T304FN-27P	0.4	10 ea.	070	
10T308FN-27P	0.8	10 ea.	071	
130404FN-27P	0.4	10 ea.	072	
130408FN-27P	0.8	10 ea.	073	
170508FN-27P	0.8	10 ea.	074	

ISO	Material	Treatment type / alloy		VDI 3323 group	Hardness HB	Carbide uncoated H216T v _c [m/min]
N	Aluminium wrought alloy	cannot be hardened		21	60	100 - 2500
		can be hardened		22	100	100 - 2000
	Aluminium cast alloy	cannot be hardened	12% Si	23	80	100 - 1500
		can be hardened	12% Si	24	90	100 - 1500
		cannot be hardened	> 12% Si	25	130	100 - 800
	Copper and copper alloy (bronze, brass)		Automated machine alloy (1% Pb)	26	–	100 - 600
			Brass, gunmetal	27	90	100 - 600
			Bronze	28	100	100 - 400
			Lead-free copper and electrolytic copper	29	100	100 - 300
	Non-metallic materials		Thermosetting plastics	29	–	80 - 180
			Fibre-reinforced plastics	29	–	60 - 150
			Hard rubber	30	–	100 - 250

99115 075-083

Through-hole thread drill

M

6H

DIN 371

DIN 376

3.5-5 B

≤ 3xD

HSS-E

1200 N/mm²

ATORN®

Type

With spiral point.

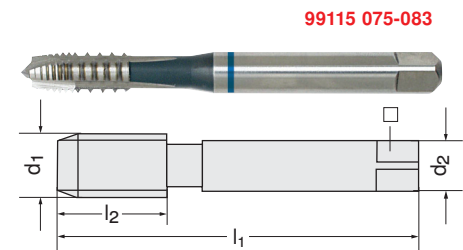
With exposed teeth to reduce the torque and for a better distribution of the lubricant.

Up to M 10 DIN 371.

From M 12 DIN 376.

Application

Particularly for materials which have a tendency to jam, and for thin-walled parts, as the material is not deformed on account of the low frictional resistance.



d ₁	Corehole Ø mm	Pitch mm	l ₂ mm	l ₁ mm	d ₂ x $\varnothing$ mm	DIN 371		DIN 376	
						99115	...	99115	...
M 3	2.50	0.50	10	56	3.5 x 2.7		075		
M 4	3.30	0.70	12	63	4.5 x 3.4		076		
M 5	4.20	0.80	14	70	6.0 x 4.9		077		
M 6	5.00	1.00	16	80	6.0 x 4.9		078		
M 8	6.80	1.25	18	90	8.0 x 6.2		079		
M 10	8.50	1.50	20	100	10.0 x 8.0		080		
M 12	10.20	1.75	22	110	9.0 x 7.0				081
M 16	14.00	2.00	25	110	12.0 x 9.0				082
M 20	17.50	2.50	32	140	16.0 x 12.0				083

Al10%Si	Al>10%Si	Cu	St520N	St750N	St900N	St1100N	St1200N	St1400N	45HRC	55HRC	60HRC	67HRC	VA900N	VA>900N	Ti alloy	GG(G)	Plastic
20-25	10-40	-	5-20	5-15	5-12	4-10	2-8	-	-	-	-	-	5-12	5-12	-	-	-

99115 084-090

Through-hole thread drill

M

6H

DIN 371

DIN 376

3.5-5 B

≤ 3xD

HSS-E

ALU

ATORN®

Type

With strong spiral point and enlarged chip space.

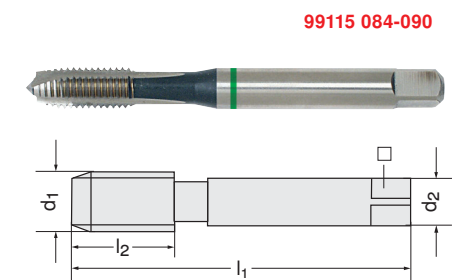
Polished flutes for improved chip removal in long-chipping non-ferrous metals.

Up to M 10 DIN 371.

From M 12 DIN 376.

Application

For through threads with enlarged chip space.



d ₁	Corehole Ø mm	Pitch mm	l ₂ mm	l ₁ mm	d ₂ x $\varnothing$ mm	DIN 371		DIN 376	
						99115	...	99115	...
M 3	2.50	0.50	10	56	3.5 x 2.7		084		
M 4	3.30	0.70	12	63	4.5 x 3.4		085		
M 5	4.20	0.80	14	70	6.0 x 4.9		086		
M 6	5.00	1.00	16	80	6.0 x 4.9		087		
M 8	6.80	1.25	18	90	8.0 x 6.2		088		
M 10	8.50	1.50	20	100	10.0 x 8.0		089		
M 12	10.20	1.75	22	110	9.0 x 7.0				090

Al10%Si	Al>10%Si	Cu	St520N	St750N	St900N	St1100N	St1200N	St1400N	45HRC	55HRC	60HRC	67HRC	VA900N	VA>900N	Ti alloy	GG(G)	Plastic
20-25	10-40	10-12	5-20	-	-	-	-	-	-	-	-	-	-	-	-	-	20-30

99115 091-098

Blind hole tap

ATORN®

Type

Polished flutes for improved chip removal in long-chipping non-ferrous metals.

Up to M 10 DIN 371.

From M 12 DIN 376.

M

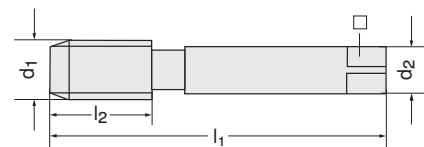
6H

DIN
371DIN
376

HSS-E

ALU

99115 091-098



d ₁	Corehole Ø mm	Pitch mm	l ₂ mm	l ₁ mm	d ₂ x $\frac{\square}{\square}$ mm	DIN 371		DIN 376	
						99115	...	99115	...
M 2	1.60	0.40	8	45	2.8 x 2.1		091		
M 3	2.50	0.50	10	56	3.5 x 2.7		092		
M 4	3.30	0.70	12	63	4.5 x 3.4		093		
M 5	4.20	0.80	14	70	6.0 x 4.9		094		
M 6	5.00	1.00	16	80	6.0 x 4.9		095		
M 8	6.80	1.25	18	90	8.0 x 6.2		096		
M 10	8.50	1.50	20	100	10.0 x 8.0		097		
M 12	10.20	1.75	22	110	9.0 x 7.0				098

Al10%Si	Al>10%Si	Cu	St520N	St750N	St900N	St1100N	St1200N	St1400N	45HRC	55HRC	60HRC	67HRC	VA900N	VA>900N	Ti alloy	GG(G)	Plastic
20-25	10-40	10-12	5-20	-	-	-	-	-	-	-	-	-	-	-	-	-	20-30

99115 099-110

Machine thread former

HHW

Type

TiN coating for good sliding properties.

With oil grooves for optimum lubrication effect.

Up to M 10 DIN 371.

From M 12 DIN 376.

Application

For through and blind holes.

Note:

For all materials with a minimum elongation of 8%.

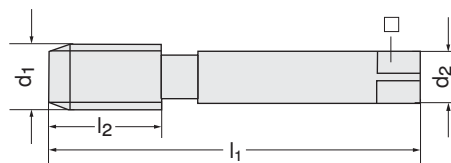
For forming, use cutting oils which are highly compressible.

M

6HX

DIN
2174HSS-E
TiN

99115 099-110



d ₁	Corehole Ø mm	Pitch mm	l ₂ mm	l ₁ mm	d ₂ x $\frac{\square}{\square}$ mm	DIN 371		DIN 376	
						99115	...	99115	...
M 2	1.83	0.40	8	45	2.8 x 2.1		099		
M 2.5	2.30	0.45	9	50	2.8 x 2.1		100		
M 3	2.80	0.50	11	56	3.5 x 2.7		101		
M 3.5	3.25	0.60	11	56	4.0 x 3.0		102		
M 4	3.70	0.70	13	63	4.5 x 3.4		103		
M 5	4.65	0.80	16	70	6.0 x 4.9		104		
M 6	5.55	1.00	19	80	6.0 x 4.9		105		
M 8	7.40	1.25	22	90	8.0 x 6.2		106		
M 10	9.30	1.50	24	100	10.0 x 8.0		107		
M 12	11.10	1.75	28	110	9.0 x 7.0				108
M 14	13.00	2.00	30	110	11.0 x 9.0				109
M 16	15.00	2.00	32	110	12.0 x 9.0				110

Al10%Si	Al>10%Si	Cu	St520N	St750N	St900N	St1100N	St1200N	St1400N	45HRC	55HRC	60HRC	67HRC	VA900N	VA>900N	Ti alloy	GG(G)	Plastic
45-60	20-80	10-20	8-60	8-45	8-36	5-20	3-18	-	-	-	-	-	8-30	8-30	-	-	-

