

HAHN+KOLB
GROUP



LET'S WORK TOGETHER.



ORION[®]

HPC MILLING TOOLS

Discover the latest generation of our reliable and high-performance ***ORION***[®] HPC milling tools.



ONLINE CUTTING VALUES

We maintain a comprehensive package of cutting data for all machining tools.

All essential tool information is available in the highest data quality. Conveniently retrieve the data relevant to you in our online shop.

Your advantages:

- ⊕ Tested and reliable cutting data from practical experience
- ⊕ All processing parameters can be retrieved simply at any time in the online shop
- ⊕ Greater planning and process reliability

Wechselköpfe für Wechselkopfsystem		Hahn+Kolb		Hahn+Kolb		Hahn+Kolb		Hahn+Kolb	
Werkzeug	Material	Spindel	Spindel	Spindel	Spindel	Spindel	Spindel	Spindel	Spindel
1.1 Außenbohrer	4500	1.1.1	1.1.1.1	1.1.1.1.1	1.1.1.1.1.1	1.1.1.1.1.1.1	1.1.1.1.1.1.1.1	1.1.1.1.1.1.1.1.1	1.1.1.1.1.1.1.1.1.1
1.2 Innenbohrer	4500	1.2.1	1.2.1.1	1.2.1.1.1	1.2.1.1.1.1	1.2.1.1.1.1.1	1.2.1.1.1.1.1.1	1.2.1.1.1.1.1.1.1	1.2.1.1.1.1.1.1.1.1
1.3 Fräsen	4500	1.3.1	1.3.1.1	1.3.1.1.1	1.3.1.1.1.1	1.3.1.1.1.1.1	1.3.1.1.1.1.1.1	1.3.1.1.1.1.1.1.1	1.3.1.1.1.1.1.1.1.1
1.4 Schleifen	4500	1.4.1	1.4.1.1	1.4.1.1.1	1.4.1.1.1.1	1.4.1.1.1.1.1	1.4.1.1.1.1.1.1	1.4.1.1.1.1.1.1.1	1.4.1.1.1.1.1.1.1.1
1.5 Drehbohrer	4500	1.5.1	1.5.1.1	1.5.1.1.1	1.5.1.1.1.1	1.5.1.1.1.1.1	1.5.1.1.1.1.1.1	1.5.1.1.1.1.1.1.1	1.5.1.1.1.1.1.1.1.1
1.6 Drehbohrer	4500	1.6.1	1.6.1.1	1.6.1.1.1	1.6.1.1.1.1	1.6.1.1.1.1.1	1.6.1.1.1.1.1.1	1.6.1.1.1.1.1.1.1	1.6.1.1.1.1.1.1.1.1
1.7 Drehbohrer	4500	1.7.1	1.7.1.1	1.7.1.1.1	1.7.1.1.1.1	1.7.1.1.1.1.1	1.7.1.1.1.1.1.1	1.7.1.1.1.1.1.1.1	1.7.1.1.1.1.1.1.1.1
1.8 Drehbohrer	4500	1.8.1	1.8.1.1	1.8.1.1.1	1.8.1.1.1.1	1.8.1.1.1.1.1	1.8.1.1.1.1.1.1	1.8.1.1.1.1.1.1.1	1.8.1.1.1.1.1.1.1.1
1.9 Drehbohrer	4500	1.9.1	1.9.1.1	1.9.1.1.1	1.9.1.1.1.1	1.9.1.1.1.1.1	1.9.1.1.1.1.1.1	1.9.1.1.1.1.1.1.1	1.9.1.1.1.1.1.1.1.1
1.10 Drehbohrer	4500	1.10.1	1.10.1.1	1.10.1.1.1	1.10.1.1.1.1	1.10.1.1.1.1.1	1.10.1.1.1.1.1.1	1.10.1.1.1.1.1.1.1	1.10.1.1.1.1.1.1.1.1

THE HAHN+KOLB ONLINE SHOP

In order to offer HAHN+KOLB customers the best possible shopping experience, the HK online shop provides a whole series of special features. The convenient product search will lead to the desired item around the clock - whether by name or manufacturer number. Extensive filter functions for important product characteristics such as length, width or diameter are at your disposal.

Your advantages:

- ⊕ Round-the-clock access
- ⊕ Individual prices and company conditions
- ⊕ Order overview
- ⊕ Intelligent user management
- ⊕ Comprehensive product information
- ⊕ Easy re-ordering
- ⊕ Universal search
- ⊕ Live availability
- ⊕ CAD and cutting data

www.hahn-kolb.com



SC HPC MILLING TOOLS

Type	Dia. range	Number of teeth	Overall length	Shank shape	Number		Image	Page
HPC end mills T=4	3-20 mm	4	Standard	HA	16851 830-850			7
HPC end mills T=4	3-20 mm	4	Standard	HB	16851 800-820			7
HPC end mills T=4	3-20 mm	4	long	HB	16851 150-160			7
HPC end mills T=4	3-20 mm	4	extra-long	HB	16851 161-179			7
TVC end mills 3xD T=4	3-20 mm	4	long	HB	16851 860-880	TVC		9
HPC end mills T=4 IC	6-20 mm	4	Standard	HB	16851 380-390			11
HPC end mills T=4 VA	3-20 mm	4	short	HB	16851 553-570			13
HPC end mills T=4 VA	3-20 mm	4	Standard	HB	16851 503-520			13
HPC end mills T=5	6-20 mm	5	Standard	HB	16851 900-910			15
TVC end mills 3xD T=5	6-20 mm	5	long	HB	16851 920-930	TVC		15
Finishing cutters T=6	6-25 mm	6	Standard	HA	16851 580-612			17
Finishing cutters T=6	6-25 mm	6	long	HA	16851 580-612			17
HPC roughing end mills T=4 NR	3-20 mm	4	Standard	HB	16851 330-349			19
HPC roughing end mills T=4 NF	3-20 mm	4	Standard	HB	16851 260-279			19
HPC torus milling cutters T=4	3-20 mm	4	Standard	HB	16851 620-656			21
HPC torus milling cutters T=4	3-20 mm	4	Standard	HB	16851 660-703			22
HPC end mills T=4 in a set	6-16 mm	4	Standard	HB	16851 180-181			24
HPC end mills T=5 in a set	6-16 mm	5	Standard	HB	16851 190-191			24

FURTHER DIMENSIONS, DETAILS AND CUTTING VALUES CAN BE FOUND IN OUR SHOP.



