ToolFactory
Cutting Tool Solutions

Mono Tools 2024

Drilling, Milling

Catalogue 2024

Content Overview

Material Class	Suitable	Partly suitable	Not suitable
Steel	P	P	P
INOX	M	M	M
Cast iron	K	K	K
Non-ferrous metals	N	N	N
Special and Titanium alloys	S	S	S
Hard materials	H	H	H

More than 25 years of expertise

The company name "TOOL FACTORY Cutting Tool Solutions GmbH" stands for efficient manufacturing cutting solutions. Along with offering tools, we offer advise and services on all elements of machining. Since 1995 we have been developing precision tools made from durable and high-performance cutting material.

Collaborating with us gives you a high degree of planning security

Among our customers are well-known companies from numerous industries across Germany and abroad. Yet our tools are also strongly established in the retail and private label business. Our partnership with the specialized trade make us a reliable supplier that is much appreciated by our customers.

On-schedule delivery by 12 noon on the next working day

Efficient and economical production is important to us, which is why we process your orders as fast and straightforward as possible. We always have over 22,000 different items available. With our computer-assisted and route-optimized warehouse management system, we are able to quickly dispatch your order. We can also ensure that your order is delivered on time by 12 noon on the next working day due to our excellent cooperation with our shipping partner UPS©.

Established solutions for smooth production

High-performance tools for metal cutting – that is what we are good at.
Permanently analysing new market trends and technical innovations, our employees continuously work on improving our products and services.

Your challenges push us to always become better.

The development of new technologies and materials has a substantial impact on your productivity. Companies are compelled to respond due to increasing time and cost constraints, as well as demanding standards of quality. The usage of state-of the art cutting technologies may result in time savings of up to 60%. So, providing effective solutions is becoming increasingly vital.

No matter where you operate, with our global network we are able to support you worldwide.

Only tools in use prove their quality of use

We know the machining challenges you face, and to ensure that you never will experience reliability issues or downtime in your production, it's important to have a supportive partner by your side.

With a wide product assortment we cover your requirements

We offer a product portfolio that provides you with the right tool for almost every application – from the smallest diameter to solutions for machining high-strength materials using complex tool sets. We make a continuous effort to enhance and optimize our product range to ensure that we have the perfect solution for each of your varied needs.

Top quality management to the highest standards

The tool won't be put up for sale until we are perfectly content with its functionality, efficacy, and performance results. As such, you can be sure that you'll get a top-notch solution for efficient use.

Since 2017, we hold an ISO 9001:2015 certification for the development, distribution, and logistics of precision tools.

More than just standard
The right tool for every application

Our portfolio "Single-point cutting tools" includes solid carbide drills, solid carbide end mills für different applications, carbide burs, form milling cutter, HSS end mills und much more. We also stock an extensive range of indexable inserts and holders as well as machine taps.

Drilling Line: This line includes our solid carbide drills for universal applications, deep-hole drills and mini drills as well as drills from the INOX series for machining high-temperature materials.

Professional Line: Our Professional Line stands for high-quality solid carbide end mills with modern geometries and coatings. These tools help you achieve best performance results, long tool life and maximum metal removal rates in your production.

Aluminium Line: This line is the right choice if you are looking for tailor-made solid carbide end mills for machining aluminium, non-ferrous metals and plastics.

Composite Line: Solid carbide end mills from this line are suitable for machining glass fiber and carbon fiber reinforced plastics.

Standard Line: This line offers a diverse and affordable range of quality tools for almost any machining task.

PM- und HSS-Line: The range of our PM- and HSS end mills includes high-quality and sturdy tools as an option to solid carbide tools. In addition to end mills, we also offer mini end mills, form milling cutters, roughing end mills, PM end mills and many other variants.

Rotary Line: Our extensive range of burs includes all common cut Typees and shapes – in a variety of diameters and lengths. We also offer a number of combinations to complete several tasks with just one tool.

Where standard tools are not sufficient, special solutions are required

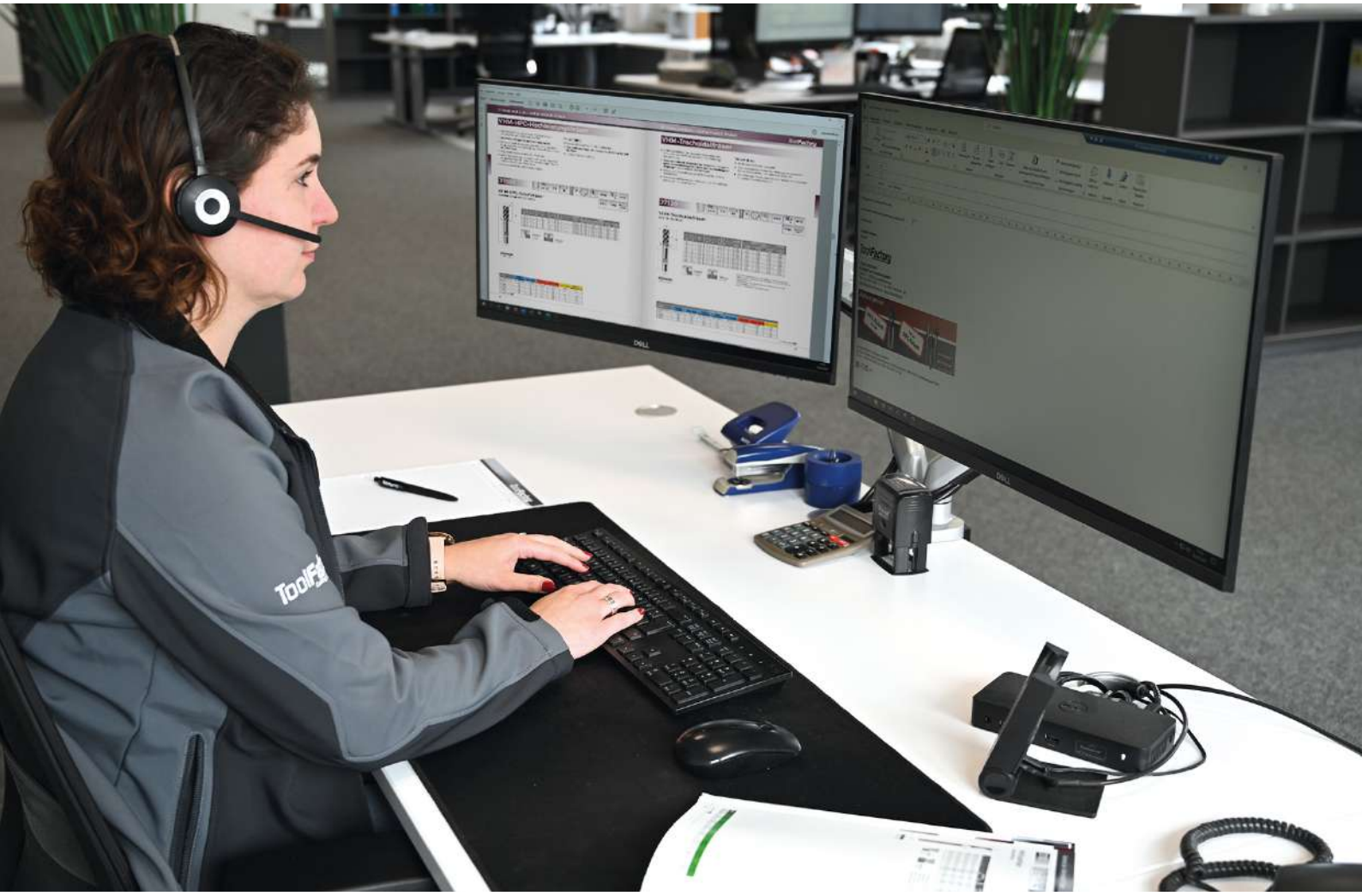
Another focus is the development of custom-fit solutions to your specifications or engineering drawings. A special tool can offer specific technical or economic added value for many applications. You benefit from our years of expertise and industry knowledge.

Highly efficient tools tailored to your specific demands

No matter whether you need to machine a specific material or a special geometry, we will give you comprehensive advice on individual applications and support you throughout the entire process, from the first idea to the final tool. You can also rely on the high quality and excellent functionality of our special tools.

Our services boost your success

We provide you with the right services to help you make your tools smart auxiliaries. From personal advice and Private Label Services to regrinding – whatever your requirements, we are here to support you.



Our customer service is ready to help

We are here to assist you – in person and/or online. Our specialists are happy to help and advise you on the technical specifications of our products. If you have any questions about suitability, fields of application or cutting values, please do not hesitate to contact us:

+492174 79153 0 or info@tool-factory.de

You can also contact us if you need help with optimizing your processes and machining strategies.

Your benefit is our years of expertise

To keep you up to date with the latest knowledge, we have developed our white papers on various topics and our SPAN-ART© videos.

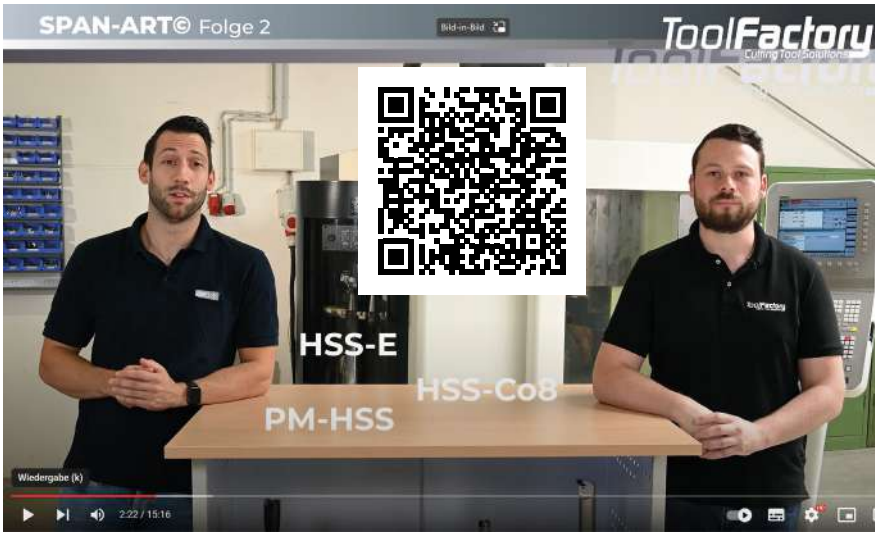
White paper

A white paper is a NEWtral document providing specialist information on specific topics. We spend a lot of time on researching and creating our white papers in order to communicate relevant topics to you in a hands-on and understandable way. Ideal for anyone who wants to know more. You can download all our available white papers from our homepage:

https://www.tool-factory.de/en/media-library/

SPAN-ART©

Our SPAN-ART© videos are explanatory videos covering the most important topics relating to machining. In cooperation with the Institute for Tooling and Production Technology (iWFT) at the RFH Cologne in Germany, we explain how chips are formed, how to select turning tools and much more. We provide an informative mix of both theory and practice.



Our Private Label Service helps you stay ahead of the game

Our precision tools are not always delivered straight to the end user but are also sold by our distributors – this is where our Private Label Service comes in. This special service allows you to compile an assortment of products that is flexibly tailored to your requirements. We deliver all products featuring your own corporate identity, which means that the tools are individually lasered, labeled and packaged. We will also gladly support you in compiling your product range.

You will benefit from:

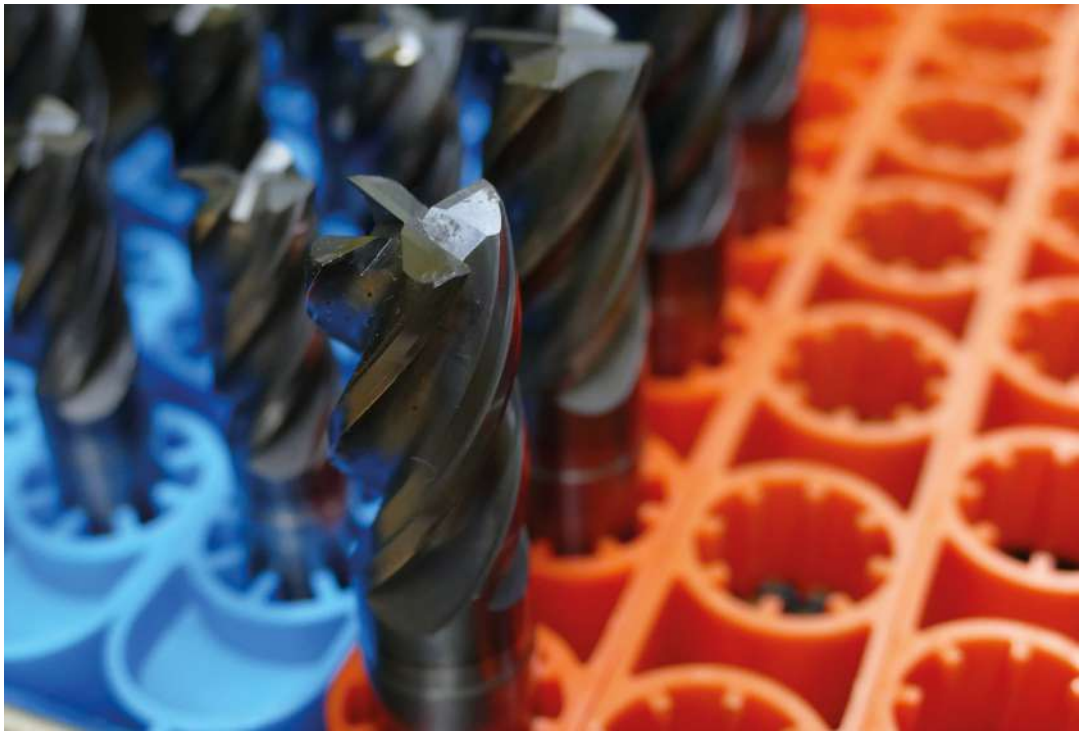
- Flexibility and unique position, regardless of the purchase quantity
- Uncomplicated processing
- Reduced warehousing and less logistical and organizational effort
- Supporting marketing measures, from videos and catalogs to supporting social media activities

Prolonging the service life of your tools through regrinding

Economical production is the key. Did you know that tools can be reground up to three times without any major loss of quality? You can save up to 60% on costs with our regrinding service instead of buying new tools. We therefore recommend to always check the regrinding options before purchasing new tools.

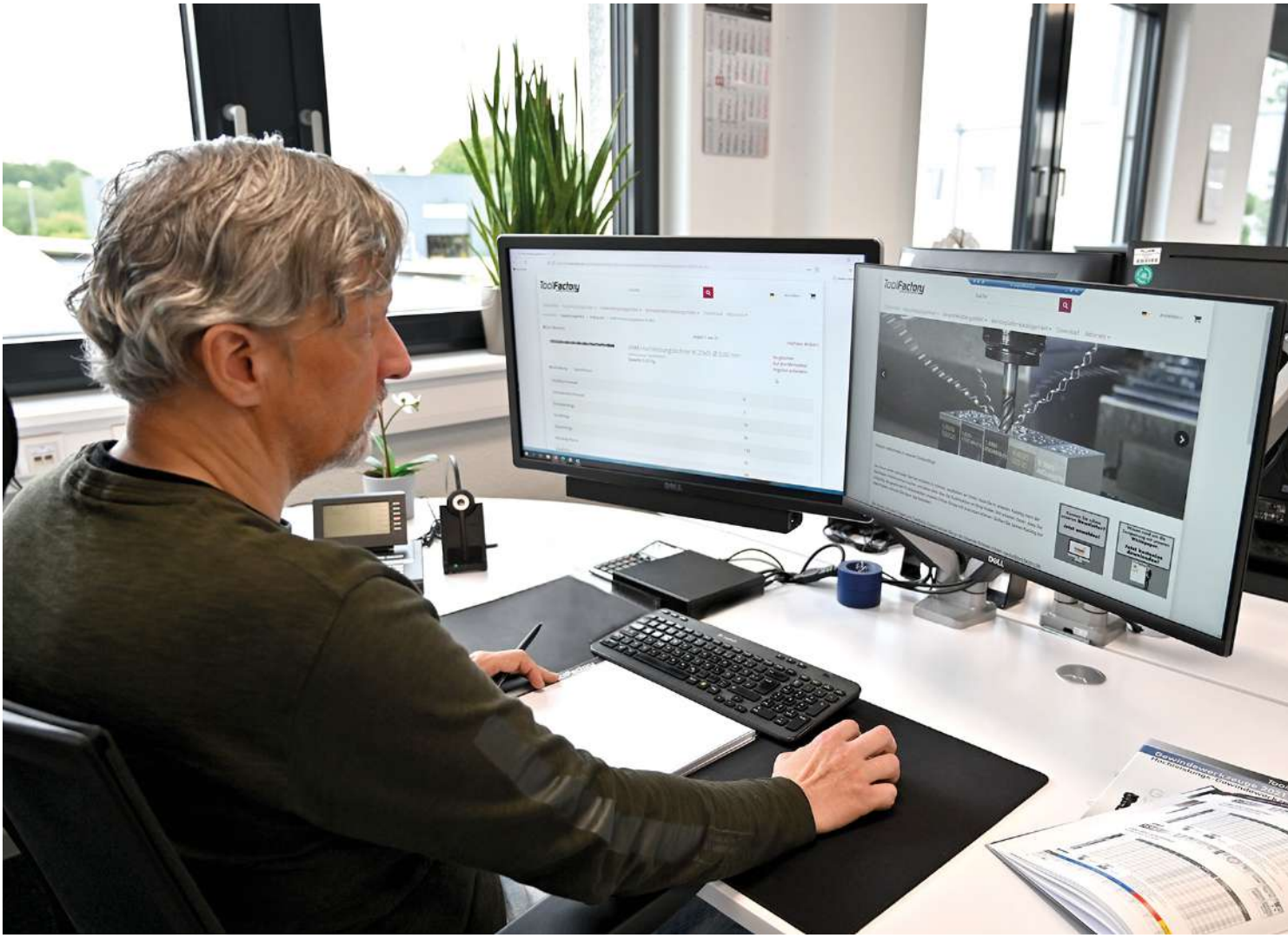
We regrind your tools, no matter of which manufacturer. We check whether regrinding is a viable option from a technical and economic point of view and whether the reconditioned tools will still achieve almost original tool life and process reliability. You will receive your reconditioned tools back within 10 working days.

https://www.tool-factory.de/en/services/regrinding-service/regrinding-form/



Order your tools online in our online store!

Regardless of opening hours, you can order the tools you need around the clock from our online store.



Flexibility with our online store

Do you already know our online store? Here you can quickly and easily access and order our standard tools. Not only can you see whether your required item is available, but also your specific terms and all relevant product specifications. We guarantee delivery by 12 noon on the next working day – with no minimum order value.

Your benefits

- Our online store also allows you to easily import and order orders from a list. This saves a lot of time, especially for recurring orders.
- Particularly for larger companies, it can also be of interest to use our store's approval process to have full transparency about your orders all the time. Simply contact us and together we will discuss your requirements and set the approval process up for you.
- We also offer an additional service for non-registered users: View our standard prices and request a quote for interesting items with just one click.

In our online store you can order 22,000 precision tools around the clock!

Register now:
shop.tool-factory.de/en/home

Product Overview

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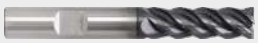 Now also as HA	Z 4/5	37131	Solid Carbide Trochoidal End Mill TPM	P M K N S H	82
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	Z 3	AG 832-2	HSS Roughing End Mill for Aluminium	Type WR	P M K N S H	203
	Z 2	AG 122-0	HSS End Mill	Type N	P M K N S H	204
	Z 2	AG 122-2	HSS End Mill	Type N	P M K N S H	205
	Z 2	AG 122-3	HSS End Mill	Type N	P M K N S H	206

Product Overview

		Product	Reference		Suitability	Page
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	Z 3	AG 112-4	HSS End Mill	Type N	P M K N S H	208
	Z 3	AG 132-0	HSS End Mill	Type N	P M K N S H	209
	Z 3	AG 132-2	HSS End Mill	Type N	P M K N S H	210
	Z 3	AG132-4	HSS End Mill	Type N	P M K N S H	211
	Z 4	AG142-0	HSS End Mill	Type N	P M K N S H	212
	Z 4-6	AG142-2 AG152-2 AG162-2	HSS End Mill	Type N	P M K N S H	213 – 214
	Z 4-6	AG142-4 AG152-4 AG162-4	HSS End Mill	Type N	P M K N S H	215 – 217
	Z 4	AG140-4	HSS End Mill	Type N	P M K N S H	218
	Z 2	AQ122-2	HSS Ball-Nosed End Mill	Type N	P M K N S H	219
	Z 2	AQ122-4	HSS Ball-Nosed End Mill	Type N	P M K N S H	220
	Z 3	AG932-2	HSS Roughing / Finishing End Mill	Type NF	P M K N S H	221
	Z 3-6	AG642-2 AG652-2 AG662-2	HSS Roughing End Mill	Type HR	P M K N S H	222 – 223
	Z 3-6	AG732-2 AG742-2 AG752-2 AG762-2	HSS Roughing End Mill	Type NR	P M K N S H	224 – 225
	Z 4	AG942-2	HSS Roughing / Finishing End Mill	Type NF	P M K N S H	226
	Z 4-6	AG642-4 AG652-4 AG662-4	HSS Roughing End Mill	Type HR	P M K N S H	227 – 228
	Z 4-6	AG742-4 AG752-4 AG762-4	HSS Roughing End Mill	Type NR	P M K N S H	229 – 230
	Z 4	AG740-4	HSS Roughing End Mill	Type NR	P M K N S H	231
	Z 6-12	AX850B	HSS-Co5 Keyseating Cutter	Type N	P M K N S H	232
	Z 6-10	AX851B	HSS-Co5 T-Slot Cutter	Type N	P M K N S H	233
	Z 10-12	AX1833C	HSS-Co5 Dovetail Cutter 45° | 60°	Type N	P M K N S H	234

Product Overview

	Product	Reference	Suitability	Page
 Z 10-12	AX1833D	HSS-Co5 Dovetail Cutter 45° | 60° Type N	P M K N S	234
 Z 8-14	AX514	HSS Shell End Mill Type N	P M K	235
 Z 8-12	AX814	HSS-Co5 Shell End Mill Type N	P M K S	235
 Z 6-12	AX518	HSS Shell End Mill Type NR	P M K	236
 Z 6-10	AX818	HSS-Co5 Shell End Mill Type NR	P M K S	236
 Z 14-28	AX842A	HSS Angle Milling Cutter Type N	P M K N	237
 Z 16-28	AX847	HSS Angle Milling Cutter Type N	P M K N	237
 Z 10-14	AX856	HSS-E Confex Milling Cutter Type N	P M K N	238
 Z 24-52	AX1834A	HSS-Co5 Side Milling Cutter Type N	P M K N S	239
 Z 12-24	AX885A	HSS-Co5 Side Milling Cutter Type N	P M K N S	240
 Z 3	335	HSS Countersink Type N	P M K N S	241
 Z 4-6	AX6518B	HSS-Co8 Corner Rounding Cutter Type N	P M K N S	242
Rotary Line				
	ZYA	Cylinder Shape, w/o End Cut Z 1 Normal | Z 3 Double | Z 41 Fine | Z 5 Diamond | Z Alu	P M K N S H	248
	ZYA-S	Cylinder Shape, w/ End Cut Z 1 Normal | Z 3 Double | Z 41 Fine | Z 5 Diamond | Z Alu	P M K N S H	249

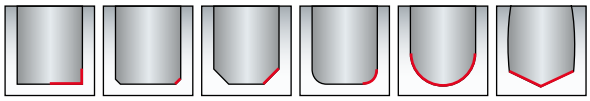
Product Overview

	Product	Reference	Suitability	Page
	WRC	Ball-Nosed Cylinder Shape — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond, Z Alu	P M K N S H	250
	KUD	Ball Shape — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond, Z Alu	P M K N S H	251
	TRE	Oval Shape — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond, Z Alu	P M K N S H	252
	RBF	Ball-Nosed Tree Shape — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond, Z Alu	P M K N S H	253
	SPG	Pointed Tree Shape — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond	P M K N S H	254
	HMB	Flame Shape — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond	P M K N S H	255
	KSJ	Cone Shape 60° — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond	P M K N S H	256
	KSK	Cone Shape 90° — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond	P M K N S H	257
	SKM	Pointed Cone Shape — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond, Z Alu	P M K N S H	258
	WKN	Inverted Cone, w/o End Cut — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond	P M K N S H	259
	KEL	Ball-Nosed Cone Shape — Z 1 Normal, Z 3 Double, Z 41 Fine, Z 5 Diamond, Z Alu	P M K N S H	260
	H10	Radius Shape Cylinder — Z 1 Normal, Z 3 Double	P M K N S H	262
	H10	Radius Shape Cylinder — Z 3 Double	P M K N S H	263
	H11	Cylinder Cone Shape — Z 1 Normal, Z 3 Double	P M K N S H	264
	H11	Cylinder w/ Taper — Z 3 Double	P M K N S H	265
	H12	Cone Shape — Z 1 Normal, Z 3 Double	P M K N S H	266
	H12	Cylinder Shape, w/ Corner Radius — Z 3 Double	P M K N S H	267

All prices are per unit plus VAT. Our General Terms and Conditions shall apply.

Symbols For Page Reference

Bur shape



Sharp-edged | Protective chamfer | Corner chamfer | Corner radius | Full radius | Drill tip

No. of Flutes

Z 2 | Z 3

Shank Type

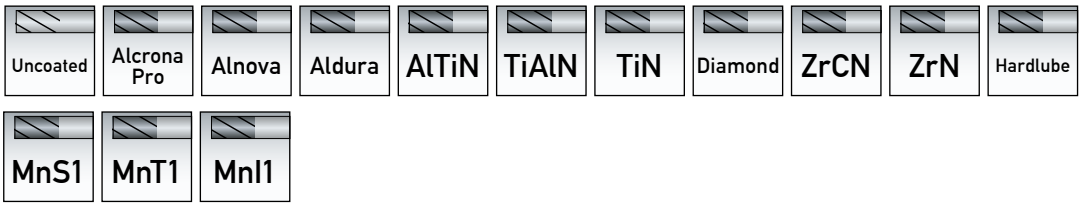
HA-Shank | HB-Shank | HE-Shank

Grade

VHM | PM | HM | HSS | HSS-E | HSS-Co5 | HSS-Co8

Solid carbide | Powder metal | Carbide | HSS | HSS-E | HSS-Co5 | HSS-Co8

Coating



Conformity

DIN 6527 | DIN 6527 L | Manu-facturer standard | DIN 844 | DIN 844L

Versions

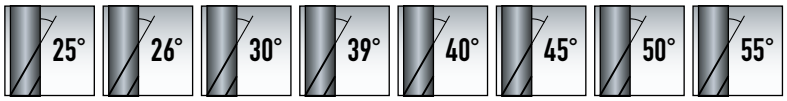
Type N | Type H | Type W | Type WR | Type HR | Type NF | Type NR

Flute design

Normal cut | Double cut (standard) | Fine cut | Diamond cut | Aluminium cut

Symbols For Page Reference

Helix angle

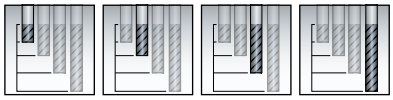


Helix angle 25° | Helix angle 26° | Helix angle 30° | Helix angle 39° | Helix angle 40° | Helix angle 45° | Helix angle 50° | Helix angle 55°

Geometry

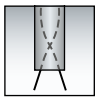
Unequal helix | Unequal pitch | Increased core diameter

Length of cut



Short / Extra short | Medium/ Long | Extra long | Over long

Internal coolant

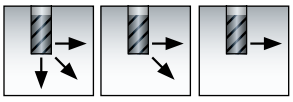


Internal coolant

Optional application

HSC — High Speed Cutting
HHC — High Hard Cutting
HPC — High Performance Cutting
TPM — Trochoidal Performance Machining
MTC — Multi Task Cutting

Allowed use



Center cutting

Suitable for

Graphite
GRP — Glass fibre reinforced plastics
CFRP — Carbon fibre reinforced plastics

Max. material hardness

HRC ≤ 53
HRC ≤ 63

Rotation accuracy

0,005 mm

Diameter Tolerance

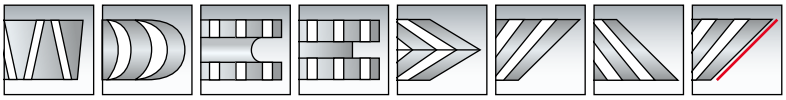
e8

Drilling depth ratio

3xD | 5xD | 8xD

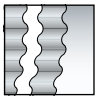
Point angle

Special shapes



Cross-cut | convex | concave | Longitudinal slot | Angle cutter double-sided | Angle cutter one-sided | Angle cutter one-sided | One-side cutting

Chip breaker



ToolFactory
Cutting Tool Solutions

Professional Drilling Line

Solid Carbide Spiral Drills

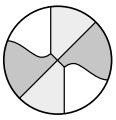
Professional Drilling Line

High Performance
Endurance
Economical

31100

TiAlN | HA | HB | HE* | 3xD | VHM | 140° | Manufacturer standard

Solid Carbide High-Performance Drill 3xD W/o Internal coolant



d1 m7

- High performance drill for the universal application
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
1.00	4	7	28	45	5.5	31100010HA	29.94	–	–	0.05 – 0.09
1.10	4	7	28	45	5.4	31100011HA	29.94	–	–	0.05 – 0.09
1.20	4	7	28	45	5.2	31100012HA	29.94	–	–	0.05 – 0.09
1.30	4	7	28	45	5.1	31100013HA	29.94	–	–	0.05 – 0.09
1.40	4	7	28	45	4.9	31100014HA	29.94	–	–	0.05 – 0.09
1.50	4	14	28	55	11.8	31100015HA	29.94	–	–	0.05 – 0.09
1.60	4	14	28	55	11.6	31100016HA	29.94	–	–	0.05 – 0.09
1.70	4	14	28	55	11.5	31100017HA	29.94	–	–	0.05 – 0.09
1.80	4	14	28	55	11.3	31100018HA	29.94	–	–	0.05 – 0.09
1.85	4	14	28	55	11.2	311000185HA	29.94	–	–	0.05 – 0.09
1.90	4	14	28	55	11.2	31100019HA	29.94	–	–	0.05 – 0.09
2.00	4	20	28	55	17.0	31100020HA	29.94	–	–	0.05 – 0.09
2.10	4	20	28	55	16.9	31100021HA	29.94	–	–	0.05 – 0.09
2.15	4	20	28	55	16.8	311000215HA	29.94	–	–	0.05 – 0.09
2.20	4	20	28	55	16.7	31100022HA	29.94	–	–	0.05 – 0.09
2.30	4	20	28	55	16.6	31100023HA	29.94	–	–	0.05 – 0.09
2.40	4	20	28	55	16.4	31100024HA	29.94	–	–	0.05 – 0.09
2.50	4	20	28	55	16.3	31100025HA	29.94	–	–	0.05 – 0.09
2.60	4	20	28	55	16.1	31100026HA	29.94	–	–	0.05 – 0.09
2.65	4	20	28	55	16.0	311000265HA	29.94	–	–	0.05 – 0.09
2.70	4	20	28	55	16.0	31100027HA	29.94	–	–	0.05 – 0.09
2.80	4	20	28	55	15.8	31100028HA	29.94	–	–	0.05 – 0.09
2.85	4	20	28	55	15.7	311000285HA	29.94	–	–	0.05 – 0.09
2.90	4	20	28	55	15.7	31100029HA	29.94	–	–	0.05 – 0.09
3.00	6	20	36	62	15.5	31100030HA	29.94	31100030HB	29.94	0.06 – 0.14
3.10	6	20	36	62	15.4	31100031HA	29.94	31100031HB	29.94	0.06 – 0.14
3.20	6	20	36	62	15.2	31100032HA	29.94	31100032HB	29.94	0.06 – 0.14
3.25	6	20	36	62	15.1	311000325HA	29.94	311000325HB	29.94	0.06 – 0.14
3.30	6	20	36	62	15.1	31100033HA	29.94	31100033HB	29.94	0.06 – 0.14
3.40	6	20	36	62	14.9	31100034HA	29.94	31100034HB	29.94	0.06 – 0.14
3.50	6	20	36	62	14.8	31100035HA	29.94	31100035HB	29.94	0.06 – 0.14
3.60	6	20	36	62	14.6	31100036HA	29.94	31100036HB	29.94	0.06 – 0.14
3.70	6	20	36	62	14.5	31100037HA	29.94	31100037HB	29.94	0.06 – 0.14
3.80	6	24	36	66	18.3	31100038HA	29.94	31100038HB	29.94	0.06 – 0.14
3.90	6	24	36	66	18.2	31100039HA	29.94	31100039HB	29.94	0.06 – 0.14
4.00	6	24	36	66	18.0	31100040HA	29.94	31100040HB	29.94	0.08 – 0.16
4.10	6	24	36	66	17.9	31100041HA	29.94	31100041HB	29.94	0.08 – 0.16
4.20	6	24	36	66	17.7	31100042HA	29.94	31100042HB	29.94	0.08 – 0.16
4.30	6	24	36	66	17.6	31100043HA	29.94	31100043HB	29.94	0.08 – 0.16
4.40	6	24	36	66	17.4	31100044HA	29.94	31100044HB	29.94	0.08 – 0.16
4.50	6	24	36	66	17.3	31100045HA	29.94	31100045HB	29.94	0.08 – 0.16
4.60	6	24	36	66	17.1	31100046HA	29.94	31100046HB	29.94	0.08 – 0.16
4.65	6	24	36	66	17.0	311000465HA	29.94	311000465HB	29.94	0.08 – 0.16
4.70	6	24	36	66	17.0	31100047HA	29.94	31100047HB	29.94	0.08 – 0.16
4.80	6	28	36	66	20.8	31100048HA	29.94	31100048HB	29.94	0.08 – 0.16
4.90	6	28	36	66	20.7	31100049HA	29.94	31100049HB	29.94	0.08 – 0.16
5.00	6	28	36	66	20.5	31100050HA	29.94	31100050HB	29.94	0.09 – 0.20
5.10	6	28	36	66	20.4	31100051HA	29.94	31100051HB	29.94	0.09 – 0.20
5.20	6	28	36	66	20.2	31100052HA	29.94	31100052HB	29.94	0.09 – 0.20
5.30	6	28	36	66	20.1	31100053HA	29.94	31100053HB	29.94	0.09 – 0.20
5.40	6	28	36	66	19.9	31100054HA	29.94	31100054HB	29.94	0.09 – 0.20
5.50	6	28	36	66	19.8	31100055HA	29.94	31100055HB	29.94	0.09 – 0.20
5.55	6	28	36	66	19.7	311000555HA	29.94	311000555HB	29.94	0.09 – 0.20
5.60	6	28	36	66	19.6	31100056HA	29.94	31100056HB	29.94	0.09 – 0.20
5.70	6	28	36	66	19.5	31100057HA	29.94	31100057HB	29.94	0.09 – 0.20
5.80	6	28	36	66	19.3	31100058HA	29.94	31100058HB	29.94	0.09 – 0.20
5.90	6	28	36	66	19.2	31100059HA	29.94	31100059HB	29.94	0.09 – 0.20
6.00	6	28	36	66	19.0	31100060HA	29.94	31100060HB	29.94	0.10 – 0.23
6.10	8	34	36	79	24.9	31100061HA	29.94	31100061HB	29.94	0.10 – 0.23
6.20	8	34	36	79	24.7	31100062HA	29.94	31100062HB	29.94	0.10 – 0.23
6.30	8	34	36	79	24.6	31100063HA	29.94	31100063HB	29.94	0.10 – 0.23
6.40	8	34	36	79	24.4	31100064HA	29.94	31100064HB	29.94	0.10 – 0.23
6.50	8	34	36	79	24.3	31100065HA	29.94	31100065HB	29.94	0.10 – 0.23
6.60	8	34	36	79	24.1	31100066HA	29.94	31100066HB	29.94	0.10 – 0.23
6.70	8	34	36	79	24.0	31100067HA	29.94	31100067HB	29.94	0.10 – 0.23
6.80	8	34	36	79	23.8	31100068HA	29.94	31100068HB	29.94	0.10 – 0.23
6.90	8	34	36	79	23.7	31100069HA	29.94	31100069HB	29.94	0.10 – 0.23
7.00	8	34	36	79	23.5	31100070HA	29.94	31100070HB	29.94	0.11 – 0.25
7.10	8	41	36	79	30.4	31100071HA	29.94	31100071HB	29.94	0.11 – 0.25
7.20	8	41	36	79	30.2	31100072HA	29.94	31100072HB	29.94	0.11 – 0.25
7.30	8	41	36	79	30.1	31100073HA	29.94	31100073HB	29.94	0.11 – 0.25
7.40	8	41	36	79	29.9	31100074HA	29.94	31100074HB	29.94	0.11 – 0.25
7.45	8	41	36	79	29.8	311000745HA	29.94	311000745HB	29.94	0.11 – 0.25
7.50	8	41	36	79	29.8	31100075HA	29.94	31100075HB	29.94	0.11 – 0.25
7.55	8	41	36	79	29.7	311000755HA	29.94	311000755HB	29.94	0.11 – 0.25
7.60	8	41	36	79	29.6	31100076HA	29.94	31100076HB	29.94	0.11 – 0.25
7.70	8	41	36	79	29.5	31100077HA	29.94	31100077HB	29.94	0.11 – 0.25

*HE drill: same price, availability on request*HE drill: same price, availability on request

Product family 111

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
7.80	8	41	36	79	29.3	31100078HA	29.94	31100078HB	29.94	0.11 – 0.25
7.90	8	41	36	79	29.2	31100079HA	29.94	31100079HB	29.94	0.11 – 0.25
8.00	8	41	36	79	29.0	31100080HA	29.94	31100080HB	29.94	0.11 – 0.27
8.10	10	47	40	89	34.9	31100081HA	33.63	31100081HB	33.63	0.11 – 0.27
8.20	10	47	40	89	34.7	31100082HA	33.63	31100082HB	33.63	0.11 – 0.27
8.30	10	47	40	89	34.6	31100083HA	33.63	31100083HB	33.63	0.11 – 0.27
8.40	10	47	40	89	34.4	31100084HA	33.63	31100084HB	33.63	0.11 – 0.27
8.50	10	47	40	89	34.3	31100085HA	33.63	31100085HB	33.63	0.11 – 0.27
8.60	10	47	40	89	34.1	31100086HA	33.63	31100086HB	33.63	0.11 – 0.27
8.70	10	47	40	89	34.0	31100087HA	33.63	31100087HB	33.63	0.11 – 0.27
8.80	10	47	40	89	33.8	31100088HA	33.63	31100088HB	33.63	0.11 – 0.27
8.90	10	47	40	89	33.7	31100089HA	33.63	31100089HB	33.63	0.11 – 0.27
9.00	10	47	40	89	33.5	31100090HA	33.63	31100090HB	33.63	0.12 – 0.28
9.10	10	47	40	89	33.4	31100091HA	33.63	31100091HB	33.63	0.12 – 0.28
9.20	10	47	40	89	33.2	31100092HA	33.63	31100092HB	33.63	0.12 – 0.28
9.25	10	47	40	89	33.1	311000925HA	33.63	311000925HB	33.63	0.12 – 0.28
9.30	10	47	40	89	33.1	31100093HA	33.63	31100093HB	33.63	0.12 – 0.28
9.35	10	47	40	89	33.0	311000935HA	33.63	311000935HB	33.63	0.12 – 0.28
9.40	10	47	40	89	32.9	31100094HA	33.63	31100094HB	33.63	0.12 – 0.28
9.50	10	47	40	89	32.8	31100095HA	33.63	31100095HB	33.63	0.12 – 0.28
9.55	10	47	40	89	32.7	311000955HA	33.63	311000955HB	33.63	0.12 – 0.28
9.60	10	47	40	89	32.6	31100096HA	33.63	31100096HB	33.63	0.12 – 0.28
9.70	10	47	40	89	32.5	31100097HA	33.63	31100097HB	33.63	0.12 – 0.28
9.80	10	47	40	89	32.3	31100098HA	33.63	31100098HB	33.63	0.12 – 0.28
9.90	10	47	40	89	32.2	31100099HA	33.63	31100099HB	33.63	0.12 – 0.28
10.00	10	47	40	89	32.0	31100100HA	33.63	31100100HB	33.63	0.13 – 0.30
10.10	12	55	45	102	39.9	31100101HA	50.10	31100101HB	50.10	0.13 – 0.30
10.20	12	55	45	102	39.7	31100102HA	50.10	31100102HB	50.10	0.13 – 0.30
10.30	12	55	45	102	39.6	31100103HA	50.10	31100103HB	50.10	0.13 – 0.30
10.40	12	55	45	102	39.4	31100104HA	50.10	31100104HB	50.10	0.13 – 0.30
10.50	12	55	45	102	39.3	31100105HA	50.10	31100105HB	50.10	0.13 – 0.30
10.60	12	55	45	102	39.1	31100106HA	50.10	31100106HB	50.10	0.13 – 0.30
10.70	12	55	45	102	39.0	31100107HA	50.10	31100107HB	50.10	0.13 – 0.30
10.80	12	55	45	102	38.8	31100108HA	50.10	31100108HB	50.10	0.13 – 0.30
10.90	12	55	45	102	38.7	31100109HA	50.10	31100109HB	50.10	0.13 – 0.30
11.00	12	55	45	102	38.5	31100110HA	50.10	31100110HB	50.10	0.14 – 0.32
11.10	12	55	45	102	38.4	31100111HA	50.10	31100111HB	50.10	0.14 – 0.32
11.20	12	55	45	102	38.2	31100112HA	50.10	31100112HB	50.10	0.14 – 0.32
11.30	12	55	45	102	38.1	31100113HA	50.10	31100113HB	50.10	0.14 – 0.32
11.40	12	55	45	102	37.9	31100114HA	50.10	31100114HB	50.10	0.14 – 0.32
11.50	12	55	45	102	37.8	31100115HA	50.10	31100115HB	50.10	0.14 – 0.32
11.60	12	55	45	102	37.6	31100116HA	50.10	31100116HB	50.10	0.14 – 0.32
11.70	12	55	45	102	37.5	31100117HA	50.10	31100117HB	50.10	0.14 – 0.32
11.80	12	55	45	102	37.3	31100118HA	50.10	31100118HB	50.10	0.14 – 0.32
11.90	12	55	45	102	37.2	31100119HA	50.10	31100119HB	50.10	0.14 – 0.32
12.00	12	55	45	102	37.0	31100120HA	50.10	31100120HB	50.10	0.15 – 0.32
12.20	14	60	45	107	41.7	31100122HA	67.11	31100122HB	67.11	0.15 – 0.32
12.50	14	60	45	107	41.3	31100125HA	67.11	31100125HB	67.11	0.15 – 0.32
12.70	14	60	45	107	41.0	31100127HA	67.11	31100127HB	67.11	0.15 – 0.32
12.80	14	60	45	107	40.8	31100128HA	67.11	31100128HB	67.11	0.15 – 0.32
13.00	14	60	45	107	40.5	31100130HA	67.11	31100130HB	67.11	0.15 – 0.32
13.30	14	60	45	107	40.1	31100133HA	67.11	31100133HB	67.11	0.15 – 0.32
13.50	14	60	45	107	39.8	31100135HA	67.11	31100135HB	67.11	0.15 – 0.32
13.70	14	60	45	107	39.5	31100137HA	67.11	31100137HB	67.11	0.15 – 0.32
13.80	14	60	45	107	39.3	31100138HA	67.11	31100138HB	67.11	0.15 – 0.32
14.00	14	60	45	107	39.0	31100140HA	67.11	31100140HB	67.11	0.16 – 0.35
14.20	16	65	48	115	43.7	31100142HA	86.68	31100142HB	86.68	0.16 – 0.35
14.50	16	65	48	115	43.3	31100145HA	86.68	31100145HB	86.68	0.16 – 0.35
14.70	16	65	48	115	43.0	31100147HA	86.68	31100147HB	86.68	0.16 – 0.35
14.80	16	65	48	115	42.8	31100148HA	86.68	31100148HB	86.68	0.16 – 0.35
15.00	16	65	48	115	42.5	31100150HA	86.68	31100150HB	86.68	0.16 – 0.35
15.20	16	65	48	115	42.2	31100152HA	86.68	31100152HB	86.68	0.16 – 0.35
15.30	16	65	48	115	42.1	31100153HA	86.68	31100153HB	86.68	0.16 – 0.35
15.50	16	65	48	115	41.8	31100155HA	86.68	31100155HB	86.68	0.16 – 0.35
15.70	16	65	48	115	41.5	31100157HA	86.68	31100157HB	86.68	0.16 – 0.35
15.80	16	65	48	115	41.3	31100158HA	86.68	31100158HB	86.68	0.16 – 0.35
16.00	16	65	48	115	41.0	31100160HA	86.68	31100160HB	86.68	0.17 – 0.37
16.50	18	73	48	123	48.3	31100165HA	147.94	31100165HB	147.94	0.17 – 0.37
16.80	18	73	48	123	47.8	31100168HA	147.94	31100168HB	147.94	0.17 – 0.37
17.00	18	73	48	123	47.5	31100170HA	147.94	31100170HB	147.94	0.17 – 0.37
17.50	18	73	48	123	46.8	31100175HA	147.94	31100175HB	147.94	0.17 – 0.37
17.70	18	73	48	123	46.5	31100177HA	147.94	31100177HB	147.94	0.17 – 0.37
17.80	18	73	48	123	46.3	31100178HA	147.94	31100178HB	147.94	0.17 – 0.37
18.00	18	73	48	123	46.0	31100180HA	147.94	31100180HB	147.94	0.18 – 0.40
18.50	20	79	50	131	51.3	31100185HA	161.41	31100185HB	161.41	0.18 – 0.40
18.80	20	79	50	131	50.8	31100188HA	161.41	31100188HB	161.41	0.18 – 0.40
19.00	20	79	50	131	50.5	31100190HA	161.41	31100190HB	161.41	0.18 – 0.40
19.50	20	79	50	131	49.8	31100195HA	161.41	31100195HB	161.41	0.18 – 0.40
19.80	20	79	50	131	49.3	31100198HA	161.41	31100198HB	161.41	0.18 – 0.40
20.00	20	79	50	131	49.0	31100200HA	161.41	31100200HB	161.41	0.20 – 0.45

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²
V_c (m/min)	105	270

Material	Alu & Al Alloys >10% Si
Tensile strength / Hardness	> 600 N/mm²
V_c (m/min)	180

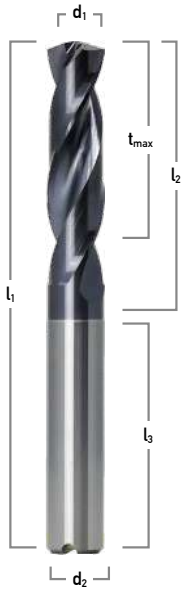
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength/Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	120	110	105	105	45	85	45	120	60

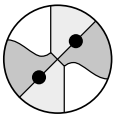
Product family 111

31200

TiAlN | HA | HB | HE* | 3xD | VHM | 25 bar | 140° | Manufacturer standard

Solid Carbide High-Performance Drill 3xD With Internal coolant





d_1 m7

- High performance drill for the universal application
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
2.00	4	20	28	55	17.0	31200020HA	37.80	–	–	0.06 – 0.11
2.10	4	20	28	55	16.9	31200021HA	37.80	–	–	0.06 – 0.11
2.15	4	20	28	55	16.8	312000215HA	37.80	–	–	0.06 – 0.11
2.20	4	20	28	55	16.7	31200022HA	37.80	–	–	0.06 – 0.11
2.30	4	20	28	55	16.6	31200023HA	37.80	–	–	0.06 – 0.11
2.40	4	20	28	55	16.4	31200024HA	37.80	–	–	0.06 – 0.11
2.50	4	20	28	55	16.3	31200025HA	37.80	–	–	0.06 – 0.11
2.60	4	20	28	55	16.1	31200026HA	37.80	–	–	0.06 – 0.11
2.65	4	20	28	55	16.0	312000265HA	37.80	–	–	0.06 – 0.11
2.70	4	20	28	55	16.0	31200027HA	37.80	–	–	0.06 – 0.11
2.80	4	20	28	55	15.8	31200028HA	37.80	–	–	0.06 – 0.11
2.85	4	20	28	55	15.7	312000285HA	37.80	–	–	0.06 – 0.11
2.90	4	20	28	55	15.7	31200029HA	37.80	–	–	0.06 – 0.11
3.00	6	20	36	62	15.5	31200030HA	37.80	31200030HB	37.80	0.06 – 0.14
3.10	6	20	36	62	15.4	31200031HA	37.80	31200031HB	37.80	0.06 – 0.14
3.20	6	20	36	62	15.2	31200032HA	37.80	31200032HB	37.80	0.06 – 0.14
3.25	6	20	36	62	15.1	312000325HA	37.80	312000325HB	37.80	0.06 – 0.14
3.30	6	20	36	62	15.1	31200033HA	37.80	31200033HB	37.80	0.06 – 0.14
3.40	6	20	36	62	14.9	31200034HA	37.80	31200034HB	37.80	0.06 – 0.14
3.50	6	20	36	62	14.8	31200035HA	37.80	31200035HB	37.80	0.06 – 0.14
3.60	6	20	36	62	14.6	31200036HA	37.80	31200036HB	37.80	0.06 – 0.14
3.70	6	20	36	62	14.5	31200037HA	37.80	31200037HB	37.80	0.06 – 0.14
3.80	6	24	36	66	18.3	31200038HA	37.80	31200038HB	37.80	0.06 – 0.14
3.90	6	24	36	66	18.2	31200039HA	37.80	31200039HB	37.80	0.06 – 0.14
4.00	6	24	36	66	18.0	31200040HA	40.93	31200040HB	40.93	0.08 – 0.16
4.10	6	24	36	66	17.9	31200041HA	40.93	31200041HB	40.93	0.08 – 0.16
4.20	6	24	36	66	17.7	31200042HA	40.93	31200042HB	40.93	0.08 – 0.16
4.30	6	24	36	66	17.6	31200043HA	40.93	31200043HB	40.93	0.08 – 0.16
4.40	6	24	36	66	17.4	31200044HA	40.93	31200044HB	40.93	0.08 – 0.16
4.50	6	24	36	66	17.3	31200045HA	40.93	31200045HB	40.93	0.08 – 0.16
4.60	6	24	36	66	17.1	31200046HA	40.93	31200046HB	40.93	0.08 – 0.16
4.65	6	24	36	66	17.0	312000465HA	40.93	312000465HB	40.93	0.08 – 0.16
4.70	6	24	36	66	17.0	31200047HA	40.93	31200047HB	40.93	0.08 – 0.16
4.80	6	28	36	66	20.8	31200048HA	40.93	31200048HB	40.93	0.08 – 0.16
4.90	6	28	36	66	20.7	31200049HA	40.93	31200049HB	40.93	0.08 – 0.16
5.00	6	28	36	66	20.5	31200050HA	40.93	31200050HB	40.93	0.09 – 0.20
5.10	6	28	36	66	20.4	31200051HA	40.93	31200051HB	40.93	0.09 – 0.20
5.20	6	28	36	66	20.2	31200052HA	40.93	31200052HB	40.93	0.09 – 0.20
5.30	6	28	36	66	20.1	31200053HA	40.93	31200053HB	40.93	0.09 – 0.20
5.40	6	28	36	66	19.9	31200054HA	40.93	31200054HB	40.93	0.09 – 0.20
5.50	6	28	36	66	19.8	31200055HA	40.93	31200055HB	40.93	0.09 – 0.20
5.55	6	28	36	66	19.7	312000555HA	40.93	312000555HB	40.93	0.09 – 0.20
5.60	6	28	36	66	19.6	31200056HA	40.93	31200056HB	40.93	0.09 – 0.20
5.70	6	28	36	66	19.5	31200057HA	40.93	31200057HB	40.93	0.09 – 0.20
5.80	6	28	36	66	19.3	31200058HA	40.93	31200058HB	40.93	0.09 – 0.20
5.90	6	28	36	66	19.2	31200059HA	40.93	31200059HB	40.93	0.09 – 0.20
6.00	6	28	36	66	19.0	31200060HA	40.93	31200060HB	40.93	0.10 – 0.23
6.10	8	34	36	79	24.9	31200061HA	55.58	31200061HB	55.58	0.10 – 0.23
6.20	8	34	36	79	24.7	31200062HA	55.58	31200062HB	55.58	0.10 – 0.23
6.30	8	34	36	79	24.6	31200063HA	55.58	31200063HB	55.58	0.10 – 0.23
6.40	8	34	36	79	24.4	31200064HA	55.58	31200064HB	55.58	0.10 – 0.23
6.50	8	34	36	79	24.3	31200065HA	55.58	31200065HB	55.58	0.10 – 0.23
6.60	8	34	36	79	24.1	31200066HA	55.58	31200066HB	55.58	0.10 – 0.23
6.70	8	34	36	79	24.0	31200067HA	55.58	31200067HB	55.58	0.10 – 0.23
6.80	8	34	36	79	23.8	31200068HA	55.58	31200068HB	55.58	0.10 – 0.23
6.90	8	34	36	79	23.7	31200069HA	55.58	31200069HB	55.58	0.10 – 0.23
7.00	8	34	36	79	23.5	31200070HA	55.58	31200070HB	55.58	0.11 – 0.25
7.10	8	41	36	79	30.4	31200071HA	55.58	31200071HB	55.58	0.11 – 0.25
7.20	8	41	36	79	30.2	31200072HA	55.58	31200072HB	55.58	0.11 – 0.25
7.30	8	41	36	79	30.1	31200073HA	55.58	31200073HB	55.58	0.11 – 0.25
7.40	8	41	36	79	29.9	31200074HA	55.58	31200074HB	55.58	0.11 – 0.25
7.45	8	41	36	79	29.8	312000745HA	55.58	312000745HB	55.58	0.11 – 0.25
7.50	8	41	36	79	29.8	31200075HA	55.58	31200075HB	55.58	0.11 – 0.25
7.55	8	41	36	79	29.7	312000755HA	55.58	312000755HB	55.58	0.11 – 0.25
7.60	8	41	36	79	29.6	31200076HA	55.58	31200076HB	55.58	0.11 – 0.25
7.70	8	41	36	79	29.5	31200077HA	55.58	31200077HB	55.58	0.11 – 0.25
7.80	8	41	36	79	29.3	31200078HA	55.58	31200078HB	55.58	0.11 – 0.25
7.90	8	41	36	79	29.2	31200079HA	55.58	31200079HB	55.58	0.11 – 0.25
8.00	8	41	36	79	29.0	31200080HA	55.58	31200080HB	55.58	0.11 – 0.27
8.10	10	47	40	89	34.9	31200081HA	62.26	31200081HB	62.26	0.11 – 0.27
8.20	10	47	40	89	34.7	31200082HA	62.26	31200082HB	62.26	0.11 – 0.27
8.30	10	47	40	89	34.6	31200083HA	62.26	31200083HB	62.26	0.11 – 0.27
8.40	10	47	40	89	34.4	31200084HA	62.26	31200084HB	62.26	0.11 – 0.27
8.50	10	47	40	89	34.3	31200085HA	62.26	31200085HB	62.26	0.11 – 0.27