99115 111-123 Solid carbide mini end milling cutter

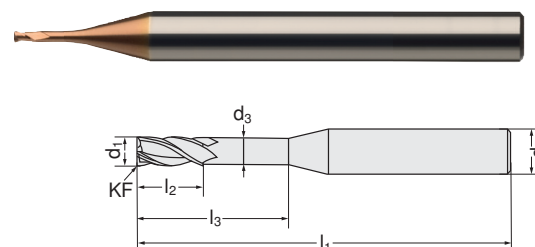
ATORN®

Type
- With chamfered edge



99115 111-123

d ₁ (e8) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...
0.5	0.9	55	4	0.48	4	0.05	111	
0.5	0.9	65	6	0.48	4	0.05	112	
0.5	0.9	65	10	0.48	4	0.05	113	
1.0	1.5	55	5	0.95	4	0.10	114	
1.0	1.5	65	10	0.95	4	0.10	115	
1.0	1.5	65	15	0.95	4	0.10	116	
1.5	1.8	55	8	1.44	4	0.10	117	
1.5	1.8	65	15	1.44	4	0.10	118	
1.5	1.8	65	20	1.44	4	0.10	119	
2.0	2.0	55	10	1.92	4	0.10	120	
2.0	2.0	65	20	1.92	4	0.10	121	
2.5	2.5	55	12	2.40	4	0.10	122	
2.5	2.5	65	20	2.40	4	0.10	123	



99115 124-136 Solid carbide mini torus milling cutter

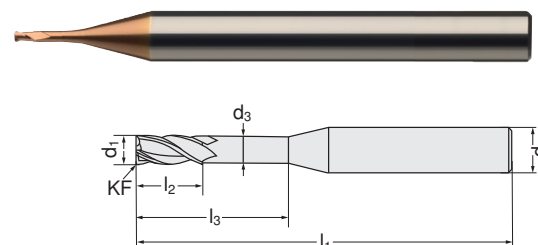
ATORN®

Type
Radius tolerance 0/-0.015



99115 124-136

d ₁ (e8) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...
0.5	0.9	55	4	0.48	4	0.05	124	
0.5	0.9	65	6	0.48	4	0.05	125	
0.5	0.9	65	10	0.48	4	0.08	126	
1.0	1.5	55	5	0.95	4	0.08	127	
1.0	1.5	65	10	0.95	4	0.10	128	
1.0	1.5	65	15	0.95	4	0.10	129	
1.5	1.8	55	8	1.44	4	0.12	130	
1.5	1.8	65	15	1.44	4	0.15	131	
1.5	1.8	65	20	1.44	4	0.15	132	
2.0	2.0	55	10	1.92	4	0.20	133	
2.0	2.0	65	20	1.92	4	0.20	134	
2.5	2.5	55	12	2.40	4	0.25	135	
2.5	2.5	65	20	2.40	4	0.25	136	



99115 137-149 Solid carbide mini radius milling cutter

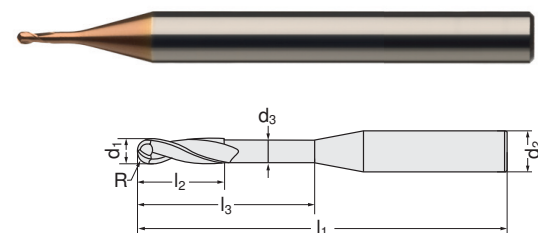
ATORN®

Type
Radius tolerance +/-0.01 mm.



99115 137-149

d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...
0.5	0.9	55	4	0.48	4	0.25	137	
0.5	0.9	65	6	0.48	4	0.25	138	
0.5	0.9	65	10	0.48	4	0.25	139	
1.0	1.5	55	5	0.95	4	0.50	140	
1.0	1.5	65	10	0.95	4	0.50	141	
1.0	1.5	65	15	0.95	4	0.50	142	
1.5	1.8	55	8	1.44	4	0.75	143	
1.5	1.8	65	15	1.44	4	0.75	144	
1.5	1.8	65	20	1.44	4	0.75	145	
2.0	2.0	55	10	1.92	4	1.00	146	
2.0	2.0	65	20	1.92	4	1.00	147	
2.5	2.5	55	12	2.40	4	1.75	148	
2.5	2.5	65	20	2.40	4	1.75	149	



ISO	Material	Strength	DIN No.	Vc	fz min/max					ap min/max*				
					0.5	1.0	1.5	2.0	2.5	0.5	1.0	1.5	2.0	2.5
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	400 - 550	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00
	Aluminium alloys, short-chipping	<500	G - AlSi12	180 - 320	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00
	Copper alloy (bronze), long-chipping	<1200	CuSn4	250 - 420	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	180 - 320	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	250 - 420	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	180 - 320	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00
	Thermoplastic	<100	PVC, acrylic glass	400 - 550	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00
	Thermoset	<150	Bakelite, melamine	300 - 450	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00
	Fibre-reinforced plastics	<1500	CFRP, GRP	250 - 420	0.009 - 0.015	0.016 - 0.025	0.030 - 0.035	0.035 - 0.050	0.040 - 0.060	0.02 - 0.30	0.05 - 0.70	0.07 - 1.20	0.10 - 1.50	0.12 - 2.00

* In each case, the lower ap values apply to long discharges and the smallest diameter.
> The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:
1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:
1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

Correction factor fz for:
full slot = x 0.7
contour = x 1.0
profiling = x 1.3

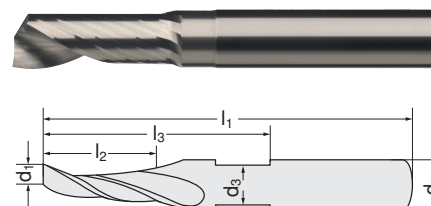
99115 150-159
Solid carbide one-flute milling cutter

VHM poliert

HSC

Z 1

d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	99115	...
1.5	6	50	22	1.45	3		150
2.0	8	50	22	1.80	3		151
3.0	12	50	22	2.80	3		152
4.0	15	57	29	3.80	4		153
5.0	17	60	32	4.80	5		154
6.0	20	64	28	5.80	6		155
8.0	24	64	28	7.80	8		156
10.0	25	73	33	9.70	10		157
12.0	32	84	39	11.70	12		158
16.0	38	93	45	15.70	16		159



ISO	Material	Strength	DIN No.	Vc	fz min/max											
					1.5 mm	2 mm	3 mm	4 mm	5 mm	6 mm	8 mm	10 mm	12 mm	16 mm		
N	Aluminium alloy, long-chipping / wrought alloy/pure metals	<500	Al99.9	350 - 500	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		
	Thermoset	<150	Bakelite, melamine	250 - 400	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.023 - 0.027	0.030 - 0.043	0.045 - 0.070	0.050 - 0.080	0.060 - 0.100	0.075 - 0.120	0.095 - 0.140	0.110 - 0.150	0.130 - 0.170	0.150 - 0.180		

99115 160-168

Solid carbide end milling cutter

ATORN®

Type

- With chamfered edge

VHM
poliert

HSC

Z 2

45°

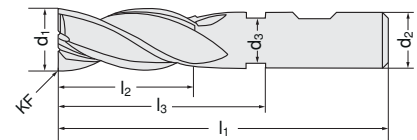
DIN
6535
HB

45°



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...
3.0	8	57	18	2.90	6	0.1	160	
4.0	11	57	18	3.90	6	0.1	161	
5.0	13	57	20	4.90	6	0.1	162	
6.0	13	57	20	5.80	6	0.1	163	
8.0	19	63	26	7.80	8	0.1	164	
10.0	22	72	29	9.70	10	0.2	165	
12.0	26	83	36	11.70	12	0.2	166	
16.0	32	92	42	15.70	16	0.2	167	
20.0	38	104	52	19.70	20	0.2	168	

99115 160-168



99115 169-184

Solid carbide end milling cutter

ATORN®

Type

- With chamfered edge

VHM
ZrCN Ultra-N

HSC

Z 2

45°

45°

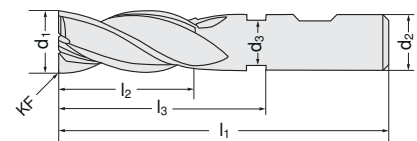


d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...	99115	...
3.0	8	57	18	2.9	6	0.1	169		177	
4.0	11	57	18	3.9	6	0.1	170		178	
5.0	13	57	20	4.9	6	0.1	171		179	
6.0	13	57	20	5.8	6	0.1	172		180	
8.0	19	63	26	7.8	8	0.1	173		181	
10.0	22	72	29	9.7	10	0.2	174		182	
12.0	26	83	36	11.7	12	0.2	175		183	
16.0	32	92	42	15.7	16	0.2	176		184	

99115 169-176

DIN
6535
HA

99115 177-184

DIN
6535
HB

ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150
	Thermoset	<150	Bakelite, melamine	250 - 400	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.030 - 0.060	0.035 - 0.070	0.040 - 0.080	0.045 - 0.090	0.050 - 0.100	0.060 - 0.110	0.070 - 0.120	0.080 - 0.140	0.100 - 0.150