SUITABLE FOR VIRTUALLY ANY APPLICATION



Groove milling



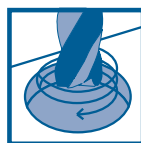
Circumferential milling



Shoulder milling



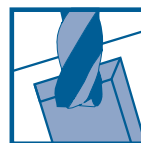
Ramp milling



Circular milling



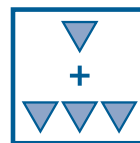
Contour milling



Pocket milling



Drilling



Rough machining and finishing

All the tools can be found in the main catalogue and are available online at www.hahn-kolb.de

ORION® HPC MILLING TOOLS

OUR LATEST GENERATION FOR RELIABLE APPLICATION IN A VARIETY OF MATERIALS

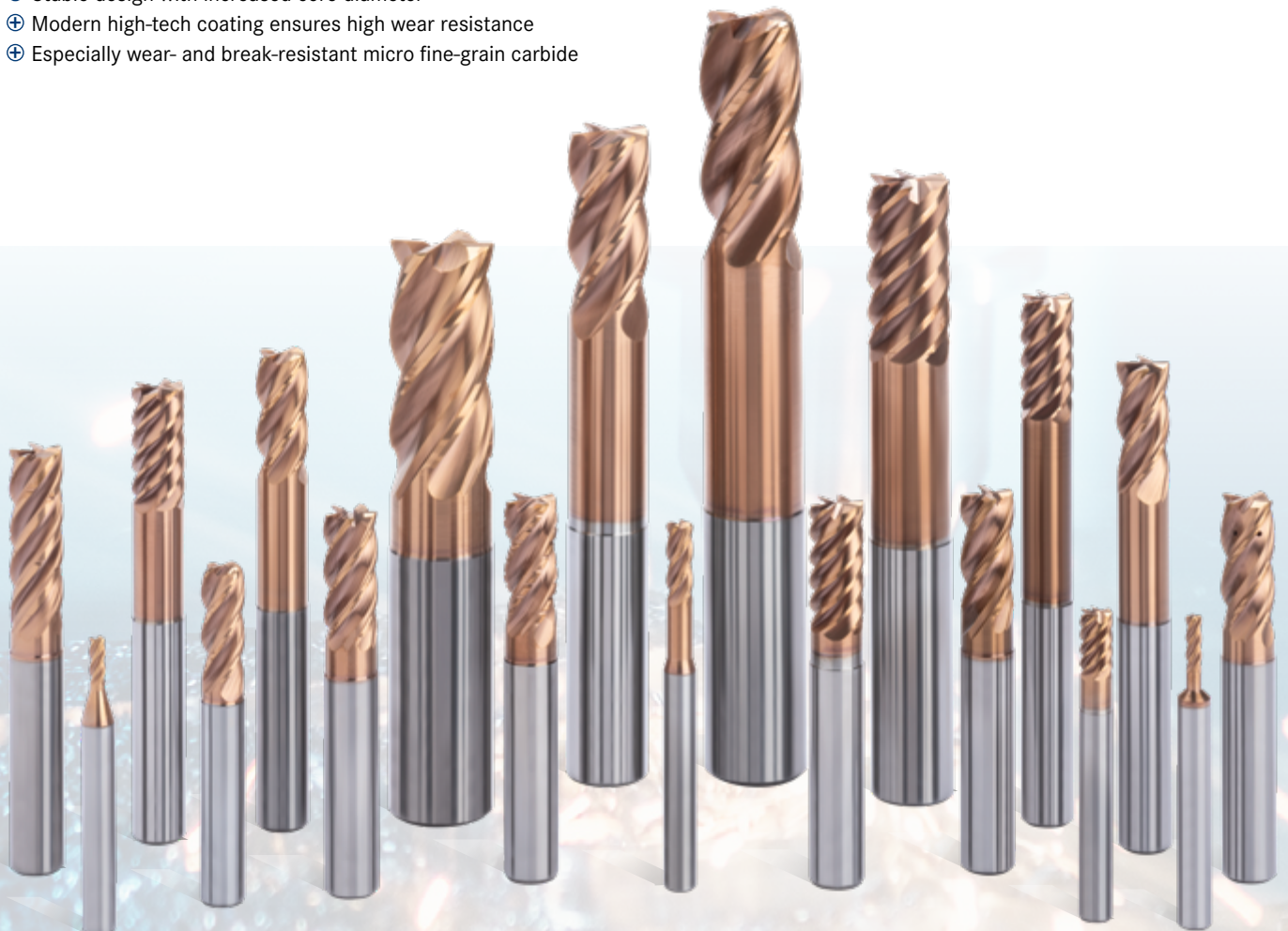
The tool family for virtually any application - significantly increase your efficiency and reduce your tool diversity at the same time. Whether steel, high-grade steel or cast iron - the newly developed geometry and coating of the ORION HPC milling range is designed for a wide variety of applications and covers a wide variety of materials. Due to the high-quality cutting material and optimal HPC geometry, the milling tools offer extraordinarily high performance. The uneven pitch ensures maximum smoothness and process reliability, while the excellent surface quality of the machined workpieces provides a further advantage.

What's more, HAHN+KOLB has optimised the high-tech multi-layer coatings and layer thicknesses of the bestseller range. In application, this means improved layer adhesion and therefore higher temperature resistance.

You can also benefit from the extensive scope of this range, which boasts an impressive 260 types in various shank versions.

THE ADVANTAGES AT A GLANCE

- ⊕ Universal application, one tool for every purpose
- ⊕ Outstanding increase in service life compared to previous tools
- ⊕ Optimal surface quality and high precision
- ⊕ Optimised cutting edge geometry for universal application
- ⊕ Stable design with increased core diameter
- ⊕ Modern high-tech coating ensures high wear resistance
- ⊕ Especially wear- and break-resistant micro fine-grain carbide

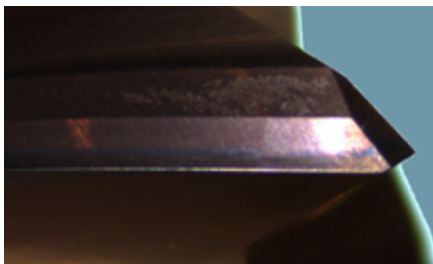
**ORION®**

ORION® OUR PERFORMANCE TESTS

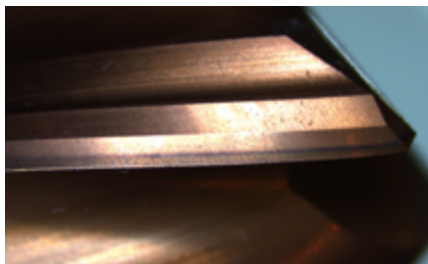
Our aspiration when reworking HPC milling tools is to make a good tool even better. When carrying out machining tests and performance tests, we first needed to clarify how the newly developed geometries and coatings behave in use. The focus was on questions about the application area, service life and cutting values.

Tests were carried out in a wide variety of materials, both in classical test applications and in numerous field tests at customer sites.