*HE drill: same price, availability on request*HE drill: same price, availability on request

Product family 111

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
8.60	10	47	40	89	34.1	31200086HA	62.26	31200086HB	62.26	0.11 – 0.27
8.70	10	47	40	89	34.0	31200087HA	62.26	31200087HB	62.26	0.11 – 0.27
8.80	10	47	40	89	33.8	31200088HA	62.26	31200088HB	62.26	0.11 – 0.27
8.90	10	47	40	89	33.7	31200089HA	62.26	31200089HB	62.26	0.11 – 0.27
9.00	10	47	40	89	33.5	31200090HA	62.26	31200090HB	62.26	0.12 – 0.28
9.10	10	47	40	89	33.4	31200091HA	62.26	31200091HB	62.26	0.12 – 0.28
9.20	10	47	40	89	33.2	31200092HA	62.26	31200092HB	62.26	0.12 – 0.28
9.25	10	47	40	89	33.1	312000925HA	62.26	312000925HB	62.26	0.12 – 0.28
9.30	10	47	40	89	33.1	31200093HA	62.26	31200093HB	62.26	0.12 – 0.28
9.35	10	47	40	89	33.0	312000935HA	62.26	312000935HB	62.26	0.12 – 0.28
9.40	10	47	40	89	32.9	31200094HA	62.26	31200094HB	62.26	0.12 – 0.28
9.50	10	47	40	89	32.8	31200095HA	62.26	31200095HB	62.26	0.12 – 0.28
9.55	10	47	40	89	32.7	312000955HA	62.26	312000955HB	62.26	0.12 – 0.28
9.60	10	47	40	89	32.6	31200096HA	62.26	31200096HB	62.26	0.12 – 0.28
9.70	10	47	40	89	32.5	31200097HA	62.26	31200097HB	62.26	0.12 – 0.28
9.80	10	47	40	89	32.3	31200098HA	62.26	31200098HB	62.26	0.12 – 0.28
9.90	10	47	40	89	32.2	31200099HA	62.26	31200099HB	62.26	0.12 – 0.28
10.00	10	47	40	89	32.0	31200100HA	62.26	31200100HB	62.26	0.13 – 0.30
10.10	12	55	45	102	39.9	31200101HA	89.21	31200101HB	89.21	0.13 – 0.30
10.20	12	55	45	102	39.7	31200102HA	89.21	31200102HB	89.21	0.13 – 0.30
10.30	12	55	45	102	39.6	31200103HA	89.21	31200103HB	89.21	0.13 – 0.30
10.40	12	55	45	102	39.4	31200104HA	89.21	31200104HB	89.21	0.13 – 0.30
10.50	12	55	45	102	39.3	31200105HA	89.21	31200105HB	89.21	0.13 – 0.30
10.60	12	55	45	102	39.1	31200106HA	89.21	31200106HB	89.21	0.13 – 0.30
10.70	12	55	45	102	39.0	31200107HA	89.21	31200107HB	89.21	0.13 – 0.30
10.80	12	55	45	102	38.8	31200108HA	89.21	31200108HB	89.21	0.13 – 0.30
10.90	12	55	45	102	38.7	31200109HA	89.21	31200109HB	89.21	0.13 – 0.30
11.00	12	55	45	102	38.5	31200110HA	89.21	31200110HB	89.21	0.14 – 0.32
11.10	12	55	45	102	38.4	31200111HA	89.21	31200111HB	89.21	0.14 – 0.32
11.20	12	55	45	102	38.2	31200112HA	89.21	31200112HB	89.21	0.14 – 0.32
11.30	12	55	45	102	38.1	31200113HA	89.21	31200113HB	89.21	0.14 – 0.32
11.40	12	55	45	102	37.9	31200114HA	89.21	31200114HB	89.21	0.14 – 0.32
11.50	12	55	45	102	37.8	31200115HA	89.21	31200115HB	89.21	0.14 – 0.32
11.60	12	55	45	102	37.6	31200116HA	89.21	31200116HB	89.21	0.14 – 0.32
11.70	12	55	45	102	37.5	31200117HA	89.21	31200117HB	89.21	0.14 – 0.32
11.80	12	55	45	102	37.3	31200118HA	89.21	31200118HB	89.21	0.14 – 0.32
11.90	12	55	45	102	37.2	31200119HA	89.21	31200119HB	89.21	0.14 – 0.32
12.00	12	55	45	102	37.0	31200120HA	89.21	31200120HB	89.21	0.15 – 0.32
12.20	14	60	45	107	41.7	31200122HA	125.22	31200122HB	125.22	0.15 – 0.32
12.50	14	60	45	107	41.3	31200125HA	125.22	31200125HB	125.22	0.15 – 0.32
12.70	14	60	45	107	41.0	31200127HA	125.22	31200127HB	125.22	0.15 – 0.32
12.80	14	60	45	107	40.8	31200128HA	125.22	31200128HB	125.22	0.15 – 0.32
13.00	14	60	45	107	40.5	31200130HA	125.22	31200130HB	125.22	0.15 – 0.32
13.50	14	60	45	107	39.8	31200135HA	125.22	31200135HB	125.22	0.15 – 0.32
13.70	14	60	45	107	39.5	31200137HA	125.22	31200137HB	125.22	0.15 – 0.32
13.80	14	60	45	107	39.3	31200138HA	125.22	31200138HB	125.22	0.15 – 0.32
14.00	14	60	45	107	39.0	31200140HA	125.22	31200140HB	125.22	0.16 – 0.35
14.20	16	65	48	115	43.7	31200142HA	151.94	31200142HB	151.94	0.16 – 0.35
14.50	16	65	48	115	43.3	31200145HA	151.94	31200145HB	151.94	0.16 – 0.35
14.70	16	65	48	115	43.0	31200147HA	151.94	31200147HB	151.94	0.16 – 0.35
14.80	16	65	48	115	42.8	31200148HA	151.94	31200148HB	151.94	0.16 – 0.35
15.00	16	65	48	115	42.5	31200150HA	151.94	31200150HB	151.94	0.16 – 0.35
15.20	16	65	48	115	42.2	31200152HA	151.94	31200152HB	151.94	0.16 – 0.35
15.30	16	65	48	115	42.1	31200153HA	151.94	31200153HB	151.94	0.16 – 0.35
15.50	16	65	48	115	41.8	31200155HA	151.94	31200155HB	151.94	0.16 – 0.35
15.70	16	65	48	115	41.5	31200157HA	151.94	31200157HB	151.94	0.16 – 0.35
15.80	16	65	48	115	41.3	31200158HA	151.94	31200158HB	151.94	0.16 – 0.35
16.00	16	65	48	115	41.0	31200160HA	151.94	31200160HB	151.94	0.17 – 0.37
16.50	18	73	48	123	48.3	31200165HA	243.38	31200165HB	243.38	0.17 – 0.37
16.80	18	73	48	123	47.8	31200168HA	243.38	31200168HB	243.38	0.17 – 0.37
17.00	18	73	48	123	47.5	31200170HA	243.38	31200170HB	243.38	0.17 – 0.37
17.50	18	73	48	123	46.8	31200175HA	243.38	31200175HB	243.38	0.17 – 0.37
17.70	18	73	48	123	46.5	31200177HA	243.38	31200177HB	243.38	0.18 – 0.40
17.80	18	73	48	123	46.3	31200178HA	243.38	31200178HB	243.38	0.18 – 0.40
18.00	18	73	48	123	46.0	31200180HA	243.38	31200180HB	243.38	0.18 – 0.40
18.50	20	79	50	131	51.3	31200185HA	267.39	31200185HB	267.39	0.18 – 0.40
18.80	20	79	50	131	50.8	31200188HA	267.39	31200188HB	267.39	0.18 – 0.40
19.00	20	79	50	131	50.5	31200190HA	267.39	31200190HB	267.39	0.18 – 0.40
19.50	20	79	50	131	49.8	31200195HA	267.39	31200195HB	267.39	0.18 – 0.40
19.80	20	79	50	131	49.3	31200198HA	267.39	31200198HB	267.39	0.20 – 0.45
20.00	20	79	50	131	49.0	31200200HA	267.39	31200200HB	267.39	0.20 – 0.45

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si
Tensile strength/ Hardness	< 450 N/mm²	< 600 N/mm²
V_c (m/min)	125	325

Material	Alu & Al Alloys >10% Si
Tensile strength/ Hardness	> 600 N/mm²
V_c (m/min)	220

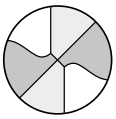
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength/Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	140	130	130	120	60	100	50	150	80

Product family 111

51100

TiAlN | HA | HB | HE* | 5xD | VHM | 140° | Manufacturer standard

Solid Carbide High-Performance Drill 5xD W/o Internal coolant



d1
m7

- High performance drill for the universal application
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
3.00	6	28	36	66	23.5	51100030HA	48.41	51100030HB	48.41	0.06 – 0.14
3.10	6	28	36	66	23.4	51100031HA	48.41	51100031HB	48.41	0.06 – 0.14
3.20	6	28	36	66	23.2	51100032HA	48.41	51100032HB	48.41	0.06 – 0.14
3.30	6	28	36	66	23.1	51100033HA	48.41	51100033HB	48.41	0.06 – 0.14
3.40	6	28	36	66	22.9	51100034HA	48.41	51100034HB	48.41	0.06 – 0.14
3.50	6	28	36	66	22.8	51100035HA	48.41	51100035HB	48.41	0.06 – 0.14
3.60	6	28	36	66	22.6	51100036HA	48.41	51100036HB	48.41	0.06 – 0.14
3.70	6	28	36	66	22.5	51100037HA	48.41	51100037HB	48.41	0.06 – 0.14
3.80	6	36	36	74	30.3	51100038HA	48.41	51100038HB	48.41	0.06 – 0.14
3.90	6	36	36	74	30.2	51100039HA	48.41	51100039HB	48.41	0.06 – 0.14
4.00	6	36	36	74	30.0	51100040HA	48.41	51100040HB	48.41	0.08 – 0.16
4.10	6	36	36	74	29.9	51100041HA	48.41	51100041HB	48.41	0.08 – 0.16
4.20	6	36	36	74	29.7	51100042HA	48.41	51100042HB	48.41	0.08 – 0.16
4.30	6	36	36	74	29.6	51100043HA	48.41	51100043HB	48.41	0.08 – 0.16
4.40	6	36	36	74	29.4	51100044HA	48.41	51100044HB	48.41	0.08 – 0.16
4.50	6	36	36	74	29.3	51100045HA	48.41	51100045HB	48.41	0.08 – 0.16
4.60	6	36	36	74	29.1	51100046HA	48.41	51100046HB	48.41	0.08 – 0.16
4.65	6	36	36	74	29.0	511000465HA	48.41	511000465HB	48.41	0.08 – 0.16
4.70	6	36	36	74	29.0	51100047HA	48.41	51100047HB	48.41	0.08 – 0.16
4.80	6	44	36	82	36.8	51100048HA	48.41	51100048HB	48.41	0.08 – 0.16
4.90	6	44	36	82	36.7	51100049HA	48.41	51100049HB	48.41	0.08 – 0.16
5.00	6	44	36	82	36.5	51100050HA	48.41	51100050HB	48.41	0.09 – 0.20
5.10	6	44	36	82	36.4	51100051HA	48.41	51100051HB	48.41	0.09 – 0.20
5.20	6	44	36	82	36.2	51100052HA	48.41	51100052HB	48.41	0.09 – 0.20
5.30	6	44	36	82	36.1	51100053HA	48.41	51100053HB	48.41	0.09 – 0.20
5.40	6	44	36	82	35.9	51100054HA	48.41	51100054HB	48.41	0.09 – 0.20
5.50	6	44	36	82	35.8	51100055HA	48.41	51100055HB	48.41	0.09 – 0.20
5.55	6	44	36	82	35.7	511000555HA	48.41	511000555HB	48.41	0.09 – 0.20
5.60	6	44	36	82	35.6	51100056HA	48.41	51100056HB	48.41	0.09 – 0.20
5.70	6	44	36	82	35.5	51100057HA	48.41	51100057HB	48.41	0.09 – 0.20
5.80	6	44	36	82	35.3	51100058HA	48.41	51100058HB	48.41	0.09 – 0.20
5.90	6	44	36	82	35.2	51100059HA	48.41	51100059HB	48.41	0.09 – 0.20
6.00	6	44	36	82	35.0	51100060HA	48.41	51100060HB	48.41	0.10 – 0.23
6.10	8	53	36	91	43.9	51100061HA	49.42	51100061HB	49.42	0.10 – 0.23
6.20	8	53	36	91	43.7	51100062HA	49.42	51100062HB	49.42	0.10 – 0.23
6.30	8	53	36	91	43.6	51100063HA	49.42	51100063HB	49.42	0.10 – 0.23
6.40	8	53	36	91	43.4	51100064HA	49.42	51100064HB	49.42	0.10 – 0.23
6.50	8	53	36	91	43.3	51100065HA	49.42	51100065HB	49.42	0.10 – 0.23
6.60	8	53	36	91	43.1	51100066HA	49.42	51100066HB	49.42	0.10 – 0.23
6.70	8	53	36	91	43.0	51100067HA	49.42	51100067HB	49.42	0.10 – 0.23
6.80	8	53	36	91	42.8	51100068HA	49.42	51100068HB	49.42	0.10 – 0.23
6.90	8	53	36	91	42.7	51100069HA	49.42	51100069HB	49.42	0.10 – 0.23
7.00	8	53	36	91	42.5	51100070HA	49.42	51100070HB	49.42	0.11 – 0.25
7.10	8	53	36	91	42.4	51100071HA	49.42	51100071HB	49.42	0.11 – 0.25
7.20	8	53	36	91	42.2	51100072HA	49.42	51100072HB	49.42	0.11 – 0.25
7.30	8	53	36	91	42.1	51100073HA	49.42	51100073HB	49.42	0.11 – 0.25
7.40	8	53	36	91	41.9	51100074HA	49.42	51100074HB	49.42	0.11 – 0.25
7.50	8	53	36	91	41.8	51100075HA	49.42	51100075HB	49.42	0.11 – 0.25
7.60	8	53	36	91	41.6	51100076HA	49.42	51100076HB	49.42	0.11 – 0.25
7.70	8	53	36	91	41.5	51100077HA	49.42	51100077HB	49.42	0.11 – 0.25
7.80	8	53	36	91	41.3	51100078HA	49.42	51100078HB	49.42	0.11 – 0.25
7.90	8	53	36	91	41.2	51100079HA	49.42	51100079HB	49.42	0.11 – 0.25
8.00	8	53	36	91	41.0	51100080HA	49.42	51100080HB	49.42	0.11 – 0.27
8.10	10	61	40	103	48.9	51100081HA	54.34	51100081HB	54.34	0.11 – 0.27
8.20	10	61	40	103	48.7	51100082HA	54.34	51100082HB	54.34	0.11 – 0.27
8.30	10	61	40	103	48.6	51100083HA	54.34	51100083HB	54.34	0.11 – 0.27
8.40	10	61	40	103	48.4	51100084HA	54.34	51100084HB	54.34	0.11 – 0.27
8.50	10	61	40	103	48.3	51100085HA	54.34	51100085HB	54.34	0.11 – 0.27
8.60	10	61	40	103	48.1	51100086HA	54.34	51100086HB	54.34	0.11 – 0.27
8.70	10	61	40	103	48.0	51100087HA	54.34	51100087HB	54.34	0.11 – 0.27
8.80	10	61	40	103	47.8	51100088HA	54.34	51100088HB	54.34	0.11 – 0.27
8.90	10	61	40	103	47.7	51100089HA	54.34	51100089HB	54.34	0.11 – 0.27
9.00	10	61	40	103	47.5	51100090HA	54.34	51100090HB	54.34	0.12 – 0.28
9.10	10	61	40	103	47.4	51100091HA	54.34	51100091HB	54.34	0.12 – 0.28
9.20	10	61	40	103	47.2	51100092HA	54.34	51100092HB	54.34	0.12 – 0.28
9.25	10	61	40	103	47.1	511000925HA	54.34	511000925HB	54.34	0.12 – 0.28
9.30	10	61	40	103	47.1	51100093HA	54.34	51100093HB	54.34	0.12 – 0.28
9.40	10	61	40	103	46.9	51100094HA	54.34	51100094HB	54.34	0.12 – 0.28

Product family 111

*HE drill: same price, availability on request*HE drill: same price, availability on request

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
9.50	10	61	40	103	46.8	51100095HA	54.34	51100095HB	54.34	0.12 – 0.28
9.60	10	61	40	103	46.6	51100096HA	54.34	51100096HB	54.34	0.12 – 0.28
9.70	10	61	40	103	46.5	51100097HA	54.34	51100097HB	54.34	0.12 – 0.28
9.80	10	61	40	103	46.3	51100098HA	54.34	51100098HB	54.34	0.12 – 0.28
9.90	10	61	40	103	46.1	51100099HA	54.34	51100099HB	54.34	0.12 – 0.28
9.92	10	61	40	103	46.1	511000992HA	54.34	511000992HB	54.34	0.12 – 0.28
10.00	10	61	40	103	46.0	51100100HA	54.34	51100100HB	54.34	0.13 – 0.30
10.10	12	71	45	118	55.9	51100101HA	81.52	51100101HB	81.52	0.13 – 0.30
10.20	12	71	45	118	55.7	51100102HA	81.52	51100102HB	81.52	0.13 – 0.30
10.30	12	71	45	118	55.6	51100103HA	81.52	51100103HB	81.52	0.13 – 0.30
10.40	12	71	45	118	55.4	51100104HA	81.52	51100104HB	81.52	0.13 – 0.30
10.50	12	71	45	118	55.3	51100105HA	81.52	51100105HB	81.52	0.13 – 0.30
10.60	12	71	45	118	55.1	51100106HA	81.52	51100106HB	81.52	0.13 – 0.30
10.70	12	71	45	118	55.0	51100107HA	81.52	51100107HB	81.52	0.13 – 0.30
10.80	12	71	45	118	54.8	51100108HA	81.52	51100108HB	81.52	0.13 – 0.30
10.90	12	71	45	118	54.7	51100109HA	81.52	51100109HB	81.52	0.13 – 0.30
11.00	12	71	45	118	54.5	51100110HA	81.52	51100110HB	81.52	0.14 – 0.32
11.10	12	71	45	118	54.4	51100111HA	81.52	51100111HB	81.52	0.14 – 0.32
11.20	12	71	45	118	54.2	51100112HA	81.52	51100112HB	81.52	0.14 – 0.32
11.30	12	71	45	118	54.1	51100113HA	81.52	51100113HB	81.52	0.14 – 0.32
11.40	12	71	45	118	53.9	51100114HA	81.52	51100114HB	81.52	0.14 – 0.32
11.50	12	71	45	118	53.8	51100115HA	81.52	51100115HB	81.52	0.14 – 0.32
11.60	12	71	45	118	53.6	51100116HA	81.52	51100116HB	81.52	0.14 – 0.32
11.70	12	71	45	118	53.5	51100117HA	81.52	51100117HB	81.52	0.14 – 0.32
11.80	12	71	45	118	53.3	51100118HA	81.52	51100118HB	81.52	0.14 – 0.32
11.90	12	71	45	118	53.2	51100119HA	81.52	51100119HB	81.52	0.14 – 0.32
12.00	12	71	45	118	53.0	51100120HA	81.52	51100120HB	81.52	0.15 – 0.32
12.10	14	77	45	124	58.9	51100121HA	107.31	51100121HB	107.31	0.15 – 0.32
12.20	14	77	45	124	58.7	51100122HA	107.31	51100122HB	107.31	0.15 – 0.32
12.30	14	77	45	124	58.6	51100123HA	107.31	51100123HB	107.31	0.15 – 0.32
12.40	14	77	45	124	58.4	51100124HA	107.31	51100124HB	107.31	0.15 – 0.32
12.50	14	77	45	124	58.3	51100125HA	107.31	51100125HB	107.31	0.15 – 0.32
12.70	14	77	45	124	58.0	51100127HA	107.31	51100127HB	107.31	0.15 – 0.32
13.00	14	77	45	124	57.5	51100130HA	107.31	51100130HB	107.31	0.15 – 0.32
13.50	14	77	45	124	56.8	51100135HA	107.31	51100135HB	107.31	0.15 – 0.32
13.70	14	77	45	124	56.5	51100137HA	107.31	51100137HB	107.31	0.15 – 0.32
13.80	14	77	45	124	56.3	51100138HA	107.31	51100138HB	107.31	0.15 – 0.32
14.00	14	77	45	124	56.0	51100140HA	107.31	51100140HB	107.31	0.16 – 0.35
14.10	16	83	48	133	61.9	51100141HA	139.56	51100141HB	139.56	0.16 – 0.35
14.20	16	83	48	133	61.7	51100142HA	139.56	51100142HB	139.56	0.16 – 0.35
14.50	16	83	48	133	61.3	51100145HA	139.56	51100145HB	139.56	0.16 – 0.35
14.70	16	83	48	133	61.0	51100147HA	139.56	51100147HB	139.56	0.16 – 0.35
15.00	16	83	48	133	60.5	51100150HA	139.56	51100150HB	139.56	0.16 – 0.35
15.20	16	83	48	133	60.2	51100152HA	139.56	51100152HB	139.56	0.16 – 0.35
15.50	16	83	48	133	59.8	51100155HA	139.56	51100155HB	139.56	0.16 – 0.35
15.70	16	83	48	133	59.5	51100157HA	139.56	51100157HB	139.56	0.16 – 0.35
15.80	16	83	48	133	59.3	51100158HA	139.56	51100158HB	139.56	0.16 – 0.35
16.00	16	83	48	133	59.0	51100160HA	139.56	51100160HB	139.56	0.17 – 0.37
16.50	18	93	48	143	68.3	51100165HA	223.37	51100165HB	223.37	0.17 – 0.37
17.00	18	93	48	143	67.5	51100170HA	223.37	51100170HB	223.37	0.17 – 0.37
17.50	18	93	48	143	66.8	51100175HA	223.37	51100175HB	223.37	0.17 – 0.37
18.00	18	93	48	143	66.0	51100180HA	223.37	51100180HB	223.37	0.18 – 0.40
18.50	20	101	50	153	73.3	51100185HA	242.53	51100185HB	242.53	0.18 – 0.40
19.00	20	101	50	153	72.5	51100190HA	242.53	51100190HB	242.53	0.18 – 0.40
19.50	20	101	50	153	71.8	51100195HA	242.53	51100195HB	242.53	0.18 – 0.40
20.00	20	101	50	153	71.0	51100200HA	242.53	51100200HB	242.53	0.20 – 0.45

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength/ Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	105	270	180

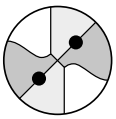
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength/Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	120	110	105	105	45	85	45	120	60

Product family 111

51200

TiAlN | HA | HB | HE* | 5xD | VHM | 25 bar | 140° | Manufacturer standard

Solid Carbide High-Performance Drill 5xD With Internal coolant



d_1 m7

- High performance drill for the universal application
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
2.00	4	26	28	62	23.0	51200020HA	48.80	–	–	0.05 – 0.12
2.10	4	26	28	62	22.9	51200021HA	48.80	–	–	0.05 – 0.12
2.15	4	26	28	62	22.8	512000215HA	48.80	–	–	0.05 – 0.12
2.20	4	26	28	62	22.7	51200022HA	48.80	–	–	0.05 – 0.12
2.30	4	26	28	62	22.6	51200023HA	48.80	–	–	0.05 – 0.12
2.40	4	26	28	62	22.4	51200024HA	48.80	–	–	0.05 – 0.12
2.50	4	26	28	62	22.3	51200025HA	48.80	–	–	0.05 – 0.12
2.60	4	26	28	62	22.1	51200026HA	48.80	–	–	0.05 – 0.12
2.65	4	26	28	62	22.0	512000265HA	48.80	–	–	0.05 – 0.12
2.70	4	26	28	62	22.0	51200027HA	48.80	–	–	0.05 – 0.12
2.80	4	26	28	62	21.8	51200028HA	48.80	–	–	0.05 – 0.12
2.85	4	26	28	62	21.7	512000285HA	48.80	–	–	0.05 – 0.12
2.90	4	26	28	62	21.7	51200029HA	48.80	–	–	0.05 – 0.12
3.00	6	28	36	66	23.5	51200030HA	48.80	51200030HB	48.80	0.06 – 0.14
3.05	6	28	36	66	23.4	512000305HA	48.80	512000305HB	48.80	0.06 – 0.14
3.10	6	28	36	66	23.4	51200031HA	48.80	51200031HB	48.80	0.06 – 0.14
3.20	6	28	36	66	23.2	51200032HA	48.80	51200032HB	48.80	0.06 – 0.14
3.25	6	28	36	66	23.1	512000325HA	48.80	512000325HB	48.80	0.06 – 0.14
3.30	6	28	36	66	23.1	51200033HA	48.80	51200033HB	48.80	0.06 – 0.14
3.40	6	28	36	66	22.9	51200034HA	48.80	51200034HB	48.80	0.06 – 0.14
3.50	6	28	36	66	22.8	51200035HA	48.80	51200035HB	48.80	0.06 – 0.14
3.60	6	28	36	66	22.6	51200036HA	48.80	51200036HB	48.80	0.06 – 0.14
3.70	6	28	36	66	22.5	51200037HA	48.80	51200037HB	48.80	0.06 – 0.14
3.80	6	36	36	74	30.3	51200038HA	48.80	51200038HB	48.80	0.06 – 0.14
3.90	6	36	36	74	30.2	51200039HA	48.80	51200039HB	48.80	0.06 – 0.14
4.00	6	36	36	74	30.0	51200040HA	52.51	51200040HB	52.51	0.08 – 0.16
4.05	6	36	36	74	29.9	512000405HA	52.51	512000405HB	52.51	0.08 – 0.16
4.10	6	36	36	74	29.9	51200041HA	52.51	51200041HB	52.51	0.08 – 0.16
4.20	6	36	36	74	29.7	51200042HA	52.51	51200042HB	52.51	0.08 – 0.16
4.30	6	36	36	74	29.6	51200043HA	52.51	51200043HB	52.51	0.08 – 0.16
4.40	6	36	36	74	29.4	51200044HA	52.51	51200044HB	52.51	0.08 – 0.16
4.50	6	36	36	74	29.3	51200045HA	52.51	51200045HB	52.51	0.08 – 0.16
4.60	6	36	36	74	29.1	51200046HA	52.51	51200046HB	52.51	0.08 – 0.16
4.65	6	36	36	74	29.0	512000465HA	52.51	512000465HB	52.51	0.08 – 0.16
4.70	6	36	36	74	29.0	51200047HA	52.51	51200047HB	52.51	0.08 – 0.16
4.80	6	44	36	82	36.8	51200048HA	52.51	51200048HB	52.51	0.08 – 0.16
4.90	6	44	36	82	36.7	51200049HA	52.51	51200049HB	52.51	0.08 – 0.16
5.00	6	44	36	82	36.5	51200050HA	52.51	51200050HB	52.51	0.09 – 0.20
5.05	6	44	36	82	36.4	512000505HA	52.51	512000505HB	52.51	0.09 – 0.20
5.10	6	44	36	82	36.4	51200051HA	52.51	51200051HB	52.51	0.09 – 0.20
5.20	6	44	36	82	36.2	51200052HA	52.51	51200052HB	52.51	0.09 – 0.20
5.30	6	44	36	82	36.1	51200053HA	52.51	51200053HB	52.51	0.09 – 0.20
5.40	6	44	36	82	35.9	51200054HA	52.51	51200054HB	52.51	0.09 – 0.20
5.50	6	44	36	82	35.8	51200055HA	52.51	51200055HB	52.51	0.09 – 0.20
5.55	6	44	36	82	35.7	512000555HA	52.51	512000555HB	52.51	0.09 – 0.20
5.60	6	44	36	82	35.6	51200056HA	52.51	51200056HB	52.51	0.09 – 0.20
5.70	6	44	36	82	35.5	51200057HA	52.51	51200057HB	52.51	0.09 – 0.20
5.80	6	44	36	82	35.3	51200058HA	52.51	51200058HB	52.51	0.09 – 0.20
5.90	6	44	36	82	35.2	51200059HA	52.51	51200059HB	52.51	0.09 – 0.20
6.00	6	44	36	82	35.0	51200060HA	52.51	51200060HB	52.51	0.10 – 0.23
6.05	6	44	36	82	34.9	512000605HA	52.51	512000605HB	52.51	0.10 – 0.23
6.10	8	53	36	91	43.9	51200061HA	58.04	51200061HB	58.04	0.10 – 0.23
6.20	8	53	36	91	43.7	51200062HA	58.04	51200062HB	58.04	0.10 – 0.23
6.30	8	53	36	91	43.6	51200063HA	58.04	51200063HB	58.04	0.10 – 0.23
6.40	8	53	36	91	43.4	51200064HA	58.04	51200064HB	58.04	0.10 – 0.23
6.50	8	53	36	91	43.3	51200065HA	58.04	51200065HB	58.04	0.10 – 0.23
6.60	8	53	36	91	43.1	51200066HA	58.04	51200066HB	58.04	0.10 – 0.23
6.70	8	53	36	91	43.0	51200067HA	58.04	51200067HB	58.04	0.10 – 0.23
6.80	8	53	36	91	42.8	51200068HA	58.04	51200068HB	58.04	0.10 – 0.23
6.90	8	53	36	91	42.7	51200069HA	58.04	51200069HB	58.04	0.10 – 0.23
7.00	8	53	36	91	42.5	51200070HA	58.04	51200070HB	58.04	0.11 – 0.25
7.10	8	53	36	91	42.4	51200071HA	58.04	51200071HB	58.04	0.11 – 0.25
7.20	8	53	36	91	42.2	51200072HA	58.04	51200072HB	58.04	0.11 – 0.25
7.30	8	53	36	91	42.1	51200073HA	58.04	51200073HB	58.04	0.11 – 0.25
7.40	8	53	36	91	41.9	51200074HA	58.04	51200074HB	58.04	0.11 – 0.25
7.45	8	53	36	91	41.8	512000745HA	58.04	512000745HB	58.04	0.11 – 0.25
7.50	8	53	36	91	41.8	51200075HA	58.04	51200075HB	58.04	0.11 – 0.25
7.55	8	53	36	91	41.7	512000755HA	58.04	512000755HB	58.04	0.11 – 0.25
7.60	8	53	36	91	41.6	51200076HA	58.04	51200076HB	58.04	0.11 – 0.25
7.70	8	53	36	91	41.5	51200077HA	58.04	51200077HB	58.04	0.11 – 0.25

Product family 111

*HE drill: same price, availability on request*HE drill: same price, availability on request

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
7.80	8	53	36	91	41.3	51200078HA	58.04	51200078HB	58.04	0.11 – 0.25
7.90	8	53	36	91	41.2	51200079HA	58.04	51200079HB	58.04	0.11 – 0.25
8.00	8	53	36	91	41.0	51200080HA	58.04	51200080HB	58.04	0.11 – 0.27
8.05	8	53	36	91	40.9	512000805HA	58.04	512000805HB	58.04	0.11 – 0.27
8.10	10	61	40	103	48.9	51200081HA	66.50	51200081HB	66.50	0.11 – 0.27
8.20	10	61	40	103	48.7	51200082HA	66.50	51200082HB	66.50	0.11 – 0.27
8.30	10	61	40	103	48.6	51200083HA	66.50	51200083HB	66.50	0.11 – 0.27
8.40	10	61	40	103	48.4	51200084HA	66.50	51200084HB	66.50	0.11 – 0.27
8.50	10	61	40	103	48.3	51200085HA	66.50	51200085HB	66.50	0.11 – 0.27
8.60	10	61	40	103	48.1	51200086HA	66.50	51200086HB	66.50	0.11 – 0.27
8.70	10	61	40	103	48.0	51200087HA	66.50	51200087HB	66.50	0.11 – 0.27
8.80	10	61	40	103	47.8	51200088HA	66.50	51200088HB	66.50	0.11 – 0.27
8.90	10	61	40	103	47.7	51200089HA	66.50	51200089HB	66.50	0.11 – 0.27
9.00	10	61	40	103	47.5	51200090HA	66.50	51200090HB	66.50	0.12 – 0.28
9.10	10	61	40	103	47.4	51200091HA	66.50	51200091HB	66.50	0.12 – 0.28
9.20	10	61	40	103	47.2	51200092HA	66.50	51200092HB	66.50	0.12 – 0.28
9.25	10	61	40	103	47.1	512000925HA	66.50	512000925HB	66.50	0.12 – 0.28
9.30	10	61	40	103	47.1	51200093HA	66.50	51200093HB	66.50	0.12 – 0.28
9.35	10	61	40	103	47.0	512000935HA	66.50	512000935HB	66.50	0.12 – 0.28
9.40	10	61	40	103	46.9	51200094HA	66.50	51200094HB	66.50	0.12 – 0.28
9.50	10	61	40	103	46.8	51200095HA	66.50	51200095HB	66.50	0.12 – 0.28
9.55	10	61	40	103	46.7	512000955HA	66.50	512000955HB	66.50	0.12 – 0.28
9.60	10	61	40	103	46.6	51200096HA	66.50	51200096HB	66.50	0.12 – 0.28
9.70	10	61	40	103	46.5	51200097HA	66.50	51200097HB	66.50	0.12 – 0.28
9.80	10	61	40	103	46.3	51200098HA	66.50	51200098HB	66.50	0.12 – 0.28
9.90	10	61	40	103	46.2	51200099HA	66.50	51200099HB	66.50	0.12 – 0.28
9.92	10	61	40	103	46.1	512000992HA	66.50	512000992HB	66.50	0.12 – 0.28
10.00	10	61	40	103	46.0	51200100HA	66.50	51200100HB	66.50	0.13 – 0.30
10.05	10	61	40	103	45.9	512001005HA	66.50	512001005HB	66.50	0.13 – 0.30
10.10	12	71	45	118	55.9	51200101HA	96.98	51200101HB	96.98	0.13 – 0.30
10.20	12	71	45	118	55.7	51200102HA	96.98	51200102HB	96.98	0.13 – 0.30
10.30	12	71	45	118	55.6	51200103HA	96.98	51200103HB	96.98	0.13 – 0.30
10.40	12	71	45	118	55.4	51200104HA	96.98	51200104HB	96.98	0.13 – 0.30
10.50	12	71	45	118	55.3	51200105HA	96.98	51200105HB	96.98	0.13 – 0.30
10.60	12	71	45	118	55.1	51200106HA	96.98	51200106HB	96.98	0.13 – 0.30
10.70	12	71	45	118	55.0	51200107HA	96.98	51200107HB	96.98	0.13 – 0.30
10.80	12	71	45	118	54.8	51200108HA	96.98	51200108HB	96.98	0.13 – 0.30
10.90	12	71	45	118	54.7	51200109HA	96.98	51200109HB	96.98	0.13 – 0.30
11.00	12	71	45	118	54.5	51200110HA	96.98	51200110HB	96.98	0.14 – 0.32
11.10	12	71	45	118	54.4	51200111HA	96.98	51200111HB	96.98	0.14 – 0.32
11.20	12	71	45	118	54.2	51200112HA	96.98	51200112HB	96.98	0.14 – 0.32
11.30	12	71	45	118	54.1	51200113HA	96.98	51200113HB	96.98	0.14 – 0.32
11.40	12	71	45	118	53.9	51200114HA	96.98	51200114HB	96.98	0.14 – 0.32
11.50	12	71	45	118	53.8	51200115HA	96.98	51200115HB	96.98	0.14 – 0.32
11.60	12	71	45	118	53.6	51200116HA	96.98	51200116HB	96.98	0.14 – 0.32
11.70	12	71	45	118	53.5	51200117HA	96.98	51200117HB	96.98	0.14 – 0.32
11.80	12	71	45	118	53.3	51200118HA	96.98	51200118HB	96.98	0.14 – 0.32
11.90	12	71	45	118	53.2	51200119HA	96.98	51200119HB	96.98	0.14 – 0.32
12.00	12	71	45	118	53.0	51200120HA	96.98	51200120HB	96.98	0.15 – 0.32
12.05	12	71	45	118	52.9	512001205HA	96.98	512001205HB	96.98	0.15 – 0.32
12.10	14	77	45	124	58.9	51200121HA	130.54	51200121HB	130.54	0.15 – 0.32
12.20	14	77	45	124	58.7	51200122HA	130.54	51200122HB	130.54	0.15 – 0.32
12.30	14	77	45	124	58.6	51200123HA	130.54	51200123HB	130.54	0.15 – 0.32
12.40	14	77	45	124	58.4	51200124HA	130.54	51200124HB	130.54	0.15 – 0.32
12.50	14	77	45	124	58.3	51200125HA	130.54	51200125HB	130.54	0.15 – 0.32
12.70	14	77	45	124	58.0	51200127HA	130.54	51200127HB	130.54	0.15 – 0.32
12.80	14	77	45	124	57.8	51200128HA	130.54	51200128HB	130.54	0.15 – 0.32
13.00	14	77	45	124	57.5	51200130HA	130.54	51200130HB	130.54	0.15 – 0.32
13.50	14	77	45	124	56.8	51200135HA	130.54	51200135HB	130.54	0.15 – 0.32
13.70	14	77	45	124	56.5	51200137HA	130.54	51200137HB	130.54	0.15 – 0.32
13.80	14	77	45	124	56.3	51200138HA	130.54	51200138HB	130.54	0.15 – 0.32

Furth sizes on p. 40

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength/ Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	125	325	220

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength/Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	140	130	130	120	60	100	50	150	80

Product family 111

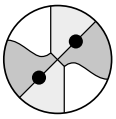
51200

Solid Carbide High-Performance Drill 5xD With Internal coolant

Continued from p. 39

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
13.90	14	77	45	124	56.2	51200139HA	130.54	51200139HB	130.54	0.15 – 0.32
14.00	14	77	45	124	56.0	51200140HA	130.54	51200140HB	130.54	0.16 – 0.35
14.10	16	83	48	133	61.9	51200141HA	161.01	51200141HB	161.01	0.16 – 0.35
14.20	16	83	48	133	61.7	51200142HA	161.01	51200142HB	161.01	0.16 – 0.35
14.50	16	83	48	133	61.3	51200145HA	161.01	51200145HB	161.01	0.16 – 0.35
14.70	16	83	48	133	61.0	51200147HA	161.01	51200147HB	161.01	0.16 – 0.35
14.80	16	83	48	133	60.8	51200148HA	161.01	51200148HB	161.01	0.16 – 0.35
15.00	16	83	48	133	60.5	51200150HA	161.01	51200150HB	161.01	0.16 – 0.35
15.10	16	83	48	133	60.4	51200151HA	161.01	51200151HB	161.01	0.16 – 0.35
15.20	16	83	48	133	60.2	51200152HA	161.01	51200152HB	161.01	0.16 – 0.35
15.30	16	83	48	133	60.1	51200153HA	161.01	51200153HB	161.01	0.16 – 0.35
15.50	16	83	48	133	59.8	51200155HA	161.01	51200155HB	161.01	0.16 – 0.35
15.70	16	83	48	133	59.5	51200157HA	161.01	51200157HB	161.01	0.16 – 0.35
15.80	16	83	48	133	59.3	51200158HA	161.01	51200158HB	161.01	0.16 – 0.35
16.00	16	83	48	133	59.0	51200160HA	161.01	51200160HB	161.01	0.17 – 0.37
16.50	18	93	48	143	68.3	51200165HA	258.07	51200165HB	258.07	0.17 – 0.37
16.80	18	93	48	143	67.8	51200168HA	258.07	51200168HB	258.07	0.17 – 0.37
17.00	18	93	48	143	67.5	51200170HA	258.07	51200170HB	258.07	0.17 – 0.37
17.50	18	93	48	143	66.8	51200175HA	258.07	51200175HB	258.07	0.17 – 0.37
17.70	18	93	48	143	66.5	51200177HA	258.07	51200177HB	258.07	0.17 – 0.37
17.80	18	93	48	143	66.3	51200178HA	258.07	51200178HB	258.07	0.17 – 0.37
18.00	18	93	48	143	66.0	51200180HA	258.07	51200180HB	258.07	0.18 – 0.40
18.50	20	101	50	153	73.3	51200185HA	280.65	51200185HB	280.65	0.18 – 0.40
18.80	20	101	50	153	72.8	51200188HA	280.65	51200188HB	280.65	0.18 – 0.40
19.00	20	101	50	153	72.5	51200190HA	280.65	51200190HB	280.65	0.18 – 0.40
19.50	20	101	50	153	71.8	51200195HA	280.65	51200195HB	280.65	0.18 – 0.40
19.80	20	101	50	153	71.3	51200198HA	280.65	51200198HB	280.65	0.18 – 0.40
20.00	20	101	50	153	71.0	51200200HA	280.65	51200200HB	280.65	0.20 – 0.45

*HE drill: same price. availability on request*HE drill: same price. availability on request



d_1 m7

- High performance drill for the universal application
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

Our solid carbide drills are ready for any grade of steel

Visit YouTube to watch our high-performance drill 51200 machining various materials.

https://www.youtube.com/watch?v=ozj03k5RT5o

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength/ Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	125	325	220

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength/Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	140	130	130	120	60	100	50	150	80

Product family 111

Do you already know our Indexable Insert Drills? High efficiency and precision

See our Indexable insert drills in action!

On YouTube you can see our indexable insert full drill during the machining of different materials.

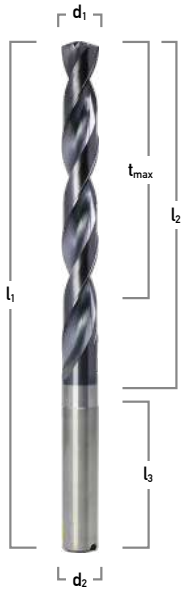
https://www.youtube.com/watch?v=7abJLb-WZlE&t=10s

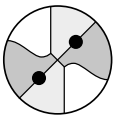
71200

TiAlN | HA | HB | HE* | 7xD | VHM | 25 bar | 140° | Manufacturer standard

Solid Carbide High-Performance Drill 7xD

With Internal coolant





d1 m7

- High performance drill for the universal application
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
2.80	4	30	28	66	25.8	71200028HA	108.07	–	–	0.04 – 0.12
3.00	6	34	36	72	29.5	71200030HA	108.07	71200030HB	108.07	0.06 – 0.14
3.10	6	34	36	72	29.4	71200031HA	108.07	71200031HB	108.07	0.06 – 0.14
3.20	6	34	36	72	29.2	71200032HA	108.07	71200032HB	108.07	0.06 – 0.14
3.25	6	34	36	72	29.1	712000325HA	108.07	712000325HB	108.07	0.06 – 0.14
3.30	6	34	36	72	29.1	71200033HA	108.07	71200033HB	108.07	0.06 – 0.14
3.40	6	34	36	72	28.9	71200034HA	108.07	71200034HB	108.07	0.06 – 0.14
3.50	6	34	36	72	28.8	71200035HA	108.07	71200035HB	108.07	0.06 – 0.14
3.60	6	34	36	72	28.6	71200036HA	108.07	71200036HB	108.07	0.06 – 0.14
3.70	6	34	36	72	28.5	71200037HA	108.07	71200037HB	108.07	0.06 – 0.14
3.80	6	43	36	81	37.3	71200038HA	108.07	71200038HB	108.07	0.06 – 0.14
3.90	6	43	36	81	37.2	71200039HA	108.07	71200039HB	108.07	0.06 – 0.14
4.00	6	43	36	81	37.0	71200040HA	108.07	71200040HB	108.07	0.08 – 0.16
4.10	6	43	36	81	36.9	71200041HA	108.07	71200041HB	108.07	0.08 – 0.16
4.20	6	43	36	81	36.7	71200042HA	108.07	71200042HB	108.07	0.08 – 0.16
4.30	6	43	36	81	36.6	71200043HA	108.07	71200043HB	108.07	0.08 – 0.16
4.40	6	43	36	81	36.4	71200044HA	108.07	71200044HB	108.07	0.08 – 0.16
4.50	6	43	36	81	36.3	71200045HA	108.07	71200045HB	108.07	0.08 – 0.16
4.60	6	43	36	81	36.1	71200046HA	108.07	71200046HB	108.07	0.08 – 0.16
4.70	6	43	36	81	36.0	71200047HA	108.07	71200047HB	108.07	0.08 – 0.16
4.80	6	57	36	95	49.8	71200048HA	108.07	71200048HB	108.07	0.08 – 0.16
4.90	6	57	36	95	49.7	71200049HA	108.07	71200049HB	108.07	0.08 – 0.16
5.00	6	57	36	95	49.5	71200050HA	108.07	71200050HB	108.07	0.09 – 0.20
5.10	6	57	36	95	49.4	71200051HA	108.07	71200051HB	108.07	0.09 – 0.20
5.20	6	57	36	95	49.2	71200052HA	108.07	71200052HB	108.07	0.09 – 0.20
5.30	6	57	36	95	49.1	71200053HA	108.07	71200053HB	108.07	0.09 – 0.20
5.40	6	57	36	95	48.9	71200054HA	108.07	71200054HB	108.07	0.09 – 0.20
5.50	6	57	36	95	48.8	71200055HA	108.07	71200055HB	108.07	0.09 – 0.20
5.60	6	57	36	95	48.6	71200056HA	108.07	71200056HB	108.07	0.09 – 0.20
5.70	6	57	36	95	48.5	71200057HA	108.07	71200057HB	108.07	0.09 – 0.20
5.80	6	57	36	95	48.3	71200058HA	108.07	71200058HB	108.07	0.09 – 0.20
5.90	6	57	36	95	48.2	71200059HA	108.07	71200059HB	108.07	0.09 – 0.20
6.00	6	57	36	95	48.0	71200060HA	108.07	71200060HB	108.07	0.10 – 0.23
6.10	8	76	36	114	66.9	71200061HA	125.00	71200061HB	125.00	0.10 – 0.23
6.20	8	76	36	114	66.7	71200062HA	125.00	71200062HB	125.00	0.10 – 0.23
6.30	8	76	36	114	66.6	71200063HA	125.00	71200063HB	125.00	0.10 – 0.23
6.40	8	76	36	114	66.4	71200064HA	125.00	71200064HB	125.00	0.10 – 0.23
6.50	8	76	36	114	66.3	71200065HA	125.00	71200065HB	125.00	0.10 – 0.23
6.60	8	76	36	114	66.1	71200066HA	125.00	71200066HB	125.00	0.10 – 0.23
6.70	8	76	36	114	66.0	71200067HA	125.00	71200067HB	125.00	0.10 – 0.23
6.80	8	76	36	114	65.8	71200068HA	125.00	71200068HB	125.00	0.10 – 0.23
6.90	8	76	36	114	65.7	71200069HA	125.00	71200069HB	125.00	0.10 – 0.23
7.00	8	76	36	114	65.5	71200070HA	125.00	71200070HB	125.00	0.11 – 0.25
7.10	8	76	36	114	65.4	71200071HA	125.00	71200071HB	125.00	0.11 – 0.25
7.20	8	76	36	114	65.2	71200072HA	125.00	71200072HB	125.00	0.11 – 0.25
7.30	8	76	36	114	65.1	71200073HA	125.00	71200073HB	125.00	0.11 – 0.25
7.40	8	76	36	114	64.9	71200074HA	125.00	71200074HB	125.00	0.11 – 0.25
7.50	8	76	36	114	64.8	71200075HA	125.00	71200075HB	125.00	0.11 – 0.25
7.60	8	76	36	114	64.6	71200076HA	125.00	71200076HB	125.00	0.11 – 0.25
7.70	8	76	36	114	64.5	71200077HA	125.00	71200077HB	125.00	0.11 – 0.25
7.80	8	76	36	114	64.3	71200078HA	125.00	71200078HB	125.00	0.11 – 0.25
7.90	8	76	36	114	64.2	71200079HA	125.00	71200079HB	125.00	0.11 – 0.25
8.00	8	76	36	114	64.0	71200080HA	125.00	71200080HB	125.00	0.11 – 0.27
8.10	10	95	40	142	82.9	71200081HA	151.32	71200081HB	151.32	0.11 – 0.27
8.20	10	95	40	142	82.7	71200082HA	151.32	71200082HB	151.32	0.11 – 0.27
8.30	10	95	40	142	82.6	71200083HA	151.32	71200083HB	151.32	0.11 – 0.27
8.40	10	95	40	142	82.4	71200084HA	151.32	71200084HB	151.32	0.11 – 0.27
8.50	10	95	40	142	82.3	71200085HA	151.32	71200085HB	151.32	0.11 – 0.27
8.60	10	95	40	142	82.1	71200086HA	151.32	71200086HB	151.32	0.11 – 0.27
8.70	10	95	40	142	82.0	71200087HA	151.32	71200087HB	151.32	0.11 – 0.27
8.80	10	95	40	142	81.8	71200088HA	151.32	71200088HB	151.32	0.11 – 0.27
8.90	10	95	40	142	81.7	71200089HA	151.32	71200089HB	151.32	0.11 – 0.27

*HE drill: same price, availability on request*HE drill: same price, availability on request