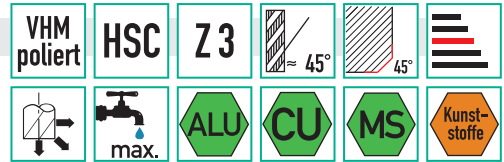
99115 185-202

Solid carbide end milling cutter

ATORN®

Type

- With chamfered edge



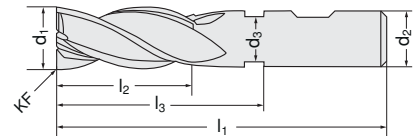
d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...	99115	...
3.0	12	57	16	2.8	6	0.1		185		194
4.0	12	57	18	3.8	6	0.1		186		195
5.0	15	57	18	4.7	6	0.1		187		196
6.0	16	57	21	5.6	6	0.1		188		197
8.0	22	64	28	7.6	8	0.1		189		198
10.0	25	73	33	9.6	10	0.2		190		199
12.0	28	84	39	11.4	12	0.2		191		200
16.0	35	93	45	15.4	16	0.2		192		201
20.0	40	104	54	19.4	20	0.2		193		202



99115 185-193



99115 194-202



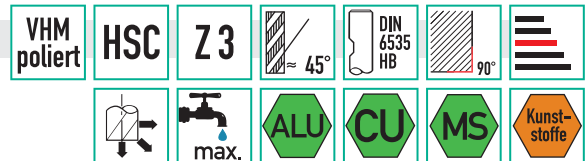
99115 203-211

Solid carbide end milling cutter

ATORN®

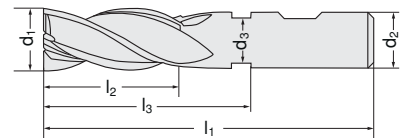
Type

- Sharp edge

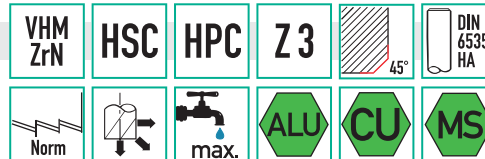


d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	99115	...
3.0	12	57	16	2.8	6		203
4.0	12	57	18	3.8	6		204
5.0	15	57	18	4.7	6		205
6.0	16	57	21	5.6	6		206
8.0	22	64	28	7.6	8		207
10.0	25	73	33	9.6	10		208
12.0	28	84	39	11.4	12		209
16.0	35	93	45	15.4	16		210
20.0	40	104	54	19.4	20		211

99115 203-211



ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	300 - 450	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Aluminium alloys, short-chipping	<500	G - AlSi12	125 - 200	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), long-chipping	<1200	CuSn4	175 - 300	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	125 - 200	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	175 - 300	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	125 - 200	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoplastic	<100	PVC, acrylic glass	300 - 450	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoset	<150	Bakelite, melamine	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Fibre-reinforced plastics	<1500	CFRP, GRP	175 - 300	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150

**Type**

- Sturdy roughing cutter with reinforced core
- Chip spaces polished before and after coating, special edge treatment
- Titanium-free ZrN coating developed for aluminium machining, for optimum sliding properties

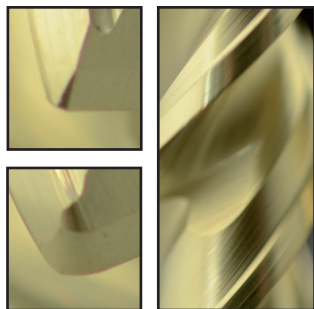
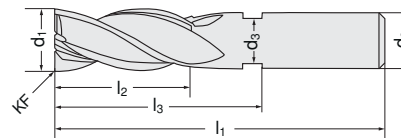
Application

For roughing to the highest requirements.

Advantage

Top machining performance and premium surface quality.

99115 212-222



Blade Ø mm	Blade length l_2 mm	AP	d_3	Total length l_1	Protective chamfer mm	Shank Ø mm	99115	...
3.0	8	12	2.8	57	0.1	6		212
4.0	11	18	3.8	57	0.1	6		213
5.0	13	18	4.8	57	0.1	6		214
6.0	13	18	5.8	57	0.2	6		215
8.0	21	25	7.8	63	0.2	8		216
10.0	22	30	9.7	72	0.2	10		217
12.0	26	36	11.7	83	0.2	12		218
16.0	36	42	15.7	92	0.2	16		219
18.0	36	42	17.6	92	0.2	18		220
20.0	41	52	19.5	104	0.2	20		221
25.0	50	65	24.5	125	0.3	25		222

ISO	Material	Strength	DIN No.	Vc	fz min/max										
					3	4	5	6	8	10	12	16	18	20	25
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	250 - 400	0.020-0.025	0.020-0.025	0.040-0.055	0.040-0.055	0.045-0.055	0.055-0.065	0.055-0.065	0.071-0.085	0.092-0.110	0.092-0.110	0.110-0.130
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.020-0.025	0.020-0.025	0.040-0.055	0.040-0.055	0.045-0.055	0.055-0.065	0.055-0.065	0.071-0.085	0.092-0.110	0.092-0.110	0.110-0.130
	Copper alloy (bronze), long-chipping	<1200	CuSn4	180 - 250	0.020-0.025	0.020-0.025	0.040-0.055	0.040-0.055	0.045-0.055	0.055-0.065	0.055-0.065	0.071-0.085	0.092-0.110	0.092-0.110	0.110-0.130
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	120 - 180	0.020-0.025	0.020-0.025	0.040-0.055	0.040-0.055	0.045-0.055	0.055-0.065	0.055-0.065	0.071-0.085	0.092-0.110	0.092-0.110	0.110-0.130
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	180 - 250	0.017-0.020	0.017-0.020	0.029-0.035	0.029-0.035	0.029-0.035	0.042-0.050	0.042-0.050	0.063-0.075	0.076-0.090	0.076-0.090	0.100-0.120
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	120 - 180	0.017-0.020	0.017-0.020	0.029-0.035	0.029-0.035	0.029-0.035	0.042-0.050	0.042-0.050	0.063-0.075	0.076-0.090	0.076-0.090	0.100-0.120
	Thermoplastic	<100	PVC, acrylic glass	350 - 450	0.020-0.025	0.020-0.025	0.040-0.055	0.040-0.055	0.045-0.055	0.055-0.065	0.055-0.065	0.071-0.085	0.092-0.110	0.092-0.110	0.110-0.130
	Thermoset	<150	Bakelite, melamine	300 - 400	0.020-0.025	0.020-0.025	0.040-0.055	0.040-0.055	0.045-0.055	0.055-0.065	0.055-0.065	0.071-0.085	0.092-0.110	0.092-0.110	0.110-0.130

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor fz for:

full slot = x 0.7

contour = x 1.0

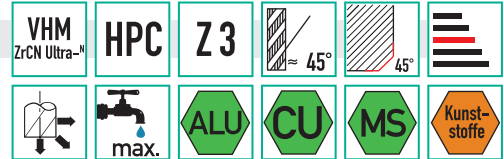
99115 223-240

Solid carbide end milling cutter

ATORN®

Type

- With chamfered edge



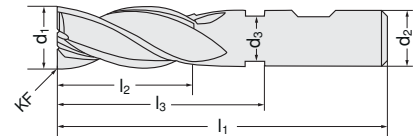
d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...	99115	...
3.0	12	57	16	2.8	6	0.1		223		232
4.0	12	57	18	3.8	6	0.1		224		233
5.0	15	57	18	4.7	6	0.1		225		234
6.0	16	57	21	5.6	6	0.1		226		235
8.0	22	64	28	7.6	8	0.1		227		236
10.0	25	73	33	9.6	10	0.2		228		237
12.0	28	84	39	11.4	12	0.2		229		238
16.0	35	93	45	15.4	16	0.2		230		239
20.0	40	104	54	19.4	20	0.2		231		240



99115 223-231



9915 232-240



99115 241-249

Solid carbide end milling cutter

ATORN®

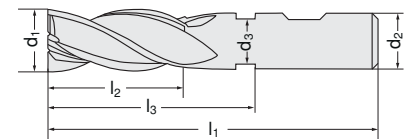
Type

- Sharp edge



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	99115	...
3.0	12	57	16	2.8	6		241
4.0	12	57	18	3.8	6		242
5.0	15	57	18	4.7	6		243
6.0	16	57	21	5.6	6		244
8.0	22	64	28	7.6	8		245
10.0	25	73	33	9.6	10		246
12.0	28	84	39	11.4	12		247
16.0	35	93	45	15.4	16		248
20.0	40	104	54	19.4	20		249

99115 241-249



ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoset	<150	Bakelite, melamine	250 - 400	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.9

>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.7

>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7

contour = x 1.0

profiling = x 1.3

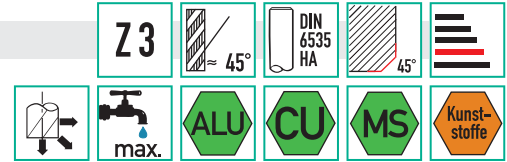
99115 250-267

Solid carbide end milling cutter

ATORN®

Type

- With chamfered edge

VHM
poliert

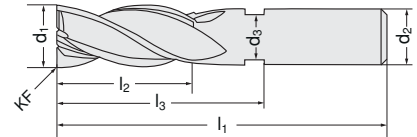
HSC

99115 250-258

VHM
ZrCN Ultra-N

HPC

99115 259-267



99115 268-276

Solid carbide end milling cutter

ATORN®

Type

- Sharp edge

VHM
ZrCN Ultra-N

HPC

Z3

45°

DIN 6535
HA

90°

max.