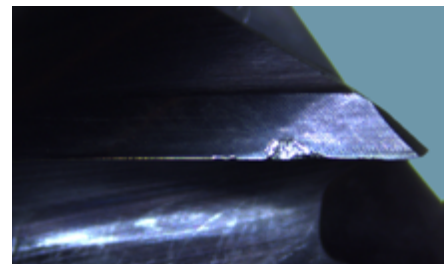
The result: An average cutting value increase of 20 to 40 %, while simultaneously extending the service life by 30 to 40 %.



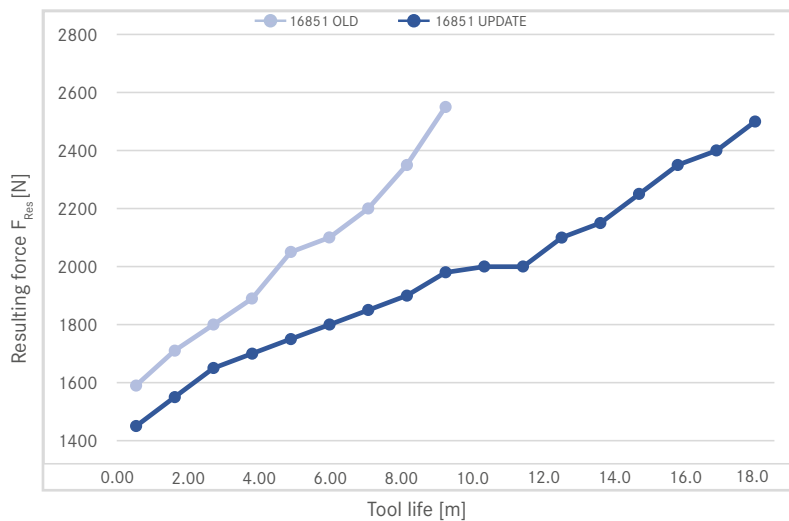
ORION 16851 OLD
1,2379/8 metres



ORION 16851 UPDATE
1,2379/8 metres



Competitor 1
1,2379/8 metres

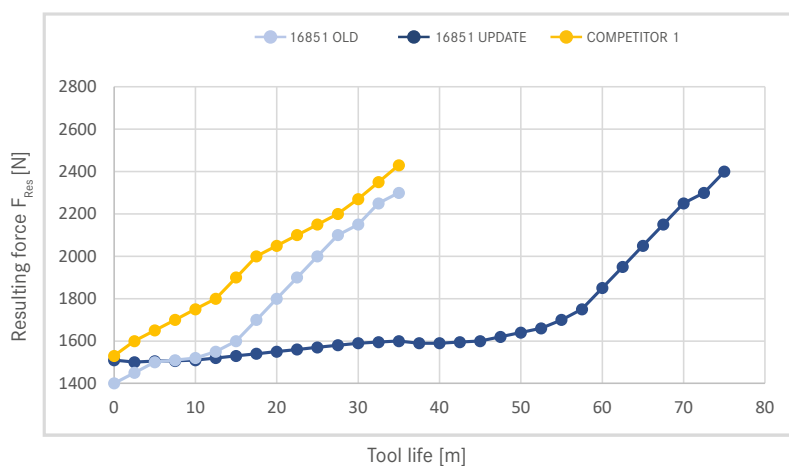


TEST CONDITIONS

Material: X155CrMo5-1
Material number: 1,2379
Tool: HPC end mill
16851810

CUTTING DATA:

Vc (m/min) 160
fz (mm) 0.06
ap (mm) 10
ae (mm) 8
D (mm) 10
n (rpm) 5,093
Vf (mm/min) 1,222
Coolant Emulsion 9 %



TEST CONDITIONS

Material: 42CrMoS4ex
Material number: 1,7225
Tool: HPC end mill
16851810

CUTTING DATA:

Vc (m/min) 180
fz (mm) 0.06
ap (mm) 10
ae (mm) 8
D (mm) 10
n (rpm) 5,730
Vf (mm/min) 1,375
Coolant Emulsion 10 %

ORION®

SOLID CARBIDE HPC END MILLS T=4

**HIGH-PERFORMANCE HPC MILLING
IN GENERAL MECHANICAL ENGI-
NEERING, TOOL MANUFACTURING
AND MOULD-MAKING APPLICATIONS**



Application:

High-performance HPC end mill for universal roughing and finishing in general mechanical engineering, tool manufacturing and mould making applications using a wide variety of materials. Optimal application in trochoidal milling and in edge, corner and groove machining.

FURTHER DIMENSIONS, DETAILS AND
CUTTING VALUES CAN BE FOUND IN
OUR SHOP.



Large gashing version for
improved chip removal
during ramping etc.

REDUCED VIBRATIONS

Fewer vibrations and optimal smoothness as the cutting edges have unequal helix angles and therefore unequal pitch. This facilitates higher cutting speeds and cutting depths

REDUCED WEAR

All tools are manufactured with an edge protection chamfer to prevent wear

OPTIMISED GEOMETRY

Minimises breakouts with robust cutting geometry and microfinishing

OPTIMUM CHIP REMOVAL

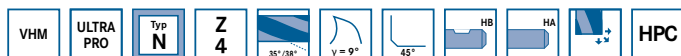
Large chip space and special, CAD-optimised groove profiles

ULTRA PRO COATING

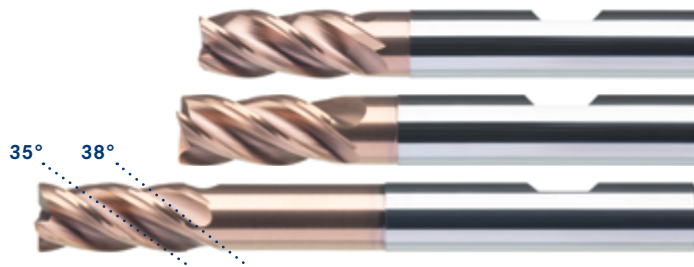
High-performance, TiAlN-based PVD coating extends the service life and is optimised for higher cutting speeds

ORION®**SC HPC END MILL T=4**

4 cutting edges, ULTRA PRO-coated

**Version:**

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HA and HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Optimised 45° edge protection chamfer
- Rake angle: 9°