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
9.00	10	95	40	142	81.5	71200090HA	151.32	71200090HB	151.32	0.12 – 0.28
9.10	10	95	40	142	81.4	71200091HA	151.32	71200091HB	151.32	0.12 – 0.28
9.20	10	95	40	142	81.2	71200092HA	151.32	71200092HB	151.32	0.12 – 0.28
9.30	10	95	40	142	81.1	71200093HA	151.32	71200093HB	151.32	0.12 – 0.28
9.40	10	95	40	142	80.9	71200094HA	151.32	71200094HB	151.32	0.12 – 0.28
9.50	10	95	40	142	80.8	71200095HA	151.32	71200095HB	151.32	0.12 – 0.28
9.60	10	95	40	142	80.6	71200096HA	151.32	71200096HB	151.32	0.12 – 0.28
9.70	10	95	40	142	80.5	71200097HA	151.32	71200097HB	151.32	0.12 – 0.28
9.80	10	95	40	142	80.3	71200098HA	151.32	71200098HB	151.32	0.12 – 0.28
9.90	10	95	40	142	80.2	71200099HA	151.32	71200099HB	151.32	0.12 – 0.28
10.00	10	95	40	142	80.0	71200100HA	151.32	71200100HB	151.32	0.13 – 0.30
10.20	12	114	45	162	98.7	71200102HA	199.59	71200102HB	199.59	0.13 – 0.30
10.30	12	114	45	162	98.6	71200103HA	199.59	71200103HB	199.59	0.13 – 0.30
10.50	12	114	45	162	98.3	71200105HA	199.59	71200105HB	199.59	0.13 – 0.30
10.80	12	114	45	162	97.8	71200108HA	199.59	71200108HB	199.59	0.13 – 0.30
11.00	12	114	45	162	97.5	71200110HA	199.59	71200110HB	199.59	0.14 – 0.32
11.20	12	114	45	162	97.2	71200112HA	199.59	71200112HB	199.59	0.14 – 0.32
11.50	12	114	45	162	96.8	71200115HA	199.59	71200115HB	199.59	0.14 – 0.32
11.60	12	114	45	162	96.6	71200116HA	199.59	71200116HB	199.59	0.14 – 0.32
11.80	12	114	45	162	96.3	71200118HA	199.59	71200118HB	199.59	0.14 – 0.32
12.00	12	114	45	162	96.0	71200120HA	199.59	71200120HB	199.59	0.15 – 0.32
12.10	14	133	45	178	114.9	71200121HA	281.95	71200121HB	281.95	0.15 – 0.32
12.20	14	133	45	178	114.7	71200122HA	281.95	71200122HB	281.95	0.15 – 0.32
12.50	14	133	45	178	114.3	71200125HA	281.95	71200125HB	281.95	0.15 – 0.32
12.70	14	133	45	178	114.0	71200127HA	281.95	71200127HB	281.95	0.15 – 0.32
12.80	14	133	45	178	113.8	71200128HA	281.95	71200128HB	281.95	0.15 – 0.32
13.00	14	133	45	178	113.5	71200130HA	281.95	71200130HB	281.95	0.15 – 0.32
13.50	14	133	45	178	112.8	71200135HA	281.95	71200135HB	281.95	0.15 – 0.32
13.80	14	133	45	178	112.3	71200138HA	281.95	71200138HB	281.95	0.15 – 0.35
14.00	14	133	45	178	112.0	71200140HA	281.95	71200140HB	281.95	0.16 – 0.35
14.20	16	152	48	203	130.7	71200142HA	353.38	71200142HB	353.38	0.16 – 0.35
14.50	16	152	48	203	130.3	71200145HA	353.38	71200145HB	353.38	0.16 – 0.35
14.80	16	152	48	203	129.8	71200148HA	353.38	71200148HB	353.38	0.16 – 0.35
15.00	16	152	48	203	129.5	71200150HA	353.38	71200150HB	353.38	0.16 – 0.35
15.50	16	152	48	203	128.8	71200155HA	353.38	71200155HB	353.38	0.16 – 0.35
15.80	16	152	48	203	128.3	71200158HA	353.38	71200158HB	353.38	0.16 – 0.35
16.00	16	152	48	203	128.0	71200160HA	353.38	71200160HB	353.38	0.17 – 0.37
16.50	18	171	48	222	146.3	71200165HA	441.81	71200165HB	441.81	0.17 – 0.37
17.00	18	171	48	222	145.5	71200170HA	441.81	71200170HB	441.81	0.17 – 0.37
17.50	18	171	48	222	144.8	71200175HA	441.81	71200175HB	441.81	0.17 – 0.37
18.00	18	171	48	222	144.0	71200180HA	441.81	71200180HB	441.81	0.18 – 0.40
18.50	20	190	50	243	162.3	71200185HA	518.70	71200185HB	518.70	0.18 – 0.40
19.00	20	190	50	243	161.5	71200190HA	518.70	71200190HB	518.70	0.18 – 0.40
19.50	20	190	50	243	160.8	71200195HA	518.70	71200195HB	518.70	0.18 – 0.40
20.00	20	190	50	243	160.0	71200200HA	518.70	71200200HB	518.70	0.20 – 0.45

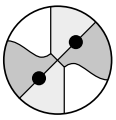
Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	125	325	220

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	140	130	130	120	60	100	55	150	80

Product family 111

120200

Solid Carbide High-Performance Drill 12xD With Internal coolant



d1
h7

- High performance drill for the universal application
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
3.00	6	50	36	90	45.5	120200030HA	144.63	0.06 – 0.14
3.10	6	50	36	90	45.4	120200031HA	144.63	0.06 – 0.14
3.20	6	50	36	90	45.2	120200032HA	144.63	0.06 – 0.14
3.30	6	50	36	90	45.1	120200033HA	144.63	0.06 – 0.14
3.40	6	50	36	90	44.9	120200034HA	144.63	0.06 – 0.14
3.50	6	50	36	90	44.8	120200035HA	144.63	0.06 – 0.14
3.60	6	50	36	90	44.6	120200036HA	144.63	0.06 – 0.14
3.70	6	50	36	90	44.5	120200037HA	144.63	0.06 – 0.14
3.80	6	64	36	102	58.3	120200038HA	144.63	0.06 – 0.14
3.90	6	64	36	102	58.2	120200039HA	144.63	0.06 – 0.14
4.00	6	64	36	102	58.0	120200040HA	144.63	0.08 – 0.16
4.10	6	64	36	102	57.9	120200041HA	144.63	0.08 – 0.16
4.20	6	64	36	102	57.7	120200042HA	144.63	0.08 – 0.16
4.30	6	64	36	102	57.6	120200043HA	144.63	0.08 – 0.16
4.40	6	64	36	102	57.4	120200044HA	144.63	0.08 – 0.16
4.50	6	64	36	102	57.3	120200045HA	144.63	0.08 – 0.16
4.60	6	64	36	102	57.1	120200046HA	144.63	0.08 – 0.16
4.70	6	64	36	102	57.0	120200047HA	144.63	0.08 – 0.16
4.80	6	78	36	116	70.8	120200048HA	144.63	0.08 – 0.16
4.90	6	78	36	116	70.7	120200049HA	144.63	0.08 – 0.16
5.00	6	78	36	116	70.5	120200050HA	144.63	0.09 – 0.20
5.10	6	78	36	116	70.4	120200051HA	144.63	0.09 – 0.20
5.20	6	78	36	116	70.2	120200052HA	144.63	0.09 – 0.20
5.30	6	78	36	116	70.1	120200053HA	144.63	0.09 – 0.20
5.40	6	78	36	116	69.9	120200054HA	144.63	0.09 – 0.20
5.50	6	78	36	116	69.8	120200055HA	144.63	0.09 – 0.20
5.60	6	78	36	116	69.6	120200056HA	144.63	0.09 – 0.20
5.70	6	78	36	116	69.5	120200057HA	144.63	0.09 – 0.20
5.80	6	78	36	116	69.3	120200058HA	144.63	0.09 – 0.20
5.90	6	78	36	116	69.2	120200059HA	144.63	0.09 – 0.20
6.00	6	78	36	116	69.0	120200060HA	144.63	0.10 – 0.23
6.10	8	108	36	146	98.9	120200061HA	169.65	0.10 – 0.23
6.20	8	108	36	146	98.7	120200062HA	169.65	0.10 – 0.23
6.30	8	108	36	146	98.6	120200063HA	169.65	0.10 – 0.23
6.40	8	108	36	146	98.4	120200064HA	169.65	0.10 – 0.23
6.50	8	108	36	146	98.3	120200065HA	169.65	0.10 – 0.23
6.60	8	108	36	146	98.1	120200066HA	169.65	0.10 – 0.23
6.70	8	108	36	146	98.0	120200067HA	169.65	0.10 – 0.23
6.80	8	108	36	146	97.8	120200068HA	169.65	0.10 – 0.23
6.90	8	108	36	146	97.7	120200069HA	169.65	0.10 – 0.23
7.00	8	108	36	146	97.5	120200070HA	169.65	0.11 – 0.25
7.10	8	108	36	146	97.4	120200071HA	169.65	0.11 – 0.25
7.20	8	108	36	146	97.2	120200072HA	169.65	0.11 – 0.25
7.30	8	108	36	146	97.1	120200073HA	169.65	0.11 – 0.25
7.40	8	108	36	146	96.9	120200074HA	169.65	0.11 – 0.25
7.50	8	108	36	146	96.8	120200075HA	169.65	0.11 – 0.25
7.60	8	108	36	146	96.6	120200076HA	169.65	0.11 – 0.25
7.70	8	108	36	146	96.5	120200077HA	169.65	0.11 – 0.25
7.80	8	108	36	146	96.3	120200078HA	169.65	0.11 – 0.25
7.90	8	108	36	146	96.2	120200079HA	169.65	0.11 – 0.25
8.00	8	108	36	146	96.0	120200080HA	169.65	0.11 – 0.27
8.10	10	120	40	162	107.9	120200081HA	214.90	0.11 – 0.27
8.20	10	120	40	162	107.7	120200082HA	214.90	0.11 – 0.27
8.30	10	120	40	162	107.6	120200083HA	214.90	0.11 – 0.27
8.40	10	120	40	162	107.4	120200084HA	214.90	0.11 – 0.27
8.50	10	120	40	162	107.3	120200085HA	214.90	0.11 – 0.27
8.60	10	120	40	162	107.1	120200086HA	214.90	0.11 – 0.27
8.70	10	120	40	162	107.0	120200087HA	214.90	0.11 – 0.27
8.80	10	120	40	162	106.8	120200088HA	214.90	0.11 – 0.27
8.90	10	120	40	162	106.7	120200089HA	214.90	0.11 – 0.27
9.00	10	120	40	162	106.5	120200090HA	214.90	0.12 – 0.28
9.10	10	120	40	162	106.4	120200091HA	214.90	0.12 – 0.28
9.20	10	120	40	162	106.2	120200092HA	214.90	0.12 – 0.28
9.30	10	120	40	162	106.1	120200093HA	214.90	0.12 – 0.28
9.40	10	120	40	162	105.9	120200094HA	214.90	0.12 – 0.28

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
9.50	10	120	40	162	105.8	120200095HA	214.90	0.12 – 0.28
9.60	10	120	40	162	105.6	120200096HA	214.90	0.12 – 0.28
9.70	10	120	40	162	105.5	120200097HA	214.90	0.12 – 0.28
9.80	10	120	40	162	105.3	120200098HA	214.90	0.12 – 0.28
9.90	10	120	40	162	105.2	120200099HA	214.90	0.12 – 0.28
10.00	10	120	40	162	105.0	120200100HA	214.90	0.13 – 0.30
10.20	12	156	45	204	140.7	120200102HA	281.33	0.13 – 0.30
10.50	12	156	45	204	140.3	120200105HA	281.33	0.13 – 0.30
11.00	12	156	45	204	139.5	120200110HA	281.33	0.14 – 0.32
11.50	12	156	45	204	138.8	120200115HA	281.33	0.14 – 0.32
12.00	12	156	45	204	138.0	120200120HA	281.33	0.15 – 0.32
12.50	14	182	45	230	163.3	120200125HA	350.31	0.15 – 0.32
12.70	14	182	45	230	163.0	120200127HA	350.31	0.15 – 0.32
13.00	14	182	45	230	162.5	120200130HA	350.31	0.15 – 0.32
13.50	14	182	45	230	161.8	120200135HA	350.31	0.15 – 0.32
14.00	14	182	45	230	161.0	120200140HA	350.31	0.16 – 0.35
14.50	16	208	48	260	186.3	120200145HA	496.70	0.16 – 0.35
15.00	16	208	48	260	185.5	120200150HA	496.70	0.16 – 0.35
15.50	16	208	48	260	184.8	120200155HA	496.70	0.16 – 0.35
16.00	16	208	48	260	184.0	120200160HA	496.70	0.17 – 0.37
16.50	18	234	48	285	209.3	120200165HA	553.51	0.17 – 0.37
17.00	18	234	48	285	208.5	120200170HA	553.51	0.17 – 0.37
17.50	18	234	48	285	207.8	120200175HA	553.51	0.17 – 0.37
18.00	18	234	48	285	207.0	120200180HA	553.51	0.18 – 0.40
18.50	20	258	50	310	230.3	120200185HA	789.04	0.18 – 0.40
19.00	20	258	50	310	229.5	120200190HA	789.04	0.18 – 0.40
19.50	20	258	50	310	228.8	120200195HA	789.04	0.18 – 0.40
20.00	20	258	50	310	228.0	120200200HA	789.04	0.20 – 0.45

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	140	150	120

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	120	110	105	105	45	85	55	120	60

Product family 111

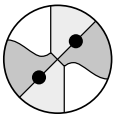
200200

TiAlN | HA | 20xD | VHM | 40 bar | 135° | Manufacturer standard

Solid Carbide Deep-Hole Drill 20xD

With Internal coolant

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
3.00	6	70	36	110	65.5	200200030HA	272.17	0.06 – 0.14
3.50	6	96	36	136	90.8	200200035HA	272.17	0.06 – 0.14
3.97	6	96	36	136	90.0	2002000397HA	282.17	0.06 – 0.14
4.00	6	96	36	136	90.0	200200040HA	282.17	0.08 – 0.16
4.50	6	118	36	158	111.3	200200045HA	324.19	0.08 – 0.16
4.76	6	118	36	158	110.9	2002000476HA	324.19	0.08 – 0.16
5.00	6	118	36	158	110.5	200200050HA	324.19	0.09 – 0.20
5.50	6	140	36	180	131.8	200200055HA	344.23	0.09 – 0.20
5.56	6	140	36	180	131.7	2002000556HA	344.23	0.09 – 0.20
6.00	6	140	36	180	131.0	200200060HA	380.23	0.10 – 0.23
6.35	8	162	36	202	152.5	2002000635HA	415.50	0.10 – 0.23
6.50	8	162	36	202	152.3	200200065HA	415.50	0.10 – 0.23
7.00	8	162	36	202	151.5	200200070HA	415.50	0.11 – 0.25
7.14	8	183	36	223	172.3	2002000714HA	451.52	0.11 – 0.25
7.50	8	183	36	223	171.8	200200075HA	451.52	0.11 – 0.25
8.00	8	183	36	223	171.0	200200080HA	494.33	0.11 – 0.27
8.50	10	205	40	249	192.3	200200085HA	547.59	0.11 – 0.27
9.00	10	205	40	249	191.5	200200090HA	547.59	0.12 – 0.28
10.00	10	227	40	271	212.0	200200100HA	552.35	0.13 – 0.30
12.00	12	274	45	323	256.0	200200120HA	610.40	0.15 – 0.32
14.00	14	318	45	367	297.0	200200140HA	872.54	0.16 – 0.35



d_1 h7

- Deep-hole drill for universal applications
- Ultra-micro grain solid carbide with TiAlN coating
- 4 margins for concentricity and alignment accuracy
- Optimized geometry for an optimum chip breaking and a high level of process reliability

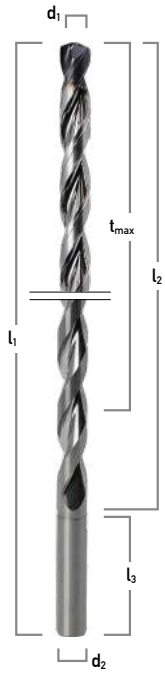
Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	140	150	120

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	120	110	105	105	45	85	75	120	60

Product family 111

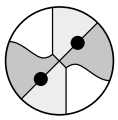
250200

Solid Carbide Deep-Hole Drill 25xD With Internal coolant



d_1	d_2	l_2	l_3	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
3.00	6	85	36	125	80.5	250200030HA	300.18	0.06 – 0.14
3.50	6	116	36	156	110.8	250200035HA	300.18	0.06 – 0.14
3.97	6	116	36	156	110.0	2502000397HA	311.43	0.06 – 0.14
4.00	6	116	36	156	110.0	250200040HA	311.43	0.08 – 0.16
4.50	6	143	36	183	136.3	250200045HA	370.24	0.08 – 0.16
4.76	6	143	36	183	135.9	2502000476HA	370.24	0.08 – 0.16
5.00	6	143	36	183	135.5	250200050HA	370.24	0.09 – 0.20
5.50	6	170	36	210	161.8	250200055HA	370.24	0.09 – 0.20
5.56	6	170	36	210	167.7	2502000556HA	396.25	0.09 – 0.20
6.00	6	170	36	210	161.0	250200060HA	444.27	0.10 – 0.23
6.35	8	197	36	237	187.5	2502000635HA	466.30	0.10 – 0.23
6.50	8	197	36	237	187.3	250200065HA	466.30	0.10 – 0.23
7.00	8	197	36	237	186.5	250200070HA	466.30	0.11 – 0.25
7.14	8	223	36	263	212.3	2502000714HA	518.34	0.11 – 0.25
7.50	8	223	36	263	211.8	250200075HA	518.34	0.11 – 0.25
8.00	8	223	36	263	211.0	250200080HA	573.14	0.11 – 0.27
8.50	10	250	40	294	237.3	250200085HA	623.61	0.11 – 0.27
9.00	10	250	40	294	236.5	250200090HA	706.44	0.12 – 0.28
10.00	10	277	40	321	262.0	250200100HA	706.44	0.13 – 0.30
12.00	12	337	45	386	319.0	250200120HA	800.51	0.15 – 0.32

- Deep-hole drill for universal applications
- Ultra-micro grain solid carbide with TiAlN coating
- 4 margins for concentricity and alignment accuracy
- Optimized geometry for an optimum chip breaking and a high level of process reliability



d_1 h7

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	140	150	120

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	120	110	105	105	45	85	75	120	60

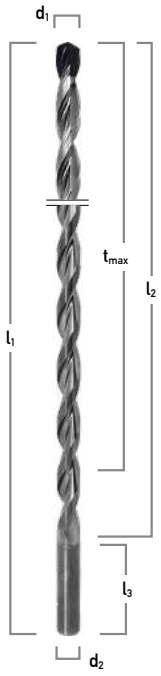
Product family 111

300200

TiAlN | HA | 30xD | VHM | 40 bar | 135° | Manufacturer standard

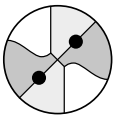
Solid Carbide Deep-Hole Drill 30xD

With Internal coolant



d_1	d_2	l_2	l_3	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
3.00	6	100	36	140	95.5	300200030HA	340.20	0.06 – 0.14
3.50	6	136	36	176	130.8	300200035HA	340.20	0.06 – 0.14
3.97	6	136	36	176	130.0	3002000397HA	366.22	0.06 – 0.14
4.00	6	136	36	176	130.0	300200040HA	366.22	0.08 – 0.16
4.50	6	168	36	208	161.3	300200045HA	434.28	0.08 – 0.16
4.76	6	168	36	208	160.9	3002000476HA	434.28	0.08 – 0.16
5.00	6	168	36	208	160.5	300200050HA	434.28	0.09 – 0.20
5.50	6	200	36	240	191.8	300200055HA	462.30	0.09 – 0.20
5.56	6	200	36	240	191.7	3002000556HA	462.30	0.09 – 0.20
6.00	6	200	36	240	191.0	300200060HA	516.32	0.10 – 0.23
6.35	8	232	36	272	222.5	3002000635HA	553.11	0.10 – 0.23
6.50	8	232	36	272	222.3	300200065HA	553.11	0.10 – 0.23
7.00	8	232	36	272	221.5	300200070HA	553.11	0.11 – 0.25
7.14	8	263	36	303	252.3	3002000714HA	584.36	0.11 – 0.25
7.50	8	263	36	303	251.8	300200075HA	623.61	0.11 – 0.25
8.00	8	263	36	303	251.0	300200080HA	664.41	0.11 – 0.27
8.50	10	295	40	339	282.3	300200085HA	723.68	0.11 – 0.27
9.00	10	295	40	339	281.5	300200090HA	723.68	0.12 – 0.28
10.00	10	327	40	371	312.0	300200100HA	740.45	0.13 – 0.30

- Deep-hole drill for universal applications
- Ultra-micro grain solid carbide with TiAlN coating
- 4 margins for concentricity and alignment accuracy
- Optimized geometry for an optimum chip breaking and a high level of process reliability



d_1 h7

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	140	150	120

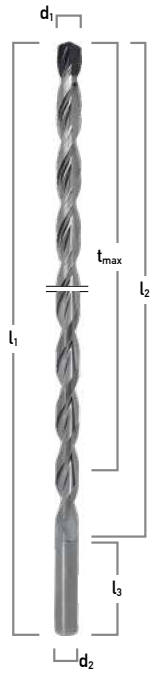
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	120	110	105	105	45	85	75	120	60

Product family 111

400200

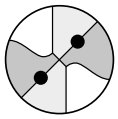
Solid Carbide Deep-Hole Drill 40xD

With Internal coolant



d_1	d_2	l_2	l_3	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
3.00	6	130	36	170	125.5	400200030HA	410.25	0.06 – 0.14
3.17	6	153	36	193	148.2	4002000317HA	410.25	0.06 – 0.14
3.50	6	153	36	193	147.8	400200035HA	410.25	0.06 – 0.14
3.97	6	176	36	216	170.0	4002000397HA	440.27	0.06 – 0.14
4.00	6	176	36	216	170.0	400200040HA	440.27	0.08 – 0.16
4.50	6	198	36	238	191.3	400200045HA	515.56	0.08 – 0.16
4.76	6	218	36	258	210.9	4002000476HA	515.56	0.08 – 0.16
5.00	6	218	36	258	210.5	400200050HA	515.56	0.09 – 0.20
5.50	6	240	36	280	231.8	400200055HA	552.35	0.09 – 0.20
5.56	6	260	36	300	251.7	4002000556HA	552.35	0.09 – 0.20
6.00	6	260	36	300	251.0	400200060HA	620.37	0.10 – 0.23
6.35	8	282	36	322	272.5	4002000635HA	664.41	0.10 – 0.23
6.50	8	282	36	322	272.3	400200065HA	664.41	0.10 – 0.23
7.00	8	302	36	342	291.5	400200070HA	664.41	0.11 – 0.25
7.14	8	323	36	363	312.3	4002000714HA	711.68	0.11 – 0.25
7.50	8	323	36	363	311.8	400200075HA	711.68	0.11 – 0.25
8.00	8	343	36	383	331.0	400200080HA	736.44	0.11 – 0.27

- Deep-hole drill for universal applications
- Ultra-micro grain solid carbide with TiAlN coating
- 4 margins for concentricity and alignment accuracy
- Optimized geometry for an optimum chip breaking and a high level of process reliability



d_1
h7

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	140	150	120

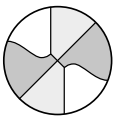
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1400 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	> 260 HB
V_c (m/min)	120	110	105	105	45	85	75	120	60

Product family 111

41100

TiAlN | HA | 4xD | VHM | 140° | Manufacturer standard

Solid Carbide Miniature Spiral Drill 4xD W/o Internal coolant



d1
m7

d_1	d_2	l_2	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
0.80	3	4.80	47	3.6	41100008HA	55.49	0.008 – 0.09
0.85	3	5.10	47	3.8	411000085HA	55.49	0.008 – 0.09
0.90	3	5.40	47	4.1	41100009HA	55.49	0.008 – 0.09
0.95	3	5.70	47	4.3	411000095HA	55.49	0.008 – 0.09
1.00	3	6.00	47	4.5	41100010HA	57.27	0.012 – 0.12
1.05	3	6.30	47	4.7	411000105HA	57.27	0.012 – 0.12
1.10	3	6.60	47	5.0	41100011HA	58.34	0.012 – 0.12
1.15	3	6.90	47	5.2	411000115HA	58.34	0.012 – 0.12
1.20	3	7.20	47	5.4	41100012HA	60.66	0.012 – 0.12
1.25	3	7.50	47	5.6	411000125HA	60.66	0.012 – 0.12
1.30	3	7.80	47	5.9	41100013HA	60.66	0.012 – 0.12
1.35	3	8.10	47	6.1	411000135HA	60.66	0.012 – 0.12
1.40	3	8.40	47	6.3	41100014HA	60.66	0.012 – 0.12
1.45	3	8.70	47	6.5	411000145HA	60.66	0.012 – 0.12
1.50	3	9.00	47	6.8	41100015HA	60.66	0.021 – 0.18
1.55	3	9.30	47	7.0	411000155HA	60.66	0.021 – 0.18
1.60	3	9.60	47	7.2	41100016HA	64.04	0.021 – 0.18
1.65	3	9.90	47	7.4	411000165HA	64.04	0.021 – 0.18
1.70	3	10.20	47	7.7	41100017HA	64.04	0.021 – 0.18
1.75	3	10.50	47	7.9	411000175HA	64.04	0.021 – 0.18
1.80	3	10.80	52	8.1	41100018HA	64.04	0.021 – 0.18
1.85	3	11.10	52	8.3	411000185HA	64.04	0.021 – 0.18
1.90	3	11.40	52	8.6	41100019HA	64.04	0.021 – 0.18
1.95	3	11.70	52	8.8	411000195HA	64.04	0.021 – 0.18
2.00	4	12.00	59	9.0	41100020HA	72.05	0.032 – 0.24
2.05	4	12.30	59	9.2	411000205HA	72.05	0.032 – 0.24
2.10	4	12.60	59	9.5	41100021HA	72.05	0.032 – 0.24
2.15	4	12.90	59	9.7	411000215HA	72.05	0.032 – 0.24
2.20	4	13.20	59	9.9	41100022HA	72.05	0.032 – 0.24
2.25	4	13.50	59	10.1	411000225HA	72.05	0.032 – 0.24
2.30	4	13.80	59	10.4	41100023HA	72.05	0.032 – 0.24
2.35	4	14.10	59	10.6	411000235HA	78.44	0.032 – 0.24
2.40	4	14.40	59	10.8	41100024HA	78.44	0.032 – 0.24
2.45	4	14.70	59	11.0	411000245HA	78.44	0.032 – 0.24
2.50	4	15.00	59	11.3	41100025HA	78.44	0.045 – 0.30
2.55	4	15.30	59	11.5	411000255HA	78.44	0.045 – 0.30
2.60	4	15.60	59	11.7	41100026HA	78.44	0.045 – 0.30
2.65	4	15.90	59	11.9	411000265HA	78.44	0.045 – 0.30
2.70	4	16.20	59	12.2	41100027HA	78.44	0.045 – 0.30
2.75	4	16.50	59	12.4	411000275HA	81.90	0.045 – 0.30
2.80	4	16.80	59	12.6	41100028HA	81.90	0.045 – 0.30
2.85	4	17.10	59	12.8	411000285HA	81.90	0.045 – 0.30
2.90	4	17.40	59	13.1	41100029HA	81.90	0.045 – 0.30
2.95	4	17.70	59	13.3	411000295HA	81.90	0.045 – 0.30
3.00	4	18.00	59	13.5	41100030HA	81.90	0.060 – 0.36

- Miniature drill for universal applications
- Made from ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the optimized geometry provide an optimum chip breaking and the highest level of process reliability
- No chip clearing even with deeper drilling holes
- MQL-suitable

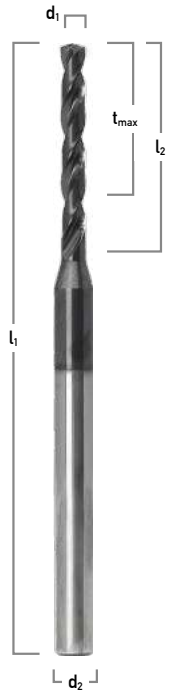
Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	70	135	120

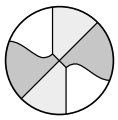
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 100 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	< 240HB
V_c (m/min)	105	90	90	50	50	70	50	130	140

Product family 111

70100

Solid Carbide Miniature Spiral Drill 7xD W/o Internal coolant





d1	d2	l2	l1	tmax	HA		Feed
mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
0.80	3	6.40	47	5.2	70100008HA	58.04	0.008 – 0.09
0.85	3	6.80	47	5.5	701000085HA	58.04	0.008 – 0.09
0.90	3	7.20	47	5.9	70100009HA	58.04	0.008 – 0.09
0.95	3	7.60	47	6.2	701000095HA	58.04	0.008 – 0.09
1.00	3	8.00	47	6.5	70100010HA	58.04	0.012 – 0.12
1.05	3	8.40	47	6.8	701000105HA	60.81	0.012 – 0.12
1.10	3	8.80	47	7.2	70100011HA	60.81	0.012 – 0.12
1.15	3	9.20	47	7.5	701000115HA	60.81	0.012 – 0.12
1.20	3	10.80	52	9.0	70100012HA	64.04	0.012 – 0.12
1.25	3	11.30	52	9.4	701000125HA	64.04	0.012 – 0.12
1.30	3	11.70	52	9.8	70100013HA	67.11	0.012 – 0.12
1.35	3	12.20	52	10.2	701000135HA	67.11	0.012 – 0.12
1.40	3	12.60	52	10.5	70100014HA	67.11	0.012 – 0.12
1.45	3	13.10	52	10.9	701000145HA	67.11	0.012 – 0.12
1.50	3	13.50	52	11.3	70100015HA	67.11	0.021 – 0.18
1.55	3	14.00	52	11.7	701000155HA	67.11	0.021 – 0.18
1.60	3	14.40	52	12.0	70100016HA	72.05	0.021 – 0.18
1.65	3	15.18	52	12.4	701000165HA	72.05	0.021 – 0.18
1.70	3	15.30	52	12.8	70100017HA	72.05	0.021 – 0.18
1.75	3	15.80	52	13.2	701000175HA	72.05	0.021 – 0.18
1.80	3	16.20	52	13.5	70100018HA	72.05	0.021 – 0.18
1.85	3	16.70	52	13.9	701000185HA	72.05	0.021 – 0.18
1.90	3	17.10	52	14.3	70100019HA	72.05	0.021 – 0.18
1.95	3	17.60	52	14.7	701000195HA	72.05	0.021 – 0.18
2.00	4	18.00	63	15.0	70100020HA	81.90	0.032 – 0.24
2.05	4	18.50	63	15.4	701000205HA	81.90	0.032 – 0.24
2.10	4	18.90	63	15.8	70100021HA	81.90	0.032 – 0.24
2.15	4	19.40	63	16.2	701000215HA	81.90	0.032 – 0.24
2.20	4	19.80	63	16.5	70100022HA	81.90	0.032 – 0.24
2.25	4	20.30	63	16.9	701000225HA	81.90	0.032 – 0.24
2.30	4	20.70	63	17.3	70100023HA	83.68	0.032 – 0.24
2.35	4	21.20	63	17.7	701000235HA	83.68	0.032 – 0.24
2.40	4	21.60	63	18.0	70100024HA	83.68	0.032 – 0.24
2.45	4	22.10	63	18.4	701000245HA	83.68	0.032 – 0.24
2.50	4	22.50	63	18.8	70100025HA	83.68	0.045 – 0.30
2.55	4	23.00	63	19.2	701000255HA	83.68	0.045 – 0.30
2.60	4	23.40	67	19.5	70100026HA	88.05	0.045 – 0.30
2.65	4	23.90	67	19.9	701000265HA	88.05	0.045 – 0.30
2.70	4	24.30	67	20.3	70100027HA	88.05	0.045 – 0.30
2.75	4	24.80	67	20.7	701000275HA	88.05	0.045 – 0.30
2.80	4	25.20	67	21.0	70100028HA	91.67	0.045 – 0.30
2.85	4	25.70	67	21.4	701000285HA	91.67	0.045 – 0.30
2.90	4	26.10	67	21.8	70100029HA	91.67	0.045 – 0.30
2.95	4	27.11	67	22.7	701000295HA	91.67	0.045 – 0.30
3.00	4	27.00	67	22.5	70100030HA	93.66	0.060 – 0.36

d1
m7

- Miniature drill for universal applications
- Made from ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the optimized geometry provide an optimum chip breaking and the highest level of process reliability
- No chip clearing even with deeper drilling holes
- MQL-suitable

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	70	135	120

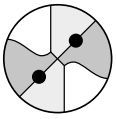
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	< 240HB
V_c (m/min)	105	90	90	50	50	70	50	130	140

Product family 111

81200

Solid Carbide Miniature Spiral Drill 8xD

With Internal coolant



d_1	d_2	l_2	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
1.40	4	15	52	12.9	812000014HA	119.70	0.012 – 0.12
1.45	4	16	52	13.8	812000145HA	119.70	0.012 – 0.12
1.50	4	17	52	14.8	81200015HA	119.70	0.021 – 0.18
1.55	4	17	52	14.7	812000155HA	119.70	0.021 – 0.18
1.59	4	18	52	15.6	812000159HA	119.70	0.021 – 0.18
1.60	4	18	52	15.6	81200016HA	119.70	0.021 – 0.18
1.65	4	18	52	15.5	812000165HA	125.33	0.021 – 0.18
1.70	4	19	56	16.5	81200017HA	125.33	0.021 – 0.18
1.75	4	19	56	16.4	812000175HA	125.33	0.021 – 0.18
1.80	4	20	56	17.3	81200018HA	125.33	0.021 – 0.18
1.85	4	20	56	17.2	812000185HA	125.33	0.021 – 0.18
1.90	4	21	56	18.2	81200019HA	125.33	0.021 – 0.18
1.95	4	21	56	18.1	812000195HA	125.33	0.021 – 0.18
1.98	4	22	56	19.0	812000198HA	125.33	0.021 – 0.18
2.00	4	22	56	19.0	81200020HA	128.85	0.032 – 0.24
2.05	4	23	56	19.9	812000205HA	128.85	0.032 – 0.24
2.10	4	23	62	19.9	81200021HA	128.85	0.032 – 0.24
2.15	4	24	62	20.8	812000215HA	128.85	0.032 – 0.24
2.20	4	24	62	20.7	81200022HA	128.85	0.032 – 0.24
2.25	4	25	62	21.6	812000225HA	128.85	0.032 – 0.24
2.30	4	25	62	21.6	81200023HA	132.85	0.032 – 0.24
2.35	4	26	62	22.5	812000235HA	132.85	0.032 – 0.24
2.38	4	26	62	22.4	812000238HA	132.85	0.032 – 0.24
2.40	4	26	62	22.4	81200024HA	132.85	0.032 – 0.24
2.45	4	27	62	23.3	812000245HA	132.85	0.032 – 0.24
2.50	4	28	62	24.3	81200025HA	132.85	0.045 – 0.30
2.55	4	28	62	24.2	812000255HA	132.85	0.045 – 0.30
2.60	4	29	66	25.1	81200026HA	132.85	0.045 – 0.30
2.65	4	29	66	25.0	812000265HA	132.85	0.045 – 0.30
2.70	4	30	66	26.0	81200027HA	132.85	0.045 – 0.30
2.75	4	30	66	25.9	812000275HA	134.48	0.045 – 0.30
2.78	4	31	66	26.8	812000278HA	134.48	0.045 – 0.30
2.80	4	31	66	26.8	81200028HA	134.48	0.045 – 0.30
2.85	4	31	66	26.7	812000285HA	134.48	0.045 – 0.30
2.90	4	32	66	27.7	81200029HA	134.48	0.045 – 0.30
2.95	4	32	66	27.6	812000295HA	134.48	0.045 – 0.30
3.00	4	33	66	28.5	81200030HA	136.86	0.060 – 0.36

d_1 h7

- Miniature drill for universal applications
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the optimized geometry provide an optimum chip breaking and the highest level of process reliability.
- No chip clearing even with deeper drilling holes
- MQL-suitable
- **Application instruction:** To ensure a high level of process reliability we recommend a 142° centering and a pilot hole drilling.

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	90	160	140

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	< 240HB
V_c (m/min)	105	90	90	50	50	70	60	130	140

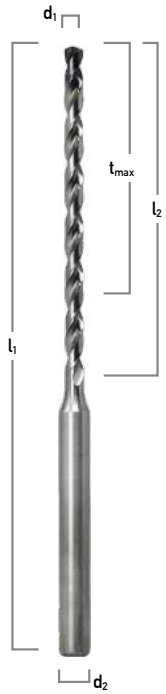
Product family 111

150200

TiAlN | HA | 15xD | VHM | 40 bar | 140° | Manufacturer standard

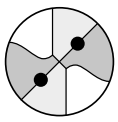
Solid Carbide Miniature Spiral Drill 15xD

With Internal coolant



d_1	d_2	l_2	l_1	t_{max}	HA		Feed
mm	mm	mm	mm	mm	Part No.	€/pc.	mm/rev
1.40	4	25	62	22.9	150200014HA	125.33	0.012 – 0.12
1.50	4	27	62	24.8	150200015HA	125.33	0.021 – 0.18
1.59	4	29	62	26.6	1502000159HA	125.33	0.021 – 0.18
1.60	4	29	62	26.6	150200016HA	125.33	0.021 – 0.18
1.70	4	31	70	28.5	150200017HA	137.70	0.021 – 0.18
1.80	4	32	70	29.3	150200018HA	137.70	0.021 – 0.18
1.90	4	34	70	31.2	150200019HA	137.70	0.021 – 0.18
1.98	4	36	70	33.0	1502000198HA	137.70	0.021 – 0.18
2.00	4	36	70	33.0	150200020HA	142.87	0.032 – 0.24
2.10	4	38	78	34.9	150200021HA	142.87	0.032 – 0.24
2.20	4	40	78	36.7	150200022HA	142.87	0.032 – 0.24
2.30	4	42	78	38.6	150200023HA	153.71	0.032 – 0.24
2.40	4	44	78	40.4	150200024HA	153.71	0.032 – 0.24
2.50	4	45	78	41.3	150200025HA	153.71	0.045 – 0.30
2.60	4	47	87	43.1	150200026HA	153.71	0.045 – 0.30
2.70	4	48	87	44.0	150200027HA	153.71	0.045 – 0.30
2.78	4	50	87	45.8	1502000278HA	160.89	0.045 – 0.30
2.80	4	50	87	45.8	150200028HA	160.89	0.045 – 0.30
2.90	4	52	87	47.7	150200029HA	160.89	0.045 – 0.30
3.00	4	54	87	49.5	150200030HA	163.95	0.060 – 0.36

- Miniature drill for universal applications
- Ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the optimized geometry provide an optimum chip breaking and the highest level of process reliability.
- No chip clearing even with deeper drilling holes
- MQL-suitable
- **Application instruction:** To ensure a high level of process reliability we recommend a 142° centering and a pilot hole drilling.



d_1
h7

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²
V_c (m/min)	90	160	140

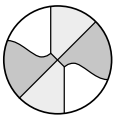
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Steel	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 650 N/mm²	< 240HB
V_c (m/min)	105	90	90	50	50	70	60	130	140

Product family 111

31000

TiAlN | HA | HB | 3xD | VHM | 140° | Manufacturer standard

Solid Carbide High-Performance Drill INOX 3xD W/o Internal coolant



d1 m7

- High performance drill for the treatment of INOX, Duplex, Titanium and heat-resisting alloys
- Made from ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
1.00	4	7	28	45	5.5	31000010HA	37.86	–	–	0.02 – 0.03
1.10	4	7	28	45	5.4	31000011HA	37.86	–	–	0.02 – 0.03
1.20	4	7	28	45	5.2	31000012HA	37.86	–	–	0.02 – 0.03
1.30	4	7	28	45	5.1	31000013HA	37.86	–	–	0.02 – 0.03
1.40	4	7	28	45	4.9	31000014HA	37.86	–	–	0.02 – 0.03
1.50	4	14	28	55	11.8	31000015HA	37.86	–	–	0.02 – 0.03
1.60	4	14	28	55	11.6	31000016HA	37.86	–	–	0.02 – 0.03
1.70	4	14	28	55	11.5	31000017HA	37.86	–	–	0.02 – 0.03
1.80	4	14	28	55	11.3	31000018HA	37.86	–	–	0.02 – 0.03
1.90	4	14	28	55	11.2	31000019HA	37.86	–	–	0.02 – 0.03
2.00	4	20	28	55	17.0	31000020HA	37.86	–	–	0.03 – 0.04
2.10	4	20	28	55	16.9	31000021HA	37.86	–	–	0.03 – 0.04
2.15	4	20	28	55	16.8	310000215HA	37.86	–	–	0.03 – 0.04
2.20	4	20	28	55	16.7	31000022HA	37.86	–	–	0.03 – 0.04
2.30	4	20	28	55	16.6	31000023HA	37.86	–	–	0.03 – 0.04
2.40	4	20	28	55	16.4	31000024HA	37.86	–	–	0.03 – 0.04
2.50	4	20	28	55	16.3	31000025HA	37.86	–	–	0.03 – 0.04
2.60	4	20	28	55	16.1	31000026HA	37.86	–	–	0.03 – 0.04
2.65	4	20	28	55	16.0	310000265HA	37.86	–	–	0.03 – 0.04
2.70	4	20	28	55	16.0	31000027HA	37.86	–	–	0.03 – 0.04
2.80	4	20	28	55	15.8	31000028HA	37.86	–	–	0.03 – 0.04
2.85	4	20	28	55	15.7	310000285HA	37.86	–	–	0.03 – 0.04
2.90	4	20	28	55	15.7	31000029HA	37.86	–	–	0.03 – 0.04
3.00	6	20	36	62	15.5	31000030HA	37.86	31000030HB	37.86	0.06 – 0.08
3.10	6	20	36	62	15.4	31000031HA	37.86	31000031HB	37.86	0.06 – 0.08
3.20	6	20	36	62	15.2	31000032HA	37.86	31000032HB	37.86	0.06 – 0.08
3.25	6	20	36	62	15.1	310000325HA	37.86	310000325HB	37.86	0.06 – 0.08
3.30	6	20	36	62	15.1	31000033HA	37.86	31000033HB	37.86	0.06 – 0.08
3.40	6	20	36	62	14.9	31000034HA	37.86	31000034HB	37.86	0.06 – 0.08
3.50	6	20	36	62	14.8	31000035HA	37.86	31000035HB	37.86	0.06 – 0.08
3.60	6	20	36	62	14.6	31000036HA	37.86	31000036HB	37.86	0.06 – 0.08
3.70	6	20	36	62	14.5	31000037HA	37.86	31000037HB	37.86	0.06 – 0.08
3.80	6	24	36	66	18.3	31000038HA	37.86	31000038HB	37.86	0.06 – 0.08
3.90	6	24	36	66	18.2	31000039HA	37.86	31000039HB	37.86	0.06 – 0.08
4.00	6	24	36	66	18.0	31000040HA	37.86	31000040HB	37.86	0.06 – 0.08
4.10	6	24	36	66	17.9	31000041HA	37.86	31000041HB	37.86	0.06 – 0.08
4.20	6	24	36	66	17.7	31000042HA	37.86	31000042HB	37.86	0.06 – 0.08
4.30	6	24	36	66	17.6	31000043HA	37.86	31000043HB	37.86	0.06 – 0.08
4.40	6	24	36	66	17.4	31000044HA	37.86	31000044HB	37.86	0.06 – 0.08
4.50	6	24	36	66	17.3	31000045HA	37.86	31000045HB	37.86	0.06 – 0.08
4.60	6	24	36	66	17.1	31000046HA	37.86	31000046HB	37.86	0.06 – 0.08
4.65	6	24	36	66	17.0	310000465HA	37.86	310000465HB	37.86	0.06 – 0.08
4.70	6	24	36	66	17.0	31000047HA	37.86	31000047HB	37.86	0.06 – 0.08
4.80	6	28	36	66	20.8	31000048HA	37.86	31000048HB	37.86	0.06 – 0.08
4.90	6	28	36	66	20.7	31000049HA	37.86	31000049HB	37.86	0.06 – 0.08
5.00	6	28	36	66	20.5	31000050HA	37.86	31000050HB	37.86	0.07 – 0.09
5.10	6	28	36	66	20.4	31000051HA	37.86	31000051HB	37.86	0.07 – 0.09
5.20	6	28	36	66	20.2	31000052HA	37.86	31000052HB	37.86	0.07 – 0.09
5.30	6	28	36	66	20.1	31000053HA	37.86	31000053HB	37.86	0.07 – 0.09
5.40	6	28	36	66	19.9	31000054HA	37.86	31000054HB	37.86	0.07 – 0.09
5.50	6	28	36	66	19.8	31000055HA	37.86	31000055HB	37.86	0.07 – 0.09
5.55	6	28	36	66	19.7	310000555HA	37.86	310000555HB	37.86	0.07 – 0.09
5.60	6	28	36	66	19.6	31000056HA	37.86	31000056HB	37.86	0.07 – 0.09
5.70	6	28	36	66	19.5	31000057HA	37.86	31000057HB	37.86	0.07 – 0.09
5.80	6	28	36	66	19.3	31000058HA	37.86	31000058HB	37.86	0.07 – 0.09
5.90	6	28	36	66	19.2	31000059HA	37.86	31000059HB	37.86	0.07 – 0.09
6.00	6	28	36	66	19.0	31000060HA	37.86	31000060HB	37.86	0.07 – 0.09
6.10	8	34	36	79	24.9	31000061HA	39.66	31000061HB	39.66	0.07 – 0.09
6.20	8	34	36	79	24.7	31000062HA	39.66	31000062HB	39.66	0.07 – 0.09
6.30	8	34	36	79	24.6	31000063HA	39.66	31000063HB	39.66	0.07 – 0.09
6.40	8	34	36	79	24.4	31000064HA	39.66	31000064HB	39.66	0.07 – 0.09
6.50	8	34	36	79	24.3	31000065HA	39.66	31000065HB	39.66	0.07 – 0.09
6.60	8	34	36	79	24.1	31000066HA	39.66	31000066HB	39.66	0.07 – 0.09
6.70	8	34	36	79	24.0	31000067HA	39.66	31000067HB	39.66	0.07 – 0.09
6.80	8	34	36	79	23.8	31000068HA	39.66	31000068HB	39.66	0.07 – 0.09
6.90	8	34	36	79	23.7	31000069HA	39.66	31000069HB	39.66	0.07 – 0.09
7.00	8	34	36	79	23.5	31000070HA	39.66	31000070HB	39.66	0.09 – 0.10
7.10	8	41	36	79	30.4	31000071HA	39.66	31000071HB	39.66	0.09 – 0.10
7.20	8	41	36	79	30.2	31000072HA	39.66	31000072HB	39.66	0.09 – 0.10
7.30	8	41	36	79	30.1	31000073HA	39.66	31000073HB	39.66	0.09 – 0.10
7.40	8	41	36	79	29.9	31000074HA	39.66	31000074HB	39.66	0.09 – 0.10
7.45	8	41	36	79	29.8	310000745HA	39.66	310000745HB	39.66	0.09 – 0.10

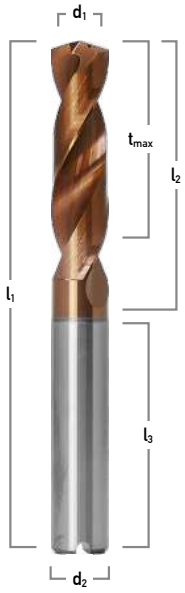
d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
7.50	8	41	36	79	29.8	31000075HA	39.66	31000075HB	39.66	0.09 – 0.10
7.55	8	41	36	79	29.7	310000755HA	39.66	310000755HB	39.66	0.09 – 0.10
7.60	8	41	36	79	29.6	31000076HA	39.66	31000076HB	39.66	0.09 – 0.10
7.70	8	41	36	79	29.5	31000077HA	39.66	31000077HB	39.66	0.09 – 0.10
7.80	8	41	36	79	29.3	31000078HA	39.66	31000078HB	39.66	0.09 – 0.10
7.90	8	41	36	79	29.2	31000079HA	39.66	31000079HB	39.66	0.09 – 0.10
8.00	8	41	36	79	29.0	31000080HA	39.66	31000080HB	39.66	0.10 – 0.12
8.10	10	47	40	89	34.9	31000081HA	44.28	31000081HB	44.28	0.10 – 0.12
8.20	10	47	40	89	34.7	31000082HA	44.28	31000082HB	44.28	0.10 – 0.12
8.30	10	47	40	89	34.6	31000083HA	44.28	31000083HB	44.28	0.10 – 0.12
8.40	10	47	40	89	34.4	31000084HA	44.28	31000084HB	44.28	0.10 – 0.12
8.50	10	47	40	89	34.3	31000085HA	44.28	31000085HB	44.28	0.10 – 0.12
8.60	10	47	40	89	34.1	31000086HA	44.28	31000086HB	44.28	0.10 – 0.12
8.70	10	47	40	89	34.0	31000087HA	44.28	31000087HB	44.28	0.10 – 0.12
8.80	10	47	40	89	33.8	31000088HA	44.28	31000088HB	44.28	0.10 – 0.12
8.90	10	47	40	89	33.7	31000089HA	44.28	31000089HB	44.28	0.10 – 0.12
9.00	10	47	40	89	33.5	31000090HA	44.28	31000090HB	44.28	0.10 – 0.12
9.10	10	47	40	89	33.4	31000091HA	44.28	31000091HB	44.28	0.10 – 0.12
9.20	10	47	40	89	33.2	31000092HA	44.28	31000092HB	44.28	0.10 – 0.12
9.30	10	47	40	89	33.1	31000093HA	44.28	31000093HB	44.28	0.10 – 0.12
9.35	10	47	40	89	33.0	310000935HA	44.28	310000935HB	44.28	0.10 – 0.12
9.40	10	47	40	89	32.9	31000094HA	44.28	31000094HB	44.28	0.10 – 0.12
9.50	10	47	40	89	32.8	31000095HA	44.28	31000095HB	44.28	0.10 – 0.12
9.55	10	47	40	89	32.7	310000955HA	44.28	310000955HB	44.28	0.10 – 0.12
9.60	10	47	40	89	32.6	31000096HA	44.28	31000096HB	44.28	0.10 – 0.12
9.70	10	47	40	89	32.5	31000097HA	44.28	31000097HB	44.28	0.10 – 0.12
9.80	10	47	40	89	32.3	31000098HA	44.28	31000098HB	44.28	0.10 – 0.12
9.90	10	47	40	89	32.2	31000099HA	44.28	31000099HB	44.28	0.10 – 0.12
10.00	10	47	40	89	32.0	31000100HA	44.28	31000100HB	44.28	0.10 – 0.12
10.10	12	55	45	102	39.9	31000101HA	60.44	31000101HB	60.44	0.10 – 0.12
10.20	12	55	45	102	39.7	31000102HA	60.44	31000102HB	60.44	0.10 – 0.12
10.30	12	55	45	102	39.6	31000103HA	60.44	31000103HB	60.44	0.10 – 0.12
10.40	12	55	45	102	39.4	31000104HA	60.44	31000104HB	60.44	0.10 – 0.12
10.50	12	55	45	102	39.3	31000105HA	60.44	31000105HB	60.44	0.10 – 0.12
10.60	12	55	45	102	39.1	31000106HA	60.44	31000106HB	60.44	0.10 – 0.12
10.70	12	55	45	102	39.0	31000107HA	60.44	31000107HB	60.44	0.10 – 0.12
10.80	12	55	45	102	38.8	31000108HA	60.44	31000108HB	60.44	0.10 – 0.12
10.90	12	55	45	102	38.7	31000109HA	60.44	31000109HB	60.44	0.10 – 0.12
11.00	12	55	45	102	38.5	31000110HA	60.44	31000110HB	60.44	0.10 – 0.12
11.10	12	55	45	102	38.4	31000111HA	60.44	31000111HB	60.44	0.10 – 0.12
11.20	12	55	45	102	38.2	31000112HA	60.44	31000112HB	60.44	0.10 – 0.12
11.30	12	55	45	102	38.1	31000113HA	60.44	31000113HB	60.44	0.10 – 0.12
11.40	12	55	45	102	37.9	31000114HA	60.44	31000114HB	60.44	0.10 – 0.12
11.50	12	55	45	102	37.8	31000115HA	60.44	31000115HB	60.44	0.10 – 0.12
11.60	12	55	45	102	37.6	31000116HA	60.44	31000116HB	60.44	0.10 – 0.12
11.70	12	55	45	102	37.5	31000117HA	60.44	31000117HB	60.44	0.10 – 0.12
11.80	12	55	45	102	37.3	31000118HA	60.44	31000118HB	60.44	0.10 – 0.12
11.90	12	55	45	102	37.2	31000119HA	60.44	31000119HB	60.44	0.10 – 0.12
12.00	12	55	45	102	37.0	31000120HA	60.44	31000120HB	60.44	0.14 – 0.16
12.20	14	60	45	107	41.7	31000122HA	81.11	31000122HB	81.11	0.14 – 0.16
12.50	14	60	45	107	41.3	31000125HA	81.11	31000125HB	81.11	0.14 – 0.16
12.70	14	60	45	107	41.0	31000127HA	81.11	31000127HB	81.11	0.14 – 0.16
12.80	14	60	45	107	40.8	31000128HA	81.11	31000128HB	81.11	0.14 – 0.16
13.00	14	60	45	107	40.5	31000130HA	81.11	31000130HB	81.11	0.14 – 0.16
13.50	14	60	45	107	39.8	31000135HA	81.11	31000135HB	81.11	0.14 – 0.16
13.80	14	60	45	107	39.3	31000138HA	81.11	31000138HB	81.11	0.14 – 0.16
14.00	14	60	45	107	39.0	31000140HA	81.11	31000140HB	81.11	0.14 – 0.16
14.20	16	65	48	115	43.7	31000142HA	120.33	31000142HB	120.33	0.14 – 0.16
14.50	16	65	48	115	43.3	31000145HA	120.33	31000145HB	120.33	0.14 – 0.16
14.80	16	65	48	115	42.8	31000148HA	120.33	31000148HB	120.33	0.14 – 0.16
15.00	16	65	48	115	42.5	31000150HA	120.33	31000150HB	120.33	0.14 – 0.16
15.30	16	65	48	115	42.1	31000153HA	120.33	31000153HB	120.33	0.14 – 0.16
15.50	16	65	48	115	41.8	31000155HA	120.33	31000155HB	120.33	0.14 – 0.16
15.80	16	65	48	115	41.3	31000158HA	120.33	31000158HB	120.33	0.14 – 0.16
16.00	16	65	48	115	41.0	31000160HA	120.33	31000160HB	120.33	0.15 – 0.17
16.50	18	73	48	123	48.3	31000165HA	215.19	31000165HB	215.19	0.15 – 0.17
16.80	18	73	48	123	47.8	31000168HA	215.19	31000168HB	215.19	0.15 – 0.17
17.00	18	73	48	123	47.5	31000170HA	215.19	31000170HB	215.19	0.15 – 0.17
17.50	18	73	48	123	46.8	31000175HA	215.19	31000175HB	215.19	0.15 – 0.17
17.70	18	73	48	123	46.5	31000177HA	215.19	31000177HB	215.19	0.15 – 0.17
17.80	18	73	48	123	46.3	31000178HA	215.19	31000178HB	215.19	0.15 – 0.17
18.00	18	73	48	123	46.0	31000180HA	215.19	31000180HB	215.19	0.15 – 0.17
18.50	20	79	50	131	51.3	31000185HA	221.89	31000185HB	221.89	0.15 – 0.17
18.80	20	79	50	131	50.8	31000188HA	221.89	31000188HB	221.89	0.15 – 0.17
19.00	20	79	50	131	50.5	31000190HA	221.89	31000190HB	221.89	0.15 – 0.17
19.50	20	79	50	131	49.8	31000195HA	221.89	31000195HB	221.89	0.15 – 0.17
19.80	20	79	50	131	49.3	31000198HA	221.89	31000198HB	221.89	0.15 – 0.17
20.00	20	79	50	131	49.0	31000200HA	221.89	31000200HB	221.89	0.15 – 0.17