ALU

CU

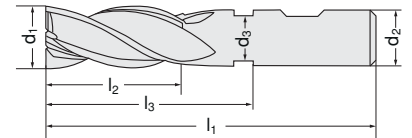
MS

Kunststoffe

d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF	99115	...	99115	...
3.0	15	64	21	2.8	6	0.1		250		259
4.0	19	64	27	3.8	6	0.1		251		260
5.0	20	64	28	4.7	6	0.1		252		261
6.0	20	64	28	5.6	6	0.1		253		262
8.0	38	80	44	7.6	8	0.1		254		263
10.0	45	95	55	9.6	10	0.2		255		264
12.0	53	100	55	11.4	12	0.2		256		265
16.0	63	123	75	15.4	16	0.2		257		266
20.0	65	125	75	19.4	20	0.2		258		267



99115 268-276



ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoset	<150	Bakelite, melamine	250 - 400	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Uncoated type (99115 250-258) Vc - 20%, fz remains unchanged.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.9

>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.7

>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7

contour = x 1.0

profiling = x 1.3

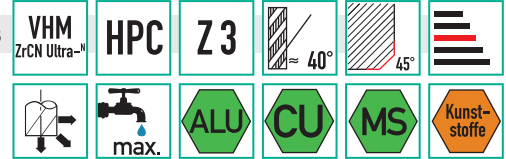
99115 277-288

Solid Carbide Roughing End Milling Cutters

ATORN®

Type

- With chamfered edge

DIN
6535
HA

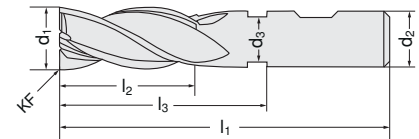
99115 277-282



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...	99115	...
6.0	13	57	18	5.6	6	0.4		277		283
8.0	21	63	25	7.6	8	0.4		278		284
10.0	22	72	30	9.6	10	0.4		279		285
12.0	26	83	36	11.4	12	0.4		280		286
16.0	36	92	42	15.4	16	0.4		281		287
20.0	41	104	52	19.4	20	0.4		282		288

DIN
6535
HB

99115 283-288



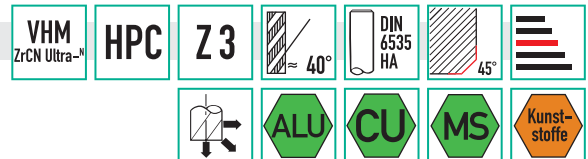
99115 289-294

Solid carbide end milling cutter with ICF

ATORN®

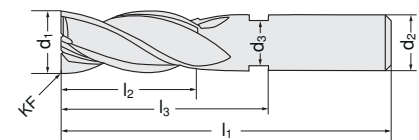
Type

- With chamfered edge



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...
6.0	13	57	18	5.6	6	0.4		289
8.0	21	63	25	7.6	8	0.4		290
10.0	22	72	30	9.6	10	0.4		291
12.0	26	83	36	11.4	12	0.4		292
16.0	36	92	42	15.4	16	0.4		293
20.0	41	104	52	19.4	20	0.4		294

99115 289-294



ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoset	<150	Bakelite, melamine	250 - 400	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.9

>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.7

>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7

contour = x 1.0

profiling = x 1.3

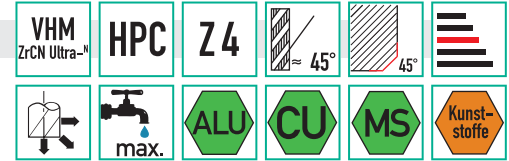
99115 295-312

Solid carbide end milling cutter

ATORN®

Type

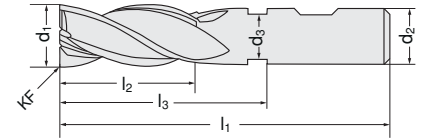
- With chamfered edge



99115 295-303



99115 304-312



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...	99115	...
3.0	6	57	10	2.8	6	0.1		295		304
4.0	8	57	14	3.8	6	0.1		296		305
5.0	10	57	16	4.7	6	0.1		297		306
6.0	12	57	19	5.6	6	0.2		298		307
8.0	16	63	25	7.6	8	0.2		299		308
10.0	20	72	30	9.6	10	0.2		300		309
12.0	24	83	36	11.4	12	0.2		301		310
16.0	32	92	42	15.4	16	0.2		302		311
20.0	40	104	52	19.4	20	0.2		303		312

	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Thermoset	<150	Bakelite, melamine	250 - 400	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.020 - 0.040	0.025 - 0.045	0.035 - 0.050	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22

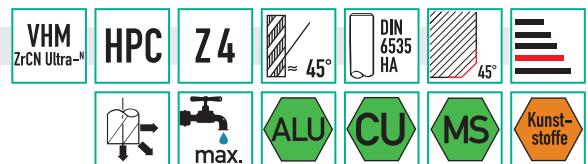
99115 313-319

Solid carbide end milling cutter

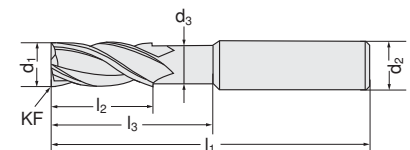
ATORN®

Type

- With chamfered edge



99115 313-319



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...
4.0	16	62	22	3.8	6	0.1		313
5.0	17	62	24	4.7	6	0.1		314
6.0	18	62	24	5.6	6	0.2		315
8.0	24	72	30	7.6	8	0.2		316
10.0	30	80	38	9.6	10	0.2		317
12.0	36	93	46	11.4	12	0.2		318
16.0	48	108	58	15.4	16	0.2		319

ISO	Material	Strength	DIN No.	Vc	fz min/max							
					4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20
	Thermoset	<150	Bakelite, melamine	250 - 400	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.022 - 0.042	0.032 - 0.047	0.037 - 0.052	0.045 - 0.065	0.055 - 0.085	0.065 - 0.095	0.090 - 0.115	0.12 - 0.20

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

Correction factor fz for:

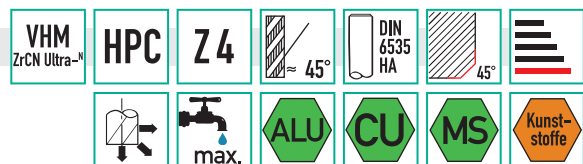
full slot = x 0.7
contour = x 1.0
profiling = x 1.3

99115 320-324 Solid carbide end milling cutter

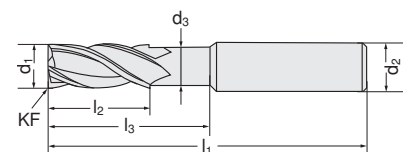
ATORN®

Type

- With chamfered edge



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...
6.0	12	80	42	5.6	6	0.2	320	
8.0	16	100	58	7.6	8	0.2	321	
10.0	20	100	62	9.6	10	0.2	322	
12.0	24	120	75	11.4	12	0.2	323	
16.0	32	150	100	15.4	16	0.2	324	



ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	300 - 450	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18
	Aluminium alloys, short-chipping	<500	G - AlSi12	125 - 200	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18
	Copper alloy (bronze), long-chipping	<1200	CuSn4	175 - 300	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	125 - 200	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	175 - 300	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	125 - 200	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18
	Thermoplastic	<100	PVC, acrylic glass	300 - 450	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18
	Thermoset	<150	Bakelite, melamine	225 - 350	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18
	Fibre-reinforced plastics	<1500	CFRP, GRP	175 - 300	0.015 - 0.035	0.020 - 0.040	0.030 - 0.045	0.035 - 0.050	0.040 - 0.060	0.050 - 0.080	0.060 - 0.090	0.085 - 0.110	0.10 - 0.18

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

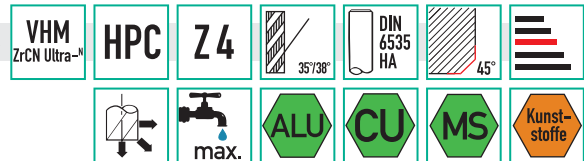
Correction factor fz for:

full slot = x 0.7
contour = x 1.0
profiling = x 1.3

99115 325-333 Solid carbide end milling cutter HPC

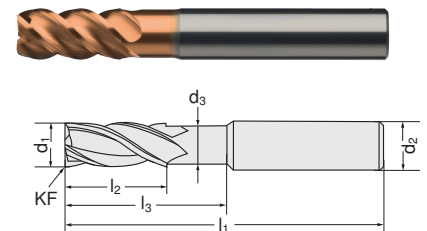
ATORN®

Type
- With chamfered edge



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...
3.0	6	57	10	2.8	6	0.1		325
4.0	8	57	14	3.8	6	0.1		326
5.0	10	57	16	4.7	6	0.1		327
6.0	12	57	19	5.6	6	0.2		328
8.0	16	63	25	7.6	8	0.2		329
10.0	20	72	30	9.6	10	0.2		330
12.0	24	83	36	11.4	12	0.2		331
16.0	32	92	42	15.4	16	0.2		332
20.0	40	104	52	19.4	20	0.2		333

99115 325-333



ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Thermoset	<150	Bakelite, melamine	250 - 400	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.02 - 0.035	0.025 - 0.04	0.03 - 0.05	0.040 - 0.055	0.05 - 0.07	0.06 - 0.09	0.07 - 0.10	0.10 - 0.12	0.14 - 0.22

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7
contour = x 1.0
profiling = x 1.3

Weight reduction, stability and machinability!