**Standard version**

									Type	N	N
									Surface	ULTRA PRO	ULTRA PRO
									Tool holder	HB straight shank	HA straight shank
									Cutting diameter tolerance	e8	e8
									Shank diameter tolerance	h6	h6
							Teeth (no.)	fz steel 1,000  (mm)	16851... Ref. no.	16851... Ref. no.	
mm	mm	mm	mm	mm	mm	F _{mm}					
3	8	13	57	2.8	6	0.05	4	0.03	800	830	
4	11	17	57	3.8	6	0.1	4	0.035	802	832	
5	13	19	57	4.7	6	0.1	4	0.04	804	834	
6	13	19	57	5.8	6	0.1	4	0.05	806	836	
8	21	25	63	7.7	8	0.2	4	0.06	808	838	
10	22	30	72	9.7	10	0.2	4	0.07	810	840	
12	26	36	83	11.6	12	0.2	4	0.08	812	842	
14	26	36	83	13.6	14	0.2	4	0.1	814	844	
16	36	42	92	15.5	16	0.2	4	0.12	816	846	
18	36	42	92	17.5	18	0.2	4	0.13	818	848	
20	41	52	104	19.5	20	0.2	4	0.14	820	850	

Long version

3	6	9	55	2.8	6	0.1	4	0.11	150
4	8	12	55	3.8	6	0.1	4	0.11	151
5	10	15	58	4.8	6	0.1	4	0.11	152
6	13	18	58	5.8	6	0.1	4	0.11	153
8	17	24	64	7.7	8	0.2	4	0.11	154
10	21	30	74	9.7	10	0.2	4	0.11	155
12	25	36	85	11.6	12	0.3	4	0.11	156
14	29	42	91	13.6	14	0.3	4	0.11	157
16	33	48	100	15.5	16	0.3	4	0.11	158
18	38	54	106	17.5	18	0.3	4	0.11	159
20	42	60	114	19.5	20	0.3	4	0.11	160

Extra-long version

3	6	15	58	2.8	6	0.1	4	0.11	161
4	8	20	62	3.8	6	0.1	4	0.11	170
5	10	25	70	4.8	6	0.1	4	0.11	171
6	13	30	70	5.8	6	0.1	4	0.11	172
8	17	40	80	7.7	8	0.2	4	0.11	173
10	21	50	94	9.7	10	0.2	4	0.11	174
12	25	60	109	11.6	12	0.3	4	0.11	175
14	29	70	119	13.6	14	0.3	4	0.11	176
16	33	80	132	15.5	16	0.3	4	0.11	177
18	38	90	142	17.5	18	0.3	4	0.11	178
20	42	100	154	19.5	20	0.3	4	0.11	179

ORION®



SOLID CARBIDE TVC END MILL 3XD T=4

TROCHOIDAL MILLING IN MATERIALS UP TO 1,400 N/MM²



Application:

The TVC end mills are ideally suited for machining using modern milling strategies, and for universal roughing and finishing in general mechanical engineering, tool manufacturing and mould making using a wide range of materials.

3xD cutting edge lengths, reinforced cores and specially developed chip breaker geometries allow high application depths with maximum process reliability.

FURTHER DIMENSIONS, DETAILS AND CUTTING VALUES CAN BE FOUND IN OUR SHOP.



Large gashing version for improved chip removal during helical milling etc.

3xD APPLICATION DEPTH

The large cutting edge lengths ensure high application depths and maximum material removal rate

CHIPBREAKER GEOMETRY

Produces short chips, thereby optimising chip removal



REDUCED VIBRATIONS

Fewer vibrations and optimal smoothness as the cutting edges have unequal helix angles and therefore unequal pitch. This facilitates higher cutting speeds and cutting depths

OPTIMISED GEOMETRY

Minimises breakouts with robust cutting geometry and microfinishing

ULTRA PRO COATING

High-performance, TiAlN-based PVD coating extends the service life and is optimised for higher cutting speeds

ORION®**SOLID CARBIDE TVC END MILL 3xD T=4**

4 cutting edges, ULTRA PRO-coated

**Version:**

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Chip breaker on every cutting edge
- Optimised 45° edge protection chamfer
- Rake angle: 9°

**CHIPBREAKER
ON ALL CUTTING EDGES**

Produces short chips,
thereby optimising chip removal

Standard version

							Type	N	
							Surface	ULTRA PRO	
							Tool holder	HB straight shank	
							Cutting diameter tolerance	f8	
							Shank diameter tolerance	h6	
 mm	 mm	 mm	 mm	 mm	 mm	 mm	Teeth (no.)	fz steel 1,000 ● (mm)	16851... Ref. no.
3	9	12	54	2.8	6	0.1	4	0.03	860
4	12	16	57	3.8	6	0.1	4	0.035	862
5	15	20	57	4.8	6	0.1	4	0.04	864
6	18	24	62	5.8	6	0.1	4	0.05	866
8	24	30	68	7.7	8	0.2	4	0.06	868
10	31	38	80	9.7	10	0.2	4	0.07	870
12	41	46	93	11.6	12	0.2	4	0.08	872
14	43	53	100	13.6	14	0.3	4	0.1	874
16	51	58	108	15.5	16	0.2	4	0.11	876
18	55	73	123	17.5	18	0.3	4	0.13	878
20	61	74	126	19.5	20	0.2	4	0.13	880

**TVC = TROCHOIDAL VOLUME CUTTING****WHAT IS TROCHOIDAL MILLING?**

Particularly during roughing, this milling strategy results in smarter and more efficient tool paths. This means that more material can be removed in a shorter time - without any loss of quality.

Overlapping a circular path on the feed movement has a positive influence on contact conditions. Reducing stepover while at the same time utilising the entire cutting edge length results in the process forces being significantly reduced.

ADVANTAGES:

- Cutting depths of 3-4xD can be easily achieved
- Optimised and controlled tool engagement
- Almost constant engagement angle (max. 70°) and average chip thickness
- Reduced loads on the tool/spindle/bearings
- Extremely aggressive cutting parameters can be selected

Static: Only grooves are milled.

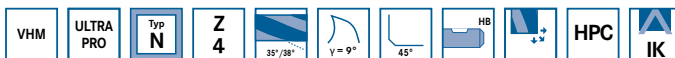
The tool paths consist exclusively of circular tool paths.

Dynamic: Free workpiece contours are milled. The tool paths consist of circular and straight tool paths. The circular paths may in some cases include very large radii or linear movements.

ORION®

SOLID CARBIDE HPC END MILLS T=4 WITH INTERNAL COOLING

HPC MILLING WITH INTERNAL COOLING IN GENERAL MECHANICAL ENGINEERING, TOOL MANUFACTURING AND MOULD MAKING APPLICATIONS



Application:

High-performance HPC end mill with internal cooling for universal roughing and finishing in general mechanical engineering, tool manufacturing and mould making applications using a wide variety of materials. With radial cooling, i.e. in the chip space, enabling a significant increase in service life through better chip removal and temperature control. Optimal application in trochoidal milling and in edge, corner and groove machining.

Large gashing version for improved chip removal during ramping etc.



FURTHER DIMENSIONS, DETAILS AND CUTTING VALUES CAN BE FOUND IN OUR SHOP.