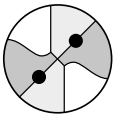
Material	Stainless steels	Stainless steels	Super alloys	Titanium materials
Tensile strength / Hardness	< 750 N/mm²	< 850 N/mm²	> 260 HB	< 1400 N/mm²
V_c (m/min)	70	60	30	45

31300

TiAlN | HA | HB | HE* | 3xD | VHM | 25 bar | 140° | Manufacturer standard

Solid Carbide High-Performance Drill INOX 3xD With Internal coolant





d1
m7

- High performance drill for the treatment of INOX, Duplex, Titanium and heat-resisting alloys
- Made from ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
2.00	4	20	28	55	17.0	31300020HA	60.04	–	–	0.03 – 0.06
2.10	4	20	28	55	16.9	31300021HA	60.04	–	–	0.03 – 0.06
2.15	4	20	28	55	16.8	313000215HA	60.04	–	–	0.03 – 0.06
2.20	4	20	28	55	16.7	31300022HA	60.04	–	–	0.03 – 0.06
2.30	4	20	28	55	16.6	31300023HA	60.04	–	–	0.03 – 0.06
2.40	4	20	28	55	16.4	31300024HA	60.04	–	–	0.03 – 0.06
2.50	4	20	28	55	16.3	31300025HA	60.04	–	–	0.03 – 0.06
2.60	4	20	28	55	16.1	31300026HA	60.04	–	–	0.03 – 0.06
2.65	4	20	28	55	16.0	313000265HA	60.04	–	–	0.03 – 0.06
2.70	4	20	28	55	16.0	31300027HA	60.04	–	–	0.03 – 0.06
2.80	4	20	28	55	15.8	31300028HA	60.04	–	–	0.03 – 0.06
2.85	4	20	28	55	15.7	313000285HA	60.04	–	–	0.03 – 0.06
2.90	4	20	28	55	15.7	31300029HA	60.04	–	–	0.03 – 0.06
3.00	6	20	36	62	15.5	31300030HA	60.04	31300030HB	60.04	0.04 – 0.08
3.10	6	20	36	62	15.4	31300031HA	60.04	31300031HB	60.04	0.04 – 0.08
3.20	6	20	36	62	15.2	31300032HA	60.04	31300032HB	60.04	0.04 – 0.08
3.25	6	20	36	62	15.1	313000325HA	60.04	313000325HB	60.04	0.04 – 0.08
3.30	6	20	36	62	15.1	31300033HA	60.04	31300033HB	60.04	0.04 – 0.08
3.40	6	20	36	62	14.9	31300034HA	60.04	31300034HB	60.04	0.04 – 0.08
3.50	6	20	36	62	14.8	31300035HA	60.04	31300035HB	60.04	0.04 – 0.08
3.60	6	20	36	62	14.6	31300036HA	60.04	31300036HB	60.04	0.04 – 0.08
3.70	6	20	36	62	14.5	31300037HA	60.04	31300037HB	60.04	0.04 – 0.08
3.80	6	24	36	66	18.3	31300038HA	60.04	31300038HB	60.04	0.04 – 0.08
3.90	6	24	36	66	18.2	31300039HA	60.04	31300039HB	60.04	0.04 – 0.08
4.00	6	24	36	66	18.0	31300040HA	62.05	31300040HB	62.05	0.06 – 0.10
4.10	6	24	36	66	17.9	31300041HA	62.05	31300041HB	62.05	0.06 – 0.10
4.20	6	24	36	66	17.7	31300042HA	62.05	31300042HB	62.05	0.06 – 0.10
4.30	6	24	36	66	17.6	31300043HA	62.05	31300043HB	62.05	0.06 – 0.10
4.40	6	24	36	66	17.4	31300044HA	62.05	31300044HB	62.05	0.06 – 0.10
4.50	6	24	36	66	17.3	31300045HA	62.05	31300045HB	62.05	0.06 – 0.10
4.60	6	24	36	66	17.1	31300046HA	62.05	31300046HB	62.05	0.06 – 0.10
4.65	6	24	36	66	17.0	313000465HA	62.05	313000465HB	62.05	0.06 – 0.10
4.70	6	24	36	66	17.0	31300047HA	62.05	31300047HB	62.05	0.06 – 0.10
4.80	6	28	36	66	20.8	31300048HA	62.05	31300048HB	62.05	0.06 – 0.10
4.90	6	28	36	66	20.7	31300049HA	62.05	31300049HB	62.05	0.06 – 0.10
5.00	6	28	36	66	20.5	31300050HA	62.05	31300050HB	62.05	0.07 – 0.12
5.10	6	28	36	66	20.4	31300051HA	62.05	31300051HB	62.05	0.07 – 0.12
5.20	6	28	36	66	20.2	31300052HA	62.05	31300052HB	62.05	0.07 – 0.12
5.30	6	28	36	66	20.1	31300053HA	62.05	31300053HB	62.05	0.07 – 0.12
5.40	6	28	36	66	19.9	31300054HA	62.05	31300054HB	62.05	0.07 – 0.12
5.50	6	28	36	66	19.8	31300055HA	62.05	31300055HB	62.05	0.07 – 0.12
5.55	6	28	36	66	19.7	313000555HA	62.05	313000555HB	62.05	0.07 – 0.12
5.60	6	28	36	66	19.6	31300056HA	62.05	31300056HB	62.05	0.07 – 0.12
5.70	6	28	36	66	19.5	31300057HA	62.05	31300057HB	62.05	0.07 – 0.12
5.80	6	28	36	66	19.3	31300058HA	62.05	31300058HB	62.05	0.07 – 0.12
5.90	6	28	36	66	19.2	31300059HA	62.05	31300059HB	62.05	0.07 – 0.12
6.00	6	28	36	66	19.0	31300060HA	62.05	31300060HB	62.05	0.08 – 0.14
6.10	8	34	36	79	24.9	31300061HA	83.31	31300061HB	83.31	0.08 – 0.14
6.20	8	34	36	79	24.7	31300062HA	83.31	31300062HB	83.31	0.08 – 0.14
6.30	8	34	36	79	24.6	31300063HA	83.31	31300063HB	83.31	0.08 – 0.14
6.40	8	34	36	79	24.4	31300064HA	83.31	31300064HB	83.31	0.08 – 0.14
6.50	8	34	36	79	24.3	31300065HA	83.31	31300065HB	83.31	0.08 – 0.14
6.60	8	34	36	79	24.1	31300066HA	83.31	31300066HB	83.31	0.08 – 0.14
6.70	8	34	36	79	24.0	31300067HA	83.31	31300067HB	83.31	0.08 – 0.14
6.80	8	34	36	79	23.8	31300068HA	83.31	31300068HB	83.31	0.08 – 0.14
6.90	8	34	36	79	23.7	31300069HA	83.31	31300069HB	83.31	0.08 – 0.14
7.00	8	34	36	79	23.5	31300070HA	83.31	31300070HB	83.31	0.09 – 0.15
7.10	8	41	36	79	30.4	31300071HA	83.31	31300071HB	83.31	0.09 – 0.15
7.20	8	41	36	79	30.2	31300072HA	83.31	31300072HB	83.31	0.09 – 0.15
7.30	8	41	36	79	30.1	31300073HA	83.31	31300073HB	83.31	0.09 – 0.15
7.40	8	41	36	79	29.9	31300074HA	83.31	31300074HB	83.31	0.09 – 0.15
7.45	8	41	36	79	29.8	313000745HA	83.31	313000745HB	83.31	0.09 – 0.15
7.50	8	41	36	79	29.8	31300075HA	83.31	31300075HB	83.31	0.09 – 0.15
7.55	8	41	36	79	29.7	313000755HA	83.31	313000755HB	83.31	0.09 – 0.15
7.60	8	41	36	79	29.6	31300076HA	83.31	31300076HB	83.31	0.09 – 0.15
7.70	8	41	36	79	29.5	31300077HA	83.31	31300077HB	83.31	0.09 – 0.15
7.80	8	41	36	79	29.3	31300078HA	83.31	31300078HB	83.31	0.09 – 0.15
7.90	8	41	36	79	29.2	31300079HA	83.31	31300079HB	83.31	0.09 – 0.15
8.00	8	41	36	79	29.0	31300080HA	83.31	31300080HB	83.31	0.09 – 0.16
8.10	10	47	40	89	34.9	31300081HA	97.30	31300081HB	97.30	0.09 – 0.16
8.20	10	47	40	89	34.7	31300082HA	97.30	31300082HB	97.30	0.09 – 0.16
8.30	10	47	40	89	34.6	31300083HA	97.30	31300083HB	97.30	0.09 – 0.16

Product family 111

*HE drill: same price, availability on request*HE drill: same price, availability on request

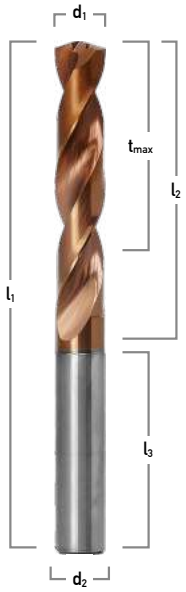
d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
8.40	10	47	40	89	34.4	31300084HA	97.30	31300084HB	97.30	0.09 – 0.16
8.50	10	47	40	89	34.3	31300085HA	97.30	31300085HB	97.30	0.09 – 0.16
8.60	10	47	40	89	34.1	31300086HA	97.30	31300086HB	97.30	0.09 – 0.16
8.70	10	47	40	89	34.0	31300087HA	97.30	31300087HB	97.30	0.09 – 0.16
8.80	10	47	40	89	33.8	31300088HA	97.30	31300088HB	97.30	0.09 – 0.16
8.90	10	47	40	89	33.7	31300089HA	97.30	31300089HB	97.30	0.09 – 0.16
9.00	10	47	40	89	33.5	31300090HA	97.30	31300090HB	97.30	0.10 – 0.17
9.10	10	47	40	89	33.4	31300091HA	97.30	31300091HB	97.30	0.10 – 0.17
9.20	10	47	40	89	33.2	31300092HA	97.30	31300092HB	97.30	0.10 – 0.17
9.30	10	47	40	89	33.1	31300093HA	97.30	31300093HB	97.30	0.10 – 0.17
9.35	10	47	40	89	33.0	313000935HA	97.30	313000935HB	97.30	0.10 – 0.17
9.40	10	47	40	89	32.9	31300094HA	97.30	31300094HB	97.30	0.10 – 0.17
9.50	10	47	40	89	32.8	31300095HA	97.30	31300095HB	97.30	0.10 – 0.17
9.55	10	47	40	89	32.7	313000955HA	97.30	313000955HB	97.30	0.10 – 0.17
9.60	10	47	40	89	32.6	31300096HA	97.30	31300096HB	97.30	0.10 – 0.17
9.70	10	47	40	89	32.5	31300097HA	97.30	31300097HB	97.30	0.10 – 0.17
9.80	10	47	40	89	32.3	31300098HA	97.30	31300098HB	97.30	0.10 – 0.17
9.90	10	47	40	89	32.2	31300099HA	97.30	31300099HB	97.30	0.10 – 0.17
10.00	10	47	40	89	32.0	31300100HA	97.30	31300100HB	97.30	0.10 – 0.18
10.10	12	55	45	102	39.9	31300101HA	138.86	31300101HB	138.86	0.10 – 0.18
10.20	12	55	45	102	39.7	31300102HA	138.86	31300102HB	138.86	0.10 – 0.18
10.30	12	55	45	102	39.6	31300103HA	138.86	31300103HB	138.86	0.10 – 0.18
10.40	12	55	45	102	39.4	31300104HA	138.86	31300104HB	138.86	0.10 – 0.18
10.50	12	55	45	102	39.3	31300105HA	138.86	31300105HB	138.86	0.10 – 0.18
10.60	12	55	45	102	39.1	31300106HA	138.86	31300106HB	138.86	0.10 – 0.18
10.70	12	55	45	102	39.0	31300107HA	138.86	31300107HB	138.86	0.10 – 0.18
10.80	12	55	45	102	38.8	31300108HA	138.86	31300108HB	138.86	0.10 – 0.18
10.90	12	55	45	102	38.7	31300109HA	138.86	31300109HB	138.86	0.10 – 0.18
11.00	12	55	45	102	38.5	31300110HA	138.86	31300110HB	138.86	0.10 – 0.18
11.10	12	55	45	102	38.4	31300111HA	138.86	31300111HB	138.86	0.10 – 0.18
11.20	12	55	45	102	38.2	31300112HA	138.86	31300112HB	138.86	0.10 – 0.18
11.30	12	55	45	102	38.1	31300113HA	138.86	31300113HB	138.86	0.10 – 0.18
11.40	12	55	45	102	37.9	31300114HA	138.86	31300114HB	138.86	0.10 – 0.18
11.50	12	55	45	102	37.8	31300115HA	138.86	31300115HB	138.86	0.10 – 0.18
11.60	12	55	45	102	37.6	31300116HA	138.86	31300116HB	138.86	0.10 – 0.18
11.70	12	55	45	102	37.5	31300117HA	138.86	31300117HB	138.86	0.10 – 0.18
11.80	12	55	45	102	37.3	31300118HA	138.86	31300118HB	138.86	0.10 – 0.18
11.90	12	55	45	102	37.2	31300119HA	138.86	31300119HB	138.86	0.10 – 0.18
12.00	12	55	45	102	37.0	31300120HA	138.86	31300120HB	138.86	0.12 – 0.20
12.20	14	60	45	107	41.7	31300122HA	194.90	31300122HB	194.90	0.12 – 0.20
12.50	14	60	45	107	41.3	31300125HA	194.90	31300125HB	194.90	0.12 – 0.20
12.70	14	60	45	107	41.0	31300127HA	194.90	31300127HB	194.90	0.12 – 0.20
12.80	14	60	45	107	40.8	31300128HA	194.90	31300128HB	194.90	0.12 – 0.20
13.00	14	60	45	107	40.5	31300130HA	194.90	31300130HB	194.90	0.12 – 0.20
13.30	14	60	45	107	40.1	31300133HA	194.90	31300133HB	194.90	0.12 – 0.20
13.50	14	60	45	107	39.8	31300135HA	194.90	31300135HB	194.90	0.12 – 0.20
13.70	14	60	45	107	39.5	31300137HA	194.90	31300137HB	194.90	0.12 – 0.20
13.80	14	60	45	107	39.3	31300138HA	194.90	31300138HB	194.90	0.12 – 0.20
14.00	14	60	45	107	39.0	31300140HA	194.90	31300140HB	194.90	0.13 – 0.22
14.20	16	65	48	115	43.7	31300142HA	242.16	31300142HB	242.16	0.13 – 0.22
14.30	16	65	48	115	43.6	31300143HA	242.16	31300143HB	242.16	0.13 – 0.22
14.50	16	65	48	115	43.3	31300145HA	242.16	31300145HB	242.16	0.13 – 0.22
14.70	16	65	48	115	43.0	31300147HA	242.16	31300147HB	242.16	0.13 – 0.22
14.80	16	65	48	115	42.8	31300148HA	242.16	31300148HB	242.16	0.13 – 0.22
15.00	16	65	48	115	42.5	31300150HA	242.16	31300150HB	242.16	0.13 – 0.22
15.20	16	65	48	115	42.2	31300152HA	242.16	31300152HB	242.16	0.13 – 0.22
15.30	16	65	48	115	42.1	31300153HA	242.16	31300153HB	242.16	0.13 – 0.22
15.50	16	65	48	115	41.8	31300155HA	242.16	31300155HB	242.16	0.13 – 0.22
15.70	16	65	48	115	41.5	31300157HA	242.16	31300157HB	242.16	0.13 – 0.22
15.80	16	65	48	115	41.3	31300158HA	242.16	31300158HB	242.16	0.13 – 0.22
16.00	16	65	48	115	41.0	31300160HA	242.16	31300160HB	242.16	0.14 – 0.23
16.50	18	73	48	123	48.3	31300165HA	331.22	31300165HB	331.22	0.14 – 0.23
16.80	18	73	48	123	47.8	31300168HA	331.22	31300168HB	331.22	0.14 – 0.23
17.00	18	73	48	123	47.5	31300170HA	331.22	31300170HB	331.22	0.14 – 0.23
17.50	18	73	48	123	46.8	31300175HA	331.22	31300175HB	331.22	0.14 – 0.23
17.70	18	73	48	123	46.5	31300177HA	331.22	31300177HB	331.22	0.14 – 0.23
17.80	18	73	48	123	46.3	31300178HA	331.22	31300178HB	331.22	0.14 – 0.23
18.00	18	73	48	123	46.0	31300180HA	331.22	31300180HB	331.22	0.15 – 0.25
18.50	20	79	50	131	51.3	31300185HA	408.26	31300185HB	408.26	0.15 – 0.25
18.80	20	79	50	131	50.8	31300188HA	408.26	31300188HB	408.26	0.15 – 0.25
19.00	20	79	50	131	50.5	31300190HA	408.26	31300190HB	408.26	0.15 – 0.25
19.50	20	79	50	131	49.8	31300195HA	408.26	31300195HB	408.26	0.15 – 0.25
19.80	20	79	50	131	49.3	31300198HA	408.26	31300198HB	408.26	0.15 – 0.25
20.00	20	79	50	131	49.0	31300200HA	408.26	31300200HB	408.26	0.16 – 0.26

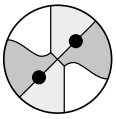
Material	Stainless steels	Stainless steels	Super alloys	Titanium materials
Tensile strength / Hardness	< 750 N/mm²	< 850 N/mm²	> 260 HB	< 1400 N/mm²
V_c (m/min)	90	70	40	55

51300

TiAlN | HA | HB | HE* | 5xD | VHM | 25 bar | 140° | Manufacturer standard

Solid Carbide High-Performance Drill INOX 5xD With Internal coolant





d1 m7

- High performance drill for the treatment of INOX, Duplex, Titanium and heat-resisting alloys
- Made from ultra-micro grain solid carbide with state-of-the-art TiAlN coating
- Excellent self-centering and high drilling performance
- Straight main cutting edges and the reinforced geometry provide an optimum chip breaking and the highest level of process reliability.

d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
2.00	4	26	28	62	23.0	51300020HA	70.81	–	–	0.03 – 0.06
2.10	4	26	28	62	22.9	51300021HA	70.81	–	–	0.03 – 0.06
2.15	4	26	28	62	22.8	513000215HA	70.81	–	–	0.03 – 0.06
2.20	4	26	28	62	22.7	51300022HA	70.81	–	–	0.03 – 0.06
2.30	4	26	28	62	22.6	51300023HA	70.81	–	–	0.03 – 0.06
2.40	4	26	28	62	22.4	51300024HA	70.81	–	–	0.03 – 0.06
2.50	4	26	28	62	22.3	51300025HA	70.81	–	–	0.03 – 0.06
2.60	4	26	28	62	22.1	51300026HA	70.81	–	–	0.03 – 0.06
2.65	4	26	28	62	22.0	513000265HA	70.81	–	–	0.03 – 0.06
2.70	4	26	28	62	22.0	51300027HA	70.81	–	–	0.03 – 0.06
2.80	4	26	28	62	21.8	51300028HA	70.81	–	–	0.03 – 0.06
2.85	4	26	28	62	21.7	513000285HA	70.81	–	–	0.03 – 0.06
2.90	4	26	28	62	21.7	51300029HA	70.81	–	–	0.03 – 0.06
3.00	6	28	36	66	23.5	51300030HA	70.81	51300030HB	70.81	0.04 – 0.08
3.10	6	28	36	66	23.4	51300031HA	70.81	51300031HB	70.81	0.04 – 0.08
3.20	6	28	36	66	23.2	51300032HA	70.81	51300032HB	70.81	0.04 – 0.08
3.25	6	28	36	66	23.1	513000325HA	70.81	513000325HB	70.81	0.04 – 0.08
3.30	6	28	36	66	23.1	51300033HA	70.81	51300033HB	70.81	0.04 – 0.08
3.40	6	28	36	66	22.9	51300034HA	70.81	51300034HB	70.81	0.04 – 0.08
3.50	6	28	36	66	22.8	51300035HA	70.81	51300035HB	70.81	0.04 – 0.08
3.60	6	28	36	66	22.6	51300036HA	70.81	51300036HB	70.81	0.04 – 0.08
3.70	6	28	36	66	22.5	51300037HA	70.81	51300037HB	70.81	0.04 – 0.08
3.80	6	36	36	74	30.3	51300038HA	70.81	51300038HB	70.81	0.04 – 0.08
3.90	6	36	36	74	30.2	51300039HA	70.81	51300039HB	70.81	0.04 – 0.08
4.00	6	36	36	74	30.0	51300040HA	76.05	51300040HB	76.05	0.06 – 0.10
4.10	6	36	36	74	29.9	51300041HA	76.05	51300041HB	76.05	0.06 – 0.10
4.20	6	36	36	74	29.7	51300042HA	76.05	51300042HB	76.05	0.06 – 0.10
4.30	6	36	36	74	29.6	51300043HA	76.05	51300043HB	76.05	0.06 – 0.10
4.40	6	36	36	74	29.4	51300044HA	76.05	51300044HB	76.05	0.06 – 0.10
4.50	6	36	36	74	29.3	51300045HA	76.05	51300045HB	76.05	0.06 – 0.10
4.60	6	36	36	74	29.1	51300046HA	76.05	51300046HB	76.05	0.06 – 0.10
4.65	6	36	36	74	29.0	513000465HA	76.05	513000465HB	76.05	0.06 – 0.10
4.70	6	36	36	74	29.0	51300047HA	76.05	51300047HB	76.05	0.06 – 0.10
4.80	6	44	36	82	36.8	51300048HA	76.05	51300048HB	76.05	0.06 – 0.10
4.90	6	44	36	82	36.7	51300049HA	76.05	51300049HB	76.05	0.06 – 0.10
5.00	6	44	36	82	36.5	51300050HA	76.05	51300050HB	76.05	0.07 – 0.12
5.10	6	44	36	82	36.4	51300051HA	76.05	51300051HB	76.05	0.07 – 0.12
5.20	6	44	36	82	36.2	51300052HA	76.05	51300052HB	76.05	0.07 – 0.12
5.30	6	44	36	82	36.1	51300053HA	76.05	51300053HB	76.05	0.07 – 0.12
5.40	6	44	36	82	35.9	51300054HA	76.05	51300054HB	76.05	0.07 – 0.12
5.50	6	44	36	82	35.8	51300055HA	76.05	51300055HB	76.05	0.07 – 0.12
5.55	6	44	36	82	35.7	513000555HA	76.05	513000555HB	76.05	0.07 – 0.12
5.60	6	44	36	82	35.6	51300056HA	76.05	51300056HB	76.05	0.07 – 0.12
5.70	6	44	36	82	35.5	51300057HA	76.05	51300057HB	76.05	0.07 – 0.12
5.80	6	44	36	82	35.3	51300058HA	76.05	51300058HB	76.05	0.07 – 0.12
5.90	6	44	36	82	35.2	51300059HA	76.05	51300059HB	76.05	0.07 – 0.12
6.00	6	44	36	82	35.0	51300060HA	76.05	51300060HB	76.05	0.08 – 0.14
6.10	8	53	36	91	43.9	51300061HA	94.07	51300061HB	94.07	0.08 – 0.14
6.20	8	53	36	91	43.7	51300062HA	94.07	51300062HB	94.07	0.08 – 0.14
6.30	8	53	36	91	43.6	51300063HA	94.07	51300063HB	94.07	0.08 – 0.14
6.40	8	53	36	91	43.4	51300064HA	94.07	51300064HB	94.07	0.08 – 0.14
6.50	8	53	36	91	43.3	51300065HA	94.07	51300065HB	94.07	0.08 – 0.14
6.60	8	53	36	91	43.1	51300066HA	94.07	51300066HB	94.07	0.08 – 0.14
6.70	8	53	36	91	43.0	51300067HA	94.07	51300067HB	94.07	0.08 – 0.14
6.80	8	53	36	91	42.8	51300068HA	94.07	51300068HB	94.07	0.08 – 0.14
6.90	8	53	36	91	42.7	51300069HA	94.07	51300069HB	94.07	0.08 – 0.14
7.00	8	53	36	91	42.5	51300070HA	94.07	51300070HB	94.07	0.09 – 0.15
7.10	8	53	36	91	42.4	51300071HA	94.07	51300071HB	94.07	0.09 – 0.15
7.20	8	53	36	91	42.2	51300072HA	94.07	51300072HB	94.07	0.09 – 0.15
7.30	8	53	36	91	42.1	51300073HA	94.07	51300073HB	94.07	0.09 – 0.15
7.40	8	53	36	91	41.9	51300074HA	94.07	51300074HB	94.07	0.09 – 0.15
7.45	8	53	36	91	41.8	513000745HA	94.07	513000745HB	94.07	0.09 – 0.15
7.50	8	53	36	91	41.8	51300075HA	94.07	51300075HB	94.07	0.09 – 0.15
7.55	8	53	36	91	41.7	513000755HA	94.07	513000755HB	94.07	0.09 – 0.15
7.60	8	53	36	91	41.6	51300076HA	94.07	51300076HB	94.07	0.09 – 0.15
7.70	8	53	36	91	41.5	51300077HA	94.07	51300077HB	94.07	0.09 – 0.15
7.80	8	53	36	91	41.3	51300078HA	94.07	51300078HB	94.07	0.09 – 0.15
7.90	8	53	36	91	41.2	51300079HA	94.07	51300079HB	94.07	0.09 – 0.15
8.00	8	53	36	91	41.0	51300080HA	94.07	51300080HB	94.07	0.09 – 0.16
8.10	10	61	40	103	48.9	51300081HA	107.31	51300081HB	107.31	0.09 – 0.16
8.20	10	61	40	103	48.7	51300082HA	107.31	51300082HB	107.31	0.09 – 0.16
8.30	10	61	40	103	48.6	51300083HA	107.31	51300083HB	107.31	0.09 – 0.16

*HE drill: same price, availability on request*HE drill: same price, availability on request

Product family 111

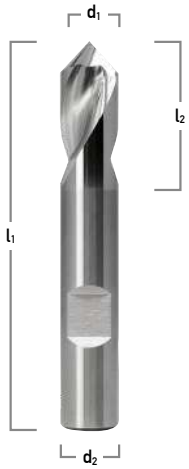
d_1	d_2	l_2	l_3	l_1	t_{max}	HA		HB		Feed		
mm	mm	mm	mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev		
8.40	10	61	40	103	48.4	51300084HA	107.31	51300084HB	107.31	0.09	–	0.16
8.50	10	61	40	103	48.3	51300085HA	107.31	51300085HB	107.31	0.09	–	0.16
8.60	10	61	40	103	48.1	51300086HA	107.31	51300086HB	107.31	0.09	–	0.16
8.70	10	61	40	103	48.0	51300087HA	107.31	51300087HB	107.31	0.09	–	0.16
8.80	10	61	40	103	47.8	51300088HA	107.31	51300088HB	107.31	0.09	–	0.16
8.90	10	61	40	103	47.7	51300089HA	107.31	51300089HB	107.31	0.09	–	0.16
9.00	10	61	40	103	47.5	51300090HA	107.31	51300090HB	107.31	0.10	–	0.17
9.10	10	61	40	103	47.4	51300091HA	107.31	51300091HB	107.31	0.10	–	0.17
9.20	10	61	40	103	47.2	51300092HA	107.31	51300092HB	107.31	0.10	–	0.17
9.30	10	61	40	103	47.1	51300093HA	107.31	51300093HB	107.31	0.10	–	0.17
9.35	10	61	40	103	47.0	513000935HA	107.31	513000935HB	107.31	0.10	–	0.17
9.40	10	61	40	103	46.9	51300094HA	107.31	51300094HB	107.31	0.10	–	0.17
9.50	10	61	40	103	46.8	51300095HA	107.31	51300095HB	107.31	0.10	–	0.17
9.55	10	61	40	103	46.7	513000955HA	107.31	513000955HB	107.31	0.10	–	0.17
9.60	10	61	40	103	46.6	51300096HA	107.31	51300096HB	107.31	0.10	–	0.17
9.70	10	61	40	103	46.5	51300097HA	107.31	51300097HB	107.31	0.10	–	0.17
9.80	10	61	40	103	46.3	51300098HA	107.31	51300098HB	107.31	0.10	–	0.17
9.90	10	61	40	103	46.2	51300099HA	107.31	51300099HB	107.31	0.10	–	0.17
10.00	10	61	40	103	46.0	51300100HA	107.31	51300100HB	107.31	0.10	–	0.18
10.10	12	71	45	118	55.9	51300101HA	147.72	51300101HB	147.72	0.10	–	0.18
10.20	12	71	45	118	55.7	51300102HA	147.72	51300102HB	147.72	0.10	–	0.18
10.30	12	71	45	118	55.6	51300103HA	147.72	51300103HB	147.72	0.10	–	0.18
10.40	12	71	45	118	55.4	51300104HA	147.72	51300104HB	147.72	0.10	–	0.18
10.50	12	71	45	118	55.3	51300105HA	147.72	51300105HB	147.72	0.10	–	0.18
10.60	12	71	45	118	55.1	51300106HA	147.72	51300106HB	147.72	0.10	–	0.18
10.70	12	71	45	118	55.0	51300107HA	147.72	51300107HB	147.72	0.10	–	0.18
10.80	12	71	45	118	54.8	51300108HA	147.72	51300108HB	147.72	0.10	–	0.18
10.90	12	71	45	118	54.7	51300109HA	147.72	51300109HB	147.72	0.10	–	0.18
11.00	12	71	45	118	54.5	51300110HA	147.72	51300110HB	147.72	0.10	–	0.18
11.10	12	71	45	118	54.4	51300111HA	147.72	51300111HB	147.72	0.10	–	0.18
11.20	12	71	45	118	54.2	51300112HA	147.72	51300112HB	147.72	0.10	–	0.18
11.30	12	71	45	118	54.1	51300113HA	147.72	51300113HB	147.72	0.10	–	0.18
11.40	12	71	45	118	53.9	51300114HA	147.72	51300114HB	147.72	0.10	–	0.18
11.50	12	71	45	118	53.8	51300115HA	147.72	51300115HB	147.72	0.10	–	0.18
11.60	12	71	45	118	53.6	51300116HA	147.72	51300116HB	147.72	0.10	–	0.18
11.70	12	71	45	118	53.5	51300117HA	147.72	51300117HB	147.72	0.10	–	0.18
11.80	12	71	45	118	53.3	51300118HA	147.72	51300118HB	147.72	0.10	–	0.18
11.90	12	71	45	118	53.2	51300119HA	147.72	51300119HB	147.72	0.10	–	0.18
12.00	12	71	45	118	53.0	51300120HA	147.72	51300120HB	147.72	0.12	–	0.20
12.20	14	77	45	124	58.7	51300122HA	203.73	51300122HB	203.73	0.12	–	0.20
12.50	14	77	45	124	58.3	51300125HA	203.73	51300125HB	203.73	0.12	–	0.20
12.70	14	77	45	124	58.0	51300127HA	203.73	51300127HB	203.73	0.12	–	0.20
12.80	14	77	45	124	57.8	51300128HA	203.73	51300128HB	203.73	0.12	–	0.20
13.00	14	77	45	124	57.5	51300130HA	203.73	51300130HB	203.73	0.12	–	0.20
13.30	14	77	45	124	57.1	51300133HA	203.73	51300133HB	203.73	0.12	–	0.20
13.50	14	77	45	124	56.8	51300135HA	203.73	51300135HB	203.73	0.12	–	0.20
13.70	14	77	45	124	56.5	51300137HA	203.73	51300137HB	203.73	0.12	–	0.20
13.80	14	77	45	124	56.3	51300138HA	203.73	51300138HB	203.73	0.12	–	0.20
14.00	14	77	45	124	56.0	51300140HA	203.73	51300140HB	203.73	0.13	–	0.22
14.20	16	83	48	133	61.7	51300142HA	250.16	51300142HB	250.16	0.13	–	0.22
14.30	16	83	48	133	61.6	51300143HA	250.16	51300143HB	250.16	0.13	–	0.22
14.50	16	83	48	133	61.3	51300145HA	250.16	51300145HB	250.16	0.13	–	0.22
14.70	16	83	48	133	61.0	51300147HA	250.16	51300147HB	250.16	0.13	–	0.22
14.80	16	83	48	133	60.8	51300148HA	250.16	51300148HB	250.16	0.13	–	0.22
15.00	16	83	48	133	60.5	51300150HA	250.16	51300150HB	250.16	0.13	–	0.22
15.10	16	83	48	133	60.4	51300151HA	250.16	51300151HB	250.16	0.13	–	0.22
15.20	16	83	48	133	60.2	51300152HA	250.16	51300152HB	250.16	0.13	–	0.22
15.30	16	83	48	133	60.1	51300153HA	250.16	51300153HB	250.16	0.13	–	0.22
15.50	16	83	48	133	59.8	51300155HA	250.16	51300155HB	250.16	0.13	–	0.22
15.70	16	83	48	133	59.5	51300157HA	250.16	51300157HB	250.16	0.13	–	0.22
15.80	16	83	48	133	59.3	51300158HA	250.16	51300158HB	250.16	0.13	–	0.22
16.00	16	83	48	133	59.0	51300160HA	250.16	51300160HB	250.16	0.14	–	0.23
16.50	18	93	48	143	68.3	51300165HA	364.21	51300165HB	364.21	0.14	–	0.23
16.80	18	93	48	143	67.8	51300168HA	364.21	51300168HB	364.21	0.14	–	0.23
17.00	18	93	48	143	67.5	51300170HA	364.21	51300170HB	364.21	0.14	–	0.23
17.50	18	93	48	143	66.8	51300175HA	364.21	51300175HB	364.21	0.14	–	0.23
17.70	18	93	48	143	66.5	51300177HA	364.21	51300177HB	364.21	0.14	–	0.23
17.80	18	93	48	143	66.3	51300178HA	364.21	51300178HB	364.21	0.14	–	0.23
18.00	18	93	48	143	66.0	51300180HA	364.21	51300180HB	364.21	0.15	–	0.25
18.50	20	101	50	153	73.3	51300185HA	424.27	51300185HB	424.27	0.15	–	0.25
18.80	20	101	50	153	72.8	51300188HA	424.27	51300188HB	424.27	0.15	–	0.25
19.00	20	101	50	153	72.5	51300190HA	424.27	51300190HB	424.27	0.15	–	0.25
19.50	20	101	50	153	71.8	51300195HA	424.27	51300195HB	424.27	0.15	–	0.25
19.80	20	101	50	153	71.3	51300198HA	424.27	51300198HB	424.27	0.16	–	0.26
20.00	20	101	50	153	71.0	51300200HA	424.27	51300200HB	424.27	0.16	–	0.26

Material	Stainless steels	Stainless steels	Super alloys	Titanium materials
Tensile strength / Hardness	< 750 N/mm²	< 850 N/mm²	> 260 HB	< 1400 N/mm²
V_c (m/min)	90	70	40	55

50101

Uncoated | TiAlN | Z 2 | HB | VHM | 90° | Manufacturer standard | HA*

Solid Carbide NC Spotting Drill
90°



d_1	d_2	l_2	l_1		uncoated		coated		Feed
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/rev
3.0*	3	8	38	2	50101030	25.22	50101030TA	31.15	0.070 – 0.160
4.0*	4	10	50	2	50101040	25.22	50101040TA	31.15	0.100 – 0.200
5.0*	5	13	50	2	50101050	25.22	50101050TA	31.15	0.100 – 0.250
6.0	6	11	57	2	50101060	25.22	50101060TA	31.15	0.125 – 0.315
8.0	8	19	63	2	50101080	32.32	50101080TA	38.85	0.160 – 0.315
10.0	10	20	66	2	50101100	51.98	50101100TA	60.39	0.200 – 0.400
12.0	12	22	73	2	50101120	59.37	50101120TA	72.79	0.200 – 0.500
16.0	16	24	82	2	50101160	112.07	50101160TA	140.83	0.250 – 0.630
20.0	20	30	92	2	50101200	182.55	50101200TA	220.43	0.315 – 0.630

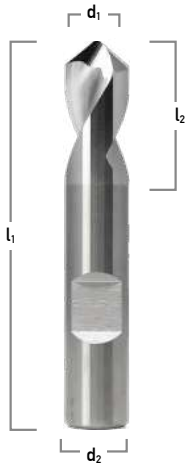
- For universal applications
- Exact point cuts for high geometrical and positional accuracy
- Stable due to short flutes
- **Application instruction:** Always calculate speed n based on the effective spotting drill diameter.

d_1 h7

50103

Uncoated | TiAlN | Z 2 | HB | VHM | 100° | Manufacturer standard | HA*

Solid Carbide NC Spotting Drill
100°



d_1	d_2	l_2	l_1		uncoated		coated		Feed
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/rev
3.0*	3	8	38	2	50103030	25.22	50103030TA	31.15	0.070 – 0.160
4.0*	4	10	50	2	50103040	25.22	50103040TA	31.15	0.100 – 0.200
5.0*	5	13	50	2	50103050	25.22	50103050TA	31.15	0.100 – 0.250
6.0	6	11	57	2	50103060	25.22	50103060TA	31.15	0.125 – 0.315
8.0	8	19	63	2	50103080	32.32	50103080TA	38.85	0.160 – 0.315
10.0	10	20	66	2	50103100	51.98	50103100TA	60.39	0.200 – 0.400
12.0	12	22	73	2	50103120	59.37	50103120TA	72.79	0.200 – 0.500
16.0	16	24	82	2	50103160	112.07	50103160TA	140.83	0.250 – 0.630
20.0	20	30	92	2	50103200	182.55	50103200TA	220.43	0.315 – 0.630

- For universal applications
- Exact point cuts for high geometrical and positional accuracy
- Stable due to short flutes
- **Application instruction:** Always calculate speed n based on the effective spotting drill diameter.

d_1 h7

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic	Super alloys	Titanium materials
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²			> 260 HB	< 1400 N/mm²
V_c (m/min) uncoated	180	150	100	65	70	100	110	20	25
V_c (m/min) TiAlN	220	180	140	80	85	115	130	35	40

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 750 N/mm²	< 800 N/mm²	> 260 HB
V_c (m/min) uncoated	90	80	80	45	65	55	120	40
V_c (m/min) TiAlN	110	100	100	65	85	75	140	60

Product family 160

50102

Uncoated | TiAlN | Z 2 | HB | VHM | 120° | Manufacturer standard | HA*

Solid Carbide NC Spotting Drill
120°

d_1	d_2	l_2	l_1		uncoated		coated		Feed
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/rev
3.0*	3	8	38	2	50102030	25.22	50102030TA	31.15	0.070 – 0.160
4.0*	4	10	50	2	50102040	25.22	50102040TA	31.15	0.100 – 0.200
5.0*	5	13	50	2	50102050	25.22	50102050TA	31.15	0.100 – 0.250
6.0	6	11	57	2	50102060	25.22	50102060TA	31.15	0.125 – 0.315
8.0	8	19	63	2	50102080	32.32	50102080TA	38.85	0.160 – 0.315
10.0	10	20	66	2	50102100	51.98	50102100TA	60.39	0.200 – 0.400
12.0	12	22	73	2	50102120	59.37	50102120TA	72.79	0.200 – 0.500
16.0	16	24	82	2	50102160	112.07	50102160TA	140.83	0.250 – 0.630
20.0	20	30	92	2	50102200	182.55	50102200TA	220.43	0.315 – 0.630

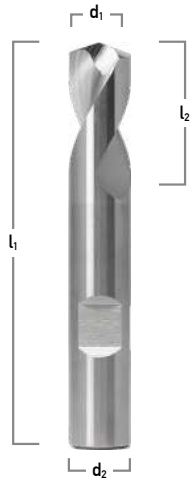
- For universal applications
- Exact point cuts for high geometrical and positional accuracy
- Stable due to short flutes
- **Application instruction:** Always calculate speed n based on the effective spotting drill diameter.

d_1 h7

50100

Uncoated | TiAlN | Z 2 | HB | VHM | 142° | Manufacturer standard | HA*

Solid Carbide NC Spotting Drill
142°



d_1	d_2	l_2	l_1		uncoated		coated		Feed
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/rev
3.0*	3	8	38	2	50100030	25.22	50100030TA	31.15	0.070 – 0.160
4.0*	4	10	50	2	50100040	25.22	50100040TA	31.15	0.100 – 0.200
5.0*	5	13	50	2	50100050	25.22	50100050TA	31.15	0.100 – 0.250
6.0	6	11	57	2	50100060	25.22	50100060TA	31.15	0.125 – 0.315
8.0	8	19	63	2	50100080	32.32	50100080TA	38.85	0.160 – 0.315
10.0	10	20	66	2	50100100	51.98	50100100TA	60.39	0.200 – 0.400
12.0	12	22	73	2	50100120	59.37	50100120TA	72.79	0.200 – 0.500
16.0	16	24	82	2	50100160	112.07	50100160TA	140.83	0.250 – 0.630
20.0	20	30	92	2	50100200	182.55	50100200TA	220.43	0.315 – 0.630

- Exact point cuts for high geometrical and positional accuracy
- Stable due to short flutes
- **Application instruction:** Always calculate speed n based on the effective spotting drill diameter. Speed n immer auf den tatsächlichen Anbohrdurchmesser berechnen.

d_1 h7

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic	Super alloys	Titanium materials
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²			> 260 HB	< 1400 N/mm²
V_c (m/min) uncoated	180	150	100	65	70	100	110	20	25
V_c (m/min) TiAlN	220	180	140	80	85	115	130	35	40

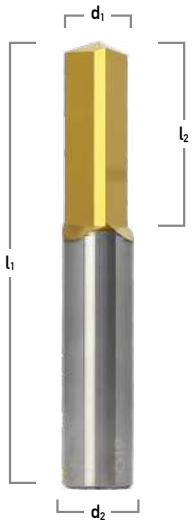
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Tool steels	Alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 1000 N/mm²	< 750 N/mm²	< 800 N/mm²	> 260 HB
V_c (m/min) uncoated	90	80	80	45	65	55	120	40
V_c (m/min) TiAlN	110	100	100	65	85	75	140	60

Product family 160

50000

TiN | Z 3 | HA |  | VHM | Manu-facturer standard

Solid Carbide Thread Repair Drill



d1
h7

for	d_1	d_2	l_2	l_1		coated		Feed
Threads	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/rev
M4	3.3	6	15	50	3	50000033	46.84	0.01
M5	4.2	6	15	50	3	50000042	49.48	0.01
M6	5.0	6	15	50	3	50000050	54.90	0.01
M8	6.8	8	20	60	3	50000068	73.73	0.01
M10	8.5	10	25	70	3	50000085	92.58	0.01
M12	10.2	12	30	75	3	50000102	114.56	0.01

Operating instructions for solid carbide thread repair drill

Drilling-out operation needs to be carried out under dry conditions at approx. 1500 – 3500 rpm. Using the suitable tapping drill makes it easy to drill-out the core of the tap, with fully removing its residues from the drill hole.

The work-piece needs to be securely tightened to prevent from moving during high speed rates. When the tap has broken-off obliquely, first run the repair tool for several times to centralise the tap. Now you can start drilling-out. Additionally, repeat chips removal operation to remove all chips.

Shortly before drilling-out is completed, there will be a vibration. The repair drill should be removed then.

Now it is possible to cut a new thread using a tap.

Because of heavy strain during repair operation and to achieve best results, the edges of the solid carbide thread repair drill must be re-sharpened from time to time.

Metric sizes from M 4 – M 12 available in stock.

Other Types on request.