Good reasons to rely on aluminium in state-of-the-art design and production.

The following characteristics make aluminium indispensable in the machining industry:

- Weight reduction ...** Due to its low density, aluminium is the material of choice where weight is an important consideration, for example in the aerospace industry or in vehicle construction. The decisive advantage here is energy recovery through lightweight construction.
- Machinability ...** Compared to steel materials, aluminium is easily machinable. The cutting forces involved are approx. 30-35% lower than those of steel with the same strength.
- Stability ...** Changed forms and the use of alloys allow strengths on a level with those of steel to be reached with a significant weight reduction.
- Corrosion-resistant ...** Its resistance to corrosion makes aluminium a good choice of material in industry.

99115 334-341

Solid carbide end milling cutter HPC

ATORN®

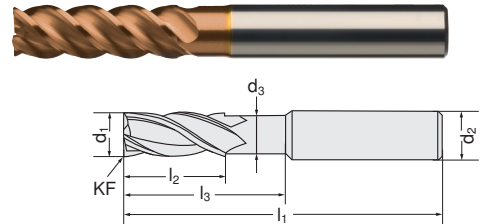
Type

- With chamfered edge



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	KF mm	99115	...
4.0	16	62	22	3.8	6	0.1		334
5.0	17	62	24	4.7	6	0.1		335
6.0	18	62	24	5.6	6	0.2		336
8.0	24	68	30	7.6	8	0.2		337
10.0	30	80	38	9.6	10	0.2		338
12.0	36	93	46	11.4	12	0.2		339
16.0	48	108	58	15.4	16	0.2		340
20.0	60	126	74	19.4	20	0.2		341

99115 334-341



ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180
	Thermoset	<150	Bakelite, melamine	250 - 400	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.015 - 0.030	0.020 - 0.035	0.025 - 0.045	0.035 - 0.050	0.045 - 0.065	0.050 - 0.080	0.060 - 0.090	0.090 - 0.110	0.110 - 0.180

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:

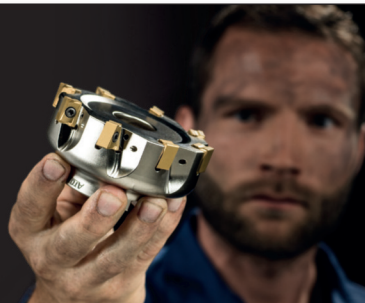
1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7
contour = x 1.0
profiling = x 1.3

When you are king ...

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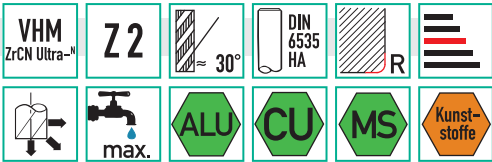
... your wishes come true.

ATORN®

Performance requires quality

99115 342-357 Solid Carbide Torus Milling Cutters

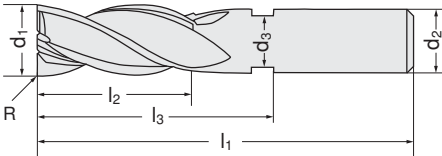
ATORN®
Type
Radius tolerance +/-0.015 mm



99115 342-357



d ₁ (e8) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...
3.0	4	50	14	2.9	3	0.3		342
4.0	5	50	16	3.8	4	0.3		343
5.0	6	54	18	4.8	5	0.3		344
6.0	7	57	21	5.7	6	0.3		345
6.0	7	57	21	5.7	6	1.0		346
6.0	7	57	21	5.7	6	2.0		347
8.0	9	63	27	7.7	8	0.3		348
8.0	9	63	27	7.7	8	1.0		349
8.0	9	63	27	7.7	8	2.0		350
10.0	11	72	32	9.6	10	0.3		351
10.0	11	72	32	9.6	10	1.5		352
10.0	11	72	32	9.6	10	3.0		353
12.0	12	83	38	11.6	12	1.5		354
12.0	12	83	38	11.6	12	4.0		355
16.0	16	92	44	15.5	16	2.0		356
16.0	16	92	44	15.5	16	4.0		357



ISO	Material	Strength	DIN No.	Vc	fz min/max							
					3	4	5	6	8	10	12	16
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	375 - 550	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Aluminium alloys, short-chipping	<500	G - AlSi12	175 - 275	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Copper alloy (bronze), long-chipping	<1200	CuSn4	225 - 375	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	175 - 275	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	225 - 375	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	175 - 275	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Thermoplastic	<100	PVC, acrylic glass	375 - 550	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Thermoset	<150	Bakelite, melamine	275 - 450	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Fibre-reinforced plastics	<1500	CFRP, GRP	225 - 375	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:	Correction factor fz for projecting length:	Correction factor fz for:
1 - 5 x D = x 1.0	1 - 5 x D = x 1.0	full slot = x 0.7
5 - 10 x D = x 0.9	5 - 10 x D = x 0.7	contour = x 1.0
>10 x D = x 0.8	>10 x D = x 0.5	profiling = x 1.3

When your voice counts ...

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... your suggestions are heard.

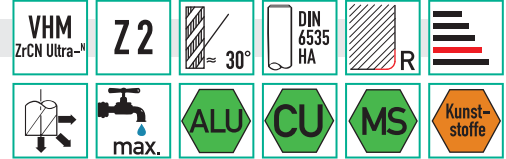
ATORN®

Performance requires quality

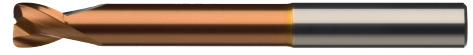
ATORN®

Type

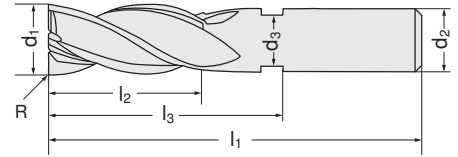
Radius tolerance ± 0.015 mm



99115 358-373



d ₁ (e8) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...
3.0	4	75	32	2.80	3	0.3		358
4.0	5	75	36	3.75	4	0.3		359
5.0	6	75	40	4.70	5	0.3		360
6.0	7	80	44	5.60	6	0.3		361
6.0	7	80	44	5.60	6	1.0		362
6.0	7	80	44	5.60	6	2.0		363
8.0	9	100	54	7.60	8	0.3		364
8.0	9	100	54	7.60	8	1.0		365
8.0	9	100	54	7.60	8	2.0		366
10.0	11	100	60	9.50	10	0.3		367
10.0	11	100	60	9.50	10	1.5		368
10.0	11	100	60	9.50	10	3.0		369
12.0	12	120	75	11.50	12	1.5		370
12.0	12	120	75	11.50	12	4.0		371
16.0	16	150	92	15.50	16	2.0		372
16.0	16	150	92	15.50	16	4.0		373



ISO	Material	Strength	DIN No.	Vc	fz min/max							
					3	4	5	6	8	10	12	16
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	375 - 550	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Aluminium alloys, short-chipping	<500	G - AlSi12	175 - 275	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Copper alloy (bronze), long-chipping	<1200	CuSn4	225 - 375	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	175 - 275	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	225 - 375	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	175 - 275	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Thermoplastic	<100	PVC, acrylic glass	375 - 550	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Thermoset	<150	Bakelite, melamine	275 - 450	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Fibre-reinforced plastics	<1500	CFRP, GRP	225 - 375	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

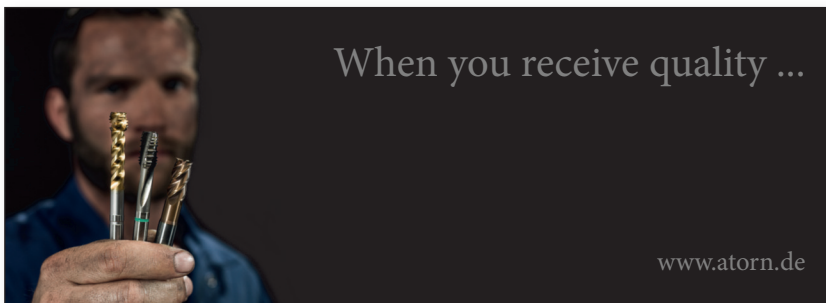
1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7
contour = x 1.0
profiling = x 1.3



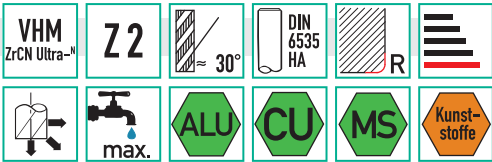
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... then it's ATORN.