INTERNAL COOLING

Radial internal coolant supply for safe chip removal and temperature control even under unfavourable conditions

REDUCED VIBRATIONS

Fewer vibrations and optimal smoothness as the cutting edges have unequal helix angles and therefore unequal pitch. This facilitates higher cutting speeds and cutting depths

OPTIMISED GEOMETRY

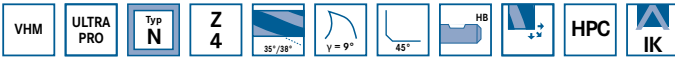
Minimises breakouts with robust cutting geometry and microfinishing

ULTRA PRO COATING

High-performance, TiAlN-based PVD coating extends the service life and is optimised for higher cutting speeds

ORION®

SC HPC END MILLS T=4 WITH INTERNAL COOLING



4 cutting edges, ULTRA PRO-coated

Version:

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- With radial internal cooling
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Optimised 45° edge protection chamfer
- Rake angle: 9°



INTERNAL COOLING

Radial internal coolant supply for safe chip removal and temperature control even under unfavourable conditions

							Type	N
							Surface	ULTRA PRO
							Tool holder	HB straight shank
							Cutting diameter tolerance	f8
							Shank diameter tolerance	h6
							Teeth (no.)	fz steel 1,000 ● (mm)
								16851... Ref. no.
mm	mm	mm	mm	mm	mm	F mm		
6	13	19	57	5.8	6	0.1	4	0.05
8	21	25	63	7.7	8	0.2	4	0.06
10	22	30	72	9.7	10	0.2	4	0.07
12	26	36	83	11.6	12	0.3	4	0.08
16	36	42	92	15.5	16	0.3	4	0.11
20	41	52	104	19.5	20	0.3	4	0.13
								380
								382
								384
								386
								388
								390

TOOLREX CUTTING FLUIDS AND OILS - ENVIRONMENTALLY FRIENDLY, GENTLE ON SKIN AND EFFICIENT

As your technology partner for metal working, we have an innovative range of cutting fluids and oils under the name Toolrex.

The innovative high-performance cutting fluids, oils and emulsions not only optimise metal working from an ecological perspective, but also increase the efficiency of the production process.



ORION®

SOLID CARBIDE HPC END MILLS T=4

FOR HIGH-GRADE STEEL

**HIGH-PERFORMANCE HPC MILLING
IN GENERAL MECHANICAL ENGI-
NEERING, TOOL MANUFACTURING
AND MOULD MAKING APPLICATIONS**



Application:

High-performance HPC end mill for roughing and finishing high-grade steels in general mechanical engineering, tool manufacturing and mould making applications. Optimal application in trochoidal milling and in edge, corner and groove machining.

FURTHER DIMENSIONS, DETAILS AND
CUTTING VALUES CAN BE FOUND IN
OUR SHOP.



REDUCED VIBRATIONS

Fewer vibrations and optimal smoothness as the cutting edges have unequal helix angles and therefore unequal pitch. This enables higher cutting speeds and cutting depths

OPTIMISED COATING

High-performance AlCrN-based PVD coating extends service life and is optimised for maximum wear protection in high-grade steel

REDUCED WEAR

All tools are manufactured with an edge protection chamfer to prevent wear

OPTIMUM CHIP REMOVAL

Large chip space and special, CAD-optimised groove profiles

ORION®

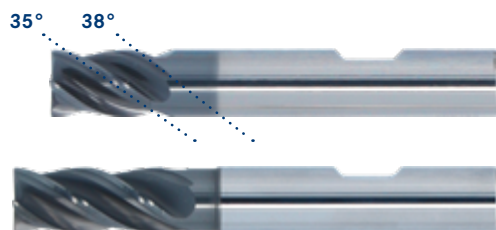
SC HPC END MILLS T=4 FOR HIGH-GRADE STEEL



4 cutting edges, AlCrN-coated

Version:

- Cutting material: solid carbide, ultra-fine grain
- High-performance AlCrN coating
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Optimised 45° edge protection chamfer
- Rake angle: 12°



Short version

									Type	VA
									Surface	AlCrN
									Tool holder	HB straight shank
									Cutting diameter tolerance	f8
									Shank diameter tolerance	h6
							Teeth (no.)	fz high- grade steel  (mm)	16851... Ref. no.	
3	5	-	50	-	6	0.1	4	0.012	553	
4	8	-	54	-	6	0.1	4	0.015	554	
5	9	-	54	-	6	0.1	4	0.019	555	
6	10	-	54	-	6	0.1	4	0.025	556	
8	12	-	58	-	8	0.2	4	0.032	558	
10	14	-	66	-	10	0.2	4	0.04	560	
12	16	-	73	-	12	0.3	4	0.045	562	
16	22	-	82	-	16	0.3	4	0.06	566	
20	26	-	92	-	20	0.3	4	0.09	570	

Standard version

3	8	13	57	2.8	6	0.1	4	0.012	503
4	11	17	57	3.8	6	0.1	4	0.015	504
5	13	19	57	4.8	6	0.1	4	0.019	505
6	13	19	57	5.8	6	0.1	4	0.025	506
8	21	25	63	7.7	8	0.2	4	0.032	508
10	22	30	72	9.7	10	0.2	4	0.04	510
12	26	36	83	11.6	12	0.3	4	0.045	512
14	26	36	83	13.6	14	0.3	4	0.05	514
16	36	42	92	15.5	16	0.3	4	0.06	516
18	36	42	92	17.5	18	0.3	4	0.07	518
20	41	52	104	19.5	20	0.3	4	0.09	520

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SOLID CARBIDE HPC/TVC END MILLS T=5

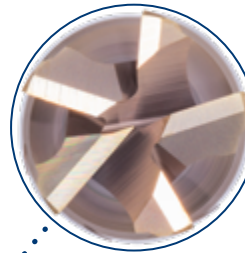
**HIGH-PERFORMANCE MILLING
IN GENERAL MECHANICAL ENGI-
NEERING, TOOL MANUFACTURING
AND MOULD MAKING**



Application:

High-performance HPC end mill for universal roughing and finishing in general mechanical engineering, tool manufacturing and mould making applications using a wide variety of materials. Optimal application in trochoidal milling and in edge, corner and groove machining. Five cutting edges for higher feed speeds.

FURTHER DIMENSIONS, DETAILS AND CUTTING VALUES CAN BE FOUND IN OUR SHOP.