ToolFactory
Cutting Tool Solutions

Professional Line

Solid Carbide End Mill

Professional Line

Quality
Precision
Efficiency

Solid Carbide HPC End Mill

Series 35401, 35402 and 35403

- The renowed end mill of the 35402 series has been supplemented by further variants: **short version** with edge chamfer, standard length **with corner radius** or protective chamfer
- The high performance end mills of the series 354... are characterised by a cutting edge geometry with **unequal pitch**, dynamic helix angles, cutting edge preparation, large flutes in the front area and a **reinforced core**
- MnS1 coating, based on the latest coating technology for high resistance to thermal and abrasive wear
- Very smooth running
- **Maximum stability, service life and process reliability**

MnS1 Coating
for high wear resistance

Reinforced core
for high stability

Maximum tool life
and process reliability

Application:

- Can be used with a wide range of materials
- For roughing and finishing up to 2.0xD into solid

Facts

Material	Solid Carbide
Coating	MnS1
Diameter	3,0 - 20,0 mm
Milling depth a_p	to 2,0xD
Cutting width a_e	0,5xD
Areas of application	suitable for dry and wet processing
	Especially for series producers

Versions

35401	Short version with edge chamfer
35402	Standard length with corner radius
35403	Standard length with protective chamfer
35404	Long version with corner radius

4 cutting edges for high metal removal rate

Unequal pitch
35/38° for smooth running

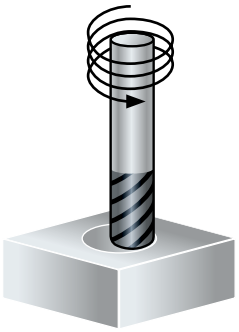
TOP Performance
in series production

Various versions as short variant with edge chamfer, standard length with corner radius or protective chamfer and long version with corner radius

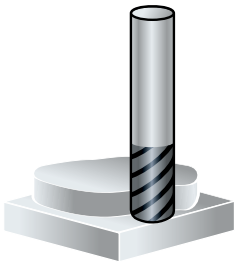
Suitability

Material Class	Suitable
Steel	P
INOX	M
Cast iron	K
Non-ferrous metals	
Special and Titanium alloys	
Hard materials	

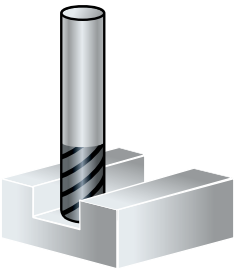
Scope of Application



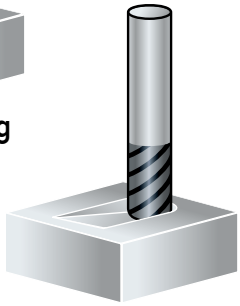
Helix milling



Trimming



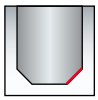
Full slot milling



Ramping

NEW

35401






Solid Carbide HPC End Mill

Short version with edge chamfer

d_1	d_2	Corner chamfer	l_2	l_1		coated	
mm	mm		mm	mm	Z	Part No.	€/pc.
3.0	6	0.13	6	54	4	35401030	31.68
4.0	6	0.18	8	54	4	35401040	31.68
5.0	6	0.20	9	54	4	35401050	31.68
6.0	6	0.20	10	54	4	35401060	31.68
7.0	8	0.20	12	58	4	35401070	44.68
8.0	8	0.20	12	58	4	35401080	44.68
9.0	10	0.30	14	66	4	35401090	62.80
10.0	10	0.30	14	66	4	35401100	62.80
11.0	12	0.30	16	73	4	35401110	89.93
12.0	12	0.30	16	73	4	35401120	89.93
14.0	14	0.30	18	75	4	35401140	125.81
16.0	16	0.40	22	82	4	35401160	152.22
20.0	20	0.50	26	92	4	35401200	221.68

f_z Roughing	f_z Finishing
mm/Z	mm/Z
0.007 – 0.031	0.007 – 0.027
0.011 – 0.039	0.010 – 0.033
0.016 – 0.039	0.015 – 0.033
0.026 – 0.044	0.025 – 0.038
0.032 – 0.05	0.029 – 0.043
0.032 – 0.055	0.029 – 0.048
0.037 – 0.066	0.034 – 0.057
0.042 – 0.077	0.039 – 0.067
0.053 – 0.088	0.049 – 0.076
0.063 – 0.099	0.059 – 0.086
0.074 – 0.121	0.069 – 0.105
0.095 – 0.143	0.088 – 0.124
0.137 – 0.187	0.127 – 0.162

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	220	190	180	160	130	110	160	130	90
Trimming a_e = 0,2xD	310	280	250	220	190	160	220	190	110

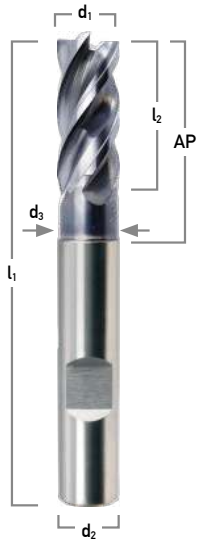
Product family 159

35402

MnS1 | Z 4 | NEW HA | HB | ≠ | VHM | Type N | HPC | Manu-facturer standard

Solid Carbide HPC End Mill

With edge chamfer



d1	d2
h10	h6

d1	d2	Corner chamfer	l2	l1	d3	AP		coated (HA)		coated (HB)		fz Roughing	fz Finishing
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	6	0.13	8	57	2.8	18	4	35402030HA	34.82	35402030	34.82	0.007 – 0.031	0.007 – 0.027
3.5	6	0.18	11	57	3.3	21	4	35402035HA	34.82	35402035	34.82	0.009 – 0.035	0.008 – 0.030
4.0	6	0.18	11	57	3.8	21	4	35402040HA	34.82	35402040	34.82	0.011 – 0.039	0.010 – 0.033
5.0	6	0.20	13	57	4.8	21	4	35402050HA	34.82	35402050	34.82	0.016 – 0.039	0.015 – 0.033
6.0	6	0.20	13	57	5.5	21	4	35402060HA	34.82	35402060	34.82	0.026 – 0.044	0.025 – 0.038
7.0	8	0.20	19	63	6.5	27	4	35402070HA	49.10	35402070	49.10	0.032 – 0.050	0.029 – 0.043
8.0	8	0.20	19	63	7.5	27	4	35402080HA	49.10	35402080	49.10	0.032 – 0.055	0.029 – 0.048
9.0	10	0.30	22	72	8.5	32	4	35402090HA	69.01	35402090	69.01	0.037 – 0.066	0.034 – 0.057
10.0	10	0.30	22	72	9.5	32	4	35402100HA	69.01	35402100	69.01	0.042 – 0.077	0.039 – 0.067
11.0	12	0.30	26	83	10.5	38	4	35402110HA	99.92	35402110	99.92	0.053 – 0.088	0.049 – 0.076
12.0	12	0.30	26	83	11.5	38	4	35402120HA	99.92	35402120	99.92	0.063 – 0.099	0.059 – 0.086
13.0	14	0.30	26	83	12.5	42	4	35402130HA	139.80	35402130	139.80	0.074 – 0.099	0.069 – 0.086
14.0	14	0.30	26	83	13.5	42	4	35402140HA	139.80	35402140	139.80	0.074 – 0.121	0.069 – 0.105
16.0	16	0.40	32	92	15.5	44	4	35402160HA	169.13	35402160	169.13	0.095 – 0.143	0.088 – 0.124
18.0	18	0.40	32	92	17.5	50	4	35402180HA	209.15	35402180	209.15	0.116 – 0.143	0.108 – 0.124
20.0	20	0.50	38	104	19.5	54	4	35402200HA	249.07	35402200	249.07	0.137 – 0.187	0.127 – 0.162

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

35402 in action

Visit YouTube to watch our high-performance end mill in action machining steel grade 42CrMo4.

https://www.youtube.com/watch?v=mAI_gnptJe0

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	220	190	180	160	130	110	160	130	90
Trimming a_e = 0,2xD	310	280	250	220	190	160	220	190	110

Product family 159

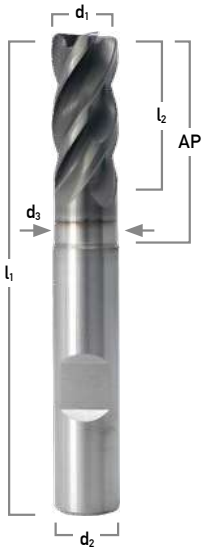
NEW

35402CR



Solid Carbide HPC End Mill

With corner radius



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	CR	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	+/- 0.02	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
4.0	6	11	57	0.25	3.8	21	4	3540204025	36.65	0.011 –	0.039	0.010 –	0.033
4.0	6	11	57	0.50	3.8	21	4	354020405	36.65	0.011 –	0.039	0.010 –	0.033
4.0	6	11	57	1.00	3.8	21	4	354020410	36.65	0.011 –	0.039	0.010 –	0.033
5.0	6	13	57	0.50	4.8	21	4	354020505	36.65	0.016 –	0.039	0.015 –	0.033
5.0	6	13	57	1.00	4.8	21	4	354020510	36.65	0.016 –	0.039	0.015 –	0.033
5.0	6	13	57	1.50	4.8	21	4	354020515	36.65	0.016 –	0.039	0.015 –	0.033
6.0	6	13	57	0.50	5.5	21	4	354020605	36.65	0.026 –	0.044	0.025 –	0.038
6.0	6	13	57	1.00	5.5	21	4	354020610	36.65	0.026 –	0.044	0.025 –	0.038
6.0	6	13	57	1.50	5.5	21	4	354020615	36.65	0.026 –	0.044	0.025 –	0.038
6.0	6	13	57	2.00	5.5	21	4	354020620	36.65	0.026 –	0.044	0.025 –	0.038
8.0	8	19	63	0.50	7.5	27	4	354020805	51.69	0.032 –	0.055	0.029 –	0.048
8.0	8	19	63	1.00	7.5	27	4	354020810	51.69	0.032 –	0.055	0.029 –	0.048
8.0	8	19	63	1.50	7.5	27	4	354020815	51.69	0.032 –	0.055	0.029 –	0.048
8.0	8	19	63	2.00	7.5	27	4	354020820	51.69	0.032 –	0.055	0.029 –	0.048
10.0	10	22	72	0.50	9.5	32	4	354021005	72.65	0.042 –	0.077	0.039 –	0.067
10.0	10	22	72	1.00	9.5	32	4	354021010	72.65	0.042 –	0.077	0.039 –	0.067
10.0	10	22	72	1.50	9.5	32	4	354021015	72.65	0.042 –	0.077	0.039 –	0.067
10.0	10	22	72	2.00	9.5	32	4	354021020	72.65	0.042 –	0.077	0.039 –	0.067
10.0	10	22	72	3.00	9.5	32	4	354021030	72.65	0.042 –	0.077	0.039 –	0.067
12.0	12	26	83	0.50	11.5	38	4	354021205	105.18	0.063 –	0.099	0.059 –	0.086
12.0	12	26	83	1.00	11.5	38	4	354021210	105.18	0.063 –	0.099	0.059 –	0.086
12.0	12	26	83	1.50	11.5	38	4	354021215	105.18	0.063 –	0.099	0.059 –	0.086
12.0	12	26	83	2.00	11.5	38	4	354021220	105.18	0.063 –	0.099	0.059 –	0.086
12.0	12	26	83	3.00	11.5	38	4	354021230	105.18	0.063 –	0.099	0.059 –	0.086
14.0	14	26	83	1.00	13.5	42	4	354021410	147.16	0.074 –	0.121	0.069 –	0.105
14.0	14	26	83	2.00	13.5	42	4	354021420	147.16	0.074 –	0.121	0.069 –	0.105
16.0	16	32	92	1.00	15.5	44	4	354021610	178.03	0.095 –	0.143	0.088 –	0.124
16.0	16	32	92	1.50	15.5	44	4	354021615	178.03	0.095 –	0.143	0.088 –	0.124
16.0	16	32	92	2.00	15.5	44	4	354021620	178.03	0.095 –	0.143	0.088 –	0.124
16.0	16	32	92	2.50	15.5	44	4	354021625	178.03	0.095 –	0.143	0.088 –	0.124
16.0	16	32	92	3.00	15.5	44	4	354021630	178.03	0.095 –	0.143	0.088 –	0.124
16.0	16	32	92	4.00	15.5	44	4	354021640	178.03	0.095 –	0.143	0.088 –	0.124
20.0	20	38	104	1.00	19.5	54	4	354022010	262.19	0.137 –	0.187	0.127 –	0.162
20.0	20	38	104	1.50	19.5	54	4	354022015	262.19	0.137 –	0.187	0.127 –	0.162
20.0	20	38	104	2.00	19.5	54	4	354022020	262.19	0.137 –	0.187	0.127 –	0.162
20.0	20	38	104	2.50	19.5	54	4	354022025	262.19	0.137 –	0.187	0.127 –	0.162
20.0	20	38	104	3.00	19.5	54	4	354022030	262.19	0.137 –	0.187	0.127 –	0.162
20.0	20	38	104	4.00	19.5	54	4	354022040	262.19	0.137 –	0.187	0.127 –	0.162
20.0	20	38	104	5.00	19.5	54	4	354022050	262.19	0.137 –	0.187	0.127 –	0.162

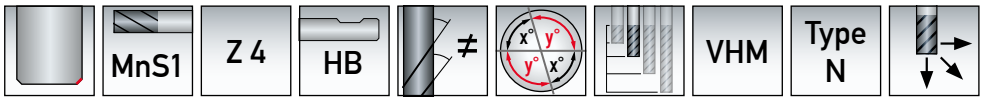
Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	220	190	180	160	130	110	160	130	90
Trimming a_e = 0,2xD	310	280	250	220	190	160	220	190	110

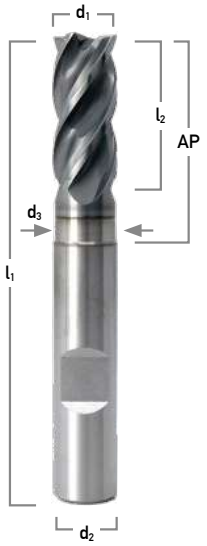
Product family 159

NEW **35403**



Solid Carbide HPC End Mill

With protective chamfer



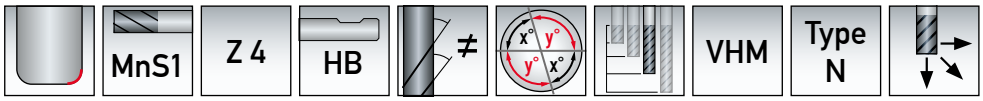
d_1	d_2	Schutz fase	l_2	l_1	d_3	AP	Z	coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	mm	mm		Part No.	€/pc.	mm/Z		mm/Z	
3.0	6	0.03	8	57	2.8	18	4	35403030	34.82	0.007 –	0.031	0.007 –	0.027
4.0	6	0.04	11	57	3.8	21	4	35403040	34.82	0.011 –	0.039	0.010 –	0.033
5.0	6	0.05	13	57	4.8	21	4	35403050	34.82	0.016 –	0.039	0.015 –	0.033
6.0	6	0.06	13	57	5.5	21	4	35403060	34.82	0.026 –	0.044	0.025 –	0.038
8.0	8	0.08	19	63	7.5	27	4	35403080	49.10	0.032 –	0.055	0.029 –	0.048
10.0	10	0.10	22	72	9.5	32	4	35403100	69.01	0.042 –	0.077	0.039 –	0.067
12.0	12	0.12	26	83	11.5	38	4	35403120	99.92	0.063 –	0.099	0.059 –	0.086
16.0	16	0.15	32	92	15.5	44	4	35403160	169.13	0.095 –	0.143	0.088 –	0.124
20.0	20	0.15	38	104	19.5	54	4	35403200	249.07	0.137 –	0.187	0.127 –	0.162

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

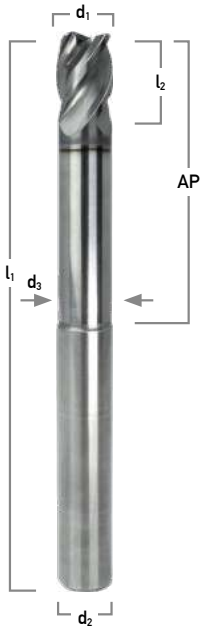
Full slot milling
a_p = 2.0xD

NEW **35404**



Solid Carbide HPC End Mill

Long version with corner radius



d_1	d_2	l_2	l_1	CR	d_3	AP	Z	coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	+/- 0.02	mm	mm		Part No.	€/pc.	mm/Z		mm/Z	
6.0	6	7	75	0.50	5.5	32	4	354040605	37.60	0.023 -	0.04	0.023 -	0.034
6.0	6	7	75	1.00	5.5	32	4	354040610	37.60	0.023 -	0.04	0.023 -	0.034
6.0	6	7	75	1.50	5.5	32	4	354040615	37.60	0.023 -	0.04	0.023 -	0.034
6.0	6	7	75	2.00	5.5	32	4	354040620	37.60	0.023 -	0.04	0.023 -	0.034
8.0	8	9	85	0.50	7.5	42	4	354040805	56.29	0.029 -	0.05	0.026 -	0.043
8.0	8	9	85	1.00	7.5	42	4	354040810	56.29	0.029 -	0.05	0.026 -	0.043
8.0	8	9	85	1.50	7.5	42	4	354040815	56.29	0.029 -	0.05	0.026 -	0.043
8.0	8	9	85	2.00	7.5	42	4	354040820	56.29	0.029 -	0.05	0.026 -	0.043
10.0	10	11	100	0.50	9.5	52	4	354041005	79.25	0.038 -	0.069	0.035 -	0.06
10.0	10	11	100	1.00	9.5	52	4	354041010	79.25	0.038 -	0.069	0.035 -	0.06
10.0	10	11	100	1.50	9.5	52	4	354041015	79.25	0.038 -	0.069	0.035 -	0.06
10.0	10	11	100	2.00	9.5	52	4	354041020	79.25	0.038 -	0.069	0.035 -	0.06
12.0	12	12	110	0.50	11.5	62	4	354041205	113.18	0.057 -	0.089	0.045 -	0.077
12.0	12	12	110	1.00	11.5	62	4	354041210	113.18	0.057 -	0.089	0.045 -	0.077
12.0	12	12	110	1.50	11.5	62	4	354041215	113.18	0.057 -	0.089	0.045 -	0.077
12.0	12	12	110	2.00	11.5	62	4	354041220	113.18	0.057 -	0.089	0.045 -	0.077
16.0	16	16	140	0.50	15.5	82	4	354041605	191.65	0.086 -	0.129	0.079 -	0.112
16.0	16	16	140	1.00	15.5	82	4	354041610	191.65	0.086 -	0.129	0.079 -	0.112
16.0	16	16	140	1.50	15.5	82	4	354041615	191.65	0.086 -	0.129	0.079 -	0.112
16.0	16	16	140	2.00	15.5	82	4	354041620	191.65	0.086 -	0.129	0.079 -	0.112
16.0	16	16	140	2.50	15.5	82	4	354041625	191.65	0.086 -	0.129	0.079 -	0.112

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	220	190	180	160	130	110	160	130	90
Trimming a_e = 0,2xD	310	280	250	220	190	160	220	190	110

Product family 159

Solid Carbide HPC High-Performance End Mill

- Solid carbide end mill of the latest generation made
- from wear-resistant ultra-micro grain solid carbide
- Newly developed cutting geometry with unequal
- spacing, dynamic helix angles, cutting edge preparation, **edge chamfer**, large flutes in the front area and **reinforced core**
- MnI1 coating, based on the latest coating technology for high resistance to thermal and abrasive wear
- Very smooth running and low-noise operation
- **Maximum stability, service life and process reliability**

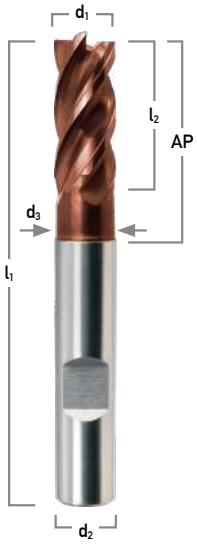
Application:

- Can be used in all stainless and high-temperature steels
- For roughing and finishing up to 1.5xD into solid

35405

Solid Carbide HPC End Mill INOX-Titanium

With edge chamfer



d1	d2
h10	h6

d1 mm	d2 mm	Corner chamfer	l2 mm	l1 mm	d3 mm	AP mm	Z	coated Part No.	coated €/pc.	fz Roughing mm/Z	fz Finishing mm/Z
3.0	6	0.13	8	57	2.8	18	4	35405030	40.42	0.0105 – 0.0170	0.0098 – 0.0140
4.0	6	0.18	11	57	3.8	21	4	35405040	40.42	0.0147 – 0.0220	0.0137 – 0.0190
5.0	6	0.20	13	57	4.8	21	4	35405050	40.42	0.0189 – 0.0260	0.0176 – 0.0230
6.0	6	0.20	13	57	5.5	21	4	35405060	40.42	0.0210 – 0.0310	0.0196 – 0.0270
7.0	8	0.20	19	63	6.5	27	4	35405070	56.81	0.0315 – 0.0420	0.0294 – 0.0360
8.0	8	0.20	19	63	7.5	27	4	35405080	56.81	0.0315 – 0.0420	0.0294 – 0.0360
9.0	10	0.30	22	72	8.5	32	4	35405090	76.79	0.0420 – 0.0550	0.0392 – 0.0480
10.0	10	0.30	22	72	9.5	32	4	35405100	76.79	0.0420 – 0.0550	0.0392 – 0.0480
11.0	12	0.30	26	83	10.5	38	4	35405110	107.62	0.0473 – 0.0610	0.0441 – 0.0520
12.0	12	0.30	26	83	11.5	38	4	35405120	107.62	0.0473 – 0.0610	0.0441 – 0.0520
13.0	14	0.30	26	83	12.5	42	4	35405130	158.11	0.0525 – 0.0660	0.0490 – 0.0570
14.0	14	0.30	26	83	13.5	42	4	35405140	158.11	0.0525 – 0.0660	0.0490 – 0.0570
16.0	16	0.40	32	92	15.5	44	4	35405160	179.96	0.0735 – 0.0880	0.0686 – 0.0760
18.0	18	0.40	32	92	17.5	50	4	35405180	226.11	0.0735 – 0.0990	0.0686 – 0.0860
20.0	20	0.50	38	104	19.5	54	4	35405200	265.96	0.0735 – 0.0990	0.0686 – 0.0860

NEW

d1 mm	d2 mm	Corner chamfer	l2 mm	l1 mm	d3 mm	AP mm	Z	coated Part No.	coated €/pc.	fz Roughing mm/Z	fz Finishing mm/Z
3.0	6	0.13	8	57	2.8	12	4	35405031	40.42	0.0105 – 0.0170	0.0098 – 0.0140
4.0	6	0.18	11	57	3.8	15	4	35405041	40.42	0.0147 – 0.0220	0.0137 – 0.0190
5.0	6	0.20	13	57	4.8	17	4	35405051	40.42	0.0189 – 0.0260	0.0176 – 0.0230

With shortened AP measure

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

V_c (m/min)	General structured steels	Legierte Vergütungsstähle	Cast iron (GGG,GT)	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	≤ 1100 N/mm²	> 260 HB	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	200	140	70	110	100	80	40	60
Trimming a_e = 0,2xD	300	200	100	150	130	100	60	80

Product family 159

36380






Solid Carbide HPC End Mill

Short version with protective chamfer

d1	d2
h10	h6

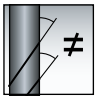
d1	d2	Corner chamfer	l2	l1		coated		fz Roughing	fz Finishing
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	0.02	4	54	4	36380020	25.22	0.007 – 0.022	0.007 – 0.019
2.5	6	0.02	4	54	4	36380025	25.22	0.007 – 0.022	0.007 – 0.019
3.0	6	0.03	6	54	4	36380030	25.22	0.007 – 0.031	0.007 – 0.027
4.0	6	0.04	8	54	4	36380040	25.22	0.011 – 0.031	0.010 – 0.027
5.0	6	0.05	9	54	4	36380050	25.22	0.016 – 0.039	0.015 – 0.033
6.0	6	0.06	10	54	4	36380060	24.84	0.026 – 0.044	0.025 – 0.038
7.0	8	0.07	12	58	4	36380070	37.19	0.032 – 0.050	0.029 – 0.043
8.0	8	0.08	12	58	4	36380080	37.19	0.032 – 0.055	0.029 – 0.048
9.0	10	0.09	14	66	4	36380090	51.24	0.037 – 0.066	0.034 – 0.057
10.0	10	0.10	14	66	4	36380100	51.99	0.037 – 0.066	0.034 – 0.057
11.0	12	0.11	16	73	4	36380110	77.04	0.053 – 0.088	0.049 – 0.076
12.0	12	0.12	16	73	4	36380120	77.04	0.063 – 0.099	0.059 – 0.086
14.0	14	0.14	18	75	4	36380140	109.25	0.074 – 0.121	0.069 – 0.105
16.0	16	0.15	22	82	4	36380160	144.50	0.095 – 0.143	0.088 – 0.124
18.0	18	0.15	24	84	4	36380180	176.31	0.095 – 0.143	0.088 – 0.124
20.0	20	0.15	26	92	4	36380200	204.25	0.137 – 0.187	0.127 – 0.162

Peripheral milling
a_e = 0.5xD
a_p = 1.3xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

35380



Solid Carbide HPC End Mill

Short version with edge chamfer

d1	d2
h10	h6

d1	d2	Corner chamfer	l2	l1		coated		fz Roughing	fz Finishing
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
3.0	6	0.13	6	54	4	35380030A	25.10	0.007 – 0.031	0.007 – 0.027
4.0	6	0.18	8	54	4	35380040A	25.10	0.007 – 0.039	0.007 – 0.033
5.0	6	0.20	9	54	4	35380050A	25.10	0.011 – 0.039	0.010 – 0.033
6.0	6	0.20	10	54	4	35380060A	25.10	0.016 – 0.044	0.015 – 0.038
7.0	8	0.20	12	58	4	35380070A	37.44	0.026 – 0.044	0.025 – 0.038
8.0	8	0.20	12	58	4	35380080A	37.44	0.032 – 0.055	0.029 – 0.048
9.0	10	0.30	14	66	4	35380090A	51.29	0.032 – 0.055	0.029 – 0.048
10.0	10	0.30	14	66	4	35380100A	51.29	0.037 – 0.077	0.034 – 0.067
11.0	12	0.30	16	73	4	35380110A	76.03	0.037 – 0.088	0.034 – 0.076
12.0	12	0.30	16	73	4	35380120A	76.03	0.053 – 0.099	0.049 – 0.086
13.0	14	0.30	18	75	4	35380130A	106.13	0.053 – 0.099	0.049 – 0.086
14.0	14	0.30	18	75	4	35380140A	106.13	0.063 – 0.121	0.059 – 0.105
16.0	16	0.40	22	82	4	35380160A	140.44	0.074 – 0.143	0.069 – 0.124
18.0	18	0.40	24	84	4	35380180A	171.80	0.095 – 0.143	0.088 – 0.124
20.0	20	0.50	26	92	4	35380200A	198.54	0.095 – 0.165	0.088 – 0.143

Peripheral milling
a_e = 0.5xD
a_p = 1.3xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

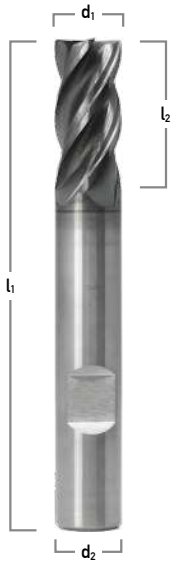
Product family 159

35381




Solid Carbide HPC End Mill

With edge chamfer



d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
3.0	6	0.10	8	57	4	35381030A	27.74	0.007 –	0.031	0.007 –	0.027
4.0	6	0.18	11	57	4	35381040A	27.74	0.011 –	0.039	0.010 –	0.033
5.0	6	0.20	13	57	4	35381050A	27.74	0.016 –	0.039	0.015 –	0.033
6.0	6	0.20	13	57	4	35381060A	27.74	0.026 –	0.044	0.025 –	0.038
7.0	8	0.20	19	63	4	35381070A	39.12	0.032 –	0.050	0.029 –	0.043
8.0	8	0.20	19	63	4	35381080A	39.12	0.032 –	0.055	0.029 –	0.048
9.0	10	0.30	22	72	4	35381090A	55.00	0.037 –	0.066	0.034 –	0.057
10.0	10	0.30	22	72	4	35381100A	55.00	0.042 –	0.077	0.039 –	0.067
11.0	12	0.30	26	83	4	35381110A	79.61	0.053 –	0.088	0.049 –	0.076
12.0	12	0.30	26	83	4	35381120A	79.61	0.063 –	0.099	0.059 –	0.086
14.0	14	0.30	26	83	4	35381140A	111.40	0.074 –	0.012	0.069 –	0.010
16.0	16	0.40	32	92	4	35381160A	134.76	0.095 –	0.014	0.088 –	0.012
18.0	18	0.40	32	92	4	35381180A	166.64	0.116 –	0.017	0.108 –	0.014
20.0	20	0.50	38	104	4	35381200A	198.44	0.137 –	0.019	0.127 –	0.016

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

d_1	d_2
h10	h6

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

Product family 159

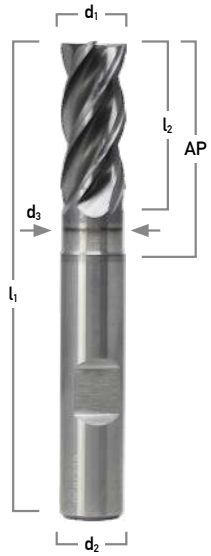
36382






Solid Carbide HPC End Mill

With protective chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	0.02	6	57	–	–	4	36382020	28.31	0.007 – 0.022	0.007 – 0.019
2.5	6	0.02	6	57	–	–	4	36382025	28.31	0.007 – 0.022	0.007 – 0.019
3.0	6	0.03	8	57	2.8	18	4	36382030	28.31	0.007 – 0.031	0.007 – 0.027
4.0	6	0.04	11	57	3.8	21	4	36382040	28.31	0.011 – 0.031	0.010 – 0.027
5.0	6	0.05	13	57	4.8	21	4	36382050	28.31	0.016 – 0.039	0.015 – 0.033
6.0	6	0.06	13	57	5.5	21	4	36382060	28.31	0.026 – 0.044	0.025 – 0.038
7.0	8	0.07	19	63	6.5	27	4	36382070	39.92	0.032 – 0.050	0.029 – 0.043
8.0	8	0.08	19	63	7.5	27	4	36382080	39.92	0.032 – 0.055	0.029 – 0.048
9.0	10	0.09	22	72	8.5	32	4	36382090	56.12	0.037 – 0.066	0.034 – 0.057
10.0	10	0.10	22	72	9.5	32	4	36382100	56.12	0.037 – 0.066	0.034 – 0.057
11.0	12	0.11	26	83	10.5	38	4	36382110	56.12	0.053 – 0.088	0.049 – 0.076
12.0	12	0.12	26	83	11.5	38	4	36382120	81.24	0.063 – 0.099	0.059 – 0.086
14.0	14	0.14	26	83	13.5	42	4	36382140	113.65	0.074 – 0.121	0.069 – 0.105
16.0	16	0.15	32	92	15.5	44	4	36382160	137.52	0.095 – 0.143	0.088 – 0.124
18.0	18	0.15	32	92	17.5	50	4	36382180	170.05	0.095 – 0.143	0.088 – 0.124
20.0	20	0.15	38	104	19.5	54	4	36382200	202.80	0.137 – 0.187	0.127 – 0.162

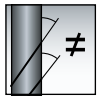
Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

d_1	d_2
h10	h6

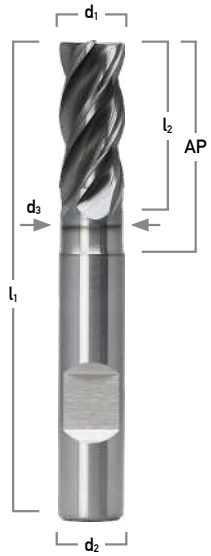
35382



Solid Carbide HPC End Mill

With edge chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	0.02	3	57	0.9	5	4	35382010A	34.38	0.006 – 0.017	0.006 – 0.014
1.5	6	0.02	4.5	57	1.4	8	4	35382015A	34.38	0.006 – 0.017	0.006 – 0.014
2.0	6	0.02	6	57	1.8	10	4	35382020A	34.38	0.007 – 0.022	0.007 – 0.019
2.5	6	0.02	7	57	2.3	11	4	35382025A	34.38	0.007 – 0.022	0.007 – 0.019
3.0	6	0.13	8	57	2.8	18	4	35382030A	28.31	0.007 – 0.031	0.007 – 0.027
4.0	6	0.18	11	57	3.8	21	4	35382040A	28.31	0.011 – 0.039	0.010 – 0.033
5.0	6	0.20	13	57	4.8	21	4	35382050A	28.31	0.016 – 0.039	0.015 – 0.033
6.0	6	0.20	13	57	5.5	21	4	35382060A	28.31	0.026 – 0.044	0.025 – 0.038
7.0	8	0.20	19	63	6.5	27	4	35382070A	39.92	0.032 – 0.050	0.029 – 0.043
8.0	8	0.20	19	63	7.5	27	4	35382080A	39.92	0.032 – 0.055	0.029 – 0.048
9.0	10	0.30	22	72	8.5	32	4	35382090A	56.12	0.037 – 0.066	0.034 – 0.057
10.0	10	0.30	22	72	9.5	32	4	35382100A	56.12	0.042 – 0.077	0.039 – 0.067
11.0	12	0.30	26	83	10.5	38	4	35382110A	81.24	0.053 – 0.088	0.049 – 0.076
12.0	12	0.30	26	83	11.5	38	4	35382120A	81.24	0.063 – 0.099	0.059 – 0.086
13.0	14	0.30	26	83	12.5	42	4	35382130A	113.65	0.074 – 0.099	0.069 – 0.086
14.0	14	0.30	26	83	13.5	42	4	35382140A	113.65	0.074 – 0.121	0.069 – 0.105
16.0	16	0.40	32	92	15.5	44	4	35382160A	137.52	0.095 – 0.143	0.088 – 0.124
18.0	18	0.40	32	92	17.5	50	4	35382180A	170.05	0.116 – 0.143	0.108 – 0.124
20.0	20	0.50	38	104	19.5	54	4	35382200A	202.51	0.137 – 0.187	0.127 – 0.162

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

d_1	d_2
h10	h6

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

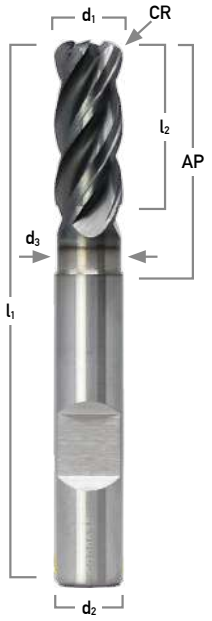
Product family 159

35384

Alcrona Pro | Z 4 | HB | ≠ | VHM | Type N | HPC | Manu-facturer standard

Solid Carbide HPC Torus Cutter

With corner radius



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	CR	d_3	AP		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	+/- 0.02	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
4.0	6	11	57	0.25	3.8	21	4	3538440025A	30.72	0.011 – 0.039	0.010 – 0.033
4.0	6	11	57	0.50	3.8	21	4	353844005A	30.72	0.011 – 0.039	0.010 – 0.033
4.0	6	11	57	1.00	3.8	21	4	353844010A	30.72	0.011 – 0.039	0.010 – 0.033
5.0	6	13	57	0.50	4.8	21	4	353845005A	30.72	0.016 – 0.039	0.015 – 0.033
5.0	6	13	57	1.00	4.8	21	4	353845010A	30.72	0.016 – 0.039	0.015 – 0.033
5.0	6	13	57	1.50	4.8	21	4	353845015A	30.72	0.016 – 0.039	0.015 – 0.033
6.0	6	13	57	0.50	5.5	21	4	353846005A	30.72	0.026 – 0.044	0.025 – 0.038
6.0	6	13	57	1.00	5.5	21	4	353846010A	30.72	0.026 – 0.044	0.025 – 0.038
6.0	6	13	57	1.50	5.5	21	4	353846015A	30.72	0.026 – 0.044	0.025 – 0.038
6.0	6	13	57	2.00	5.5	21	4	353846020A	30.72	0.026 – 0.044	0.025 – 0.038
8.0	8	19	63	0.50	7.5	27	4	353848005A	42.02	0.032 – 0.055	0.029 – 0.048
8.0	8	19	63	1.00	7.5	27	4	353848010A	42.02	0.032 – 0.055	0.029 – 0.048
8.0	8	19	63	1.50	7.5	27	4	353848015A	42.02	0.032 – 0.055	0.029 – 0.048
8.0	8	19	63	2.00	7.5	27	4	353848020A	42.02	0.032 – 0.055	0.029 – 0.048
10.0	10	22	72	0.50	9.5	32	4	353841005A	61.07	0.042 – 0.077	0.039 – 0.067
10.0	10	22	72	1.00	9.5	32	4	353841010A	61.07	0.042 – 0.077	0.039 – 0.067
10.0	10	22	72	1.50	9.5	32	4	353841015A	61.07	0.042 – 0.077	0.039 – 0.067
10.0	10	22	72	2.00	9.5	32	4	353841020A	61.07	0.042 – 0.077	0.039 – 0.067
12.0	12	26	83	0.50	11.5	38	4	353841205A	79.85	0.063 – 0.099	0.059 – 0.086
12.0	12	26	83	1.00	11.5	38	4	353841210A	79.85	0.063 – 0.099	0.059 – 0.086
12.0	12	26	83	1.50	11.5	38	4	353841215A	79.85	0.063 – 0.099	0.059 – 0.086
12.0	12	26	83	2.00	11.5	38	4	353841220A	79.85	0.063 – 0.099	0.059 – 0.086
14.0	14	26	83	1.00	13.5	42	4	353841410A	111.69	0.084 – 0.121	0.078 – 0.105
14.0	14	26	83	2.00	13.5	42	4	353841420A	111.69	0.084 – 0.121	0.078 – 0.105
16.0	16	32	92	1.00	15.5	44	4	353841610A	144.74	0.095 – 0.143	0.088 – 0.124
16.0	16	32	92	1.50	15.5	44	4	353841615A	144.74	0.095 – 0.143	0.088 – 0.124
16.0	16	32	92	2.00	15.5	44	4	353841620A	144.74	0.095 – 0.143	0.088 – 0.124
16.0	16	32	92	2.50	15.5	44	4	353841625A	144.74	0.095 – 0.143	0.088 – 0.124
18.0	18	32	92	1.50	17.5	50	4	353841815A	179.00	0.126 – 0.165	0.118 – 0.143
18.0	18	32	92	2.50	17.5	50	4	353841825A	179.00	0.126 – 0.165	0.118 – 0.143
20.0	20	38	104	1.00	19.5	54	4	353842010A	213.16	0.137 – 0.187	0.127 – 0.162
20.0	20	38	104	1.50	19.5	54	4	353842015A	213.16	0.137 – 0.187	0.127 – 0.162
20.0	20	38	104	2.00	19.5	54	4	353842020A	213.16	0.137 – 0.187	0.127 – 0.162
20.0	20	38	104	2.50	19.5	54	4	353842025A	213.16	0.137 – 0.187	0.127 – 0.162
20.0	20	38	104	3.00	19.5	54	4	353842030A	213.16	0.137 – 0.187	0.127 – 0.162
20.0	20	38	104	4.00	19.5	54	4	353842040A	213.16	0.137 – 0.187	0.127 – 0.162
20.0	20	38	104	5.00	19.5	54	4	353842050A	213.16	0.137 – 0.187	0.127 – 0.162

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

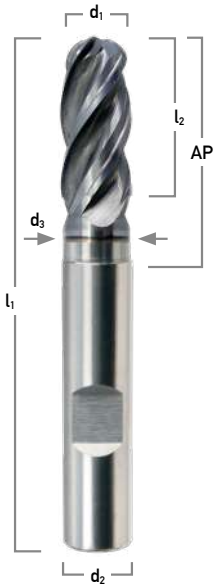
Product family 159

35582

Alcrona Pro | Z 4 | HB | ≠ | VHM | Type N | HPC | Manu-facturer standard

Solid Carbide HPC Ball-Nosed End Mill

With neck and full radius



d_1	d_2	l_2	l_1	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
3.0	6	8	57	2.8	18	4	35582030	34.38	0.007	– 0.031	0.007	– 0.027
4.0	6	11	57	3.8	21	4	35582040	34.38	0.011	– 0.039	0.010	– 0.033
5.0	6	13	57	4.8	21	4	35582050	34.38	0.016	– 0.039	0.015	– 0.033
6.0	6	13	57	5.5	21	4	35582060	34.38	0.026	– 0.044	0.025	– 0.038
8.0	8	19	63	7.5	27	4	35582080	48.54	0.032	– 0.055	0.029	– 0.048
10.0	10	22	72	10.0	32	4	35582100	68.23	0.042	– 0.077	0.039	– 0.067
12.0	12	26	83	11.5	38	4	35582120	100.13	0.063	– 0.099	0.059	– 0.086
14.0	14	26	83	13.5	42	4	35582140	140.06	0.084	– 0.121	0.078	– 0.105
16.0	16	32	92	15.5	44	4	35582160	169.61	0.095	– 0.143	0.088	– 0.124
20.0	20	38	104	19.5	54	4	35582200	249.51	0.137	– 0.187	0.127	– 0.162

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

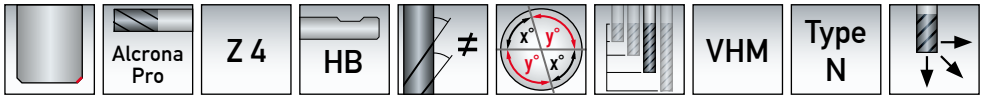
Full slot milling
a_p = 1.5xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- **Tip:** incline for maximum cutting performance

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

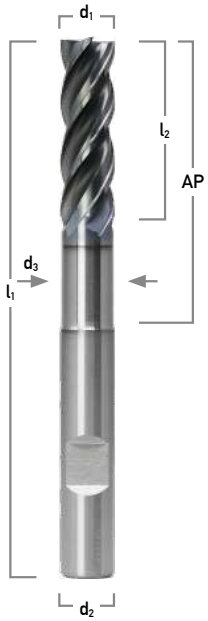
Product family 159

36388



Solid Carbide HPC End Mill

Long version with protective chamfer



d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	d_3 mm	AP mm	Z	coated Part No.	coated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
5.0	6	0.05	22	63	4.8	29	4	36388050	30.94	0.016 – 0.039	0.015 – 0.033
6.0	6	0.06	22	63	5.5	29	4	36388060	30.94	0.026 – 0.044	0.025 – 0.038
8.0	8	0.08	28	80	7.5	36	4	36388080	43.77	0.032 – 0.055	0.029 – 0.048
10.0	10	0.10	33	80	9.5	43	4	3638810080	56.89	0.037 – 0.066	0.034 – 0.057
10.0	10	0.10	33	100	9.5	54	4	36388100	59.64	0.037 – 0.066	0.034 – 0.057
12.0	12	0.12	33	100	11.5	54	4	36388120	80.05	0.063 – 0.099	0.059 – 0.086
12.0	12	0.12	33	120	11.5	69	4	36388120120	89.29	0.063 – 0.099	0.059 – 0.086
14.0	14	0.14	48	100	13.5	54	4	36388140	97.79	0.074 – 0.121	0.069 – 0.105
16.0	16	0.15	53	125	15.5	69	4	36388160125	138.87	0.095 – 0.143	0.088 – 0.124
16.0	16	0.15	53	150	15.5	84	4	36388161	144.32	0.095 – 0.143	0.088 – 0.124
20.0	20	0.15	68	150	19.5	84	4	36388200	237.60	0.137 – 0.187	0.127 – 0.162

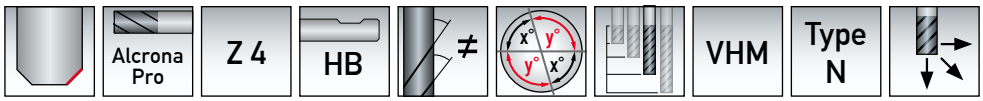
d_1 h10	d_2 h6

Peripheral milling
a_e = 0.4xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

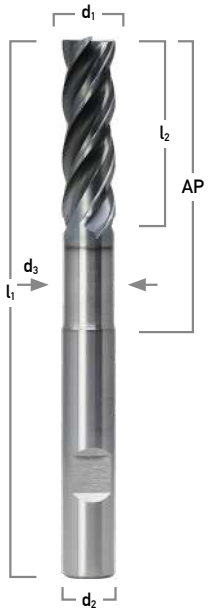
- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

35388



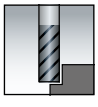
Solid Carbide HPC End Mill

Long version with edge chamfer



d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	d_3 mm	AP mm	Z	coated Part No.	coated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
5.0	6	0.20	22	63	4.8	29	4	35388050A	30.94	0.016 – 0.039	0.015 – 0.033
6.0	6	0.20	22	63	5.5	29	4	35388060A	30.94	0.026 – 0.044	0.025 – 0.038
7.0	8	0.20	28	80	6.5	36	4	35388070A	43.77	0.032 – 0.055	0.029 – 0.048
8.0	8	0.20	28	80	7.5	36	4	35388080A	43.77	0.032 – 0.055	0.029 – 0.048
9.0	10	0.30	33	80	8.5	43	4	35388090A	59.64	0.037 – 0.066	0.034 – 0.057
10.0	10	0.30	33	80	9.5	43	4	35388100A	59.64	0.037 – 0.066	0.034 – 0.057
10.0	10	0.30	33	100	9.5	54	4	35388101A	59.64	0.037 – 0.066	0.034 – 0.057
11.0	12	0.30	33	100	10.5	54	4	35388110A	80.05	0.063 – 0.099	0.059 – 0.086
12.0	12	0.30	33	100	11.5	54	4	35388120A	80.05	0.063 – 0.099	0.059 – 0.086
12.0	12	0.30	42	100	11.5	54	4	35388121A	80.05	0.063 – 0.099	0.059 – 0.086
13.0	14	0.30	48	100	12.5	54	4	35388130A	105.61	0.074 – 0.121	0.069 – 0.105
14.0	14	0.30	48	100	13.5	54	4	35388140A	97.79	0.074 – 0.121	0.069 – 0.105
16.0	16	0.40	53	125	15.5	69	4	35388160A	144.32	0.095 – 0.143	0.088 – 0.124
16.0	16	0.40	53	150	15.5	84	4	35388161A	144.32	0.095 – 0.143	0.088 – 0.124
18.0	18	0.40	53	150	17.5	69	4	35388180A	229.19	0.095 – 0.143	0.088 – 0.124
20.0	20	0.50	68	150	19.5	84	4	35388200A	237.60	0.137 – 0.187	0.127 – 0.162

d_1 h10	d_2 h6



Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

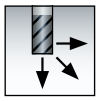
Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

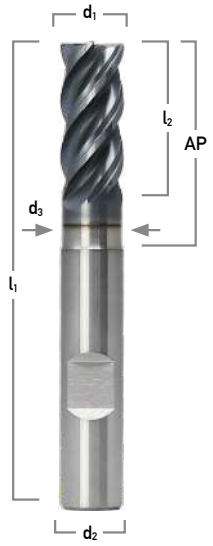
Product family 159

30382


Solid Carbide MTC End Mill

With edge chamfer



d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	d_3 mm	AP mm	Z	coated Part No.	coated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
3.0	6	0.13	8	57	2.8	18	4	30382030	31.59	0.007 – 0.031	0.007 – 0.027
4.0	6	0.18	11	57	3.8	21	4	30382040	31.59	0.011 – 0.031	0.010 – 0.027
5.0	6	0.20	13	57	4.8	21	4	30382050	31.59	0.016 – 0.039	0.015 – 0.033
6.0	6	0.20	13	57	5.5	21	4	30382060	31.59	0.026 – 0.044	0.025 – 0.038
8.0	8	0.20	19	63	7.5	27	4	30382080	47.63	0.032 – 0.055	0.029 – 0.048
10.0	10	0.30	22	72	9.5	32	4	30382100	66.99	0.037 – 0.066	0.034 – 0.057
12.0	12	0.30	26	83	11.5	38	4	30382120	96.93	0.063 – 0.099	0.059 – 0.086
14.0	14	0.30	26	83	13.5	42	4	30382140	135.6	0.074 – 0.121	0.069 – 0.105
16.0	16	0.40	32	92	15.5	44	4	30382160	153.53	0.095 – 0.143	0.088 – 0.124
20.0	20	0.50	38	104	19.5	54	4	30382200	228.34	0.137 – 0.187	0.127 – 0.162

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

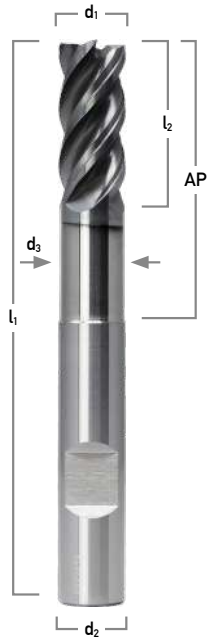
- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- high machining performance in HPC area up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life
- Especially suitable for the use in milling and turning centres and low performance machines

30389



Solid Carbide HPC End Mill

Long version with edge chamfer



d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	d_3 mm	AP mm	Z	coated Part No.	coated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
5.0	6	0.20	13	63	4.5	29	4	30389050	31.00	0.016 – 0.039	0.015 – 0.033
6.0	6	0.20	13	63	5.5	29	4	30389060	31.00	0.026 – 0.044	0.025 – 0.038
8.0	8	0.20	19	80	7.5	40	4	30389080	46.68	0.032 – 0.055	0.029 – 0.048
10.0	10	0.30	22	80	9.5	40	4	30389100	68.83	0.037 – 0.066	0.034 – 0.057
12.0	12	0.30	26	100	11.5	50	4	30389120	95.06	0.063 – 0.099	0.059 – 0.086
16.0	16	0.40	32	115	15.5	65	4	30389160	150.93	0.095 – 0.143	0.088 – 0.124
20.0	20	0.50	38	130	19.5	80	4	30389200	254.18	0.137 – 0.187	0.127 – 0.162

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

Product family 159

Solid carbide HPC high performance end mill

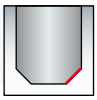
- High-performance end mills for roughing and finishing suitable for universal use
- The **cost-effective alternative** to high-performance milling
- Ultra-fine grain solid carbide with high-performance coating Alcrona Pro for a high wear-resistance
- Newly developed cutting edge geometry with unequal pitch, dynamic helix angle, 45° edge chamfer for maximum tool life
- **Smooth running** due to axial and radial unequal spacing
- **High machining performance** up to 1.5xD into solid

Application:

- Can be used with a wide range of materials
- For roughing and finishing up to 1.5xD into solid

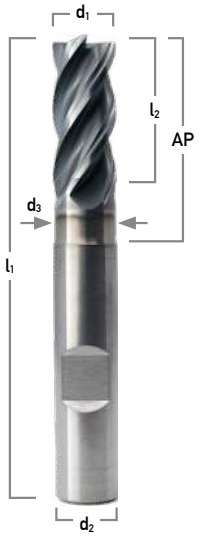
NEW

35449



Solid Carbide HPC End Mill

With edge chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
3.0	6	0.13	8	57	2.8	18	4	35449030A	24.12	0.007 –	0.031	0.007 –	0.027
4.0	6	0.13	11	57	3.8	21	4	35449040A	24.12	0.007 –	0.031	0.007 –	0.027
5.0	6	0.18	13	57	4.8	21	4	35449050A	24.12	0.011 –	0.039	0.010 –	0.033
6.0	6	0.20	13	57	5.5	21	4	35449060A	24.12	0.016 –	0.039	0.015 –	0.033
7.0	8	0.20	19	63	6.5	27	4	35449070A	35.64	0.026 –	0.044	0.025 –	0.038
8.0	8	0.20	19	63	7.5	27	4	35449080A	34.05	0.032 –	0.050	0.029 –	0.043
9.0	10	0.20	22	72	8.5	32	4	35449090A	50.18	0.032 –	0.055	0.029 –	0.048
10.0	10	0.30	22	72	9.5	32	4	35449100A	50.18	0.037 –	0.066	0.034 –	0.057
11.0	12	0.30	26	83	10.5	38	4	35449110A	69.32	0.042 –	0.077	0.039 –	0.067
12.0	12	0.30	26	83	11.5	38	4	35449120A	69.32	0.053 –	0.088	0.049 –	0.076
13.0	14	0.30	26	83	12.5	42	4	35449130A	113.65	0.063 –	0.099	0.059 –	0.086
14.0	14	0.30	26	83	13.5	42	4	35449140A	96.78	0.074 –	0.099	0.069 –	0.086
16.0	16	0.40	32	92	15.5	44	4	35449160A	117.32	0.095 –	0.143	0.088 –	0.124
18.0	18	0.40	32	92	17.5	50	4	35449180A	146.77	0.116 –	0.143	0.108 –	0.124
20.0	20	0.50	38	104	19.5	54	4	35449200A	171.30	0.137 –	0.187	0.127 –	0.162

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

*Please use with coolant!