ATORN®
Performance requires quality

99115 374-383 Solid Carbide Torus Milling Cutters

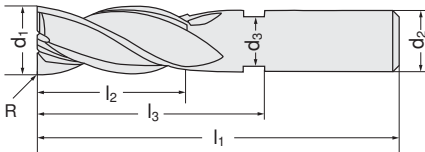
ATORN®
Type
Radius tolerance +/-0.015 mm



99115 374-383



d ₁ (e8) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...
6.0	7	120	80	5.6	6	0.3		374
6.0	7	120	80	5.6	6	1.0		375
8.0	9	130	90	7.6	8	0.3		376
8.0	9	130	90	7.6	8	1.0		377
8.0	9	130	90	7.6	8	2.0		378
10.0	11	150	110	9.5	10	0.3		379
10.0	11	150	110	9.5	10	3.0		380
12.0	12	160	115	11.5	12	1.5		381
12.0	12	160	115	11.5	12	4.0		382
16.0	16	200	140	15.5	16	2.0		383



ISO	Material	Strength	DIN No.	Vc	fz min/max							
					3	4	5	6	8	10	12	16
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Thermoset	<150	Bakelite, melamine	250 - 400	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7
contour = x 1.0
profiling = x 1.3



Important formulae

Speed:

$$n = \frac{V_c \cdot 1.000}{D \cdot \pi}$$

Cutting speed:

$$V_c = \frac{D \cdot \pi \cdot N}{1.000}$$

Feed rate:

$$V_f = f_z \cdot z \cdot n$$

Feed per flute:

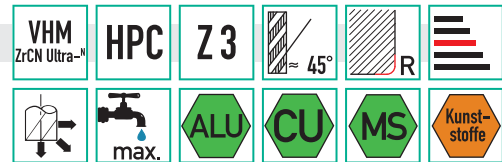
$$f_z = \frac{V_f}{z \cdot n}$$

D	Tool diameter (mm)
n	Speed (rpm)
z	Number of blades
Q	Machining volume
A	Chip cross-section (mm ²)
f	Feed (mm/rev.)
b	Width of cut (mm)
h _m	Average chip thickness (mm)
V _f	Feed rate (mm/min)
f _z	Feed per flute (mm)
a _e	Radial cutting depth
a _p	Axial cutting depth
D _{bmax}	Max. possible hole diameter
R	Corner radius



ATORN®

Type

Radius tolerance ± 0.015 mm

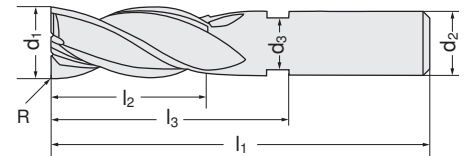
99115 384-396



99115 397-409



d ₁ (h9) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...	99115	...
5.0	13	57	18	4.7	6	0.5	384		397	
5.0	13	57	18	4.7	6	1.0	385		398	
6.0	13	57	18	5.6	6	0.5	386		399	
6.0	13	57	18	5.6	6	1.0	387		400	
8.0	21	63	25	7.6	8	0.5	388		401	
8.0	21	63	25	7.6	8	1.0	389		402	
10.0	22	72	30	9.6	10	0.5	390		403	
10.0	22	72	30	9.6	10	1.0	391		404	
12.0	26	83	36	11.4	12	0.5	392		405	
12.0	26	83	36	11.4	12	1.0	393		406	
16.0	36	92	42	15.4	16	2.0	394		407	
16.0	36	92	42	15.4	16	4.0	395		408	
20.0	41	104	52	19.4	20	4.0	396		409	



ISO	Material	Strength	DIN No.	Vc	fz min/max								
					3	4	5	6	8	10	12	16	20
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	375 - 550	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Aluminium alloys, short-chipping	<500	G - AlSi12	175 - 275	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), long-chipping	<1200	CuSn4	225 - 375	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	175 - 275	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	225 - 375	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	175 - 275	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoplastic	<100	PVC, acrylic glass	375 - 550	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Thermoset	<150	Bakelite, melamine	275 - 450	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150
	Fibre-reinforced plastics	<1500	CFRP, GRP	225 - 375	0.015 - 0.035	0.020 - 0.040	0.025 - 0.050	0.030 - 0.060	0.040 - 0.080	0.050 - 0.100	0.060 - 0.110	0.065 - 0.130	0.075 - 0.150

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.9

>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.7

>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7

contour = x 1.0

profiling = x 1.3

**Important formulae****Chip cross-section:**

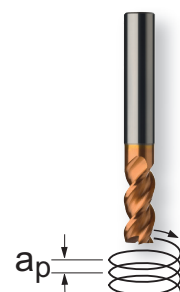
$$A = f \cdot a_p = b \cdot h_m$$

Machining volume:

$$Q = \frac{a_e \cdot a_p \cdot V_f}{1.000}$$

Recommendation for helical feed when machining various materials:Steel: $a_p < 0.10 \cdot D$ Aluminium: $a_p < 0.20 \cdot D$ Hardened steel: $a_p < 0.05 \cdot D$

$$D_{bmax} = 2 \cdot (D - R)$$

Use max. hole diameter (close to D_{bmax}) for good chip removal.

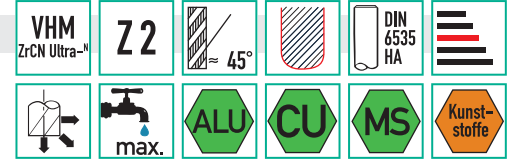
99115 410-417

Solid Carbide Radius Milling Cutters

ATORN®

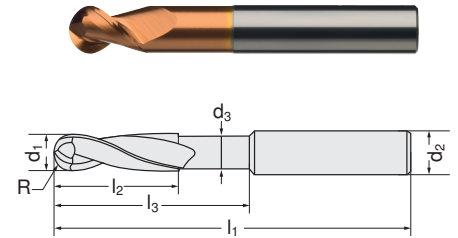
Type

Radius tolerance +/-0.015 mm



99115 410-417

d ₁ (e8) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...
3.0	6	50	16	2.9	3	1.5		410
4.0	7	54	17	3.8	4	2.0		411
5.0	8	54	18	4.8	5	2.5		412
6.0	10	54	21	5.7	6	3.0		413
8.0	12	60	27	7.7	8	4.0		414
10.0	13	67	32	9.6	10	5.0		415
12.0	16	73	38	11.6	12	6.0		416
16.0	20	83	44	15.5	16	8.0		417



ISO	Material	Strength	DIN No.	Vc	fz min/max							
					3	4	5	6	8	10	12	16
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	400 - 550	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Aluminium alloys, short-chipping	<500	G - AlSi12	180 - 320	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Copper alloy (bronze), long-chipping	<1200	CuSn4	250 - 420	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	180 - 320	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	250 - 420	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	180 - 320	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Thermoplastic	<100	PVC, acrylic glass	400 - 550	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Thermoset	<150	Bakelite, melamine	300 - 450	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140
	Fibre-reinforced plastics	<1500	CFRP, GRP	250 - 420	0.020 - 0.040	0.025 - 0.040	0.030 - 0.045	0.035 - 0.050	0.050 - 0.070	0.060 - 0.090	0.070 - 0.100	0.080 - 0.140

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.9

>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0

5 - 10 x D = x 0.7

>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7

contour = x 1.0

profiling = x 1.3

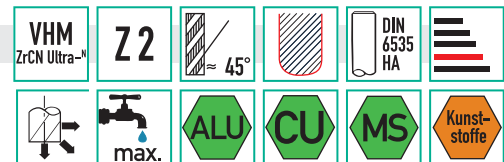
99115 418-425

Solid Carbide Radius Milling Cutters

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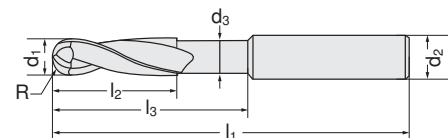
Type

Radius tolerance +/-0.015 mm



99115 418-425

d ₁ (e8) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...
3.0	10	75	32	2.9	3	1.5		418
4.0	13	75	36	3.8	4	2.0		419
5.0	15	75	40	4.8	5	2.5		420
6.0	16	100	44	5.7	6	3.0		421
8.0	22	100	54	7.7	8	4.0		422
10.0	25	100	60	9.6	10	5.0		423
12.0	26	100	60	11.6	12	6.0		424
16.0	30	150	92	15.5	16	8.0		425