Five cutting edges for higher feed speeds

REDUCED VIBRATIONS

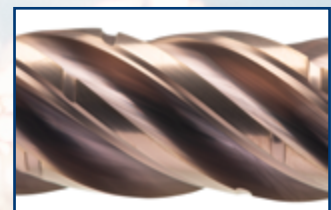
Fewer vibrations and optimal smoothness as the cutting edges have unequal helix angles and therefore unequal pitch. This enables higher cutting speeds and cutting depths

3XD APPLICATION DEPTH

The large cutting edge lengths ensure high application depths and maximum material removal rate

CHIPBREAKER GEOMETRY

Produces short chips, optimising chip removal



OPTIMISED GEOMETRY

Minimises breakouts with robust cutting edge geometry and microfinishing

ULTRA PRO COATING

High-performance, TiAlN-based PVD coating extends the service life and is optimised for higher cutting speeds

ORION®

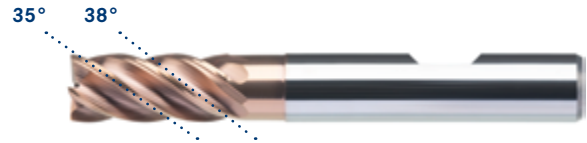
SC HPC END MILLS T=5

5 cutting edges, ULTRA PRO-coated



Version:

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Optimised 45° edge protection chamfer
- Rake angle: 8°



							Type	N	
							Surface	ULTRA PRO	
							Tool holder	HB straight shank	
							Cutting diameter tolerance	e8	
							Shank diameter tolerance	h5	
							Teeth (no.)	fz steel 1,000 ● (mm)	16851... Ref. no.
mm	mm	mm	mm	mm	mm	F mm			
6	13	19	57	5.8	6	0.1	5	0.05	900
8	21	25	63	7.7	8	0.2	5	0.06	902
10	22	30	72	9.7	10	0.2	5	0.07	904
12	26	36	83	11.6	12	0.3	5	0.08	906
16	36	42	92	15.5	16	0.3	5	0.11	908
20	41	52	104	19.5	20	0.3	5	0.13	910

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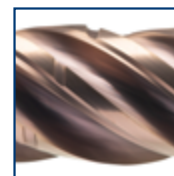
SC TVC END MILLS 3xD T=5

5 cutting edges, ULTRA PRO-coated



Version:

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Chip breaker on every cutting edge
- Optimised 45° edge protection chamfer
- Rake angle: 8°



CHIP BREAKERS ON ALL CUTTING EDGES

Produces short chips,
thereby optimising chip removal

							Type	N	
							Surface	ULTRA PRO	
							Tool holder	HB straight shank	
							Cutting diameter tolerance	e8	
							Shank diameter tolerance	h5	
							Teeth (no.)	fz steel 1,000 ● (mm)	16851... Ref. no.
mm	mm	mm	mm	mm	mm	F mm			
6	18	24	62	5.8	6	0.1	5	0.05	920
8	24	30	68	7.7	8	0.2	5	0.06	922
10	30	38	80	9.7	10	0.2	5	0.07	924
12	36	46	93	11.6	12	0.3	5	0.08	926
16	48	58	108	15.5	16	0.3	5	0.11	928
20	60	74	126	19.5	20	0.3	5	0.13	930

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SOLID CARBIDE FINISHING CUTTER T=6

FINISHING IN GENERAL MECHANICAL ENGINEERING, TOOL MANUFACTURING AND MOULD MAKING

FURTHER DIMENSIONS, DETAILS AND CUTTING VALUES CAN BE FOUND IN OUR SHOP.



Application:

High-precision finishing cutters for circumferential, fine finishing and semi-roughing work in general mechanical engineering, tool manufacturing and mould making applications using a wide range of materials.

The optimised geometry and coating ensure high-precision machining results with excellent surfaces.

Fewer vibrations and optimal smoothness due to the unequal pitch of the cutting edges



GREATER ACCURACY

The taper of a maximum of 0.005 mm results in exact angular accuracy

OPTIMISED GEOMETRY

The special cutting edge geometry ensures optimum surface quality and highest precision during finishing

BROAD RANGE OF APPLICATIONS

This facilitates circumferential, fine finishing and semi-roughing work using almost all materials

INCREASED CORE DIAMETER

Stable core diameter reduces vibrations for finishing with very good surface quality

ULTRA PRO COATING

High-performance, TiAlN-based PVD coating extends the service life and is optimised for higher cutting speeds



ORION®

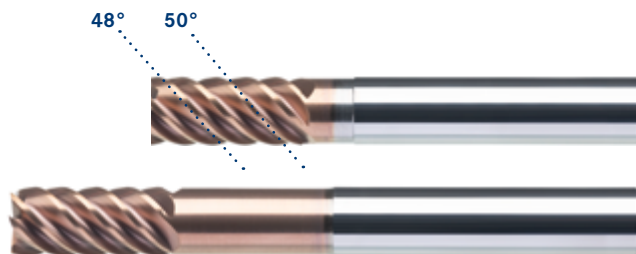
SOLID CARBIDE FINISHING CUTTER T=6

6 cutting edges, ULTRA PRO-coated



Version:

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HA shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 48°/50°
- Unequal cutting edge pitch
- Optimised corner protection, with face-cutting correction
- Rake angle: 13°



								Type	N
								Surface	ULTRA PRO
								Tool holder	HA straight shank
								Cutting diameter tolerance	e8
								Shank diameter tolerance	h6
 mm	 mm	 mm	 mm	 mm	 mm	Teeth (no.)	fz steel 1,000  (mm)	16851... Ref. no.	
6	10	18	58	5.8	6	6	0.11	580	
6	13	19	57	5.6	6	6	0.11	581	
6	13	27	67	5.8	6	6	0.11	582	
6	13	36	76	5.8	6	6	0.11	583	
6	15	42	80	5.6	6	6	0.11	584	
8	13	24	64	7.7	8	6	0.11	585	
8	19	25	63	7.6	8	6	0.11	586	
8	17	36	76	7.7	8	6	0.11	587	
8	17	48	89	7.7	8	6	0.11	588	
8	20	62	100	7.6	8	6	0.11	589	
10	22	30	72	9.6	10	6	0.11	590	
10	16	30	74	9.7	10	6	0.11	591	
10	21	45	89	9.7	10	6	0.11	592	
10	21	60	104	9.7	10	6	0.11	593	
10	25	58	100	9.6	10	6	0.11	594	
12	26	36	83	11.5	12	6	0.11	595	
12	19	36	85	11.6	12	6	0.11	596	
12	25	54	103	11.6	12	6	0.11	597	
12	25	72	121	11.6	12	6	0.11	598	
12	30	73	120	11.5	12	6	0.11	599	
16	25	48	100	15.5	16	6	0.11	600	
16	32	42	92	15.5	16	6	0.11	601	
16	33	72	124	15.5	16	6	0.11	602	
16	33	96	148	15.5	16	6	0.11	603	
16	40	100	150	15.5	16	6	0.11	604	
20	32	60	114	19.5	20	6	0.11	605	
20	38	52	104	19.5	20	6	0.11	606	
20	42	90	144	19.5	20	6	0.11	607	
20	42	120	174	19.5	20	6	0.11	608	
20	50	98	150	19.5	20	6	0.11	609	
25	40	75	136	24.5	25	6	0.11	610	
25	52	113	174	24.5	25	6	0.11	611	
25	52	150	210	24.5	25	6	0.11	612	

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SOLID CARBIDE HPC ROUGHING END MILL T=4

HIGH-PERFORMANCE ROUGH MILLING IN GENERAL MECHANICAL ENGINEERING, TOOL MANUFACTURING AND MOULD MAKING APPLICATIONS

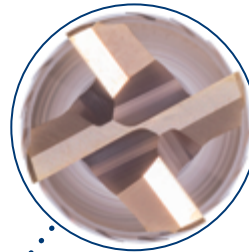


FURTHER DIMENSIONS, DETAILS AND CUTTING VALUES CAN BE FOUND IN OUR SHOP.