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

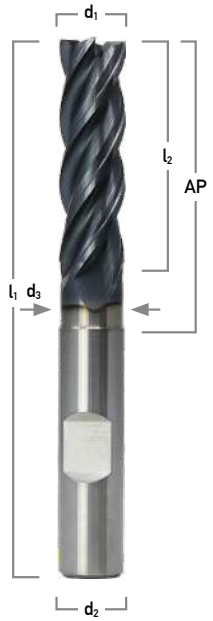
Product family 159

30388

Alcrona Pro | Z 4 | HB | ≠ | Increased core diameter | VHM | HPC | TPM | Manu-facturer standard

VHM-HPC/TPM End Mill

Long version with protective chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
6.0	6	0.06	22	63	5.5	29	4	30388060	30.94	0.026 – 0.044		0.025 – 0.038	
8.0	8	0.08	28	80	7.5	36	4	30388080	39.85	0.032 – 0.055		0.029 – 0.048	
10.0	10	0.10	33	80	9.5	43	4	30388100	53.47	0.037 – 0.066		0.034 – 0.057	
12.0	12	0.12	33	100	11.5	54	4	30388120	86.24	0.063 – 0.099		0.059 – 0.086	
14.0	14	0.14	48	100	13.5	54	4	30388140	120.78	0.074 – 0.121		0.069 – 0.105	
16.0	16	0.15	53	125	15.5	69	4	30388160	196.24	0.095 – 0.143		0.088 – 0.124	
20.0	20	0.15	68	150	19.5	84	4	30388200	272.79	0.137 – 0.187		0.127 – 0.162	

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- Smooth running due to axial and radial unequal spacing
- With increased core best suitable with low cutting depths (finishing)
- Maximum side feed (ae) 0.5xD
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

Product family 159

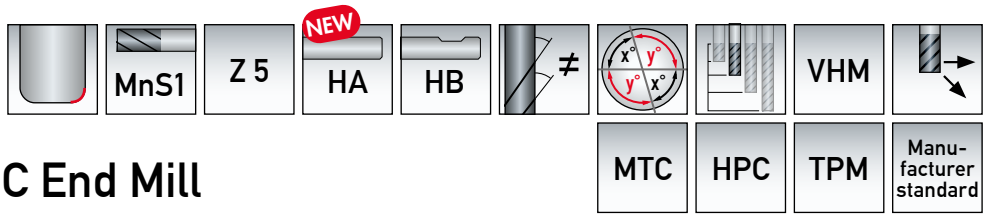
Solid Carbide HPC High-Performance End Mill

- Solid carbide end mill of the latest generation made from wear-resistant ultra-micro grain solid carbide
- **High material remove rate and long tool life**
- Newly developed cutting geometry with unequal pitch,- dynamic helix pitch, cutting edge preparation, **corner radius**
- Optimized facing geometry for plunging
- MnS1 coating, based on the latest coating technology for high resistance to thermal and abrasive wear
- Highest stability and process reliability

Application:

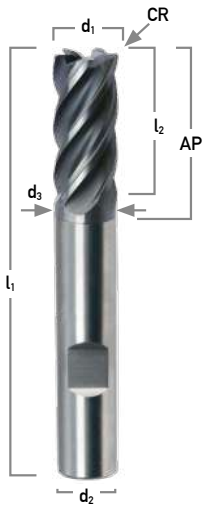
- Versatile use in all steel grades
- **For full slotting, roughing, and finishing, up to 2xD into solid**
- Trochoidal machining

35502



Solid Carbide HPC End Mill

With corner radius



d_1	d_2	l_2	l_1	d_3	CR	AP		coated (HA)		coated (HB)		f_z (mm/Z)				
mm	mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	$a_e \leq 1.0xd$ ∢ ≤ 180°	$a_e \leq 0.4xd$ ∢ ≤ 78.5°	$a_e \leq 0.25$ xd ∢ ≤ 60°	$a_e \leq 0.1xd$ ∢ ≤ 38°	$a_e \leq 0.05xd$ ∢ ≤ 26°
6.0	6	13	57	5.5	0.50	21	5	35502060HA	41.34	35502060	41.34	0.030	0.040	0.055	0.070	0.100
8.0	8	19	63	7.5	0.50	27	5	35502080HA	56.55	35502080	56.55	0.040	0.055	0.070	0.100	0.140
10.0	10	22	72	9.5	1.00	32	5	35502100HA	84.63	35502100	84.63	0.050	0.070	0.090	0.120	0.160
12.0	12	26	83	11.5	1.00	38	5	35502120HA	111.09	35502120	111.09	0.070	0.100	0.120	0.170	0.200
16.0	16	32	92	15.5	1.00	44	5	35502160HA	185.79	35502160	185.79	0.090	0.120	0.170	0.220	0.260
20.0	20	38	104	19.5	1.00	54	5	35502200HA	293.51	35502200	293.51	0.120	0.150	0.180	0.240	0.280

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

d_1	d_2
h10	h6

V_c (m/min)	Non-alloy Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG,GT)	Stainless austenitic	Stainless acid-resistant austenitic
Tensile strength / Hardness / etc.	850–1000 N/mm²	<1200 N/mm²	<450 N/mm²	<650 N/mm²	1.4301	1.4571
Ramp/Helix ≤	≤8°	≤5°	≤3°	≤2°	≤3°	≤1,5°
a_e = 1xD	160	80	140	120	–	–
a_e = 0,4xD	220	140	170	150	90	80
a_e = 0,25xD	260	160	210	160	110	100
a_e = 0,1xD	300	180	240	185	120	110
a_e = 0,05xD	380	230	360	240	150	140

Product family 159

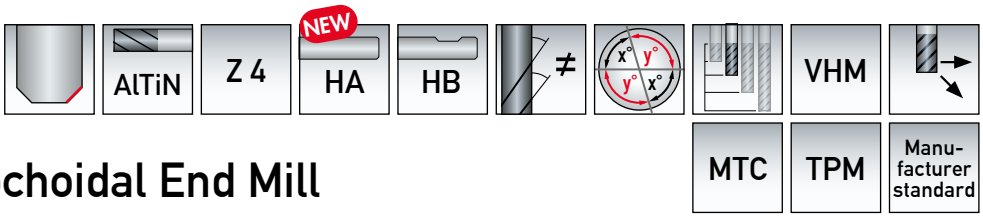
Solid Carbide Trochoidal End Mill

- Solid carbide end mill of the latest generation made from ultra-micro grain solid carbide with a special AlTiN coating
- **Geometry with improved shearing action for machines with lower driving power under difficult machining conditions and unstable conditions**
- Protection of the cutting edges through edge chamfer for longer tool life
- Cutting edges with chip breakers reduce the cutting forces and provide for short chips

Application:

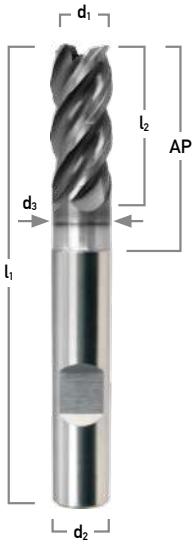
- Also suitable for slot milling
- For trochoidal milling with the use of the whole length of the cutting edge at highest cutting parameters
- Finish milling (trimming) at high cutting parameters and best surface finishing

37130



Solid Carbide Trochoidal End Mill

2xD with edge chamfer



d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	d_3 mm	AP mm	Z	coated (HA) Part No.	coated (HA) €/pc.	coated (HB) Part No.	coated (HB) €/pc.
3.0	6	0.13	8	57	2.8	18	4	37130030HA	39.19	37130030	39.19
4.0	6	0.18	11	57	3.8	21	4	37130040HA	39.19	37130040	39.19
5.0	6	0.20	13	57	4.8	21	4	37130050HA	39.19	37130050	39.19
6.0	6	0.20	13	57	5.5	21	4	37130060HA	38.17	37130060	38.17
8.0	8	0.20	19	63	7.5	27	4	37130080HA	55.94	37130080	55.94
10.0	10	0.30	22	72	9.5	32	4	37130100HA	78.62	37130100	78.62
12.0	12	0.30	26	83	11.5	38	4	37130120HA	110.66	37130120	110.66
14.0	14	0.30	26	83	13.5	42	4	37130140HA	154.76	37130140	154.76
16.0	16	0.40	32	92	15.5	44	4	37130160HA	175.27	37130160	175.27
20.0	20	0.50	38	104	19.5	54	4	37130200HA	286.95	37130200	286.95

Trochoidal / Trimming f_z (mm/Z)			HPC Full slot
$a_e \le 0.5xd$ ß ≤ 90°	$a_e \le 0.25xd$ ß ≤ 60°	$a_e \le 0.1xd$ ß ≤ 38°	$a_e \le 1.0 \times d$ $a_p \le 1.0 \times d$
0.013	0.030	0.050	0.008
0.020	0.040	0.070	0.009
0.025	0.045	0.085	0.015
0.030	0.045	0.095	0.022
0.040	0.045	0.135	0.028
0.050	0.065	0.150	0.038
0.070	0.075	0.195	0.055
0.080	0.100	0.210	0.075
0.115	0.125	0.225	0.085
0.155	0.160	0.240	0.120

Peripheral milling
a_e = 0.15xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

- Smaller tool diameter than for HPC machining for increased cutting performance
- Lateral infeed for normal materials (good machinability). approx. half of the maximum values specified (ae)
- Lateral infeed for demanding materials (poor machinability). approx. 1/3 of the maximum values specified (ae)
- Cooling only in exceptional cases. such as special alloys

d_1 h10	d_2 h6

Trochoidal / Trimming V_c (m/min)	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG,GT)	Stainless austenitic
Tensile strength / Hardness / etc.	500–850 N/mm²	≤ 1000 N/mm²	850–1000 N/mm²	1000–1200 N/mm²	<1400 N/mm²	<450 N/mm²	> 260 HB	1.4301
a_e = 1xD	240	225	195	–	–	130	105	100
a_e = 0,5xD	300	280	245	195	–	160	130	125
a_e = 0,25xD	330	310	270	215	150	180	145	140
a_e = 0,1xD	370	345	300	230	160	200	160	150

Product family 159

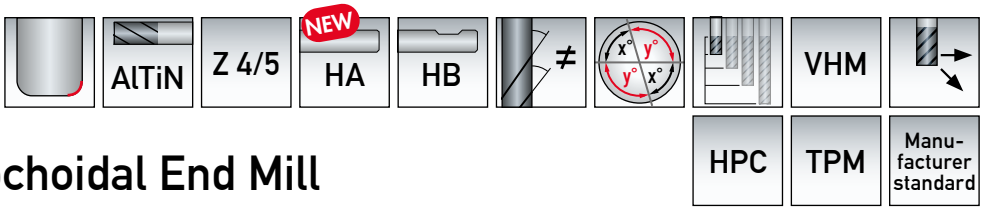
Solid Carbide Trochoidal End Mill

- Solid carbide end mill of the latest generation made from ultra-micro grain solid carbide with a special AlTiN coating
- Optimized geometry with increased core and large flutes in the front area
- High machining performance
- Protection of the cutting edges through corner radius for longer tool life
- Cutting edges with chip breakers reduce the cutting forces and provide for short chips
- Cutting edges with chip breakers reduce the cutting forces and provide for short chips

Application:

- For trochoidal milling with the use of the whole length of the cutting edge at highest cutting parameters
- Finish milling (trimming) at high cutting parameters and best surface finishing

37131



Solid Carbide Trochoidal End Mill

3xD with corner radius

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	CR	d_3	AP		coated				Trochoidal / Trimming f, (mm/Z)				HPC Full slot f, (mm/Z)
mm	mm	mm	mm	mm	mm	mm	Z	Part No. (HA)	€/pc.	Part No. (HB)	€/pc.	$a_e \le 0.1 \times d$ ß ≤ 45.6°	$a_e \le 0.1 \times d$ ß ≤ 36.9°	$a_e \le 0.075 \times d$ ß ≤ 31.8°	$a_e \le 0.05 \times d$ ß ≤ 25.8°	$a_e \le 1.0 \times d$ $a_p \le 1.0 \times d$
5.0	6	16	57	0.10	–	–	4	37131050HA	45.93	37131050	45.93	0.06	0.069	0.084	0.084	0.020 – 0.040
6.0	6	20	57	0.10	–	–	4	37131060HA	45.93	37131060	45.93	0.06	0.069	0.084	0.084	0.020 – 0.040
8.0	8	26	63	0.10	–	–	4	37131080HA	62.85	37131080	62.85	0.08	0.092	0.112	0.112	0.030 – 0.050
10.0	10	32	72	0.10	–	–	5	37131100HA	94.04	37131100	94.04	0.10	0.115	0.140	0.140	0.040 – 0.072
12.0	12	38	83	0.12	–	–	5	37131120HA	123.43	37131120	123.43	0.12	0.138	0.168	0.168	0.060 – 0.090
14.0	14	44	100	0.15	–	–	5	37131140HA	171.44	37131140	171.44	0.14	0.161	0.196	0.196	0.085 – 0.110
16.0	16	52	115	0.15	–	–	5	37131160HA	206.44	37131160	206.44	0.16	0.184	0.224	0.224	0.090 – 0.120
20.0	20	62	131	0.20	–	–	5	37131200HA	326.13	37131200	326.13	0.20	0.230	0.280	0.280	0.110 – 0.140

Peripheral milling
a_e = 0.15xD
a_p = 3.0xD

Our trochoidal end mills' performance show

Visit YouTube to watch our trochoidal end mills machining C45E.

https://www.youtube.com/watch?v=8bVfFQaGVdw

Trochoidal / Trimming								
V_c (m/min)	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG,GT)	Stainless austenitic
Tensile strength / Hardness / etc.	500–850 N/mm²	≤ 1000 N/mm²	850–1000 N/mm²	1000–1200 N/mm²	<1400 N/mm²	<450 N/mm²	> 260 HB	1.4301
a_e = 0,15xD	240	225	195	–	–	130	105	100
a_e = 0,1xD	300	280	245	195	–	160	130	125
a_e = 0,075xD	330	310	270	215	150	180	145	140
a_e = 0,05xD	370	345	300	230	160	200	160	150

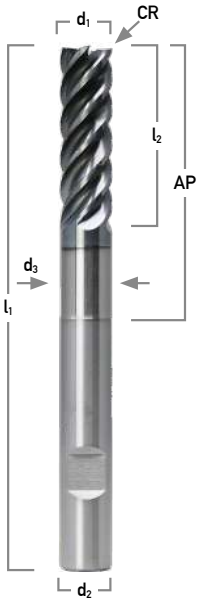
Product family 159

37132

AlTiN | Z 4/5 | NEW HA | HB | ≠ | VHM | HPC | TPM | Manu-facturer standard

Solid Carbide Trochoidal End Mill

3xD with corner radius



d_1	d_2	l_2	l_1	CR	d_3	AP		coated				Trochoidal / Trimming f_z (mm/Z)		
mm	mm	mm	mm	mm	mm	mm	Z	Part No. (HA)	€/pc.	Part No. (HB)	€/pc.	$a_e \le 0.1xd$ ∢ ≤ 36.9°	$a_e \le 0.075xd$ ∢ ≤ 31.8°	$a_e \le 0.05xd$ ∢ ≤ 25.8°
6.0	6	20	75	0.10	5.5	32	4	37132060HA	55.10	37132060	55.10	0.066	0.076	0.092
8.0	8	26	85	0.10	7.5	42	4	37132080HA	77.28	37132080	77.28	0.088	0.101	0.123
10.0	10	32	100	0.10	9.5	52	5	37132100HA	116.76	37132100	116.76	0.110	0.127	0.154
12.0	12	38	110	0.12	11.5	62	5	37132120HA	152.34	37132120	152.34	0.132	0.152	0.185
14.0	14	44	125	0.15	13.5	72	5	37132140HA	200.62	37132140	200.62	0.154	0.177	0.216
16.0	16	52	140	0.15	15.5	82	5	37132160HA	246.37	37132160	246.37	0.176	0.202	0.246
20.0	20	62	165	0.20	19.5	102	5	37132200HA	389.22	37132200	389.22	0.220	0.253	0.308

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.1xD
a_p = 3.0xD

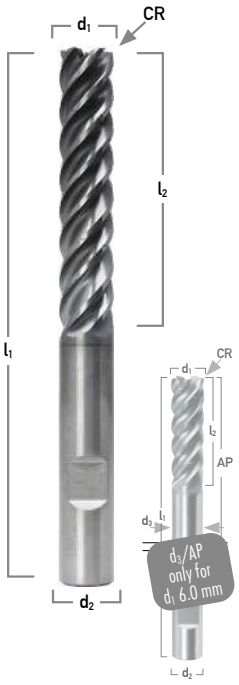
3xD	Trochoidal / Trimming							
V, (m/min)	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG,GT)	Stainless austenitic
Tensile strength / Hardness / etc.	500–850 N/mm²	≤ 1000 N/mm²	850–1000 N/mm²	1000–1200 N/mm²	<1400 N/mm²	<450 N/mm²	> 260 HB	1.4301
a_e = 0,15xD	240	225	195	–	–	130	105	100
a_e = 0,1xD	300	280	245	195	–	160	130	125
a_e = 0,075xD	330	310	270	215	150	180	145	140
a_e = 0,05xD	370	345	300	230	160	200	160	150

37151

AlTiN | Z 4/5 | NEW HA | HB | ≠ | VHM | HPC | TPM | Manu-facturer standard

Solid Carbide Trochoidal End Mill

5xD with corner radius



d_1	d_2	l_2	l_1	CR	d_3	AP		coated				Trochoidal / Trimming f_z (mm/Z)		
mm	mm	mm	mm	mm	mm	mm	Z	Part No. (HA)	€/pc.	Part No. (HB)	€/pc.	$a_e \le 0.1xd$ ∢ ≤ 36.9°	$a_e \le 0.075xd$ ∢ ≤ 31.8°	$a_e \le 0.05xd$ ∢ ≤ 25.8°
6.0	6	25	75	0.10	5.5	32	4	37151060HA	63.17	37151060	63.17	0.055	0.063	0.077
8.0	8	42	85	0.10	–	–	4	37151080HA	86.86	37151080	86.86	0.073	0.086	0.102
10.0	10	52	100	0.10	–	–	5	37151100HA	133.25	37151100	133.25	0.09	0.103	0.127
12.0	12	62	110	0.12	–	–	5	37151120HA	168.87	37151120	168.87	0.11	0.127	0.154
14.0	14	72	125	0.15	–	–	5	37151140HA	237.23	37151140	237.23	0.127	0.145	0.177
16.0	16	82	140	0.15	–	–	5	37151160HA	285.61	37151160	285.61	0.145	0.167	0.204
20.0	20	102	165	0.20	–	–	5	37151200HA	442.25	37151200	442.25	0.182	0.209	0.254

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.1xD
a_p = 5.0xD

5xD	Trochoidal / Trimming							
V, (m/min)	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG,GT)	Stainless austenitic
Tensile strength / Hardness / etc.	500–850 N/mm²	≤ 1000 N/mm²	850–1000 N/mm²	1000–1200 N/mm²	<1400 N/mm²	<450 N/mm²	> 260 HB	1.4301
a_e = 0,1xD	220	205	180	–	–	160	130	–
a_e = 0,075xD	240	225	200	150	110	180	145	120
a_e = 0,05xD	260	245	210	170	120	200	160	140

30386

Alnova | Z 4 | HB | ≠ | VHM | Type N | HPC | Manu-facturer standard

Solid Carbide HPC End Mill INOX-Titanium

Short version with protective chamfer

d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing			f_z Finishing		
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
3.0	6	0.03	6	54	4	30386030	30.97	0.011	–	0.017	0.010	–	0.014
4.0	6	0.04	8	54	4	30386040	30.97	0.015	–	0.022	0.014	–	0.019
5.0	6	0.05	9	54	4	30386050	30.97	0.019	–	0.026	0.018	–	0.023
6.0	6	0.06	10	54	4	30386060	30.97	0.021	–	0.031	0.020	–	0.027
8.0	8	0.08	12	58	4	30386080	43.93	0.032	–	0.042	0.029	–	0.036
10.0	10	0.10	14	66	4	30386100	52.29	0.042	–	0.055	0.039	–	0.048
12.0	12	0.12	16	73	4	30386120	74.83	0.047	–	0.061	0.044	–	0.052
14.0	14	0.14	18	75	4	30386140	97.81	0.053	–	0.066	0.049	–	0.057
16.0	16	0.15	22	82	4	30386160	161.34	0.074	–	0.088	0.069	–	0.076
20.0	20	0.15	26	92	4	30386200	190.37	0.074	–	0.099	0.069	–	0.086

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- High-performance end mill for roughing and finishing in INOX, Titanium and heat-resisting alloys
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

V_c (m/min)	General structured steels	Stainless austenitic	Stainless acid-resistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	180	100	90	65	35	50
Trimming a_e = 0,2xD	270	130	117	85	46	75

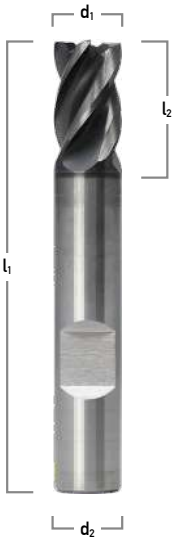
Product family 159

35386




Solid Carbide HPC End Mill INOX-Titanium

Short version with edge chamfer



d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
3.0	6	0.13	6	54	4	35386030AN	27.80	0.011 – 0.017	0.010 – 0.014
4.0	6	0.18	8	54	4	35386040AN	27.80	0.015 – 0.022	0.014 – 0.019
5.0	6	0.20	9	54	4	35386050AN	27.80	0.019 – 0.026	0.018 – 0.023
6.0	6	0.20	10	54	4	35386060AN	27.80	0.021 – 0.031	0.020 – 0.027
7.0	8	0.20	12	58	4	35386070AN	37.46	0.032 – 0.042	0.029 – 0.036
8.0	8	0.20	12	58	4	35386080AN	37.46	0.032 – 0.042	0.029 – 0.036
9.0	10	0.30	14	66	4	35386090AN	52.29	0.042 – 0.055	0.039 – 0.048
10.0	10	0.30	14	66	4	35386100AN	52.29	0.042 – 0.055	0.039 – 0.048
11.0	12	0.30	16	73	4	35386110AN	74.83	0.047 – 0.061	0.044 – 0.052
12.0	12	0.30	16	73	4	35386120AN	74.83	0.047 – 0.061	0.044 – 0.052
14.0	14	0.30	18	75	4	35386140AN	97.81	0.053 – 0.066	0.049 – 0.057
16.0	16	0.40	22	82	4	35386160AN	120.27	0.074 – 0.088	0.069 – 0.076
18.0	18	0.40	24	84	4	35386180AN	161.34	0.074 – 0.099	0.069 – 0.086
20.0	20	0.50	26	92	4	35386200AN	190.37	0.074 – 0.099	0.069 – 0.086

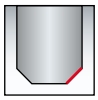
Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

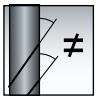
Full slot milling
a_p = 1.0xD

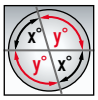
- High-performance end mill for roughing and finishing in INOX, Titanium and heat-resisting alloys
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

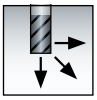
d_1	d_2
h10	h6

35383






Solid Carbide HPC End Mill INOX-Titanium

With edge chamfer

d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
4.0	6	0.18	11	57	4	35383040AN	30.19	0.015 – 0.022	0.014 – 0.019
5.0	6	0.20	13	57	4	35383050AN	30.19	0.019 – 0.026	0.018 – 0.023
6.0	6	0.20	13	57	4	35383060AN	30.19	0.021 – 0.031	0.020 – 0.027
7.0	8	0.20	19	63	4	35383070AN	42.82	0.032 – 0.042	0.029 – 0.036
8.0	8	0.20	19	63	4	35383080AN	42.82	0.032 – 0.042	0.029 – 0.036
9.0	10	0.30	22	72	4	35383090AN	56.54	0.042 – 0.055	0.039 – 0.048
10.0	10	0.30	22	72	4	35383100AN	56.54	0.042 – 0.055	0.039 – 0.048
11.0	12	0.30	26	83	4	35383110AN	83.38	0.047 – 0.061	0.044 – 0.052
12.0	12	0.30	26	83	4	35383120AN	83.38	0.047 – 0.061	0.044 – 0.052
14.0	14	0.30	26	83	4	35383140AN	116.64	0.053 – 0.066	0.049 – 0.057
16.0	16	0.40	32	92	4	35383160AN	141.13	0.074 – 0.088	0.069 – 0.076
18.0	18	0.40	32	92	4	35383180AN	174.51	0.074 – 0.099	0.069 – 0.086
20.0	20	0.50	38	104	4	35383200AN	207.82	0.074 – 0.099	0.069 – 0.086

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- High-performance end mill for roughing and finishing in INOX, Titanium and heat-resisting alloys
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

d_1	d_2
h10	h6

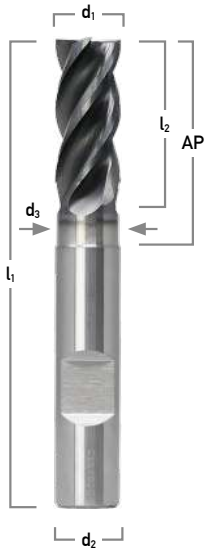
V_c (m/min)	General structured steels	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	180	100	90	65	35	50
Trimming a_e = 0,2xD	270	130	117	85	46	75

30385



Solid Carbide HPC End Mill INOX-Titanium

With neck and protective chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.
3.0	6	0.03	8	57	2.8	12	4	30385030	30.97
4.0	6	0.04	11	57	3.8	15	4	30385040	30.97
5.0	6	0.05	13	57	4.8	17	4	30385050	30.97
6.0	6	0.06	13	57	5.5	21	4	30385060	30.97
8.0	8	0.08	19	63	7.5	27	4	30385080	43.93
10.0	10	0.10	22	72	9.5	32	4	30385100	57.99
12.0	12	0.12	26	83	11.5	38	4	30385120	85.51
14.0	14	0.14	26	83	13.5	42	4	30385140	119.65
16.0	16	0.15	32	92	15.5	44	4	30385160	144.78
20.0	20	0.15	38	104	19.5	54	4	30385200	213.15

f_z Roughing			f_z Finishing		
mm/Z			mm/Z		
0.0105	–	0.0170	0.0098	–	0.0140
0.0147	–	0.0220	0.0137	–	0.0190
0.0189	–	0.0260	0.0176	–	0.0230
0.0210	–	0.0310	0.0196	–	0.0270
0.0315	–	0.0420	0.0294	–	0.0360
0.0420	–	0.0550	0.0392	–	0.0480
0.0473	–	0.0610	0.0441	–	0.0520
0.0525	–	0.0660	0.0490	–	0.0570
0.0735	–	0.0880	0.0686	–	0.0760
0.0735	–	0.0990	0.0686	–	0.0860

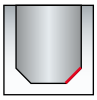
d_1	d_2
h10	h6

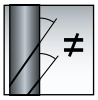
Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

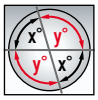
Full slot milling
a_p = 1.0xD

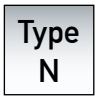
- High-performance end mill for roughing and finishing in INOX, titanium and heat-resisting alloys
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

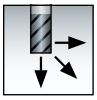
35385



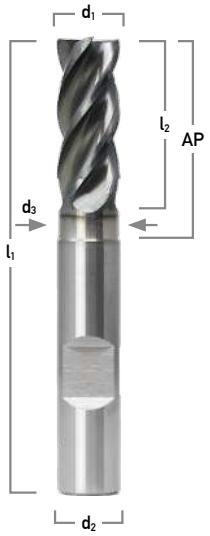







Solid Carbide HPC End Mill INOX-Titanium

With neck and edge chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.
1.0	6	0.02	3	57	0.9	5	4	35385010AN	37.61
1.5	6	0.02	4.5	57	1.4	8	4	35385015AN	37.61
2.0	6	0.02	6	57	1.8	10	4	35385020AN	37.61
2.5	6	0.02	7	57	2.3	11	4	35385025AN	37.61
3.0	6	0.13	8	57	2.8	12	4	35385030AN	30.97
4.0	6	0.18	11	57	3.8	15	4	35385040AN	30.97
5.0	6	0.20	13	57	4.8	17	4	35385050AN	30.97
6.0	6	0.20	13	57	5.5	21	4	35385060AN	30.97
7.0	8	0.20	19	63	6.5	27	4	35385070AN	43.93
8.0	8	0.20	19	63	7.5	27	4	35385080AN	43.93
9.0	10	0.30	22	72	8.5	32	4	35385090AN	57.99
10.0	10	0.30	22	72	9.5	32	4	35385100AN	57.99
11.0	12	0.30	26	83	10.5	38	4	35385110AN	85.51
12.0	12	0.30	26	83	11.5	38	4	35385120AN	85.51
13.0	14	0.30	26	83	12.5	42	4	35385130AN	119.65
14.0	14	0.30	26	83	13.5	42	4	35385140AN	119.65
16.0	16	0.40	32	92	15.5	44	4	35385160AN	144.78
18.0	18	0.40	32	92	17.5	50	4	35385180AN	178.99
20.0	20	0.50	38	104	19.5	54	4	35385200AN	213.15

f_z Roughing			f_z Finishing		
mm/Z			mm/Z		
0.0040	–	0.0100	0.0030	–	0.0090
0.0060	–	0.0120	0.0050	–	0.0110
0.0070	–	0.0130	0.0060	–	0.0120
0.0080	–	0.0150	0.0070	–	0.0130
0.0105	–	0.0170	0.0098	–	0.0140
0.0147	–	0.0220	0.0137	–	0.0190
0.0189	–	0.0260	0.0176	–	0.0230
0.0210	–	0.0310	0.0196	–	0.0270
0.0315	–	0.0420	0.0294	–	0.0360
0.0315	–	0.0420	0.0294	–	0.0360
0.0420	–	0.0550	0.0392	–	0.0480
0.0420	–	0.0550	0.0392	–	0.0480
0.0473	–	0.0610	0.0441	–	0.0520
0.0473	–	0.0610	0.0441	–	0.0520
0.0525	–	0.0660	0.0490	–	0.0570
0.0525	–	0.0660	0.0490	–	0.0570
0.0735	–	0.0880	0.0686	–	0.0760
0.0735	–	0.0990	0.0686	–	0.0860

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- High-performance end mill for roughing and finishing in INOX, titanium and heat-resisting alloys
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

V_c (m/min)	General structured steels	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	180	100	90	65	35	50
Trimming a_e = 0,2xD	270	130	117	85	46	75

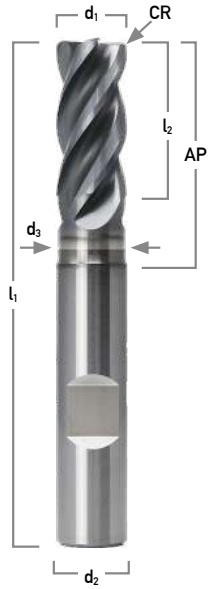
Product family 159

35387

Alnova | Z 4 | HB | ≠ | VHM | Type N | HPC | Manufacturer standard

Solid Carbide HPC Torus Cutter INOX-Titanium

With neck and corner radius



d1	d2	l2	l1	CR +/- 0.02	d3	AP		coated		f z Roughing	f z Finishing
mm	mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
3.0	6	8	57	0.50	2.8	12	4	3538703005	34.84	0.012 – 0.020	0.010 – 0.018
4.0	6	11	57	0.50	3.8	15	4	3538704005	34.84	0.015 – 0.022	0.014 – 0.019
4.0	6	11	57	1.00	3.8	15	4	3538704010	34.84	0.015 – 0.022	0.014 – 0.019
5.0	6	13	57	0.50	4.8	17	4	3538705005	34.84	0.019 – 0.026	0.018 – 0.023
5.0	6	13	57	1.00	4.8	17	4	3538705010	34.84	0.019 – 0.026	0.018 – 0.023
6.0	6	13	57	0.50	5.5	21	4	3538706005	34.84	0.021 – 0.031	0.020 – 0.027
6.0	6	13	57	1.00	5.5	21	4	3538706010	34.84	0.021 – 0.031	0.020 – 0.027
6.0	6	13	57	2.00	5.5	21	4	3538706020	34.84	0.021 – 0.031	0.020 – 0.027
8.0	8	19	63	0.50	7.5	27	4	3538708005	48.54	0.032 – 0.042	0.029 – 0.036
8.0	8	19	63	1.00	7.5	27	4	3538708010	48.54	0.032 – 0.042	0.029 – 0.036
8.0	8	19	63	2.00	7.5	27	4	3538708020	48.54	0.032 – 0.042	0.029 – 0.036
10.0	10	22	72	0.50	9.5	32	4	3538710005	69.33	0.042 – 0.055	0.039 – 0.048
10.0	10	22	72	1.00	9.5	32	4	3538710010	69.33	0.042 – 0.055	0.039 – 0.048
10.0	10	22	72	2.00	9.5	32	4	3538710020	69.33	0.042 – 0.055	0.039 – 0.048
12.0	12	26	83	0.50	11.5	38	4	3538712005	85.54	0.047 – 0.061	0.044 – 0.052
12.0	12	26	83	1.00	11.5	38	4	3538712010	85.54	0.047 – 0.061	0.044 – 0.052
12.0	12	26	83	2.00	11.5	38	4	3538712020	85.54	0.047 – 0.061	0.044 – 0.052
16.0	16	32	92	1.00	15.5	44	4	3538716010	155.07	0.074 – 0.088	0.069 – 0.076
16.0	16	32	92	2.00	15.5	44	4	3538716020	155.07	0.074 – 0.088	0.069 – 0.076
20.0	20	38	104	1.00	19.5	54	4	3538720010	235.99	0.074 – 0.099	0.069 – 0.086
20.0	20	38	104	2.00	19.5	54	4	3538720020	235.99	0.074 – 0.099	0.069 – 0.086
20.0	20	38	104	3.00	19.5	54	4	3538720030	235.99	0.074 – 0.099	0.069 – 0.086
20.0	20	38	104	5.00	19.5	54	4	3538720050	235.99	0.074 – 0.099	0.069 – 0.086

d1	d2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

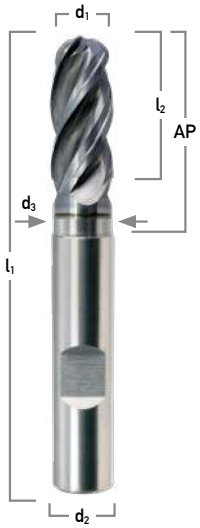
- High-performance end mill for roughing and finishing in INOX, titanium and heat-resisting alloys
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing

35585

Alnova | Z 4 | HB | ≠ | VHM | Type N | HPC | Manufacturer standard

Solid Carbide HPC Ball-Nosed End Mill INOX-Titanium

With neck and full radius



d1	d2	l2	l1	d3	AP		coated		f z Roughing	f z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
3.0	6	8	57	2.8	12	4	35585030	37.61	0.0105 – 0.0170	0.0098 – 0.0140
4.0	6	11	57	3.8	15	4	35585040	37.61	0.0150 – 0.0220	0.0140 – 0.0190
5.0	6	13	57	4.8	17	4	35585050	37.61	0.0190 – 0.0260	0.0180 – 0.0230
6.0	6	13	57	5.5	21	4	35585060	37.61	0.0210 – 0.0310	0.0200 – 0.0270
8.0	8	19	63	7.5	27	4	35585080	53.29	0.0320 – 0.0420	0.0290 – 0.0360
10.0	10	22	72	9.5	32	4	35585100	70.39	0.0420 – 0.0550	0.0390 – 0.0480
12.0	12	26	83	11.5	38	4	35585120	105.38	0.0470 – 0.0610	0.0440 – 0.0520
14.0	14	26	83	13.5	42	4	35585140	147.47	0.0525 – 0.0660	0.0490 – 0.0570
16.0	16	32	92	15.5	44	4	35585160	178.41	0.0740 – 0.0880	0.0690 – 0.0760
20.0	20	38	104	19.5	54	4	35585200	262.62	0.0740 – 0.0990	0.0690 – 0.0860

d1	d2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- High-performance end mill for roughing and finishing in INOX, titanium and heat-resisting alloys
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- **Tip:** incline for maximum cutting performance

V_c (m/min)	General structured steels	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	180	100	90	65	35	50
Trimming a_e = 0,2xD	270	130	117	85	46	75

Product family 159

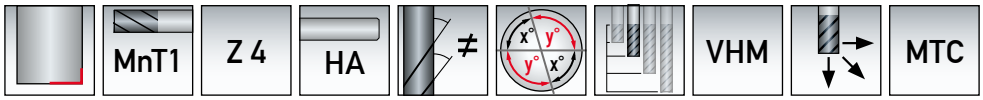
Solid Carbide End Mill for titanium machining

- Solid carbide end mill made of highly wear-resistant ultra-micro grain solid carbide
- MnT1 coating, based on the latest coating technology for high resistance to thermal and abrasive wear
- Specially designed for machining high-temperature resistant materials such as titanium
- Modern improved shearing action geometry with unequal spacing
- High running smoothness and cutting performance

Application:

- Full-slot milling, trimming and multipass milling
- Finish milling at best surface finishing

37001



Manu-facturer standard

Solid Carbide HPC End Mill Titanium

4 flutes – square end

d_1	d_2	l_2	l_1		coated		f_z Trimming	f_z Slotting
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
2.0	4	6	50	4	37001020	37.81	0.008 – 0.018	0.005 – 0.014
2.5	4	6	50	4	37001025	37.81	0.008 – 0.018	0.005 – 0.014
3.0	4	9	50	4	37001030	37.81	0.010 – 0.021	0.008 – 0.017
4.0	4	11	50	4	37001040	37.81	0.012 – 0.024	0.009 – 0.020
4.5	6	11	50	4	37001045	44.74	0.012 – 0.024	0.009 – 0.020
5.0	6	13	50	4	37001050	44.74	0.015 – 0.028	0.011 – 0.024
6.0	6	16	50	4	37001060	44.74	0.016 – 0.030	0.012 – 0.026
8.0	8	20	60	4	37001080	67.34	0.022 – 0.042	0.017 – 0.035
10.0	10	25	72	4	37001100	94.68	0.030 – 0.050	0.025 – 0.042
12.0	12	30	75	4	37001120	137.10	0.040 – 0.062	0.035 – 0.055
14.0	14	32	80	4	37001140	186.42	0.050 – 0.070	0.041 – 0.063
16.0	16	36	100	4	37001160	248.54	0.055 – 0.080	0.050 – 0.072
20.0	20	45	100	4	37001200	365.98	0.065 – 0.110	0.060 – 0.090

Trimming
$a_e \leq 0.25xD$
$a_p \leq 1.5xD$

Slotting
$a_e \leq 1.0xD$
$a_p \leq 1.0xD$

D	Tolerance
D<16	0/-0.03
D>16	0/-0.04

Trimming	
Material	Titanium alloy
V_c (m/min)	80

Slotting	
Material	Titanium alloy
V_c (m/min)	55

37002

MnT1 | Z 4 | HA | VHM | MTC | HPC | Manu-facturer standard

Solid Carbide HPC Torus Cutter Titanium

4 flutes with Corner radius

D	Tolerance
D<6	0/-0.02
6>D<16	0/-0.03
D>16	0/-0.04

d_1	d_2	l_2	l_1	CR		coated		f_z Trimming		f_z Slotting	
mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
2.0	4	6	50	0.20	4	3700202002	37.81	0.008 – 0.018		0.005 – 0.014	
3.0	4	9	50	0.30	4	3700203003	37.81	0.010 – 0.021		0.008 – 0.017	
3.0	4	9	50	0.50	4	3700203005	37.81	0.010 – 0.021		0.008 – 0.017	
4.0	4	11	50	0.50	4	3700204005	37.81	0.012 – 0.024		0.009 – 0.020	
4.0	4	11	50	1.00	4	3700204010	37.81	0.012 – 0.024		0.009 – 0.020	
5.0	6	13	50	0.50	4	3700205005	44.74	0.015 – 0.028		0.011 – 0.024	
6.0	6	16	50	0.50	4	3700206005	44.74	0.016 – 0.030		0.012 – 0.026	
6.0	6	16	50	1.00	4	3700206010	44.74	0.016 – 0.030		0.012 – 0.026	
8.0	8	20	60	0.50	4	3700208005	67.34	0.022 – 0.042		0.017 – 0.035	
8.0	8	20	60	1.00	4	3700208010	67.34	0.022 – 0.042		0.017 – 0.035	
10.0	10	25	72	0.50	4	3700210005	94.68	0.030 – 0.050		0.025 – 0.042	
10.0	10	25	72	1.00	4	3700210010	94.68	0.030 – 0.050		0.025 – 0.042	
10.0	10	25	72	2.00	4	3700210020	94.68	0.030 – 0.050		0.025 – 0.042	
12.0	12	30	75	1.00	4	3700212010	137.10	0.040 – 0.062		0.035 – 0.055	
12.0	12	30	75	2.00	4	3700212020	137.10	0.040 – 0.062		0.035 – 0.055	
12.0	12	30	75	3.00	4	3700212030	137.10	0.040 – 0.062		0.035 – 0.055	
16.0	16	36	100	1.00	4	3700216010	248.54	0.055 – 0.080		0.050 – 0.072	
16.0	16	36	100	2.00	4	3700216020	248.54	0.055 – 0.080		0.050 – 0.072	
16.0	16	36	100	3.00	4	3700216030	248.54	0.055 – 0.080		0.050 – 0.072	
16.0	16	36	100	4.00	4	3700216040	248.54	0.055 – 0.080		0.050 – 0.072	
20.0	20	45	100	1.00	4	3700220010	365.98	0.065 – 0.110		0.060 – 0.090	
20.0	20	45	100	2.00	4	3700220020	365.98	0.065 – 0.110		0.060 – 0.090	
20.0	20	45	100	3.00	4	3700220030	365.98	0.065 – 0.110		0.060 – 0.090	

Trimming
$a_e \leq 0.25xD$
$a_p \leq 1.5xD$

Slotting
$a_e \leq 1.0xD$
$a_p \leq 1.0xD$

Trimming	
Material	Titanium alloy
V_c (m/min)	80

Slotting	
Material	Titanium alloy
V_c (m/min)	55

37006

R>1 +/-0.02 | MnT1 | Z 4 | HA | VHM | MTC | HPC | Manu-facturer standard

Solid Carbide HPC Ball-Nosed End Mill Titanium

4 flutes with ball nose

D	Tolerance
R>1	+/-0.02

d_1	d_2	l_2	l_1	R		coated		f_z Trimming	
mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	
2.0	6	4	50	1.00	4	37006020	46.98	0.015 – 0.022	
3.0	6	6	50	1.50	4	37006030	46.98	0.022 – 0.028	
4.0	6	8	50	2.00	4	37006040	46.98	0.028 – 0.035	
5.0	6	10	50	2.50	4	37006050	46.98	0.037 – 0.045	
6.0	6	12	50	3.00	4	37006060	46.98	0.030 – 0.055	
8.0	8	14	60	4.00	4	37006080	70.71	0.040 – 0.068	
10.0	10	18	75	5.00	4	37006100	100.36	0.048 – 0.075	
12.0	12	22	75	6.00	4	37006120	143.95	0.053 – 0.085	
16.0	16	30	100	8.00	4	37006160	260.99	0.065 – 0.100	
20.0	20	38	100	10.00	4	37006200	384.29	0.085 – 0.145	

Trimming
$a_e \leq 0.3xD$
$a_p \leq 0.2xD$

Trimming	
Material	Titanium alloy
V_c (m/min)	75

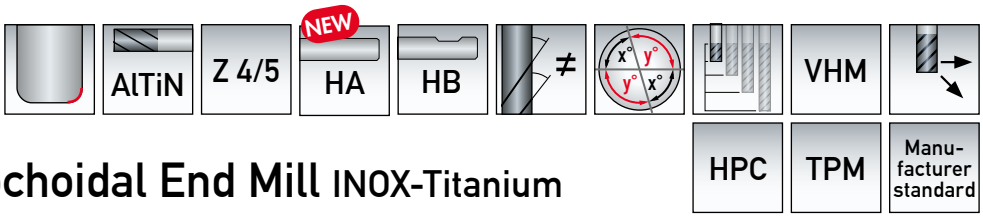
Solid Carbide Trochoidal End Mill INOX-Titanium

- Solid carbide end mill of the latest generation made from ultra-micro grain solid carbide with a special AlTiN coating
- Optimized geometry with increased core and large flutes in the front area
- High machining performance
- Protection of the cutting edges through corner radius for longer tool life
- Cutting edges with chip breakers reduce the cutting forces and provide for short chips

Application:

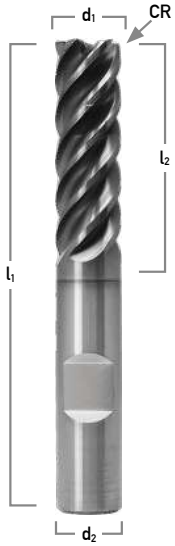
- For trochoidal milling with the use of the whole length of the cutting edge at highest cutting parameters
- Finish milling (trimming) at high cutting parameters and best surface finishing

37231



Solid Carbide Trochoidal End Mill INOX-Titanium

3xD with corner radius



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	CR	d_3	AP		coated				Trochoidal / Trimming f_z (mm/Z)			HPC Full slot f_z (mm/Z)
mm	mm	mm	mm	mm	mm	mm	Z	Part No. (HA)	€/pc.	Part No. (HB)	€/pc.	$a_e \leq 0.1 \times d$ ß ≤ 36.9°	$a_e \leq 0.075 \times d$ ß ≤ 31.8°	$a_e \leq 0.05 \times d$ ß ≤ 25.8°	$a_e \leq 1.0 \times d$ $a_p \leq 1.0 \times d$
6.0	6	20	57	0.10	–	–	4	37231060HA	54.38	37231060	54.38	0.06	0.069	0.084	0.020–0.030
8.0	8	26	63	0.10	–	–	4	37231080HA	74.62	37231080	74.62	0.08	0.092	0.112	0.030–0.040
10.0	10	32	72	0.10	–	–	5	37231100HA	115.50	37231100	115.50	0.10	0.115	0.140	0.040–0.050
12.0	12	38	83	0.12	–	–	5	37231120HA	140.09	37231120	140.09	0.12	0.138	0.168	0.045–0.060
14.0	14	44	100	0.15	–	–	5	37231140HA	183.94	37231140	183.94	0.14	0.161	0.196	0.050–0.062
16.0	16	52	115	0.15	–	–	5	37231160HA	237.08	37231160	237.08	0.16	0.184	0.224	0.070–0.090
20.0	20	62	131	0.20	–	–	5	37231200HA	364.88	37231200	364.88	0.20	0.230	0.280	0.070–0.100

Peripheral milling
a_e = 0.15xD
a_p = 3.0xD

Trochoidal / Trimming						
V, (m/min)	Stainless martensitic	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength, classification	1.4034	1.4301	1.4571	Duplex	≤1200 N/mm²	≤ 850 N/mm²
a_e = 0,1xD	160	160	145	125	70	80
a_e = 0,075xD	180	180	160	145	80	90
a_e = 0,05xD	200	200	180	160	90	100
a_e = 0,025xD	220	220	200	180	100	110

Please use cooling emulsion!

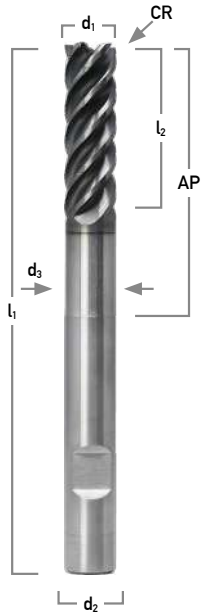
Product family 159

37232

AlTiN | Z 4/5 | NEW HA | HB | ≠ | VHM | HPC | TPM | Manu-facturer standard

Solid Carbide Trochoidal End Mill INOX-Titanium

3xD with corner radius



d_1	d_2	l_2	l_1	CR	d_3	AP		coated				Trochoidal / Trimming f_z (mm/Z)		
mm	mm	mm	mm	mm	mm	mm	Z	Part No. (HA)	€/pc.	Part No. (HB)	€/pc.	$a_e \le 0.1 \times d$ ß≤ 36.9°	$a_e \le 0.75 \times d$ ß≤ 31.8°	$a_e \le 0.05 \times d$ ß≤ 25.8°
6.0	6	20	75	0.10	5.5	32	4	37232060HA	62.41	37232060	62.41	0.045	0.050	0.065
8.0	8	26	85	0.10	7.5	42	4	37232080HA	85.27	37232080	85.27	0.055	0.065	0.080
10.0	10	32	100	0.10	9.5	52	5	37232100HA	132.22	37232100	132.22	0.075	0.085	0.105
12.0	12	38	110	0.12	11.5	62	5	37232120HA	165.00	37232120	165.00	0.090	0.105	0.125
14.0	14	44	125	0.15	13.5	72	5	37232140HA	215.82	37232140	215.82	0.110	0.130	0.160
16.0	16	52	140	0.15	15.5	82	5	37232160HA	282.54	37232160	282.54	0.125	0.145	0.180
20.0	20	62	165	0.20	19.5	102	5	37232200HA	433.94	37232200	433.94	0.160	0.180	0.220

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.1xD
a_p = 3.0xD

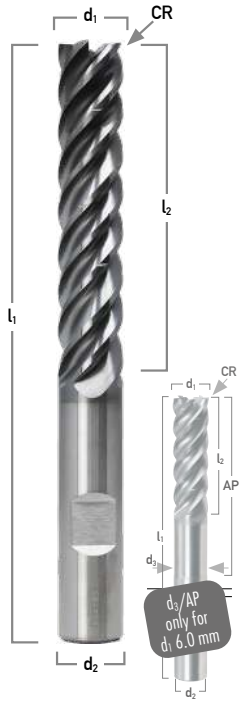
3xD	Trochoidal / Trimming					
V_c (m/min)	Stainless martensitic	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength, classification	1.4034	1.4301	1.4571	Duplex	≤1200 N/mm²	≤ 850 N/mm²
a_e = 0,1xD	140	130	120	–	–	–
a_e = 0,075xD	160	150	140	90	65	70
a_e = 0,05xD	180	170	160	110	70	80
a_e = 0,025xD	210	180	170	130	80	90

37251

AlTiN | Z 4/5 | NEW HA | HB | ≠ | VHM | HPC | TPM | Manu-facturer standard

Solid Carbide Trochoidal End Mill INOX-Titanium

5xD with corner radius



d_1	d_2	l_2	l_1	CR	d_3	AP		coated				Trochoidal / Trimming f_z (mm/Z)		
mm	mm	mm	mm	mm	mm	mm	Z	Part No. (HA)	€/pc.	Part No. (HB)	€/pc.	$a_e \le 0.1 \times d$ ß≤ 36.9°	$a_e \le 0.75 \times d$ ß≤ 31.8°	$a_e \le 0.05 \times d$ ß≤ 25.8°
6.0	6	25	75	0.10	5.5	32	4	37251060HA	72.67	37251060	72.67	0.050	0.057	0.070
8.0	8	42	85	0.10	–	–	4	37251080HA	98.66	37251080	98.66	0.066	0.078	0.093
10.0	10	52	100	0.10	–	–	5	37251100HA	153.21	37251100	153.21	0.082	0.094	0.115
12.0	12	62	110	0.12	–	–	5	37251120HA	189.05	37251120	189.05	0.100	0.115	0.140
14.0	14	72	125	0.15	–	–	5	37251140HA	254.49	37251140	254.49	0.115	0.132	0.161
16.0	16	82	140	0.15	–	–	5	37251160HA	319.90	37251160	319.90	0.132	0.152	0.185
20.0	20	102	165	0.20	–	–	5	37251200HA	496.00	37251200	496.00	0.165	0.190	0.231

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.1xD
a_p = 5.0xD

3xD	Trochoidal / Trimming					
V_c (m/min)	Stainless martensitic	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength, classification	1.4034	1.4301	1.4571	Duplex	≤1200 N/mm²	≤ 850 N/mm²
a_e = 0,1xD	140	130	120	–	–	–
a_e = 0,075xD	160	150	140	90	65	70
a_e = 0,05xD	180	170	160	110	70	80
a_e = 0,025xD	210	180	170	130	80	90

28550AD




Solid Carbide Finishing End Mill

With corner radius

d_1	d_2	l_2	l_1	CR		coated		f_z Finishing		
mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		
3.0	6	13	57	0.25	6	28550030AD	45.40	0.002	–	0.013
4.0	6	13	57	0.25	6	28550040AD	44.94	0.006	–	0.024
5.0	6	13	57	0.25	6	28550050AD	44.94	0.010	–	0.025
6.0	6	13	57	0.25	6	28550060AD	44.12	0.013	–	0.033
7.0	8	16	63	0.25	6	28550070AD	63.99	0.016	–	0.040
8.0	8	19	63	0.25	6	28550080AD	62.76	0.019	–	0.047
9.0	10	19	72	0.25	6	28550090AD	86.27	0.021	–	0.051
10.0	10	22	72	0.25	6	28550100AD	84.08	0.025	–	0.060
12.0	12	26	83	0.25	8	28550120AD	109.67	0.030	–	0.072
14.0	14	26	83	0.25	8	28550140AD	153.73	0.035	–	0.080
16.0	16	32	92	0.25	10	28550160AD	181.50	0.038	–	0.088
18.0	18	32	92	0.25	10	28550180AD	224.68	0.042	–	0.095
20.0	20	38	104	0.25	10	28550200AD	261.86	0.045	–	0.100

d_1	d_2
h10	h6

Peripheral milling
$a_e = 0.05xD$
$a_p = 2.0xD$

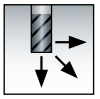
- Stable version due to increased core
- Smooth running due to 6 teeth at the minimum

Material	Tool steels	Tool steels	Hardened steels	Hardened steels	Cast iron	Cast iron	Spheroidal Graphite & malleable iron	Spheroidal Graphite & malleable iron
Tensile strength / Hardness	< 850 N/mm²	850 – 1000 N/mm²	< 40 – 48 HRC	< 48 – 60 HRC	< 240 HB	< 300 HB	< 240 HB	< 300 HB
V_c (m/min)	175	175	70	60	300	280	250	220

Product family 160

20201






Solid Carbide
High-Performance End Mill Short version with protective chamfer

d_1	d_2
e8	h6

d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	Z	coated Part No.	coated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
1.00	3*	0.02	3	54	2	20201010	23.65	0.006 – 0.017	0.006 – 0.014
1.50	3*	0.02	4	54	2	20201015	23.65	0.006 – 0.017	0.006 – 0.014
1.80	3*	0.02	4	54	2	20201018	23.65	0.007 – 0.022	0.007 – 0.019
2.00	6	0.02	4	54	2	20201020	27.49	0.007 – 0.022	0.007 – 0.019
2.50	6	0.02	4	54	2	20201025	27.49	0.007 – 0.022	0.007 – 0.019
2.80	6	0.03	6	54	2	20201028	27.49	0.007 – 0.031	0.007 – 0.027
3.00	6	0.03	6	54	2	20201030	27.49	0.007 – 0.031	0.007 – 0.027
3.80	6	0.04	8	54	2	20201038	27.49	0.011 – 0.031	0.010 – 0.027
4.00	6	0.04	8	54	2	20201040	27.49	0.011 – 0.039	0.010 – 0.033
4.80	6	0.05	9	54	2	20201048	27.49	0.016 – 0.039	0.015 – 0.033
5.00	6	0.05	9	54	2	20201050	27.49	0.016 – 0.039	0.015 – 0.033
5.75	6	0.06	10	54	2	202010575	27.49	0.026 – 0.044	0.025 – 0.038
6.00	6	0.06	10	54	2	20201060	27.49	0.026 – 0.044	0.025 – 0.038
6.75	8	0.07	12	58	2	202010675	42.67	0.032 – 0.050	0.029 – 0.043
7.00	8	0.07	12	58	2	20201070	42.67	0.032 – 0.050	0.029 – 0.043
7.75	8	0.08	12	58	2	202010775	42.67	0.032 – 0.055	0.029 – 0.048
8.00	8	0.08	12	58	2	20201080	42.67	0.032 – 0.055	0.029 – 0.048
8.70	10	0.09	14	66	2	20201087	58.78	0.037 – 0.066	0.034 – 0.057
9.00	10	0.09	14	66	2	20201090	58.78	0.037 – 0.066	0.034 – 0.057
9.70	10	0.10	14	66	2	20201097	58.78	0.037 – 0.066	0.034 – 0.057
10.00	10	0.10	14	66	2	20201100	58.78	0.042 – 0.077	0.039 – 0.067
11.70	12	0.12	16	73	2	20201117	87.07	0.063 – 0.099	0.059 – 0.086
12.00	12	0.12	16	73	2	20201120	87.07	0.063 – 0.099	0.059 – 0.086
14.00	14	0.14	18	75	2	20201140	114.70	0.074 – 0.121	0.069 – 0.105

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- The undersize values are suitable for cutting keyways
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p =1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