ISO	Material	Strength	DIN No.	Vc	fz min/max							
					3	4	5	6	8	10	12	16
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	400 - 550	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Aluminium alloys, short-chipping	<500	G - AlSi12	180 - 320	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Copper alloy (bronze), long-chipping	<1200	CuSn4	250 - 420	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	180 - 320	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	250 - 420	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	180 - 320	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Thermoplastic	<100	PVC, acrylic glass	400 - 550	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Thermoset	<150	Bakelite, melamine	300 - 450	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130
	Fibre-reinforced plastics	<1500	CFRP, GRP	250 - 420	0.017 - 0.037	0.022 - 0.037	0.027 - 0.042	0.032 - 0.047	0.045 - 0.065	0.055 - 0.085	0.065 - 0.090	0.070 - 0.130

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:

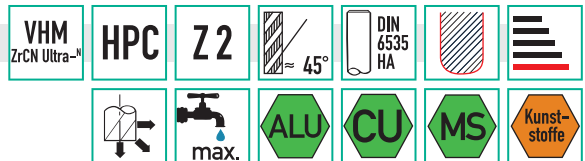
1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7
contour = x 1.0
profiling = x 1.3

99115 426-431

Solid Carbide Radius Milling Cutters



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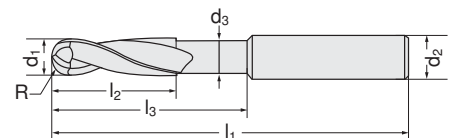
Type

Radius tolerance +/-0.015 mm

99115 426-431



d ₁ (e8) mm	l ₂ mm	l ₁ mm	l ₃ mm	d ₃ mm	d ₂ (h5) mm	R mm	99115	...
3.0	10	125	82	2.80	3	1.5		426
4.0	13	125	86	3.75	4	2.0		427
6.0	16	150	94	5.60	6	3.0		428
8.0	22	150	104	7.60	8	4.0		429
10.0	25	150	110	9.60	10	5.0		430
12.0	26	150	110	11.40	12	6.0		431



ISO	Material	Strength	DIN No.	Vc	fz min/max							
					3	4	5	6	8	10	12	16
N	Aluminium alloy, long-chipping / wrought alloy / pure metals	<500	Al99.9	350 - 500	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Aluminium alloys, short-chipping	<500	G - AlSi12	150 - 250	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Copper alloy (bronze), long-chipping	<1200	CuSn4	200 - 350	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Copper alloy (bronze), short-chipping	<850	CuNi12Zn24	150 - 250	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Copper alloy (brass), long-chipping	<600	Cu Zn 20	200 - 350	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Copper alloy (brass), short-chipping	<600	Cu Zn 39 Pb 3	150 - 250	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Thermoplastic	<100	PVC, acrylic glass	350 - 500	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Thermoset	<150	Bakelite, melamine	250 - 400	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120
	Fibre-reinforced plastics	<1500	CFRP, GRP	200 - 350	0.015 - 0.035	0.020 - 0.035	0.025 - 0.040	0.030 - 0.045	0.040 - 0.060	0.050 - 0.080	0.060 - 0.085	0.065 - 0.120

The listed reference values must be adjusted to the workpiece tensioning and machine conditions.

Correction factor Vc for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.9
>10 x D = x 0.8

Correction factor fz for projecting length:

1 - 5 x D = x 1.0
5 - 10 x D = x 0.7
>10 x D = x 0.5

Correction factor fz for:

full slot = x 0.7
contour = x 1.0
profiling = x 1.3

99115 432-437
Solid carbide 3D aluminium end milling cutter

VHM
CALIDAZ

HPC

Z3

7°

DIN 6535 HA

ATORN®

Type
Centre cut, with discharge, defined rounding of edges. With straight shank in accordance with DIN 6535 HA.

Advantages: Thanks to the optimized cutting geometry (flat helix of 7°, reinforced web, defined corner radius, chip breakers to generate chips that break off as well as defined rounding of edges), this tool enables the highest cutting values in the range of Vc=1.000-1.600 m/min.

Application
Specially for machining non-ferrous metals
Ideal for shrinking.

Quality
Multi-layer PVD coating CALIDA Z (titanium-free).

Note:
Ensure robust machine conditions, a firm workpiece tensioning as well as sufficient coolant supply.

99115 432-437

d ₁ e8 mm	l ₂ mm	l ₃ mm	l ₁ mm	r mm	d ₂ h5 mm	d ₃ mm	99115	...
6.0	8	21	57	0.6	6	5.7		432
8.0	10	27	63	0.8	8	7.7		433
10.0	12	32	72	1.0	10	9.7		434
12.0	16	38	83	1.2	12	11.7		435
16.0	20	44	92	1.6	16	15.7		436
20.0	25	54	104	2.0	20	19.0		437

					Slot milling					Circumference milling		Circumference milling	
					ap 1 x D					ae 0.1 x D		ae 0.25 x D	
ISO	Material	Example materials	Tensile strength N/mm²	Vc m/min	Ø 6 mm	Ø 8 mm	Ø 10 mm	Ø 12 mm	Ø 16 mm	Ø 6 mm	Ø 16 mm	Ø 6 mm	Ø 16 mm
N	Aluminium and aluminium alloy	3.02255 Al99.5, 3.2315 AlMgSi1	< 400	730	0.058	0.073	0.088	0.103	0.118	fz* = 3.0 x fz	fz* = 3.0 x fz	fz* = 2.0 x fz	fz* = 2.0 x fz
	Aluminium wrought alloys	3.0615 AlMgSiPb, 3.1325 AlCuMg1	< 450	890	0.058	0.073	0.088	0.094	0.118				
	Aluminium cast alloys < 10% Si	3.2131 G-AlSi5Cu1, 3.2573 G-AlSi9	< 600	330	0.053	0.067	0.080	0.091	0.107				
	Aluminium cast alloys > 10% Si	3.3581 G-AlSi12, 3.2583 G-AlSi12Cu	< 600	240	0.052	0.065	0.078	0.103	0.104				
	Magnesium alloy	MgMn2, G-MhAl18Zn1, G-MgAl16Zn3	< 450	240	0.058	0.073	0.088	0.103	0.118				
	Copper low-alloy	2.0070 SE-Cu, 2.1020 CuSn5ZnPb	< 400	230	0.058	0.073	0.088	0.094	0.118				
	Brass, short-chipping	2.0380 CuZn39Pb2	< 600	315	0.053	0.067	0.080	0.094	0.107				
	Brass, long-chipping	2.0250 CuZn20	< 600	240	0.053	0.067	0.080	0.094	0.107				
	Bronze, short-chipping	2.1090 CuSn7ZnPb	< 600	315	0.053	0.067	0.080	0.082	0.107				
	Bronze, long-chipping	2.0790 CuNi18Zn19Pb	< 600	240	0.047	0.059	0.070	0.081	0.093				

When you are king ...

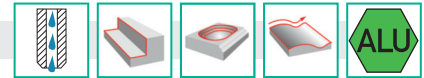
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... your wishes come true.

Performance requires quality

99115 438-439

Screw-in milling cutter, type THR



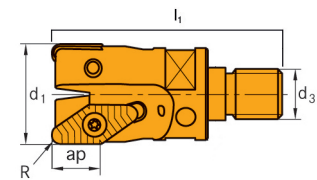
99115 438-439

ATORN®

Application
for non-ferrous metals and plastics.

Note:

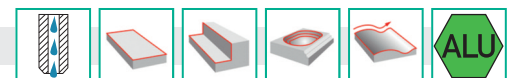
Reversible cutting inserts, see Item No. 99115 441-444.



Ø d ₁ mm	Z	R mm	l ₁ mm	ap mm	d ₃ mm	Reversible cutting inserts	99115	...
25	2	1.2	40	14	M 12	VPGT 160412-ALM	438	
32	2	3.0	50	15	M 16	VCVT 220530-ALM	439	

99115 440

Screw-in milling cutters



99115 440

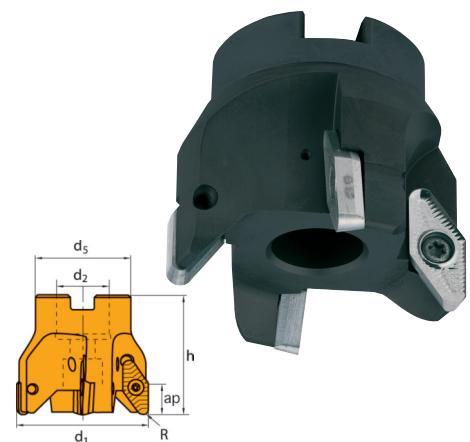
ATORN®

Type
for non-ferrous metals and plastics.

Note:

Reversible cutting inserts, see Item No. 99115 442 and 444.