Application:

HPC roughing end mill for universal roughing in general mechanical engineering, tool manufacturing and mould making applications using a wide variety of materials, with very good cutting performance and low power consumption.



NF FLAT TYPE ROUGH PROFILE

Produces short chips at low power input and usually sufficient surface

NR ROUND TYPE ROUGH PROFILE

Produces short chips at the lowest power input



REDUCED VIBRATIONS

Fewer vibrations and optimal smoothness as the cutting edges have unequal helix angles and therefore unequal pitch.

This enables higher cutting speeds and cutting depths

ULTRA PRO COATING

High-performance, TiAlN-based PVD coating extends the service life and is optimised for higher cutting speeds

OPTIMAL CORNER PROTECTION

Versions with corner protection chamfer or corner radius deliverable



ORION®**SOLID CARBIDE HPC ROUGHING END MILL T=4**

4 cutting edges, ULTRA PRO-coated

Version:

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Optimised 45° edge protection chamfer
- Rake angle: 9°
- With round or flat rough profile


Roughing end mill
Type NR
Round rough profile

Type									NR
Surface									ULTRA PRO
Tool holder									HB straight shank
Cutting diameter tolerance									f8
Shank diameter tolerance									h6
							Teeth (no.)	fz steel 1,000  (mm)	16851... Ref. no.
mm	mm	mm	mm	mm	mm	F mm			
3	8	13	57	2.8	6	0.1	4	0.11	330
3.5	11	17	57	3.3	6	0.1	4	0.11	331
4	11	17	57	3.8	6	0.1	4	0.11	332
4.5	13	19	57	4.3	6	0.1	4	0.11	333
5	13	19	57	4.8	6	0.1	4	0.11	334
5.5	13	19	57	5.3	6	0.1	4	0.11	335
6	13	19	57	5.8	6	0.1	4	0.11	336
7	21	25	63	6.7	8	0.2	4	0.11	337
8	21	25	63	7.7	8	0.2	4	0.11	338
9	22	30	72	8.7	10	0.2	4	0.11	339
10	22	30	72	9.7	10	0.2	4	0.11	340
11	26	36	83	10.6	12	0.3	4	0.11	341
12	26	36	83	11.6	12	0.3	4	0.11	342
14	26	36	83	13.6	14	0.3	4	0.11	343
15	36	42	92	14.5	16	0.3	4	0.11	344
16	36	42	92	15.5	16	0.3	4	0.11	345
17	36	42	92	16.5	18	0.3	4	0.11	346
18	36	42	92	17.5	18	0.3	4	0.11	347
19	41	52	104	18.5	20	0.3	4	0.11	348
20	41	52	104	19.5	20	0.3	4	0.11	349

Roughing and finishing
cutter
Type NF
Flat rough profile

3	8	13	57	2.8	6	0.1	4	0.11	260
3.5	11	17	57	3.3	6	0.1	4	0.11	261
4	11	17	57	3.8	6	0.1	4	0.11	262
4.5	13	19	57	4.3	6	0.1	4	0.11	263
5	13	19	57	4.8	6	0.1	4	0.11	264
5.5	13	19	57	5.3	6	0.1	4	0.11	265
6	13	19	57	5.8	6	0.1	4	0.11	266
7	21	25	63	6.7	8	0.2	4	0.11	267
8	21	25	63	7.7	8	0.2	4	0.11	268
9	22	30	72	8.7	10	0.2	4	0.11	269
10	22	30	72	9.7	10	0.2	4	0.11	270
11	26	36	83	10.6	12	0.3	4	0.11	271
12	26	36	83	11.6	12	0.3	4	0.11	272
14	26	36	83	13.6	14	0.3	4	0.11	273
15	36	42	92	14.5	16	0.3	4	0.11	274
16	36	42	92	15.5	16	0.3	4	0.11	275
17	36	42	92	16.5	18	0.3	4	0.11	276
18	36	42	92	17.5	18	0.3	4	0.11	277
19	41	52	104	18.5	20	0.3	4	0.11	278
20	41	52	104	19.5	20	0.3	4	0.11	279

ORION®



SOLID CARBIDE HPC TORUS MILLING CUTTER T=4

IDEAL FOR DIE AND MOULD MAKING APPLICATIONS



Application:

High-performance HPC torus milling cutter for universal roughing and finishing in general mechanical engineering, tool manufacturing and mould making applications using a wide variety of materials.

Ideal for machining complex free-form surfaces and geometries.

FURTHER DIMENSIONS, DETAILS AND CUTTING VALUES CAN BE FOUND IN OUR SHOP.



Large gashing version for improved chip removal during ramping etc.

REDUCED VIBRATIONS

Fewer vibrations and optimal smoothness as the cutting edges have unequal helix angles and therefore unequal pitch. This enables higher cutting speeds and cutting depths

OPTIMAL CORNER PROTECTION

Versions with corner radius offer even better corner protection, e.g. for helical milling

DIE AND MOULD MAKING

Also ideal for machining complex free-form surfaces and geometries

OPTIMISED GEOMETRY

Minimises breakouts with robust cutting edge geometry and microfinishing

VERY ACCURATE RADIAL TOLERANCE

+/- 0.005 mm for precise machining results and maximum repeat accuracy

ORION®

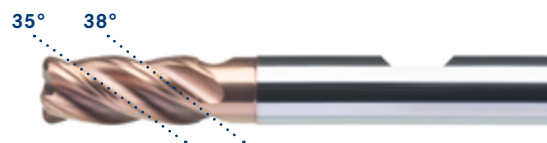
SOLID CARBIDE HPC TORUS MILLING CUTTER T=4



4 cutting edges, ULTRA PRO-coated

Version:

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Rake angle: 9°



Standard version

Type									N
Surface									ULTRA PRO
Tool holder									HB straight shank
Cutting diameter tolerance									e8
Shank diameter tolerance									h6
 mm	 mm	 mm	 mm	 mm	 mm	 mm	Teeth (no.)	fz steel 1,000  (mm)	16851... Ref. no.
3	0.1	8	13	57	2.8	6	4	0.11	620
3	0.4	8	13	57	2.8	6	4	0.11	621
3	0.5	8	13	57	2.8	6	4	0.11	622
3	1	8	13	57	2.8	6	4	0.11	623
4	0.1	11	17	57	3.8	6	4	0.11	624
4	0.4	11	17	57	3.8	6	4	0.11	625
4	0.5	11	17	57	3.8	6	4	0.11	626
4	1	11	17	57	3.8	6	4	0.11	627
5	0.1	13	19	57	4.8	6	4	0.11	628
5	0.5	13	19	57	4.8	6	4	0.11	629
5	1	13	19	57	4.8	6	4	0.11	630
6	0.1	13	19	57	5.8	6	4	0.11	631
6	0.5	13	19	57	5.8	6	4	0.11	632
6	1	13	19	57	5.8	6	4	0.11	633
6	1.5	13	19	57	5.8	6	4	0.11	634
8	0.15	21	25	63	7.7	8	4	0.11	635
8	0.5	21	25	63	7.7	8	4	0.11	636
8	1	21	25	63	7.7	8	4	0.11	637
8	1.5	21	25	63	7.7	8	4	0.11	638
8	2	21	25	63	7.7	8	4	0.11	639
10	0.15	22	30	72	9.7	10	4	0.11	640
10	0.5	22	30	72	9.7	10	4	0.11	641
10	1	22	30	72	9.7	10	4	0.11	642
10	1.5	22	30	72	9.7	10	4	0.11	643
10	2	22	30	72	9.7	10	4	0.11	644
12	0.2	26	36	83	11.6	12	4	0.11	645
12	0.5	26	36	83	11.6	12	4	0.11	646
12	1	26	36	83	11.6	12	4	0.11	647
12	1.5	26	36	83	11.6	12	4	0.11	648
12	2	26	36	83	11.6	12	4	0.11	649
16	0.3	36	42	92	15.5	16	4	0.11	650
16	1	36	42	92	15.5	16	4	0.11	651
16	2	36	42	92	15.5	16	4	0.11	652
16	4	36	42	92	15.5	16	4	0.11	653
20	1	41	52	104	19.5	20	4	0.11	654
20	2	41	52	104	19.5	20	4	0.11	655
20	4	41	52	104	19.5	20	4	0.11	656

ORION®

SOLID CARBIDE HPC TORUS MILLING CUTTER T=4



4 cutting edges, ULTRA PRO-coated

Version:

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle 35°/38°
- Unequal cutting edge pitch
- Rake angle: 9°



Long version

									Type	N
									Surface	ULTRA PRO
									Tool holder	HB straight shank
									Cutting diameter tolerance	e8
									Shank diameter tolerance	h6
 mm	 mm	 mm	 mm	 mm	 mm	 mm	Teeth (no.)	fz steel 1,000 (mm) 	16851... Ref. no	
3	0.3	8	15	69	2.8	6	4	0.11	660	
3	0.5	8	15	69	2.8	6	4	0.11	661	
3	1	8	15	69	2.8	6	4	0.11	662	
4	0.3	11	20	69	3.8	6	4	0.11	663	
4	0.5	11	20	69	3.8	6	4	0.11	664	
4	1	11	20	69	3.8	6	4	0.11	665	
5	0.3	13	25	69	4.8	6	4	0.11	666	
5	0.5	13	25	69	4.8	6	4	0.11	667	
5	1	13	25	69	4.8	6	4	0.11	668	
6	0.3	13	30	69	5.8	6	4	0.11	669	
6	0.5	13	30	69	5.8	6	4	0.11	670	
6	1	13	30	69	5.8	6	4	0.11	671	
6	1.5	13	30	69	5.8	6	4	0.11	672	
6	2	13	30	69	5.8	6	4	0.11	673	
8	0.3	17	40	79	7.7	8	4	0.11	674	
8	0.5	17	40	79	7.7	8	4	0.11	675	
8	1	17	40	79	7.7	8	4	0.11	676	
8	1.5	17	40	79	7.7	8	4	0.11	677	
8	2	17	40	79	7.7	8	4	0.11	678	
10	0.3	21	50	93	9.7	10	4	0.11	679	
10	0.5	21	50	93	9.7	10	4	0.11	680	
10	1	21	50	93	9.7	10	4	0.11	681	
10	1.5	21	50	93	9.7	10	4	0.11	682	
10	2	21	50	93	9.7	10	4	0.11	683	
12	0.3	25	60	108	11.6	12	4	0.11	684	
12	0.5	25	60	108	11.6	12	4	0.11	685	
12	1	25	60	108	11.6	12	4	0.11	686	
12	1.5	25	60	108	11.6	12	4	0.11	687	
12	2	25	60	108	11.6	12	4	0.11	688	
12	3	25	60	108	11.6	12	4	0.11	689	
16	0.3	33	80	132	15.5	16	4	0.11	690	
16	0.5	33	80	132	15.5	16	4	0.11	691	
16	1	33	80	132	15.5	16	4	0.11	692	
16	1.5	33	80	132	15.5	16	4	0.11	693	
16	2	33	80	132	15.5	16	4	0.11	694	
20	0.5	42	100	154	19.5	20	4	0.11	698	
20	1	42	100	154	19.5	20	4	0.11	699	
20	2	42	100	154	19.5	20	4	0.11	701	
20	4	42	100	154	19.5	20	4	0.11	703	



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Four and five cutting edges, ULTRA PRO coating

Version:

- Cutting material: solid carbide, ultra-fine grain
- ULTRA PRO high-performance coating
- Cutting edge finish
- HB shank in accordance with DIN 6535
- With clearance and centre cutting
- Unequal helix angle of 35°/38°
- Cutting edge with unequal pitch
- Optimised 45° edge protection chamfer
- Chip angle: 9°


Set contents:

- Ref. no. 180 - HPC end mills T=4 dia. 6-12 mm (16851 806-812)
- Ref. no. 181 - HPC end mills T=4 dia. 6-16 mm (16851 806-816)
- Ref. no. 190 - HPC end mills T=5 dia. 6-12 mm (16851 900-906)
- Ref. no. 191 - HPC end mills T=5 dia. 6-16 mm (16851 900-908)

	Four cutting edges		Five cutting edges	
	6/8/ 10/12 mm	6/8/ 10/12/16 mm	6/8/ 10/12 mm	6/8/ 10/12/16 mm
Composition of set				
Number of pieces in set	4	5	4	5
16851	Ref. no.	180	181	190
			191	

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