Product family 160

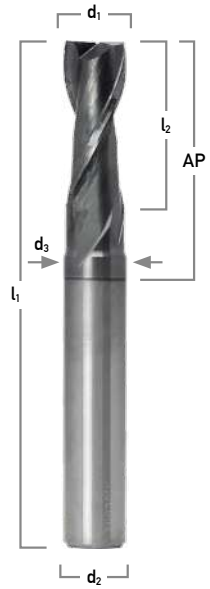
20203




Manu-facturer standard

Solid Carbide High-Performance End Mill

With neck and protective chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.
2.00	6	0.02	6	57	–	–	2	20203020	30.54
2.50	6	0.02	6	57	–	–	2	20203025	30.54
2.80	6	0.03	8	57	–	–	2	20203028	30.54
3.00	6	0.03	8	57	2.8	18	2	20203030	30.54
3.80	6	0.04	11	57	3.6	21	2	20203038	30.54
4.00	6	0.04	11	57	3.8	21	2	20203040	30.54
4.80	6	0.05	13	57	4.6	21	2	20203048	30.54
5.00	6	0.05	13	57	4.8	21	2	20203050	30.54
5.75	6	0.06	13	57	5.5	21	2	202030575	30.54
6.00	6	0.06	13	57	5.5	21	2	20203060	30.54
6.75	8	0.07	19	63	6.5	27	2	202030675	41.82
7.00	8	0.07	19	63	6.5	27	2	20203070	41.82
7.75	8	0.08	19	63	7.4	27	2	202030775	41.82
8.00	8	0.08	19	63	7.5	27	2	20203080	41.82
8.70	10	0.09	22	72	8.4	32	2	20203087	59.09
9.00	10	0.09	22	72	8.5	32	2	20203090	59.09
9.70	10	0.10	22	72	9.2	32	2	20203097	59.09
10.00	10	0.10	22	72	9.5	32	2	20203100	59.09
11.70	12	0.12	26	83	11.2	38	2	20203117	90.31
12.00	12	0.12	26	83	11.5	38	2	20203120	90.31
14.00	14	0.14	26	83	13.5	42	2	20203140	119.25

d_1	d_2
e8	h6

f_z Roughing			f_z Finishing		
mm/Z			mm/Z		
0.007	–	0.022	0.007	–	0.019
0.007	–	0.022	0.007	–	0.019
0.007	–	0.031	0.007	–	0.027
0.007	–	0.031	0.007	–	0.027
0.011	–	0.031	0.010	–	0.027
0.011	–	0.039	0.010	–	0.033
0.016	–	0.039	0.015	–	0.033
0.016	–	0.039	0.015	–	0.033
0.026	–	0.044	0.025	–	0.038
0.026	–	0.044	0.025	–	0.038
0.032	–	0.050	0.029	–	0.043
0.032	–	0.050	0.029	–	0.043
0.032	–	0.055	0.029	–	0.048
0.032	–	0.055	0.029	–	0.048
0.037	–	0.066	0.034	–	0.057
0.037	–	0.066	0.034	–	0.057
0.037	–	0.066	0.034	–	0.057
0.042	–	0.077	0.039	–	0.067
0.063	–	0.099	0.059	–	0.086
0.063	–	0.099	0.059	–	0.086
0.074	–	0.121	0.069	–	0.105

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- The undersize values are suitable for cutting keyways

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

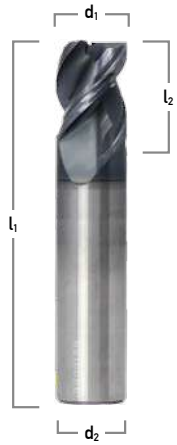
Product family 160

20305

Alcrona Pro | Z 3 | HA | ≠ | VHM | Type N | HPC | Manufacturer standard

Solid Carbide HPC End Mill

Short version with protective chamfer



d_1	d_2
e8	h6

d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
1.00	3	0.02	2	40	3	20305010	20.93	0.006 – 0.017	0.006 – 0.014
1.50	3	0.02	3	40	3	20305015	20.93	0.006 – 0.017	0.006 – 0.014
2.00	6	0.02	3	40	3	20305020	25.39	0.007 – 0.022	0.007 – 0.019
2.50	6	0.02	3	40	3	20305025	25.39	0.007 – 0.022	0.007 – 0.019
2.80	6	0.03	5	40	3	20305028	25.39	0.007 – 0.022	0.007 – 0.019
3.00	6	0.03	5	40	3	20305030	25.39	0.007 – 0.031	0.007 – 0.027
3.80	6	0.04	7	40	3	20305038	25.39	0.007 – 0.031	0.007 – 0.027
4.00	6	0.04	7	40	3	20305040	23.85	0.011 – 0.031	0.010 – 0.027
4.80	6	0.05	8	40	3	20305048	23.85	0.011 – 0.039	0.010 – 0.033
5.00	6	0.05	8	40	3	20305050	23.85	0.016 – 0.039	0.015 – 0.033
5.75	6	0.06	8	40	3	203050575	23.85	0.016 – 0.039	0.015 – 0.033
6.00	6	0.06	8	40	3	20305060	23.85	0.026 – 0.044	0.025 – 0.038
6.75	8	0.07	11	45	3	203050675	33.65	0.026 – 0.044	0.025 – 0.038
7.00	8	0.07	11	45	3	20305070	33.65	0.032 – 0.050	0.029 – 0.043
7.75	8	0.08	11	45	3	203050775	33.65	0.032 – 0.050	0.029 – 0.043
8.00	8	0.08	11	45	3	20305080	33.65	0.032 – 0.055	0.029 – 0.048
8.70	10	0.09	13	50	3	20305087	46.06	0.032 – 0.055	0.029 – 0.048
9.00	10	0.09	13	50	3	20305090	46.06	0.037 – 0.066	0.034 – 0.057
9.70	10	0.10	13	50	3	20305097	46.06	0.037 – 0.066	0.034 – 0.057
10.00	10	0.10	13	50	3	20305100	49.02	0.037 – 0.066	0.034 – 0.057
11.70	12	0.12	15	55	3	20305117	65.83	0.042 – 0.077	0.039 – 0.067
12.00	12	0.12	15	55	3	20305120	65.83	0.063 – 0.099	0.059 – 0.086
13.70	14	0.14	15	58	3	20305137	96.24	0.063 – 0.099	0.059 – 0.086
14.00	14	0.14	15	58	3	20305140	96.24	0.074 – 0.121	0.069 – 0.105
15.70	16	0.15	18	62	3	20305157	122.70	0.074 – 0.121	0.069 – 0.105
16.00	16	0.15	18	62	3	20305160	122.70	0.095 – 0.143	0.088 – 0.124
18.00	18	0.15	18	70	3	20305180	158.04	0.116 – 0.165	0.108 – 0.143
20.00	20	0.15	22	75	3	20305200	183.03	0.137 – 0.187	0.127 – 0.162

Peripheral milling
$a_e = 0.5xD$
$a_p = 1.5xD$

Full slot milling
$a_p = 1.0xD$

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

Product family 160

20300




Solid Carbide HPC End Mill

Short version with edge chamfer

d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing			f_z Finishing		
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
2.0	6	0.10	4	54	3	20300020	25.38	0.007	–	0.022	0.007	–	0.019
2.5	6	0.10	4	54	3	20300025	25.38	0.007	–	0.022	0.007	–	0.019
3.0	6	0.13	6	54	3	20300030	25.38	0.007	–	0.031	0.007	–	0.027
3.5	6	0.13	6	54	3	20300035	25.38	0.007	–	0.031	0.007	–	0.027
4.0	6	0.18	8	54	3	20300040	25.38	0.011	–	0.031	0.010	–	0.027
5.0	6	0.20	9	54	3	20300050	25.38	0.016	–	0.039	0.015	–	0.033
6.0	6	0.20	10	54	3	20300060	25.38	0.026	–	0.044	0.025	–	0.038
7.0	8	0.20	12	58	3	20300070	35.90	0.032	–	0.050	0.029	–	0.043
8.0	8	0.20	12	58	3	20300080	35.90	0.032	–	0.055	0.029	–	0.048
9.0	10	0.30	14	66	3	20300090	49.42	0.037	–	0.066	0.034	–	0.057
10.0	10	0.30	14	66	3	20300100	45.73	0.037	–	0.066	0.034	–	0.057
12.0	12	0.30	16	73	3	20300120	61.78	0.063	–	0.099	0.059	–	0.086
14.0	14	0.30	18	75	3	20300140	91.17	0.074	–	0.121	0.069	–	0.105
16.0	16	0.40	22	82	3	20300160	126.09	0.095	–	0.143	0.088	–	0.124
20.0	20	0.50	26	92	3	20300200	189.33	0.137	–	0.187	0.127	–	0.162

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

d_1	d_2
h10	h6

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

Product family 160

20301

Alcrona Pro | Z 3 | HB | *HA | VHM | Type N | HPC | Manu-facturer standard

Solid Carbide HPC End Mill

Short version with protective chamfer

d_1	d_2
h10	h6

d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
1.00	3*	0.02	3	54	3	20301010	21.36	0.006 – 0.017	0.006 – 0.014
1.50	3*	0.02	4	54	3	20301015	21.36	0.006 – 0.017	0.006 – 0.014
2.00	6	0.02	4	54	3	20301020	25.38	0.007 – 0.022	0.007 – 0.019
2.50	6	0.02	4	54	3	20301025	25.38	0.007 – 0.022	0.007 – 0.019
2.80	6	0.03	6	54	3	20301028	25.38	0.007 – 0.022	0.007 – 0.019
3.00	6	0.03	6	54	3	20301030	25.38	0.007 – 0.031	0.007 – 0.027
3.80	6	0.04	8	54	3	20301038	25.38	0.007 – 0.031	0.007 – 0.027
4.00	6	0.04	8	54	3	20301040	23.88	0.011 – 0.031	0.010 – 0.027
4.80	6	0.05	9	54	3	20301048	23.88	0.011 – 0.039	0.010 – 0.033
5.00	6	0.05	9	54	3	20301050	23.88	0.016 – 0.039	0.015 – 0.033
5.75	6	0.06	10	54	3	203010575	23.88	0.016 – 0.039	0.015 – 0.033
6.00	6	0.06	10	54	3	20301060	23.88	0.026 – 0.044	0.025 – 0.038
6.75	8	0.07	12	58	3	203010675	33.78	0.026 – 0.044	0.025 – 0.038
7.00	8	0.07	12	58	3	20301070	33.78	0.032 – 0.050	0.029 – 0.043
7.75	8	0.08	12	58	3	203010775	33.78	0.032 – 0.050	0.029 – 0.043
8.00	8	0.08	12	58	3	20301080	33.78	0.032 – 0.055	0.029 – 0.048
8.70	10	0.09	14	66	3	20301087	46.47	0.032 – 0.055	0.029 – 0.048
9.00	10	0.09	14	66	3	20301090	46.47	0.037 – 0.066	0.034 – 0.057
9.70	10	0.10	14	66	3	20301097	46.47	0.037 – 0.066	0.034 – 0.057
10.00	10	0.10	14	66	3	20301100	49.42	0.037 – 0.066	0.034 – 0.057
11.70	12	0.12	16	73	3	20301117	66.77	0.042 – 0.077	0.039 – 0.067
12.00	12	0.12	16	73	3	20301120	66.77	0.063 – 0.099	0.059 – 0.086
13.70	14	0.14	18	75	3	20301137	98.53	0.063 – 0.099	0.059 – 0.086
14.00	14	0.14	18	75	3	20301140	98.53	0.074 – 0.121	0.069 – 0.105
15.70	16	0.15	22	82	3	20301157	126.09	0.074 – 0.121	0.069 – 0.105
16.00	16	0.15	22	82	3	20301160	126.09	0.095 – 0.143	0.088 – 0.124
18.00	18	0.15	24	84	3	20301180	160.58	0.116 – 0.165	0.108 – 0.143
20.00	20	0.15	26	92	3	20301200	189.33	0.137 – 0.187	0.127 – 0.162

Peripheral milling
$a_e = 0.5xD$
$a_p = 1.5xD$

Full slot milling
$a_p = 1.0xD$

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

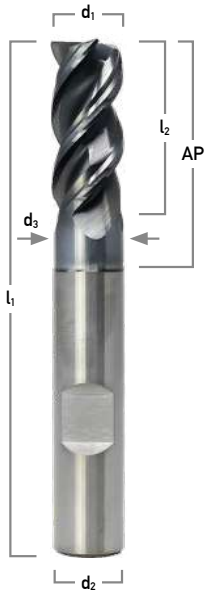
Product family 160

20302




Solid Carbide HPC End Mill

With neck and edge chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
3.0	6	0.13	8	57	2.8	18	3	20302030	23.57	0.007 –	0.031	0.007 –	0.027
3.5	6	0.13	8	57	3.3	18	3	20302035	23.57	0.011 –	0.031	0.010 –	0.027
4.0	6	0.18	11	57	3.8	21	3	20302040	23.57	0.011 –	0.039	0.010 –	0.033
5.0	6	0.20	13	57	4.8	21	3	20302050	23.57	0.016 –	0.039	0.015 –	0.033
6.0	6	0.20	13	57	5.5	21	3	20302060	23.57	0.026 –	0.044	0.025 –	0.038
7.0	8	0.20	19	63	6.5	27	3	20302070	33.90	0.032 –	0.050	0.029 –	0.043
8.0	8	0.20	19	63	7.5	27	3	20302080	33.90	0.032 –	0.055	0.029 –	0.048
9.0	10	0.30	22	72	8.5	32	3	20302090	47.38	0.037 –	0.066	0.034 –	0.057
10.0	10	0.30	22	72	9.5	32	3	20302100	47.38	0.042 –	0.077	0.039 –	0.067
12.0	12	0.30	26	83	11.5	38	3	20302120	65.65	0.063 –	0.099	0.059 –	0.086
14.0	14	0.30	26	83	13.5	42	3	20302140	96.29	0.074 –	0.121	0.069 –	0.105
16.0	16	0.40	32	92	15.5	44	3	20302160	124.88	0.095 –	0.143	0.088 –	0.124
20.0	20	0.50	38	104	19.5	54	3	20302200	192.44	0.137 –	0.187	0.127 –	0.162

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

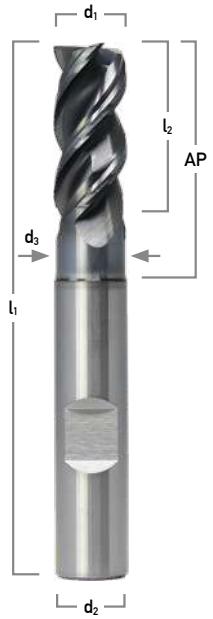
Product family 160

20303

Alcrona Pro | Z 3 | HB | ≠ | VHM | Type N | HPC | Manu-facturer standard

Solid Carbide HPC End Mill

With neck and protective chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
2.0	6	0.02	6	57	–	–	3	20303020	23.34	0.007 – 0.022		0.007 – 0.019	
2.5	6	0.02	6	57	–	–	3	20303025	23.34	0.007 – 0.022		0.007 – 0.019	
3.0	6	0.03	8	57	2.8	18	3	20303030	23.34	0.007 – 0.031		0.007 – 0.027	
3.5	6	0.03	8	57	3.3	18	3	20303035	23.34	0.007 – 0.031		0.007 – 0.027	
4.0	6	0.04	11	57	3.8	21	3	20303040	23.34	0.011 – 0.031		0.010 – 0.027	
4.5	6	0.04	11	57	4.3	21	3	20303045	23.34	0.011 – 0.031		0.010 – 0.027	
5.0	6	0.05	13	57	4.8	21	3	20303050	23.34	0.016 – 0.039		0.015 – 0.033	
5.5	6	0.05	13	57	5.3	21	3	20303055	23.34	0.016 – 0.039		0.015 – 0.033	
6.0	6	0.06	13	57	5.5	21	3	20303060	23.34	0.026 – 0.044		0.025 – 0.038	
7.0	8	0.07	19	63	6.5	27	3	20303070	33.48	0.032 – 0.050		0.029 – 0.043	
8.0	8	0.08	19	63	7.5	27	3	20303080	33.48	0.032 – 0.055		0.029 – 0.048	
9.0	10	0.09	22	72	8.5	32	3	20303090	46.64	0.037 – 0.066		0.034 – 0.057	
10.0	10	0.10	22	72	9.5	32	3	20303100	48.97	0.037 – 0.066		0.034 – 0.057	
12.0	12	0.12	26	83	11.5	38	3	20303120	67.55	0.063 – 0.099		0.059 – 0.086	
14.0	14	0.14	26	83	13.5	42	3	20303140	98.58	0.074 – 0.121		0.069 – 0.105	
16.0	16	0.15	32	92	15.5	44	3	20303160	127.53	0.095 – 0.143		0.088 – 0.124	
18.0	18	0.15	32	92	17.5	50	3	20303180	145.02	0.095 – 0.143		0.088 – 0.124	
20.0	20	0.15	38	104	19.5	54	3	20303200	186.48	0.137 – 0.187		0.127 – 0.162	

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining Pprformance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

d_1	d_2
h10	h6

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	200	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	300	270	240	210	180	150	210	180	90

Product family 160

21300



VHM

Type N

HPC

Manu-facturer standard

Solid Carbide HPC End Mill INOX-Titanium

Short version with edge chamfer

d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
2.0	6	0.10	4	54	3	21300020	25.81	0.006 –	0.011	0.006 –	0.010
2.5	6	0.10	4	54	3	21300025	25.81	0.006 –	0.011	0.006 –	0.010
3.0	6	0.13	6	54	3	21300030	25.81	0.011 –	0.017	0.010 –	0.014
3.5	6	0.13	6	54	3	21300035	25.81	0.011 –	0.017	0.010 –	0.014
4.0	6	0.18	8	54	3	21300040	25.81	0.015 –	0.022	0.014 –	0.019
5.0	6	0.20	9	54	3	21300050	25.81	0.019 –	0.026	0.018 –	0.023
6.0	6	0.20	10	54	3	21300060	25.81	0.021 –	0.031	0.020 –	0.027
7.0	8	0.20	12	58	3	21300070	36.81	0.021 –	0.031	0.020 –	0.027
8.0	8	0.20	12	58	3	21300080	36.81	0.032 –	0.042	0.029 –	0.036
9.0	10	0.30	14	66	3	21300090	49.02	0.032 –	0.042	0.029 –	0.036
10.0	10	0.30	14	66	3	21300100	49.02	0.042 –	0.055	0.039 –	0.048
12.0	12	0.30	16	73	3	21300120	66.91	0.047 –	0.061	0.044 –	0.052
14.0	14	0.30	18	75	3	21300140	97.84	0.053 –	0.066	0.049 –	0.057
16.0	16	0.40	22	82	3	21300160	116.82	0.074 –	0.088	0.069 –	0.076
20.0	20	0.50	26	92	3	21300200	194.12	0.074 –	0.099	0.069 –	0.086

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

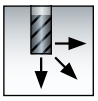
- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With edge chamfer 45° for a maximum tool life

V_c (m/min)	General structured steels	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	180	100	90	65	35	50
Trimming a_e = 0,2xD	270	130	117	85	46	75

Product family 160

21301






Solid Carbide HPC End Mill INOX-Titanium

Short version with protective chamfer

d_1	d_2
e8	h6

d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	Z	coated Part No.	coated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
1.00	3*	0.02	3	54	3	21301010	21.29	0.002 – 0.007	0.002 – 0.006
1.50	3*	0.02	4	54	3	21301015	21.29	0.002 – 0.007	0.002 – 0.006
2.00	6	0.02	4	54	3	21301020	25.81	0.006 – 0.011	0.006 – 0.010
2.50	6	0.02	4	54	3	21301025	25.81	0.006 – 0.011	0.006 – 0.010
2.80	6	0.03	6	54	3	21301028	25.81	0.006 – 0.011	0.006 – 0.010
3.00	6	0.03	6	54	3	21301030	25.81	0.011 – 0.017	0.010 – 0.014
3.80	6	0.04	8	54	3	21301038	25.81	0.011 – 0.017	0.010 – 0.014
4.00	6	0.04	8	54	3	21301040	25.81	0.015 – 0.022	0.014 – 0.019
4.80	6	0.05	9	54	3	21301048	25.81	0.015 – 0.022	0.014 – 0.019
5.00	6	0.05	9	54	3	21301050	25.81	0.019 – 0.026	0.018 – 0.023
5.75	6	0.06	10	54	3	213010575	25.81	0.019 – 0.026	0.018 – 0.023
6.00	6	0.06	10	54	3	21301060	25.81	0.021 – 0.031	0.020 – 0.027
6.75	8	0.07	12	58	3	213010675	36.81	0.021 – 0.031	0.020 – 0.027
7.00	8	0.07	12	58	3	21301070	36.81	0.021 – 0.031	0.020 – 0.027
7.75	8	0.08	12	58	3	213010775	36.81	0.032 – 0.042	0.029 – 0.036
8.00	8	0.08	12	58	3	21301080	36.81	0.032 – 0.042	0.029 – 0.036
8.70	10	0.09	14	66	3	21301087	49.02	0.032 – 0.042	0.029 – 0.036
9.00	10	0.09	14	66	3	21301090	49.02	0.032 – 0.042	0.029 – 0.036
9.70	10	0.10	14	66	3	21301097	49.02	0.042 – 0.055	0.039 – 0.048
10.00	10	0.10	14	66	3	21301100	49.02	0.042 – 0.055	0.039 – 0.048
11.70	12	0.12	16	73	3	21301117	66.91	0.473 – 0.055	0.441 – 0.048
12.00	12	0.12	16	73	3	21301120	66.91	0.047 – 0.061	0.044 – 0.052
13.00	14	0.13	18	75	3	21301130	97.84	0.047 – 0.099	0.044 – 0.086
13.70	14	0.14	18	75	3	21301137	97.84	0.047 – 0.061	0.044 – 0.052
14.00	14	0.14	18	75	3	21301140	97.84	0.053 – 0.066	0.049 – 0.057
15.00	16	0.15	22	82	3	21301150	116.82	0.053 – 0.066	0.049 – 0.057
15.70	16	0.15	22	82	3	21301157	116.82	0.053 – 0.066	0.049 – 0.057
16.00	16	0.15	22	82	3	21301160	116.82	0.053 – 0.066	0.049 – 0.057
17.70	18	0.15	24	84	3	21301177	160.67	0.074 – 0.088	0.069 – 0.076
18.00	18	0.15	24	84	3	21301180	160.67	0.074 – 0.088	0.069 – 0.076
19.70	20	0.15	26	92	3	21301197	194.12	0.074 – 0.088	0.069 – 0.076
20.00	20	0.15	26	92	3	21301200	194.12	0.074 – 0.099	0.069 – 0.086

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

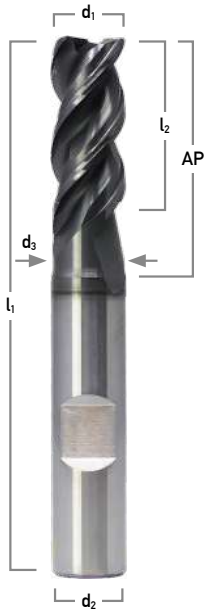
V_c (m/min)	General structured steels	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	180	100	90	65	35	50
Trimming a_e = 0,2xD	270	130	117	85	46	75

21302



Solid Carbide HPC End Mill INOX-Titanium

With neck and edge chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
3.0	6	0.13	8	57	2.8	12	3	21302030	28.18	0.011 –	0.017	0.010 –	0.014
3.5	6	0.13	8	57	3.3	12	3	21302035	28.18	0.011 –	0.017	0.010 –	0.014
4.0	6	0.18	11	57	3.8	15	3	21302040	28.18	0.015 –	0.022	0.014 –	0.019
5.0	6	0.20	13	57	4.8	17	3	21302050	28.18	0.019 –	0.026	0.018 –	0.023
6.0	6	0.20	13	57	5.5	21	3	21302060	28.18	0.021 –	0.031	0.020 –	0.027
7.0	8	0.20	19	63	6.5	27	3	21302070	40.33	0.021 –	0.031	0.020 –	0.027
8.0	8	0.20	19	63	7.5	27	3	21302080	40.33	0.032 –	0.042	0.029 –	0.036
9.0	10	0.30	22	72	8.5	32	3	21302090	54.44	0.032 –	0.042	0.029 –	0.036
10.0	10	0.30	22	72	9.5	32	3	21302100	54.44	0.042 –	0.055	0.039 –	0.048
12.0	12	0.30	26	83	11.5	38	3	21302120	79.22	0.047 –	0.061	0.044 –	0.052
14.0	14	0.30	26	83	13.5	42	3	21302140	110.34	0.053 –	0.066	0.049 –	0.057
16.0	16	0.40	32	92	15.5	44	3	21302160	142.32	0.053 –	0.066	0.049 –	0.057
20.0	20	0.50	38	104	19.5	54	3	21302200	205.17	0.074 –	0.099	0.069 –	0.086

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing

V_c (m/min)	General structured steels	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	180	100	90	65	35	50
Trimming a_e = 0,2xD	270	130	117	85	46	75

Product family 160

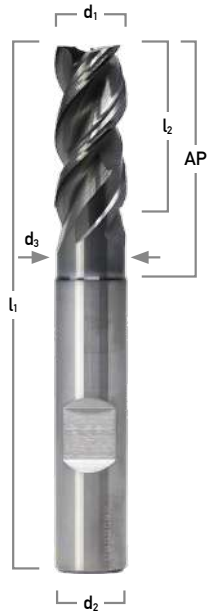
21303





Solid Carbide HPC End Mill INOX-Titanium

With neck and protective chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	0.02	6	57	–	–	3	21303020	28.18	0.006 – 0.011	0.006 – 0.010
2.5	6	0.02	6	57	–	–	3	21303025	28.18	0.006 – 0.011	0.006 – 0.010
3.0	6	0.03	8	57	2.8	12	3	21303030	28.18	0.011 – 0.017	0.010 – 0.014
3.5	6	0.03	8	57	3.3	12	3	21303035	28.18	0.011 – 0.017	0.010 – 0.014
4.0	6	0.04	11	57	3.8	15	3	21303040	28.18	0.015 – 0.022	0.014 – 0.019
5.0	6	0.05	13	57	4.8	17	3	21303050	28.18	0.019 – 0.026	0.018 – 0.023
6.0	6	0.06	13	57	5.5	21	3	21303060	28.18	0.021 – 0.031	0.020 – 0.027
7.0	8	0.07	19	63	6.5	27	3	21303070	40.33	0.021 – 0.031	0.020 – 0.027
8.0	8	0.08	19	63	7.5	27	3	21303080	40.33	0.032 – 0.042	0.029 – 0.036
9.0	10	0.09	22	72	8.5	32	3	21303090	54.44	0.032 – 0.042	0.029 – 0.036
10.0	10	0.10	22	72	9.5	32	3	21303100	54.44	0.042 – 0.055	0.039 – 0.048
12.0	12	0.12	26	83	11.5	38	3	21303120	79.22	0.047 – 0.061	0.044 – 0.052
14.0	14	0.14	26	83	13.5	42	3	21303140	110.34	0.053 – 0.066	0.049 – 0.057
16.0	16	0.15	32	92	15.5	44	3	21303160	142.32	0.074 – 0.088	0.069 – 0.076
20.0	20	0.15	38	104	19.5	54	3	21303200	205.17	0.074 – 0.099	0.069 – 0.086

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

- Universal high-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with high-performance coating Alnova
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing
- With the minimum protective chamfer best suitable for low cutting depths (finishing)

V_c (m/min)	General structured steels	Stainless austenitic	Stainless acidresistant austenitic	Stainless ferritic-austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	≤ 850 N/mm²	1.4301	1.4571	Duplex	≤1200 N/mm²	≤850 N/mm²
Full slot a_e = 1xD	180	100	90	65	35	50
Trimming a_e = 0,2xD	270	130	117	85	46	75

Product family 160

28601




Manu-facturer standard

Solid Carbide Mini Torus Cutter

Extra-long version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	CR	d_3	AP		coated		f_z Finishing		
mm	mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		
0.3	6	0.45	50	0.05	0.27	1	2	2860100031AD	73.82	0.002	–	0.004
0.3	6	0.45	50	0.05	0.27	2	2	2860100032AD	73.82	0.002	–	0.004
0.3	6	0.45	50	0.05	0.27	3	2	2860100033AD	73.82	0.002	–	0.004
0.3	6	0.45	50	0.05	0.27	5	2	2860100035AD	73.82	0.002	–	0.004
0.4	6	0.60	50	0.05	0.37	2	2	2860100042AD	73.82	0.002	–	0.007
0.4	6	0.60	50	0.05	0.37	4	2	2860100044AD	73.82	0.002	–	0.007
0.4	6	0.60	50	0.05	0.37	6	2	2860100046AD	73.82	0.002	–	0.007
0.5	6	0.70	50	0.05	0.47	2	2	2860100052AD	73.82	0.003	–	0.008
0.5	6	0.70	50	0.05	0.47	4	2	2860100054AD	73.82	0.003	–	0.008
0.5	6	0.70	50	0.05	0.47	6	2	2860100056AD	73.82	0.003	–	0.008
0.6	6	0.90	50	0.06	0.57	2	2	2860100062AD	73.59	0.003	–	0.009
0.6	6	0.90	50	0.06	0.57	4	2	2860100064AD	73.59	0.003	–	0.009
0.6	6	0.90	50	0.06	0.57	6	2	2860100066AD	64.36	0.003	–	0.009
0.6	6	0.90	50	0.06	0.57	8	2	2860100068AD	64.36	0.003	–	0.009
0.8	6	1.20	50	0.08	0.76	2	2	2860100082AD	64.36	0.004	–	0.007
0.8	6	1.20	50	0.08	0.76	4	2	2860100084AD	64.36	0.004	–	0.007
0.8	6	1.20	50	0.08	0.76	6	2	2860100086AD	64.36	0.004	–	0.007
0.8	6	1.20	50	0.08	0.76	8	2	2860100088AD	64.36	0.004	–	0.007
0.8	6	1.20	50	0.08	0.76	10	2	2860100810AD	64.36	0.004	–	0.007
1.0	6	1.60	50	0.10	0.96	3	2	2860100103AD	64.36	0.005	–	0.010
1.0	6	1.60	50	0.10	0.96	4	2	2860100104AD	64.36	0.005	–	0.010
1.0	6	1.60	50	0.10	0.96	5	2	2860100105AD	64.36	0.005	–	0.010
1.0	6	1.60	50	0.10	0.96	6	2	2860100106AD	64.36	0.005	–	0.010
1.0	6	1.60	50	0.10	0.96	8	2	2860100108AD	64.36	0.005	–	0.010
1.0	6	1.60	50	0.10	0.96	10	2	2860100110AD	64.36	0.005	–	0.010
1.0	6	1.60	55	0.10	0.96	12	2	2860100112AD	64.36	0.005	–	0.010
1.0	6	1.60	55	0.10	0.96	15	2	2860100115AD	64.36	0.005	–	0.010
1.0	6	1.60	60	0.10	0.96	20	2	2860100120AD	64.36	0.005	–	0.010
1.0	6	1.60	65	0.10	0.96	25	2	2860100125AD	64.36	0.005	–	0.010
1.0	6	1.60	70	0.10	0.96	30	2	2860100130AD	64.36	0.005	–	0.010
1.2	6	1.90	50	0.12	1.15	4	2	2860101204AD	64.36	0.005	–	0.013
1.2	6	1.90	50	0.12	1.15	6	2	2860101206AD	64.36	0.005	–	0.013
1.2	6	1.90	50	0.12	1.15	8	2	2860101208AD	64.36	0.005	–	0.013
1.2	6	1.90	50	0.12	1.15	10	2	2860101210AD	64.36	0.005	–	0.013
1.2	6	1.90	55	0.12	1.15	12	2	2860101212AD	64.36	0.005	–	0.013
1.2	6	1.90	55	0.12	1.15	15	2	2860101215AD	64.36	0.005	–	0.013
1.2	6	1.90	60	0.12	1.15	20	2	2860101220AD	64.36	0.005	–	0.013
1.2	6	1.90	65	0.12	1.15	25	2	2860101225AD	64.36	0.005	–	0.013
1.5	6	2.40	50	0.15	1.44	5	2	2860101505AD	64.36	0.006	–	0.018
1.5	6	2.40	50	0.15	1.44	6	2	2860101506AD	64.36	0.006	–	0.018
1.5	6	2.40	50	0.15	1.44	8	2	2860101508AD	64.36	0.006	–	0.018
1.5	6	2.40	50	0.15	1.44	10	2	2860101510AD	64.36	0.006	–	0.018
1.5	6	2.40	55	0.15	1.44	12	2	2860101512AD	64.36	0.006	–	0.018
1.5	6	2.40	55	0.15	1.44	15	2	2860101515AD	64.36	0.006	–	0.018
1.5	6	2.40	60	0.15	1.44	20	2	2860101520AD	64.36	0.006	–	0.018
1.5	6	2.40	65	0.15	1.44	25	2	2860101525AD	64.36	0.006	–	0.018
1.5	6	2.40	70	0.15	1.44	30	2	2860101530AD	64.36	0.006	–	0.018
2.0	6	2.80	50	0.20	1.92	6	2	2860102006AD	64.36	0.010	–	0.020
2.0	6	2.80	50	0.20	1.92	8	2	2860102008AD	64.36	0.010	–	0.020
2.0	6	2.80	50	0.20	1.92	10	2	2860102010AD	64.36	0.010	–	0.020
2.0	6	2.80	55	0.20	1.92	12	2	2860102012AD	64.36	0.010	–	0.020
2.0	6	2.80	55	0.20	1.92	15	2	2860102015AD	64.36	0.010	–	0.020
2.0	6	2.80	60	0.20	1.92	20	2	2860102020AD	64.36	0.010	–	0.020
2.0	6	2.80	65	0.20	1.92	25	2	2860102025AD	64.36	0.010	–	0.020
2.0	6	2.80	70	0.20	1.92	30	2	2860102030AD	64.36	0.010	–	0.020
3.0	6	3.00	50	0.50	2.88	5	2	2860103005AD	64.36	0.012	–	0.024
3.0	6	3.00	55	0.50	2.88	8	2	2860103008AD	64.36	0.012	–	0.024
3.0	6	3.00	55	0.50	2.88	10	2	2860103010AD	64.36	0.012	–	0.024
3.0	6	3.00	60	0.50	2.88	15	2	2860103015AD	64.36	0.012	–	0.024
3.0	6	3.00	65	0.50	2.88	20	2	2860103020AD	64.36	0.012	–	0.024
3.0	6	3.00	70	0.50	2.88	25	2	2860103025AD	64.36	0.012	–	0.024
3.0	6	3.00	75	0.50	2.88	30	2	2860103030AD	64.36	0.012	–	0.024

d_1	d_2	l_2	l_1	CR	d_3	AP		coated		f_z Finishing		
mm	mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		
4.0	6	4.00	55	0.50	3.85	10	2	2860104010AD	64.36	0.018	–	0.032
4.0	6	4.00	60	0.50	3.85	15	2	2860104015AD	64.36	0.018	–	0.032
4.0	6	4.00	65	0.50	3.85	20	2	2860104020AD	64.36	0.018	–	0.032
4.0	6	4.00	70	0.50	3.85	25	2	2860104025AD	64.36	0.018	–	0.032
4.0	6	4.00	75	0.50	3.85	30	2	2860104030AD	64.36	0.018	–	0.032
5.0	6	5.00	65	0.50	4.85	10	2	2860105010AD	64.36	0.030	–	0.035
5.0	6	5.00	65	0.50	4.85	15	2	2860105015AD	64.36	0.030	–	0.035
5.0	6	5.00	65	0.50	4.85	20	2	2860105020AD	64.36	0.030	–	0.035
5.0	6	5.00	75	0.50	4.85	30	2	2860105030AD	64.36	0.030	–	0.035
5.0	6	5.00	80	0.50	4.85	40	2	2860105040AD	64.36	0.030	–	0.035
6.0	6	6.00	60	0.50	5.85	10	2	2860106010AD	64.36	0.040	–	0.045
6.0	6	6.00	65	0.50	5.85	15	2	2860106015AD	64.36	0.040	–	0.045
6.0	6	6.00	65	0.50	5.85	20	2	2860106020AD	64.36	0.040	–	0.045
6.0	6	6.00	75	0.50	5.85	30	2	2860106030AD	64.36	0.040	–	0.045
6.0	6	6.00	90	0.50	5.85	40	2	2860106040AD	64.36	0.040	–	0.045
6.0	6	6.00	100	0.50	5.85	50	2	2860106050AD	64.36	0.040	–	0.045

Peripheral milling
$a_e = 0.02xD$
$a_p = 0.05xD$

Full slot milling
$a_p = 0.2xD$

- For machining hard materials, steel and cast material
- Perfect for copy milling with hard materials

Material	General structured steels	Free machining steels	Tool steels	Non-alloy case-hardened steels	Alloy case-hardened steels	Cast iron	Cast iron (GGG,GT)	Hard materials
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	850 – 1000 N/mm²	< 750 N/mm²	1000 – 1200 N/mm²	< 300 HB	> 260 HB	48 – 60 HRC
V_c (m/min)	90	70	70	95	60	110	90	30

20450

Alcrona Pro | Z 4 | HB | ≠ | VHM | Type HR | HPC | Manu-facturer standard

Solid Carbide HPC Roughing End Mill

Short version with edge chamfer

d_1	d_2	Corner chamfer	l_2	l_1		coated		f_z Roughing
mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z
4.0	6	0.18	8	54	4	20450040	37.73	0.011 – 0.039
5.0	6	0.20	9	54	4	20450050	37.73	0.016 – 0.039
6.0	6	0.20	10	54	4	20450060	37.73	0.026 – 0.044
8.0	8	0.20	12	58	4	20450080	49.25	0.032 – 0.055
10.0	10	0.30	14	66	4	20450100	80.13	0.042 – 0.077
12.0	12	0.30	16	73	4	20450120	104.62	0.063 – 0.099
14.0	14	0.30	18	75	4	20450140	145.49	0.074 – 0.121
16.0	16	0.40	22	82	4	20450160	185.30	0.095 – 0.143
18.0	18	0.40	24	84	4	20450180	238.11	0.116 – 0.165
20.0	20	0.50	26	92	4	20450200	250.42	0.137 – 0.187

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

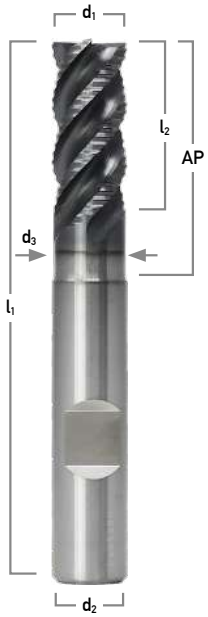
- Universal high-performance roughing end mill with HR knurled profile
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- Perfect for low performance machines

20452

Alcrona Pro | Z 4 | HB | ≠ | VHM | Type HR | HPC | Manu-facturer standard

Solid Carbide HPC Roughing End Mill

With neck



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
6.0	6	0.20	13	57	5.5	21	4	20452060	38.11	0.026 – 0.044
8.0	8	0.20	19	63	7.5	27	4	20452080	54.99	0.032 – 0.055
10.0	10	0.30	22	72	9.5	32	4	20452100	88.70	0.037 – 0.066
12.0	12	0.30	26	83	11.5	38	4	20452120	113.01	0.063 – 0.099
14.0	14	0.30	26	83	13.5	42	4	20452140	160.01	0.074 – 0.121
16.0	16	0.40	32	92	15.5	44	4	20452160	201.97	0.095 – 0.143
18.0	18	0.50	32	92	17.5	50	4	20452180	242.40	0.116 – 0.165
20.0	20	0.50	38	104	19.5	54	4	20452200	288.48	0.137 – 0.187
25.0	25	0.50	50	125	24.5	65	4	20452250	431.45	0.158 – 0.209

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

- Universal high-performance roughing end mill with HR knurled profile
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- Perfect for low performance machines

V_c (m/min)	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	280	230	200	180	160	200	160	100

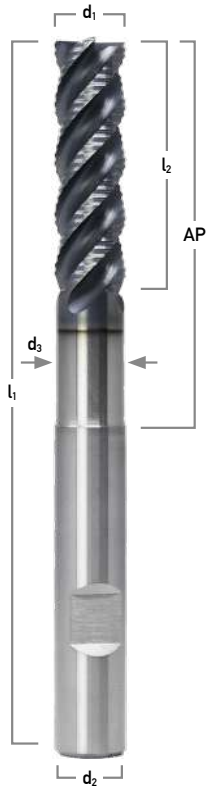
Product family 160

20454

Alcrona Pro | Z 4 | HB | ≠ | VHM | Type HR | HPC | Manu-facturer standard

Solid Carbide HPC Roughing End Mill

Long version with neck



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
6.0	6	0.20	22	63	5.5	29	4	20454060	41.91	0.026 – 0.044
8.0	8	0.20	28	80	7.5	36	4	20454080	60.50	0.032 – 0.055
10.0	10	0.30	33	100	9.5	54	4	20454100	97.58	0.037 – 0.066
12.0	12	0.30	33	100	11.5	54	4	20454120	124.31	0.063 – 0.099
14.0	14	0.30	48	100	13.5	54	4	20454140	176.02	0.074 – 0.121
16.0	16	0.40	53	125	15.5	69	4	20454160	222.14	0.095 – 0.143
18.0	18	0.40	53	150	17.5	84	4	20454180	266.63	0.116 – 0.165
20.0	20	0.50	68	150	19.5	84	4	20454200	317.33	0.137 – 0.187

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

- Universal high-performance roughing end mill with HR knurled profile
- Ultra-micro grain solid carbide with high-performance coating Alcrona Pro
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- Perfect for low performance machines

d_1	d_2
h10	h6

V_c (m/min)	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)	Stainless austenitic
Tensile strength / Hardness / etc.	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB	1.4301
Full slot a_p=1xD	180	160	140	120	100	140	120	60
Trimming a_e = 0,2xD	280	230	200	180	160	200	160	100

28650


Z 6 – 10

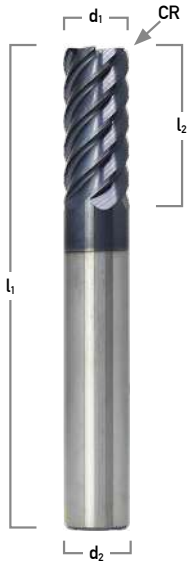


VHM
Type H

HRC ≤ 63
DIN 6527L
HHC

Solid Carbide Finishing End Mill

With corner radius



d_1	d_2
h10	h6

d_1	d_2	CR	l_2	l_1		coated		f_z Finishing		
mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		
5.0	6	0.25	13	57	6	286505000AD	46.10	0.010	–	0.025
6.0	6	0.25	13	57	6	286506000AD	50.52	0.013	–	0.033
6.0	6	0.50	13	57	6	286506005AD	61.78	0.013	–	0.033
6.0	6	1.00	13	57	6	286506010AD	61.78	0.013	–	0.033
8.0	8	0.25	19	63	6	286508000AD	59.45	0.019	–	0.047
8.0	8	0.50	19	63	6	286508005AD	71.02	0.019	–	0.047
8.0	8	1.00	19	63	6	286508010AD	71.02	0.019	–	0.047
10.0	10	0.25	22	72	6	286501000AD	95.14	0.025	–	0.059
10.0	10	0.50	22	72	6	286501005AD	116.13	0.025	–	0.059
10.0	10	1.00	22	72	6	286501010AD	116.13	0.025	–	0.059
10.0	10	1.50	22	72	6	286501015AD	116.13	0.025	–	0.059
12.0	12	0.25	26	83	8	286501200AD	126.82	0.030	–	0.072
12.0	12	0.50	26	83	8	286501205AD	154.83	0.030	–	0.072
12.0	12	1.00	26	83	8	286501210AD	154.83	0.030	–	0.072
12.0	12	1.50	26	83	8	286501215AD	154.83	0.030	–	0.072
12.0	12	2.00	26	83	8	286501220AD	154.83	0.030	–	0.072
12.0	12	2.50	26	83	8	286501225AD	154.83	0.030	–	0.072
14.0	14	0.25	26	83	8	286501400AD	172.13	0.034	–	0.080
16.0	16	0.25	32	92	10	286501600AD	277.68	0.034	–	0.080
16.0	16	0.50	32	92	10	286501605AD	277.68	0.034	–	0.080
16.0	16	1.00	32	92	10	286501610AD	277.68	0.034	–	0.080
16.0	16	1.50	32	92	10	286501615AD	277.68	0.034	–	0.080
16.0	16	2.00	32	92	10	286501620AD	277.68	0.034	–	0.080
18.0	18	0.25	32	92	10	286501800AD	253.19	0.041	–	0.095
20.0	20	0.25	38	104	10	286502000AD	320.56	0.045	–	0.100
20.0	20	2.00	38	104	10	286502020AD	392.93	0.045	–	0.100

Peripheral milling
$a_e = 0.05xD$
$a_p = 1.5xD$

- Stable version due to increased core
- Smooth running due to 6 teeth at the minimum

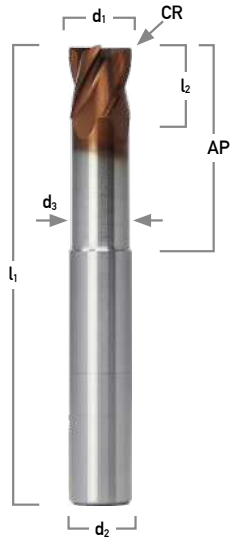
Material	Tool steels	Tool steels	Cast iron	Cast iron	Spheroidal Graphite & malleable iron	Spheroidal Graphite & malleable iron	Hardened steels	Hardened steels
Tensile strength / Hardness	< 850 N/mm²	850 – 1000 N/mm²	< 240 HB	< 300 HB	< 240 HB	< 300 HB	< 40 – 48 HRC	< 48 – 60 HRC
V_c (m/min) Finishing	180	180	300	280	245	220	70	60

Product family 160

28600

Solid Carbide Torus Cutter

Long version



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	CR	d_3	AP		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	4	57	0.20	1.8	21	4	286002002AD	53.45	0.003 – 0.008	0.002 – 0.006
2.0	6	4	57	0.50	1.8	21	4	286002005AD	53.45	0.003 – 0.008	0.002 – 0.006
3.0	6	6	57	0.20	2.8	21	4	286003002AD	53.45	0.005 – 0.010	0.003 – 0.008
3.0	6	6	57	0.50	2.8	21	4	286003005AD	53.45	0.005 – 0.010	0.003 – 0.008
4.0	6	6	57	0.20	3.6	21	4	286004002AD	53.45	0.005 – 0.015	0.003 – 0.010
4.0	6	6	57	0.50	3.6	21	4	286004005AD	53.45	0.005 – 0.015	0.003 – 0.010
4.0	6	6	57	1.00	3.6	21	4	286004010AD	53.45	0.005 – 0.015	0.003 – 0.010
5.0	6	6	57	0.20	4.6	21	4	286005002AD	53.45	0.010 – 0.025	0.080 – 0.020
5.0	6	6	57	0.50	4.6	21	4	286005005AD	53.45	0.010 – 0.025	0.080 – 0.020
5.0	6	6	57	1.00	4.6	21	4	286005010AD	53.45	0.010 – 0.025	0.080 – 0.020
5.0	6	6	57	1.50	4.6	21	4	286005015AD	53.45	0.010 – 0.025	0.080 – 0.020
5.0	6	6	57	2.00	4.6	21	4	286005020AD	53.45	0.010 – 0.025	0.080 – 0.020
6.0	6	7	57	0.20	5.5	21	4	286006002AD	53.45	0.017 – 0.039	0.015 – 0.035
6.0	6	7	57	0.30	5.5	21	4	286006003AD	53.45	0.017 – 0.039	0.015 – 0.035
6.0	6	7	57	0.50	5.5	21	4	286006005AD	53.45	0.017 – 0.039	0.015 – 0.035
6.0	6	7	57	1.00	5.5	21	4	286006010AD	53.45	0.017 – 0.039	0.015 – 0.035
6.0	6	7	57	1.50	5.5	21	4	286006015AD	53.45	0.017 – 0.039	0.015 – 0.035
6.0	6	7	57	2.00	5.5	21	4	286006020AD	53.45	0.017 – 0.039	0.015 – 0.035
8.0	8	9	63	0.50	7.4	27	4	286008005AD	62.83	0.024 – 0.055	0.020 – 0.050
8.0	8	9	63	1.00	7.4	27	4	286008010AD	62.83	0.024 – 0.055	0.020 – 0.050
8.0	8	9	63	1.50	7.4	27	4	286008015AD	62.83	0.024 – 0.055	0.020 – 0.050
8.0	8	9	63	2.00	7.4	27	4	286008020AD	62.83	0.024 – 0.055	0.020 – 0.050
10.0	10	11	72	0.50	9.2	32	4	286001005AD	84.96	0.030 – 0.065	0.025 – 0.060
10.0	10	11	72	1.00	9.2	32	4	286001010AD	84.96	0.030 – 0.065	0.025 – 0.060
10.0	10	11	72	1.50	9.2	32	4	286001015AD	84.96	0.030 – 0.065	0.025 – 0.060
10.0	10	11	72	2.00	9.2	32	4	286001020AD	84.96	0.030 – 0.065	0.025 – 0.060
12.0	12	12	83	0.50	11.0	38	4	286001205AD	117.19	0.036 – 0.079	0.031 – 0.075
12.0	12	12	83	1.00	11.0	38	4	286001210AD	117.19	0.036 – 0.079	0.031 – 0.075
12.0	12	12	83	1.50	11.0	38	4	286001215AD	117.19	0.036 – 0.079	0.031 – 0.075
12.0	12	12	83	2.00	11.0	38	4	286001220AD	117.19	0.036 – 0.079	0.031 – 0.075
16.0	16	16	92	2.00	15.0	44	4	286001620AD	193.23	0.045 – 0.095	0.040 – 0.090

Peripheral milling
a_e = 0.2xD
a_p = 0.2xD

Full slot milling
a_p = 1.0xD

- Universeller Torusfräser zum Roughing und Finishing
- Kurze Schneiden für höchste Stabilität
- Hohe Zerspanleistung bis 1xD ins Volle
- Ideal für Kopierarbeiten

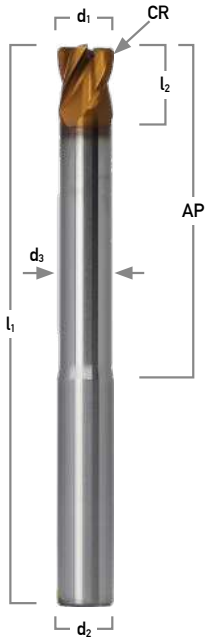
Material	Tool steels	Non-alloy Q & T steels	Alloy Q & T steels	Cast iron (GGG,GT)	Hard materials	Special and Titanium alloys
Tensile strength / Hardness	850 – 1200 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	< 300 HB	48 – 60 HRC	850 – 1200 N/mm²
V_c (m/min) Finishing	80	80	80	90	35	45
V_c (m/min) Roughing	60	65	65	70	25	30

Product family 160

28610

Solid Carbide Torus Cutter

Extra-long version



d_1	d_2	l_2	l_1	CR	d_3	AP		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
4.0	6	7	80	0.50	3.60	44	4	286104005AD	70.50	0.004	–	0.017	0.002	–	0.015
6.0	6	7	80	0.20	5.50	44	4	286106002AD	70.50	0.008	–	0.024	0.006	–	0.022
6.0	6	7	80	0.50	5.50	44	4	286106005AD	70.50	0.008	–	0.024	0.006	–	0.022
6.0	6	7	80	1.00	5.50	44	4	286106010AD	70.50	0.008	–	0.024	0.006	–	0.022
6.0	6	7	80	1.50	5.50	44	4	286106015AD	70.50	0.008	–	0.024	0.006	–	0.022
6.0	6	7	80	2.00	5.50	44	4	286106020AD	70.50	0.008	–	0.024	0.006	–	0.022
8.0	8	9	100	1.00	7.40	54	4	286108010AD	100.28	0.012	–	0.032	0.010	–	0.030
8.0	8	9	100	1.50	7.40	54	4	286108015AD	100.28	0.012	–	0.032	0.010	–	0.030
8.0	8	9	100	2.00	7.40	54	4	286108020AD	100.28	0.012	–	0.032	0.010	–	0.030
10.0	10	11	100	1.00	9.20	60	4	286101010AD	133.42	0.015	–	0.038	0.013	–	0.035
10.0	10	11	100	1.50	9.20	60	4	286101015AD	133.42	0.015	–	0.038	0.013	–	0.035
10.0	10	11	100	2.00	9.20	60	4	286101020AD	133.42	0.015	–	0.038	0.013	–	0.035
12.0	12	12	120	1.00	11.00	75	4	286101210AD	177.61	0.018	–	0.046	0.015	–	0.043
12.0	12	12	120	1.50	11.00	75	4	286101215AD	177.61	0.018	–	0.046	0.015	–	0.043
12.0	12	12	120	2.00	11.00	75	4	286101220AD	177.61	0.018	–	0.046	0.015	–	0.043
12.0	12	12	120	3.00	11.00	75	4	286101230AD	177.61	0.018	–	0.046	0.015	–	0.043
16.0	16	16	150	2.00	15.00	92	4	286101620AD	301.96	0.024	–	0.062	0.020	–	0.059