Ø d ₁ mm	Z	R mm	h mm	ap mm	Ø d ₅ mm	d ₂ mm	Reversible cutting inserts	99115	...
42	3	3.0	55	15	32	16	VCVT 220530-ALM	440	



99115 441-444

Reversible cutting inserts for milling VPGT / VCGT



99115 441-444

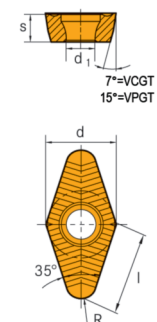
ATORN®

Application
Carbide quality
Coating

N
K10
uncoated

N
K10
coated

Type	l mm	s mm	d mm	d ₁ mm	R mm		99115	...	99115	...
VPGT 160412-ALM	16.6	4.76	9.52	4.4	1.2	10 ea.	441		443	
VCVT 220530-ALM	22.1	5.56	12.70	5.5	3.0	10 ea.	442		444	



99115 445-460

Reversible cutting inserts CCGT



ATORN®

Type

- Positive 7°
- 80° point angle
- Cutting depth approx. 0.2 - 4.0 mm for aluminium and non-ferrous metals

99115 445-452

Type

- Polished chip deflection step for the reduction of built-up edges when machining aluminium

Application

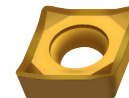
For turning aluminium and other non-ferrous metals.

99115 453-460

Application

For turning aluminium and other non-ferrous metals.
For finishing corrosion-resistant materials.

99115 453-460



Application
Carbide quality
Coating

N

HW 6310
uncoated

NM

HC 6310
coated

ISO designation	Cutting depth approx. mm	Thickness mm	r mm		99115	...	99115	...
CCGT 060202-MN	0.2 - 1.5	2.38	0.2	10 ea.		445		453
CCGT 060204-MN	0.3 - 1.8	2.38	0.4	10 ea.		446		454
CCGT 09T302-MN	0.2 - 2.0	3.97	0.2	10 ea.		447		455
CCGT 09T304-MN	0.3 - 2.5	3.97	0.4	10 ea.		448		456
CCGT 09T308-MN	0.5 - 3.0	3.97	0.8	10 ea.		449		457
CCGT 120402-MN	0.2 - 3.5	4.76	0.2	10 ea.		450		458
CCGT 120404-MN	0.2 - 4.0	4.76	0.4	10 ea.		451		459
CCGT 120408-MN	0.5 - 5.0	4.76	0.8	10 ea.		452		460

99115 461-470

Reversible cutting inserts DCGT



ATORN®

Type

- Positive 7°
- 55° point angle
- Cutting depth approx. 0.2 - 4.0 mm for aluminium and non-ferrous metals

99115 461-465

Type

- Polished chip deflection step for the reduction of built-up edges when machining aluminium

Application

For turning aluminium and other non-ferrous metals.

99115 466-470

Application

For turning aluminium and other non-ferrous metals.
For finishing corrosion-resistant materials.

99115 466-470



Application
Carbide quality
Coating

N

HW 6310
uncoated

NM

HC 6310
coated

ISO designation	Cutting depth approx. mm	Thickness mm	r mm		99115	...	99115	...
DCGT 070202-MN	0.2 - 1.5	2.38	0.2	10 ea.		461		466
DCGT 070204-MN	0.3 - 1.8	2.38	0.4	10 ea.		462		467
DCGT 11T302-MN	0.2 - 2.0	3.97	0.2	10 ea.		463		468
DCGT 11T304-MN	0.3 - 2.5	3.97	0.4	10 ea.		464		469
DCGT 11T308-MN	0.5 - 3.0	3.97	0.8	10 ea.		465		470

99115 471-478

Reversible cutting inserts VCGT



ATORN®

Type

- Positive 7°
- 35° point angle
- Cutting depth approx. 0.2 - 6.0 mm for aluminium and non-ferrous metals

99115 471-474

Type

- Polished chip deflection step for the reduction of built-up edges when machining aluminium.

Application

For turning aluminium and other non-ferrous metals.

99115 475-478

Application

For turning aluminium and other non-ferrous metals.
For finishing corrosion-resistant materials.

99115 475-478



Application
Carbide quality
Coating

N

HW 6310
uncoated

NM

HC 6310
coated

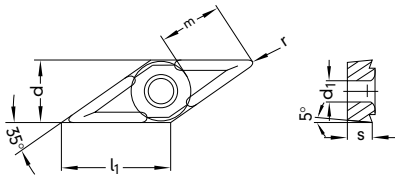
ISO designation	Cutting depth approx. mm	Thickness mm	r mm		99115	...	99115	...
VCGT 110302-MN	0.2 - 1.5	3.18	0.2	10 ea.		471		475
VCGT 110304-MN	0.3 - 1.8	3.18	0.4	10 ea.		472		476
VCGT 160404-MN	0.3 - 2.5	4.76	0.4	10 ea.		473		477
VCGT 160408-MN	0.5 - 3.0	4.76	0.8	10 ea.		474		478

99115 479 Reversible cutting inserts VBGT



Type

- Positive 5°
- 35° point angle
- With sintered-in chip deflection step
- Specially for aluminium alloys
- Extremely formed chip deflection step
- Optimum sharp-edged blade
- Precision-ground type
- Excellent surface



99115 479



Application
Carbide quality
Coating

N
H 25
uncoated

ISO designation	l ₁ mm	s mm	r mm	d mm	d ₁ mm			
VBGT 160404-2	16.6	4.76	0.4	9.52	4.4	10 ea.		479

99115 480-483 Reversible cutting inserts (negative)



Type

- Excellent chip control, surfaces, ductility and wear properties.
- Double number of cutting edges per WP.

Application

Up to approx. 5 mm cutting depth.
In standard clip holders.

99115 480-481

- Negative
- 80° point angle

99115 482

- Negative
- 55° point angle

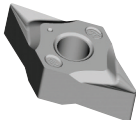
99115 483

- Triangular
- Negative

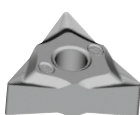
99115 480-481



99115 482



99115 483



Application
Carbide quality
Coating

N
LT 05
coated

N
LT 05
coated

N
LT 05
coated

ISO designation	99115	...	99115	...	99115	...
CNGG 120404-ALU		480				
CNGG 120408-ALU		481				
DNGG 110404-ALU			482			
TNGG 160404-ALU					483	

99115 484 Solid carbide / carbide milling bit sets (shank Ø 6 mm)



Type

Dimensions = head Ø x head length mm.

99115 484

Set contents 99115 484

Fluting 3 (aluminium)

- 1 milling bit, cylindrical 12 x 25 mm,
- 1 milling bit, cylinder shape with radius end 12 x 25 mm,
- 1 milling bit, ball nosed tree 12 x 25 mm,
- 1 milling bit, ball nose cone 12 x 28 mm.

Content	Fluting	Type	99115	...
4-part (aluminium) 3		in case		484



Explanation of HHW pictograms

	Helix angle		Flutes		Thread depth		Very suitable for aluminium
	Point angle		With internal coolant feed		With chamfered edge		Very suitable for copper
	Solid-carbide coated		Maximum cooling		Sharp-edged		Very suitable for brass
	Titanium-free ZrN coating		Construction length		Radius		Very suitable for plastics
	Multi-layer PVD coating (titanium-free)		Smooth shank		Torus		Strength of steel materials
	High Performance Cutting		Shank with clamping surface		Company standard		
	High Speed Cutting		Chamfer, thread drill				

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HOMMEL HERCULES WERKZEUGHANDEL GmbH & CO. KG

Zentrale Viernheim · Heidelberger Str. 52 · 68519 Viernheim
Tel. +49 (0) 6204 739-0 · Fax +49 (0) 6204 739-1222 · E-mail: hhwviernheim@hhw.de

Chemnitz · Röhrsdorfer Allee 14 · 09247 Chemnitz
Tel. +49 (0) 3722 5993-250 · Fax +49 (0) 3722 5993-2548 · E-mail: hhwchemnitz@hhw.de

Hannover · Frankenring 18 · 30855 Langenhagen
Tel. +49 (0) 511 740291-230 · Fax +49 (0) 511 740291-2310 · E-mail: hwhhannover@hhw.de

Cologne · Mathias-Brüggem-Str. 162 · 50829 Cologne (Ossendorf)
Tel. +49 (0) 221 59769-220 · Fax +49 (0) 221 59769-2210 · E-mail: hhwkoeln@hhw.de

Saarbrücken · Innovationspark am Beckerturm · Kaiserstr. 170-174 · 66386 St. Ingbert
Tel. +49 (0) 6894 95900-0 · Fax +49 (0) 6894 95900-2050 · E-mail: hhw Saarbruecken@hhw.de

Austria · Hommel & Seitz Gesellschaft m.b.H. · Eduard-Kittenberger-Gasse 56. Obj. 8 · 1230 Vienna
Tel. +43 1 865482-80 · Fax +43 1 865482-2 · E-mail: email@hommel-seitz.at

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