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.2xD
a_p = 0.2xD

Full slot milling
a_p = 0.5xD

- Universal torus cutter for roughing and finishing
- Short cutting edges for highest stability
- High machining performance up to 1xD into solid
- Perfect for copy milling

Material	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Cast iron (GGG,GT)	Hard materials	Special and Titanium alloys
Tensile strength / Hardness	850 – 1000 N/mm²	1000 – 1200 N/mm²	850 – 1200 N/mm²	< 300 HB	48 – 60 HRC	850 – 1200 N/mm²
V_c (m/min) Finishing	50	55	55	65	25	30
V_c (m/min) Roughing	35	40	40	50	20	25

Product family 160

28612

r_p = + 0.000 - 0.005 | AlTiN | Z 2 | HA | 30° | VHM | Type H | HRC ≤ 63 | HHC | 0,005 mm | Manufacturer standard

Solid Carbide Ball-Nosed Mini End Mill

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	d_3	AP		coated		f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
0.4	4	0.32	50	0.37	2	2	286120042AD	90.54	0.002 – 0.003
0.4	4	0.32	50	0.37	4	2	286120044AD	90.54	0.002 – 0.003
0.5	4	0.40	50	0.47	3	2	286120053AD	78.20	0.002 – 0.004
0.5	4	0.40	50	0.47	5	2	286120055AD	78.20	0.002 – 0.004
0.6	4	0.48	50	0.57	2	2	286120062AD	73.01	0.002 – 0.005
0.6	4	0.48	50	0.57	4	2	286120064AD	73.01	0.002 – 0.005
0.6	4	0.48	50	0.57	6	2	286120066AD	73.01	0.002 – 0.005
0.8	4	0.64	50	0.76	4	2	286120084AD	73.01	0.003 – 0.006
0.8	4	0.64	50	0.76	6	2	286120086AD	73.01	0.003 – 0.006
0.8	4	0.64	50	0.76	8	2	286120088AD	73.01	0.003 – 0.006
0.8	4	0.64	50	0.76	10	2	2861200810AD	73.01	0.003 – 0.006
1.0	4	0.80	50	0.96	5	2	2861201005AD	73.01	0.004 – 0.010
1.0	4	0.80	50	0.96	10	2	2861201010AD	73.01	0.004 – 0.010
1.0	4	0.80	55	0.96	15	2	2861201015AD	73.01	0.004 – 0.010
1.0	4	0.80	60	0.96	20	2	2861201020AD	73.01	0.004 – 0.010
1.0	4	0.80	65	0.96	25	2	2861201025AD	73.01	0.004 – 0.010
1.2	4	0.96	50	1.15	6	2	2861201206AD	73.01	0.004 – 0.013
1.2	4	0.96	55	1.15	12	2	2861201212AD	73.01	0.004 – 0.013
1.2	4	0.96	60	1.15	18	2	2861201218AD	73.01	0.004 – 0.013
1.2	4	0.96	65	1.15	25	2	2861201225AD	73.01	0.004 – 0.013
1.5	4	1.20	50	1.44	4	2	2861201504AD	73.01	0.005 – 0.018
1.5	4	1.20	50	1.44	8	2	2861201508AD	73.01	0.005 – 0.018
1.5	4	1.20	55	1.44	12	2	2861201512AD	73.01	0.005 – 0.018
1.5	4	1.20	55	1.44	16	2	2861201516AD	73.01	0.005 – 0.018
1.5	4	1.20	60	1.44	20	2	2861201520AD	73.01	0.005 – 0.018
1.5	4	1.20	65	1.44	25	2	2861201525AD	73.01	0.005 – 0.018
2.0	4	1.60	50	1.92	5	2	2861202005AD	73.01	0.010 – 0.020
2.0	4	1.60	50	1.92	10	2	2861202010AD	73.01	0.010 – 0.020
2.0	4	1.60	55	1.92	15	2	2861202015AD	73.01	0.010 – 0.020
2.0	4	1.60	60	1.92	20	2	2861202020AD	73.01	0.010 – 0.020
2.0	4	1.60	65	1.92	25	2	2861202025AD	73.01	0.010 – 0.020
2.0	4	1.60	70	1.92	30	2	2861202030AD	73.01	0.010 – 0.020
3.0	6	2.40	50	2.88	5	2	2861203005AD	73.01	0.015 – 0.024
3.0	6	2.40	55	2.88	10	2	2861203010AD	73.01	0.015 – 0.024
3.0	6	2.40	60	2.88	15	2	2861203015AD	73.01	0.015 – 0.024
3.0	6	2.40	65	2.88	20	2	2861203020AD	73.01	0.015 – 0.024
3.0	6	2.40	70	2.88	25	2	2861203025AD	73.01	0.015 – 0.024
3.0	6	2.40	75	2.88	30	2	2861203030AD	73.01	0.015 – 0.024
4.0	6	3.20	55	3.85	10	2	2861204010AD	76.89	0.018 – 0.032
4.0	6	3.20	60	3.85	15	2	2861204015AD	76.89	0.018 – 0.032
4.0	6	3.20	65	3.85	20	2	2861204020AD	76.89	0.018 – 0.032
4.0	6	3.20	70	3.85	25	2	2861204025AD	76.89	0.018 – 0.032
4.0	6	3.20	75	3.85	30	2	2861204030AD	76.89	0.018 – 0.032
5.0	6	4.00	65	4.85	10	2	2861205010AD	76.89	0.030 – 0.035
5.0	6	4.00	65	4.85	20	2	2861205020AD	76.89	0.030 – 0.035
5.0	6	4.00	75	4.85	30	2	2861205030AD	76.89	0.030 – 0.035
5.0	6	4.00	80	4.85	40	2	2861205040AD	76.89	0.030 – 0.035
6.0	6	4.80	60	5.85	10	2	2861206010AD	76.89	0.040 – 0.050
6.0	6	4.80	65	5.85	20	2	2861206020AD	76.89	0.040 – 0.050
6.0	6	4.80	75	5.85	30	2	2861206030AD	76.89	0.040 – 0.050
6.0	6	4.80	90	5.85	40	2	2861206040AD	76.89	0.040 – 0.050
6.0	6	4.80	100	5.85	50	2	2861206050AD	76.89	0.040 – 0.050

Peripheral milling
a_e = 0.02xD
a_p = 0.05xD

Full slot milling
a_p = 0.2xD

- High precision ball-nosed end mill for copying and finishing
- Short cutting edges for highest stability
- For universal applications

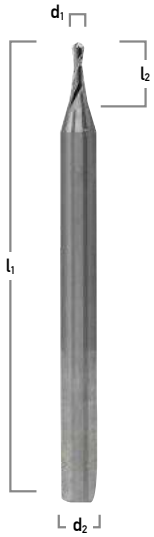
Material	General structured steels	Tool steels	Non-alloy case-hardened steels	Stainless steels	Cast iron	Cast iron (GGG,GT)	Hard materials	Aluminium
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	< 750 N/mm²	< 750 N/mm²	< 300 HB	> 260 HB	48 – 60 HRC	< 600 N/mm²
V_c (m/min) Finishing	90	70	100	35	110	90	30	175

29102




Solid Carbide Ball-Nosed Mini End Mill

Short version



d_1 h10	d_2 h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
0.25	3	0.5	38	2	291020025	65.34	291020025AD	78.14	0.002 – 0.010
0.30	3	1	38	2	29102003	58.78	29102003AD	72.41	0.002 – 0.010
0.40	3	1	38	2	29102004	39.14	29102004AD	52.84	0.002 – 0.010
0.50	3	1.5	38	2	29102005	32.55	29102005AD	45.45	0.005 – 0.020
0.60	3	1.5	38	2	29102006	32.55	29102006AD	45.45	0.005 – 0.020
0.70	3	2	38	2	29102007	32.55	29102007AD	45.45	0.005 – 0.020
0.80	3	2	38	2	29102008	32.55	29102008AD	45.45	0.005 – 0.020
0.90	3	2.5	38	2	29102009	32.55	29102009AD	45.45	0.005 – 0.020
1.00	3	3	38	2	29102010	26.02	29102010AD	40.17	0.005 – 0.020
1.10	3	3	38	2	29102011	32.55	29102011AD	45.45	0.012 – 0.032
1.20	3	3	38	2	29102012	32.55	29102012AD	45.45	0.012 – 0.032
1.40	3	4	38	2	29102014	32.55	29102014AD	45.45	0.012 – 0.032
1.50	3	4	38	2	29102015	26.02	29102015AD	40.17	0.012 – 0.032
1.60	3	5	38	2	29102016	32.55	29102016AD	45.45	0.012 – 0.032
1.80	3	5	38	2	29102018	32.55	29102018AD	45.45	0.012 – 0.032
2.00	3	5	38	2	29102020	26.02	29102020AD	40.17	0.012 – 0.032

Peripheral milling
$a_e = 0.02xD$
$a_p = 0.05xD$

Full slot milling
$a_p = 0.1xD$

- Ball-nosed end mill for copying and finishing
- For universal applications

Material	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Cast iron (GGG,GT)	Hard materials	Special and Titanium alloys
Tensile strength / Hardness	850 – 1000 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 300 HB	48 – 60 HRC	> 600 N/mm²
V_c (m/min) uncoated	40	40	40	55	50	110
V_c (m/min) AlTin	70	70	70	85	80	140

Product family 160

28611




Solid Carbide Ball-Nosed Mini End Mill

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	d_3	AP	Z	coated		f_z Finishing
mm	mm	mm	mm	mm	mm		Part No.	€/pc.	mm/Z
0.3	6	0.24	50	0.27	1	2	286110031AD	73.82	0.002 – 0.010
0.3	6	0.24	50	0.27	2	2	286110032AD	73.82	0.002 – 0.010
0.3	6	0.24	50	0.27	3	2	286110033AD	73.82	0.002 – 0.010
0.3	6	0.24	50	0.27	5	2	286110035AD	73.82	0.002 – 0.010
0.4	6	0.32	50	0.37	2	2	286110042AD	73.82	0.002 – 0.010
0.4	6	0.32	50	0.37	4	2	286110044AD	73.82	0.002 – 0.010
0.4	6	0.32	50	0.37	6	2	286110046AD	73.82	0.002 – 0.010
0.5	6	0.40	50	0.47	2	2	286110052AD	73.82	0.002 – 0.010
0.5	6	0.40	50	0.47	4	2	286110054AD	73.82	0.002 – 0.010
0.5	6	0.40	50	0.47	6	2	286110056AD	73.82	0.002 – 0.010
0.6	6	0.48	50	0.57	2	2	286110062AD	64.43	0.002 – 0.010
0.6	6	0.48	50	0.57	4	2	286110064AD	64.43	0.002 – 0.010
0.6	6	0.48	50	0.57	6	2	286110066AD	64.43	0.002 – 0.010
0.6	6	0.48	50	0.57	8	2	286110068AD	64.43	0.002 – 0.010
0.7	6	0.56	50	0.67	6	2	286110076AD	64.43	0.002 – 0.010
0.7	6	0.56	50	0.67	8	2	286110078AD	64.43	0.002 – 0.010
0.8	6	0.64	50	0.76	4	2	286110084AD	64.43	0.002 – 0.010
0.8	6	0.64	50	0.76	6	2	286110086AD	64.43	0.002 – 0.010
0.8	6	0.64	50	0.76	8	2	286110088AD	64.43	0.002 – 0.010
0.8	6	0.64	50	0.76	10	2	2861100810AD	64.43	0.002 – 0.010
0.9	6	0.72	50	0.86	6	2	286110096AD	64.43	0.002 – 0.010
1.0	6	0.80	50	0.96	4	2	286110104AD	64.43	0.002 – 0.010
1.0	6	0.80	50	0.96	6	2	286110106AD	64.43	0.002 – 0.010
1.0	6	0.80	50	0.96	8	2	286110108AD	64.43	0.002 – 0.010
1.0	6	0.80	50	0.96	10	2	2861101010AD	64.43	0.002 – 0.010
1.0	6	0.80	55	0.96	12	2	2861101012AD	64.43	0.002 – 0.010
1.0	6	0.80	55	0.96	15	2	2861101015AD	64.43	0.002 – 0.010
1.0	6	0.80	60	0.96	20	2	2861101020AD	64.43	0.002 – 0.010
1.0	6	0.80	65	0.96	25	2	2861101025AD	64.43	0.002 – 0.010
1.0	6	0.80	70	0.96	30	2	2861101030AD	64.43	0.002 – 0.010
1.2	6	0.96	50	1.15	5	2	2861101205AD	64.43	0.004 – 0.014
1.2	6	0.96	50	1.15	6	2	2861101206AD	64.43	0.004 – 0.014
1.2	6	0.96	50	1.15	8	2	2861101208AD	64.43	0.004 – 0.014
1.2	6	0.96	50	1.15	10	2	2861101210AD	64.43	0.004 – 0.014
1.2	6	0.96	55	1.15	12	2	2861101212AD	64.43	0.004 – 0.014
1.2	6	0.96	55	1.15	15	2	2861101215AD	64.43	0.004 – 0.014
1.2	6	0.96	60	1.15	20	2	2861101220AD	64.43	0.004 – 0.014
1.2	6	0.96	65	1.15	25	2	2861101225AD	64.43	0.004 – 0.014
1.5	6	1.20	50	1.44	6	2	2861101506AD	64.43	0.005 – 0.020
1.5	6	1.20	50	1.44	8	2	2861101508AD	64.43	0.005 – 0.020
1.5	6	1.20	50	1.44	10	2	2861101510AD	64.43	0.005 – 0.020
1.5	6	1.20	55	1.44	12	2	2861101512AD	64.43	0.005 – 0.020
1.5	6	1.20	55	1.44	15	2	2861101515AD	64.43	0.005 – 0.020
1.5	6	1.20	60	1.44	20	2	2861101520AD	64.43	0.005 – 0.020
1.5	6	1.20	65	1.44	25	2	2861101525AD	64.43	0.005 – 0.020
1.5	6	1.20	70	1.44	30	2	2861101530AD	64.43	0.005 – 0.020
2.0	6	1.60	50	1.92	6	2	2861102006AD	64.43	0.012 – 0.032
2.0	6	1.60	50	1.92	8	2	2861102008AD	64.43	0.012 – 0.032
2.0	6	1.60	50	1.92	10	2	2861102010AD	64.43	0.012 – 0.032
2.0	6	1.60	55	1.92	12	2	2861102012AD	64.43	0.012 – 0.032
2.0	6	1.60	55	1.92	15	2	2861102015AD	64.43	0.012 – 0.032
2.0	6	1.60	60	1.92	20	2	2861102020AD	64.43	0.012 – 0.032
2.0	6	1.60	65	1.92	25	2	2861102025AD	64.43	0.012 – 0.032
2.0	6	1.60	70	1.92	30	2	2861102030AD	64.43	0.012 – 0.032
3.0	6	2.40	50	2.88	5	2	2861103005AD	64.43	0.012 – 0.032
3.0	6	2.40	55	2.88	10	2	2861103010AD	64.43	0.012 – 0.032
3.0	6	2.40	60	2.88	15	2	2861103015AD	64.43	0.012 – 0.032
3.0	6	2.40	65	2.88	20	2	2861103020AD	64.43	0.012 – 0.032
3.0	6	2.40	70	2.88	25	2	2861103025AD	64.43	0.012 – 0.032
3.0	6	2.40	75	2.88	30	2	2861103030AD	64.43	0.012 – 0.032
4.0	6	3.20	55	3.85	10	2	2861104010AD	64.43	0.030 – 0.045
4.0	6	3.20	60	3.85	15	2	2861104015AD	64.43	0.030 – 0.045
4.0	6	3.20	65	3.85	20	2	2861104020AD	64.43	0.030 – 0.045
4.0	6	3.20	70	3.85	25	2	2861104025AD	64.43	0.030 – 0.045

d_1	d_2	l_2	l_1	d_3	AP		coated		f_z Finishing		
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		
4.0	6	3.20	75	3.85	30	2	2861104030AD	64.43	0.030	–	0.045
5.0	6	4.00	65	4.85	10	2	2861105010AD	64.43	0.030	–	0.045
5.0	6	4.00	65	4.85	15	2	2861105015AD	64.43	0.030	–	0.045
5.0	6	4.00	65	4.85	20	2	2861105020AD	64.43	0.030	–	0.045
5.0	6	4.00	70	4.85	25	2	2861105025AD	64.43	0.030	–	0.045
5.0	6	4.00	75	4.85	30	2	2861105030AD	64.43	0.030	–	0.045
5.0	6	4.00	80	4.85	40	2	2861105040AD	64.43	0.030	–	0.045
6.0	6	6.00	60	5.85	10	2	2861106010AD	64.43	0.030	–	0.045
6.0	6	6.00	65	5.85	15	2	2861106015AD	64.43	0.030	–	0.045
6.0	6	6.00	65	5.85	20	2	2861106020AD	64.43	0.030	–	0.045
6.0	6	6.00	70	5.85	25	2	2861106025AD	64.43	0.030	–	0.045
6.0	6	6.00	75	5.85	30	2	2861106030AD	64.43	0.030	–	0.045
6.0	6	6.00	90	5.85	40	2	2861106040AD	64.43	0.030	–	0.045
6.0	6	6.00	100	5.85	50	2	2861106050AD	64.43	0.030	–	0.045

Peripheral milling
$a_e = 0.02xD$
$a_p = 0.05xD$

Full slot milling
$a_p = 0.1xD$

- Ball-nosed end mill for copying and finishing
- Short cutting edges for highest stability
- For universal applications

Material	Non-alloy Q & T steels	Non-alloy case-hardened steels	Alloy case-hardened steels	Tool steels	Cast iron (GGG,GT)	Hard materials
Tensile strength / Hardness	850 – 1000 N/mm²	< 750 N/mm²	850 – 1000 N/mm²	850 – 1000 N/mm²	< 300 HB	48 – 60 HRC
V_c (m/min)	70	100	85	70	90	30

31202



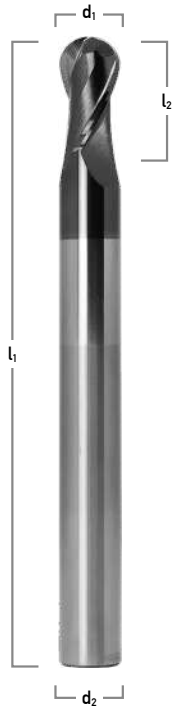
Solid Carbide High Precision Ball-Nosed End Mill Long version

d_1	d_2	l_2	l_1	AP		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
1.0	6	1.5	50	14	2	31202010	70.68	0.012	–	0.025	0.010	–	0.020
1.5	6	2.5	50	14	2	31202015	70.68	0.012	–	0.025	0.010	–	0.020
2.0	6	3	50	18.5	2	31202020	70.68	0.022	–	0.035	0.020	–	0.030
2.5	6	4	50	17.5	2	31202025	70.68	0.022	–	0.035	0.020	–	0.030
3.0	6	6	75	16.6	2	31202030	70.68	0.042	–	0.055	0.040	–	0.050
4.0	6	8	75	15.7	2	31202040	70.68	0.052	–	0.075	0.050	–	0.070
5.0	6	10	75	14	2	31202050	70.68	0.072	–	0.095	0.070	–	0.090

Peripheral milling
$a_e = 0.5xD$
$a_p = 1.0xD$

Full slot milling
$a_p = 1.0xD$

- High precision ball-nosed end mill for copying and finishing
- Short cutting edges for highest stability
- For universal applications



d_1	d_2	l_2	l_1		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
6.0	6	12	100	2	31202060	70.68	0.082	–	0.125	0.080	–	0.120
8.0	8	14	100	2	31202080	84.84	0.092	–	0.155	0.090	–	0.150
10.0	10	18	100	2	31202100	111.50	0.122	–	0.185	0.120	–	0.180
12.0	12	22	150	2	31202120	210.47	0.132	–	0.205	0.130	–	0.200
14.0	14	26	150	2	31202140	241.85	0.142	–	0.215	0.140	–	0.210
16.0	16	30	150	2	31202160	266.98	0.152	–	0.235	0.150	–	0.230
18.0	18	34	150	2	31202180	296.82	0.162	–	0.245	0.160	–	0.240
20.0	20	38	150	2	31202200	376.94	0.172	–	0.255	0.170	–	0.250

Peripheral milling
$a_e = 0.5xD$
$a_p = 1.0xD$

Full slot milling
$a_p = 1.0xD$

- High precision ball-nosed end mill for copying and finishing
- Short cutting edges for highest stability
- For universal applications

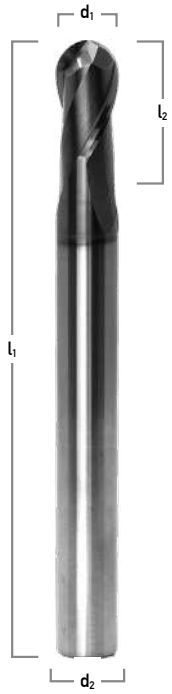
d_1	d_2	R
h10	h6	± 0.003

Material	Free machining steels	Non-alloy Q & T steels	Non-alloy case-hardened steels	Alloy case-hardened steels	Tool steels	Cast iron	Cast iron (GGG,GT)	Hard materials
Tensile strength / Hardness	< 1000 N/mm²	< 1000 N/mm²	< 750 N/mm²	< 1000 N/mm²	< 1400 N/mm²	< 180 HB – > 180 HB	> 260 HB	48 – 60 HRC
V_c (m/min) Finishing	115	90	150	110	90	90	115	45
V_c (m/min) Roughing	100	75	135	95	75	75	100	30

Product family 164

31002

Solid Carbide High Performance Ball-Nosed End Mill Long version



d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z		mm/Z	
1.0	3	1.5	50	2	31002010	48.30	31002010AD	67.67	0.012 –	0.025	0.010 –	0.020
1.5	3	2.5	50	2	31002015	48.30	31002015AD	67.67	0.012 –	0.025	0.010 –	0.020
2.0	3	3	50	2	31002020	48.30	31002020AD	67.67	0.022 –	0.035	0.020 –	0.030
2.5	3	4	50	2	31002025	48.30	31002025AD	67.67	0.022 –	0.035	0.020 –	0.030
3.0	3	6	75	2	31002030	32.32	31002030AD	46.49	0.042 –	0.055	0.040 –	0.050
4.0	4	8	75	2	31002040	40.46	31002040AD	57.32	0.052 –	0.075	0.050 –	0.070
5.0	5	10	75	2	31002050	45.24	31002050AD	59.53	0.072 –	0.095	0.070 –	0.090
6.0	6	12	100	2	31002060	46.64	31002060AD	61.05	0.082 –	0.125	0.080 –	0.120
8.0	8	14	100	2	31002080	60.75	31002080AD	78.37	0.092 –	0.155	0.090 –	0.150
10.0	10	18	100	2	31002100	75.50	31002100AD	100.66	0.122 –	0.185	0.120 –	0.180

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

- High performance ball-nose end mill for roughing and finishing
- Short cutting edges for highest stability
- For universal applications

Material	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Cast iron (GGG,GT)	Hard materials
Tensile strength / Hardness	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 300 HB	48 – 60 HRC
V_c (m/min) uncoated	55	75	65	55	90	25
V_c (m/min) Aldura	90	110	100	90	145	50

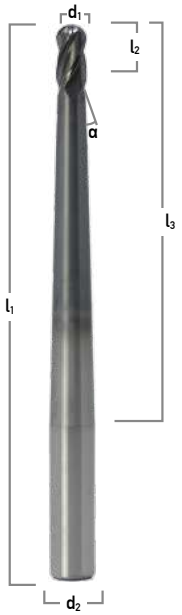
Product family 160

30042AD



Solid Carbide Ball-Nosed End Mill

Extra-long version



d_1	d_2	l_2	l_1	l_3			coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	α	Z	Part No.	€/pc.	mm/Z	mm/Z
2.0	4	5	65	45	0.90°	4	30042020AD	57.11	0.010 – 0.018	0.008 – 0.016
3.0	4	6	65	45	0.45°	4	30042030AD	57.11	0.013 – 0.024	0.010 – 0.022
4.0	6	8	75	54	0.78°	4	30042040AD	69.02	0.023 – 0.030	0.021 – 0.028
5.0	6	8	75	54	0.40°	4	30042050AD	114.81	0.026 – 0.032	0.024 – 0.030
6.0	10	9	100	60	1.18°	4	30042060AD	114.81	0.029 – 0.041	0.027 – 0.039
8.0	10	12	100	60	0.60°	4	30042080AD	114.81	0.042 – 0.058	0.040 – 0.056

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 0.5xD

- Ball-nosed end mill for roughing and finishing
- With 4 cutting edges for highest cutting performance
- Short cutting edges for highest stability
- For universal applications

d_1	d_2	l_2	l_1	d_3	AP		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
10.0	10	16	100	9.5	60	4	30042100AD	114.81	0.053 – 0.073	0.051 – 0.071
12.0	12	20	100	11.5	60	4	30042120AD	148.59	0.063 – 0.090	0.061 – 0.088

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 0.5xD

- Ball-nosed end mill for roughing and finishing
- With 4 cutting edges for highest cutting performance
- Short cutting edges for highest stability
- For universal applications

d_1	d_2
h10	h6

Material	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Cast iron (GGG,GT)	Hard materials
Tensile strength / Hardness	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 300 HB	48 – 60 HRC
V_c (m/min) Aldura	190	240	210	190	235	80

Product family 160

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Cutting Tool Solutions

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ToolFactory
Cutting Tool Solutions

Aluminium Line

Solid Carbide End Mill

High Performance
Precision
Volume

20100




Manu-facturer standard

Solid Carbide Single-Flute End Mill for Aluminium

Long version

d_1	d_2	l_2	l_1		uncoated		f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
1.5	3	6	50	1	20100015	20.68	0.020 – 0.025
2.0	3	8	50	1	20100020	22.20	0.025 – 0.028
3.0	3	12	50	1	20100030	22.67	0.030 – 0.034
4.0	4	15	60	1	20100040	25.16	0.035 – 0.050
5.0	5	17	60	1	20100050	31.96	0.040 – 0.060
6.0	6	20	65	1	20100060	31.58	0.050 – 0.070
8.0	8	22	65	1	20100080	44.94	0.055 – 0.075
10.0	10	25	75	1	20100100	69.20	0.060 – 0.080
12.0	12	30	80	1	20100120	93.82	0.070 – 0.100

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

- For Aluminium and Plastics
- Large chip space
- Perfect for plunge milling and contouring
- More versions as well as HSS single-flute end mills available upon request

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	700	600	600	180	175	400	390

Product family 160

31045


Z 2
HB

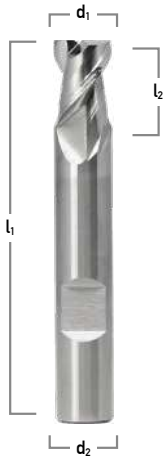


VHM
Type W

Manu-facturer standard

Solid Carbide End Mill for Aluminium

Short version



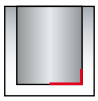
d_1	d_2
h10	h6

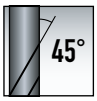
d_1	d_2	l_2	l_1		uncoated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
2.0	6	5	50	2	31045020	20.68	0.006 – 0.010		0.004 – 0.008	
3.0	6	5	50	2	31045030	20.95	0.009 – 0.020		0.007 – 0.015	
4.0	6	8	54	2	31045040	20.95	0.017 – 0.028		0.012 – 0.023	
5.0	6	9	54	2	31045050	20.95	0.017 – 0.030		0.014 – 0.025	
6.0	6	10	54	2	31045060	20.95	0.019 – 0.036		0.017 – 0.031	
8.0	8	12	58	2	31045080	24.64	0.026 – 0.047		0.024 – 0.042	
10.0	10	14	66	2	31045100	33.49	0.032 – 0.055		0.030 – 0.050	
12.0	12	16	73	2	31045120	50.74	0.038 – 0.064		0.036 – 0.059	
14.0	14	18	75	2	31045140	68.31	0.044 – 0.068		0.042 – 0.063	
16.0	16	22	82	2	31045160	77.48	0.050 – 0.076		0.048 – 0.071	
18.0	18	24	84	2	31045180	102.12	0.056 – 0.085		0.054 – 0.080	
20.0	20	26	92	2	31045200	134.00	0.060 – 0.095		0.058 – 0.090	

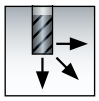

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD


Full slot milling
a_p = 1.0xD

31145




Z 2
HB



VHM
Type W

Manu-facturer standard

Solid Carbide End Mill for Aluminium

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
2.0	6	8	57	2	31145020	25.96	0.006 – 0.010		0.004 – 0.008	
3.0	6	8	57	2	31145030	26.48	0.009 – 0.020		0.007 – 0.015	
4.0	6	11	57	2	31145040	26.48	0.017 – 0.028		0.012 – 0.023	
5.0	6	13	57	2	31145050	26.48	0.016 – 0.030		0.014 – 0.025	
6.0	6	13	57	2	31145060	26.48	0.019 – 0.036		0.017 – 0.031	
8.0	8	19	63	2	31145080	29.47	0.026 – 0.047		0.024 – 0.042	
10.0	10	22	72	2	31145100	51.08	0.032 – 0.055		0.030 – 0.050	
12.0	12	26	83	2	31145120	74.12	0.038 – 0.064		0.036 – 0.059	
14.0	14	26	83	2	31145140	90.69	0.044 – 0.068		0.042 – 0.063	
16.0	16	32	92	2	31145160	120.15	0.050 – 0.076		0.048 – 0.071	
18.0	18	32	92	2	31145180	141.63	0.056 – 0.085		0.054 – 0.080	
20.0	20	38	104	2	31145200	186.71	0.060 – 0.095		0.058 – 0.090	

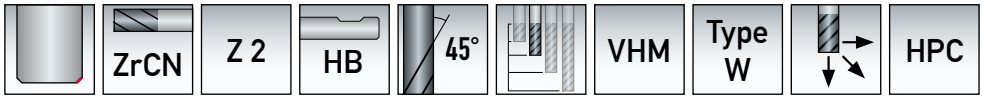

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD


Full slot milling
a_p = 1.0xD

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	330	160	130	75	75	90	80
V_c (m/min) Roughing	300	140	115	60	60	75	65

Product family 160

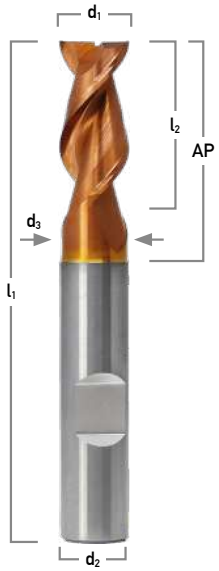
22200



Manu-facturer standard

Solid Carbide HPC End Mill for Aluminium

With protective chamfer



d1	d2	Corner chamfer	l2	l1	d3	AP		coated		f z Roughing	f z Finishing
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	0.03	6	57	–	–	2	22200020	34.40	0.026 – 0.055	0.025 – 0.048
3.0	6	0.03	8	57	2.8	18	2	22200030	34.40	0.037 – 0.077	0.034 – 0.067
4.0	6	0.04	11	57	3.8	18	2	22200040	35.27	0.042 – 0.088	0.039 – 0.076
5.0	6	0.05	13	57	4.8	21	2	22200050	35.27	0.047 – 0.099	0.044 – 0.086
6.0	6	0.06	13	57	5.5	21	2	22200060	35.40	0.063 – 0.132	0.059 – 0.114
8.0	8	0.08	21	63	7.5	27	2	22200080	47.15	0.084 – 0.176	0.078 – 0.152
10.0	10	0.10	22	72	9.5	32	2	22200100	65.65	0.095 – 0.198	0.088 – 0.171
12.0	12	0.10	26	83	11.5	38	2	22200120	89.78	0.105 – 0.220	0.098 – 0.190
14.0	14	0.10	26	83	13.5	38	2	22200140	123.44	0.116 – 0.220	0.108 – 0.190
16.0	16	0.10	36	92	15.5	44	2	22200160	161.82	0.126 – 0.231	0.118 – 0.200
18.0	18	0.10	36	92	17.5	44	2	22200180	190.95	0.137 – 0.231	0.127 – 0.200
20.0	20	0.10	41	104	19.5	54	2	22200200	256.04	0.147 – 0.242	0.137 – 0.209

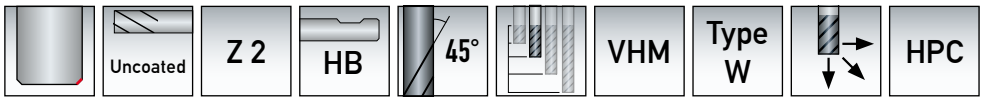
Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.5xD

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrCN coating preventing from built-up edge
- High machining performance up to 1.5xD into solid
- With protective chamfer for longer tool life

d1	d2
h10	h6

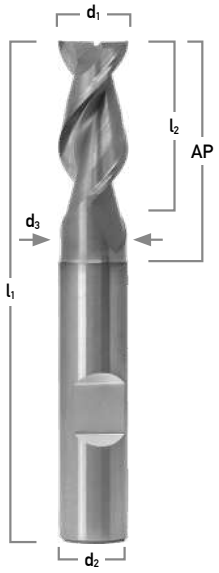
22200U



Manu-facturer standard

Solid Carbide HPC End Mill for Aluminium

With protective chamfer, uncoated



d1	d2	Corner chamfer	l2	l1	d3	AP		uncoated		f z Roughing	f z Finishing
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	0.03	6	57	–	–	2	22200020U	27.98	0.026 – 0.055	0.025 – 0.048
3.0	6	0.03	8	57	2.8	18	2	22200030U	27.98	0.037 – 0.077	0.034 – 0.067
4.0	6	0.04	11	57	3.8	18	2	22200040U	28.67	0.042 – 0.088	0.039 – 0.076
5.0	6	0.05	13	57	4.8	21	2	22200050U	28.67	0.047 – 0.099	0.044 – 0.086
6.0	6	0.06	13	57	5.5	21	2	22200060U	28.78	0.063 – 0.132	0.059 – 0.114
8.0	8	0.08	21	63	7.5	27	2	22200080U	38.34	0.084 – 0.176	0.078 – 0.152
10.0	10	0.10	22	72	9.5	32	2	22200100U	56.11	0.095 – 0.198	0.088 – 0.171
12.0	12	0.10	26	83	11.5	38	2	22200120U	76.73	0.105 – 0.220	0.098 – 0.190
14.0	14	0.10	26	83	13.5	38	2	22200140U	105.49	0.116 – 0.220	0.108 – 0.190
16.0	16	0.10	36	92	15.5	44	2	22200160U	138.31	0.126 – 0.231	0.118 – 0.200
18.0	18	0.10	36	92	17.5	44	2	22200180U	163.19	0.137 – 0.231	0.127 – 0.200
20.0	20	0.10	41	104	19.5	54	2	22200200U	218.82	0.147 – 0.242	0.137 – 0.209

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.5xD

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide
- High machining performance up to 1.5xD into solid
- With protective chamfer for longer tool life

d1	d2
h10	h6

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	350	300	300	280	350	420
V_c (m/min) Roughing	300	280	200	250	300	360

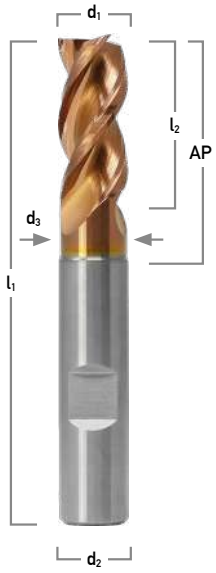
Product family 160

22303

ZrCN | Z 3 | HB | ≠ | VHM | Type W | HPC | Manufacturer standard

Solid Carbide HPC End Mill for Aluminium

With protective chamfer



d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	d_3 mm	AP mm	Z	coated Part No.	coated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
3.0	6	0.03	8	57	2.8	18	3	22303030	38.50	0.037 – 0.077	0.034 – 0.067
4.0	6	0.04	11	57	3.8	18	3	22303040	38.50	0.042 – 0.088	0.039 – 0.076
5.0	6	0.05	13	57	4.8	21	3	22303050	38.50	0.047 – 0.099	0.044 – 0.086
6.0	6	0.06	13	57	5.5	21	3	22303060	38.50	0.063 – 0.132	0.059 – 0.114
8.0	8	0.08	21	63	7.5	27	3	22303080	54.89	0.084 – 0.176	0.078 – 0.152
10.0	10	0.10	22	72	9.5	32	3	22303100	72.58	0.095 – 0.198	0.088 – 0.171
12.0	12	0.10	26	83	11.5	38	3	22303120	100.05	0.105 – 0.220	0.098 – 0.190
14.0	14	0.10	26	83	13.5	38	3	22303140	142.93	0.116 – 0.220	0.108 – 0.190
16.0	16	0.10	36	92	15.5	44	3	22303160	180.21	0.126 – 0.231	0.118 – 0.200
18.0	18	0.10	36	92	17.5	44	3	22303180	221.14	0.137 – 0.231	0.127 – 0.200
20.0	20	0.10	41	104	19.5	54	3	22303200	284.15	0.147 – 0.242	0.137 – 0.209
25.0	25	0.10	50	125	24.5	65	3	22303250	389.22	0.168 – 0.264	0.157 – 0.228

Peripheral milling
$a_e = 0.5xD$
$a_p = 1.5xD$

Full slot milling
$a_p = 1.5xD$

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrCN coating preventing from built-up edge
- High machining performance up to 1.5xD into solid
- With protective chamfer for longer tool life

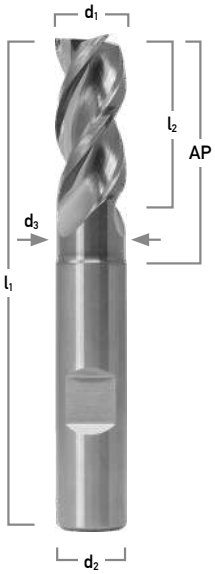
d_1	d_2
h10	h6

22303U

Uncoated | Z 3 | HB | ≠ | VHM | Type W | HPC | Manufacturer standard

Solid Carbide HPC End Mill for Aluminium

With protective chamfer, uncoated



d_1 mm	d_2 mm	Corner chamfer	l_2 mm	l_1 mm	d_3 mm	AP mm	Z	uncoated Part No.	uncoated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
3.0	6	0.03	8	57	2.8	18	3	22303030U	31.31	0.037 – 0.077	0.034 – 0.067
4.0	6	0.04	11	57	3.8	18	3	22303040U	31.31	0.042 – 0.088	0.039 – 0.076
5.0	6	0.05	13	57	4.8	21	3	22303050U	31.31	0.047 – 0.099	0.044 – 0.086
6.0	6	0.06	13	57	5.5	21	3	22303060U	31.31	0.063 – 0.132	0.059 – 0.114
8.0	8	0.08	21	63	7.5	27	3	22303080U	44.64	0.084 – 0.176	0.078 – 0.152
10.0	10	0.10	22	72	9.5	32	3	22303100U	62.04	0.095 – 0.198	0.088 – 0.171
12.0	12	0.10	26	83	11.5	38	3	22303120U	85.52	0.105 – 0.220	0.098 – 0.190
14.0	14	0.10	26	83	13.5	38	3	22303140U	122.16	0.116 – 0.220	0.108 – 0.190
16.0	16	0.10	36	92	15.5	44	3	22303160U	154.03	0.126 – 0.231	0.118 – 0.200
18.0	18	0.10	36	92	17.5	44	3	22303180U	189.01	0.137 – 0.231	0.127 – 0.200
20.0	20	0.10	41	104	19.5	54	3	22303200U	242.87	0.147 – 0.242	0.137 – 0.209
25.0	25	0.10	50	125	24.5	65	3	22303250U	332.65	0.168 – 0.264	0.157 – 0.228

Peripheral milling
$a_e = 0.5xD$
$a_p = 1.5xD$

Full slot milling
$a_p = 1.5xD$

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide
- High machining performance up to 1.5xD into solid
- With protective chamfer for longer tool life

d_1	d_2
h10	h6

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	350	300	300	280	350	420
V_c (m/min) Roughing	300	280	200	250	300	360

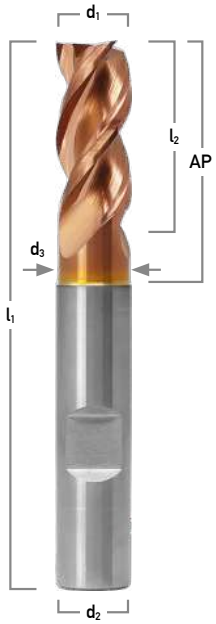
Product family 160

22301




Solid Carbide High-Performance End Mill for Aluminium

Long version with protective chamfer



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
5.0	6	0.05	22	63	4.8	29	3	22301050	46.78	0.047 –	0.099	0.044 –	0.086
6.0	6	0.06	22	63	5.5	29	3	22301060	46.78	0.063 –	0.132	0.059 –	0.114
8.0	8	0.08	28	80	7.5	36	3	22301080	60.91	0.084 –	0.176	0.078 –	0.152
10.0	10	0.10	33	80	9.5	43	3	22301100	87.34	0.095 –	0.198	0.088 –	0.171
12.0	12	0.10	33	100	11.5	54	3	22301120	118.65	0.105 –	0.220	0.098 –	0.190
14.0	14	0.10	48	100	13.5	54	3	22301140	153.30	0.116 –	0.220	0.108 –	0.190
16.0	16	0.10	53	125	15.5	69	3	22301160	213.74	0.126 –	0.231	0.118 –	0.200
20.0	20	0.10	68	150	19.5	84	3	22301200	337.61	0.147 –	0.242	0.137 –	0.209

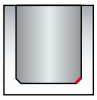
d_1	d_2
h10	h6

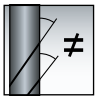
Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

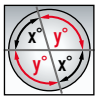
Full slot milling
a_p = 1.5xD

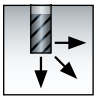
- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrCN coating preventing from built-up edge
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With protective chamfer for longer tool life

22301U



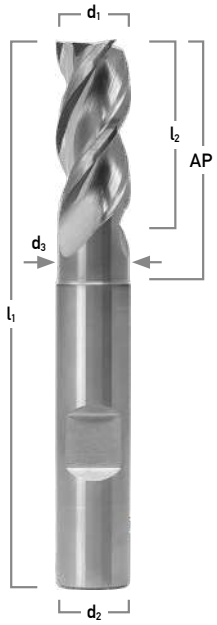






Solid Carbide High-Performance End Mill for Aluminium

Long version with protective chamfer, uncoated



d_1	d_2	Corner chamfer	l_2	l_1	d_3	AP		uncoated		f_z Roughing		f_z Finishing	
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
5.0	6	0.05	22	63	4.8	29	3	22301050U	38.04	0.047 –	0.099	0.044 –	0.086
6.0	6	0.06	22	63	5.5	29	3	22301060U	38.04	0.063 –	0.132	0.059 –	0.114
8.0	8	0.08	28	80	7.5	36	3	22301080U	49.50	0.084 –	0.176	0.078 –	0.152
10.0	10	0.10	33	80	9.5	43	3	22301100U	74.64	0.095 –	0.198	0.088 –	0.171
12.0	12	0.10	33	100	11.5	54	3	22301120U	101.40	0.105 –	0.220	0.098 –	0.190
14.0	14	0.10	48	100	13.5	54	3	22301140U	131.03	0.116 –	0.220	0.108 –	0.190
16.0	16	0.10	53	125	15.5	69	3	22301160U	182.69	0.126 –	0.231	0.118 –	0.200
20.0	20	0.10	68	150	19.5	84	3	22301200U	288.56	0.147 –	0.242	0.137 –	0.209

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.5xD

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrCN coating preventing from built-up edge
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing
- With protective chamfer for longer tool life

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	350	300	300	280	350	420
V_c (m/min) Roughing	300	280	200	250	300	360

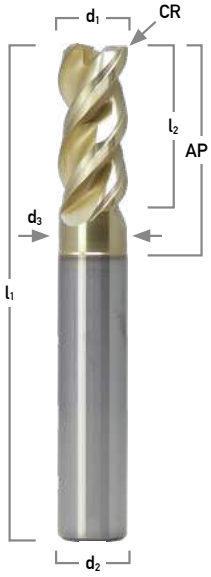
Product family 160

31845

ZrN | Z 3 | HA | ≠ | VHM | Type W | HPC | DIN 6527 L

Solid Carbide HPC Torus Cutter

Long version with corner radius



d1	d2	l2	l1	CR	d3	AP		coated		fz Roughing		fz Finishing	
mm	mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
5.0	6	13	57	1.00	4.80	18	3	31845050	55.78	0.016 – 0.030		0.014 – 0.025	
6.0	6	13	57	0.50	5.80	18	3	31845060	62.10	0.019 – 0.036		0.017 – 0.031	
6.0	6	13	57	1.00	5.80	18	3	31845061	62.10	0.019 – 0.036		0.017 – 0.031	
8.0	8	21	63	0.50	7.80	25	3	31845080	69.65	0.026 – 0.047		0.024 – 0.042	
8.0	8	21	63	1.00	7.80	25	3	31845081	69.65	0.026 – 0.047		0.024 – 0.042	
10.0	10	22	72	0.50	9.70	30	3	31845100	116.41	0.032 – 0.055		0.030 – 0.050	
10.0	10	22	72	1.00	9.70	30	3	31845101	116.41	0.032 – 0.055		0.030 – 0.050	
12.0	12	26	83	0.50	11.70	36	3	31845120	158.49	0.038 – 0.064		0.036 – 0.059	
12.0	12	26	83	1.00	11.70	36	3	31845121	158.49	0.038 – 0.064		0.036 – 0.059	
16.0	16	36	92	2.00	15.70	42	3	31845160	294.75	0.047 – 0.076		0.045 – 0.071	
16.0	16	36	92	4.00	15.70	42	3	31845161	294.75	0.047 – 0.076		0.045 – 0.071	
20.0	20	41	104	4.00	19.50	52	3	31845200	416.01	0.060 – 0.095		0.058 – 0.090	
25.0	25	50	125	5.00	24.50	65	3	31845250	684.09	0.079 – 0.130		0.078 – 0.125	

d1	d2
h10	h6

Peripheral milling
a_e = 1.0xD
a_p = 1.5xD

Full slot milling
a_p = 1.5xD

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrN coating
- High machining performance up to 1.5xD into solid
- Smooth running due to axial and radial unequal spacing

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	410	200	165	100	95	115	100
V_c (m/min) Roughing	395	185	150	85	85	100	85

Product family 160

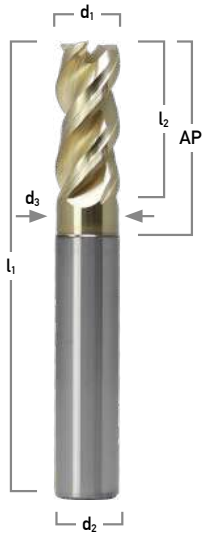
31645



Manu-facturer standard

Solid Carbide End Mill for Aluminium

Extra-long version mit edge chamfer, lapped



d_1	d_2
h10	h6

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Corner chamfer	d_3 mm	AP mm	Z	coated Part No.	coated €/pc.	f_z Roughing mm/Z	f_z Finishing mm/Z
3.0	6	8	57	0.10	2.80	12	3	31645030	52.79	0.009 – 0.020	0.007 – 0.015
4.0	6	11	57	0.10	3.80	18	3	31645040	52.79	0.014 – 0.028	0.012 – 0.023
5.0	6	13	57	0.10	4.80	18	3	31645050	52.79	0.016 – 0.030	0.014 – 0.025
6.0	6	13	57	0.20	5.80	18	3	31645060	55.49	0.019 – 0.036	0.017 – 0.031
6.0	6	13	80	0.20	5.80	42	3	31645061	76.46	0.019 – 0.036	0.017 – 0.031
8.0	8	21	63	0.20	7.80	25	3	31645080	63.86	0.026 – 0.047	0.024 – 0.042
8.0	8	21	100	0.20	7.80	62	3	31645081	99.19	0.026 – 0.047	0.024 – 0.042
10.0	10	22	72	0.20	9.70	30	3	31645100	109.60	0.032 – 0.010	0.030 – 0.050
10.0	10	22	100	0.20	9.70	58	3	31645101	146.83	0.032 – 0.010	0.030 – 0.050
12.0	12	26	83	0.20	11.70	36	3	31645120	148.82	0.038 – 0.064	0.036 – 0.059
12.0	12	26	120	0.20	11.70	73	3	31645121	210.67	0.038 – 0.064	0.036 – 0.059
16.0	16	36	92	0.20	15.70	42	3	31645160	276.74	0.047 – 0.076	0.045 – 0.071
16.0	16	36	150	0.20	15.70	100	3	31645161	444.74	0.047 – 0.076	0.045 – 0.071
18.0	18	36	92	0.20	17.60	42	3	31645180	308.39	0.056 – 0.088	0.054 – 0.083
18.0	18	36	150	0.20	17.60	100	3	31645181	473.78	0.056 – 0.088	0.054 – 0.083
20.0	20	41	104	0.20	19.50	52	3	31645200	398.29	0.063 – 0.095	0.058 – 0.090
20.0	20	41	150	0.20	19.50	98	3	31645201	573.11	0.063 – 0.095	0.058 – 0.090
25.0	25	50	125	0.30	24.50	65	3	31645250	684.09	0.080 – 0.130	0.078 – 0.125

Peripheral milling
$a_e = 0.5xD$
$a_p = 2.0xD$

Full slot milling
$a_p = 1.0xD$

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrN coating
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	410	200	165	100	95	115	100
V_c (m/min) Roughing	395	185	150	85	80	100	85

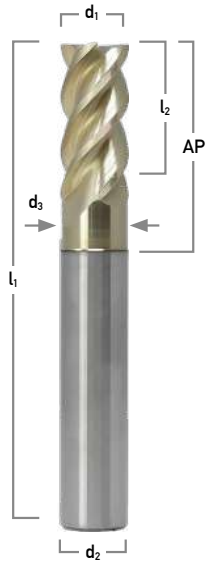
Product family 160

31745

ZrN | Z 4 | HA | ≠ | VHM | Type W | HPC | Manu-facturer standard

Solid Carbide HPC End Mill for Aluminium

Long version with edge chamfer



d1	d2
h10	h6

d1 mm	d2 mm	l2 mm	l1 mm	Corner chamfer	d3 mm	AP mm	Z	coated Part No.	coated €/pc.	fz Roughing mm/Z	fz Finishing mm/Z
3.0	6	8	57	0.10	2.80	12	4	31745030	52.79	0.007 – 0.015	0.006 – 0.013
4.0	6	11	57	0.10	3.80	18	4	31745040	52.79	0.012 – 0.023	0.010 – 0.021
5.0	6	13	57	0.10	4.80	18	4	31745050	52.79	0.014 – 0.025	0.012 – 0.023
6.0	6	13	57	0.20	5.80	18	4	31745060	55.49	0.017 – 0.031	0.015 – 0.029
6.0	6	13	80	0.20	5.80	42	4	31745061	76.46	0.017 – 0.031	0.015 – 0.029
7.0	8	21	63	0.20	6.80	25	4	31745070	70.31	0.020 – 0.037	0.018 – 0.035
8.0	8	21	63	0.20	7.80	25	4	31745080	63.77	0.024 – 0.042	0.022 – 0.040
8.0	8	21	100	0.20	7.80	62	4	31745081	99.09	0.024 – 0.042	0.022 – 0.040
10.0	10	22	72	0.20	9.70	30	4	31745100	109.60	0.030 – 0.050	0.028 – 0.048
10.0	10	22	100	0.20	9.70	58	4	31745101	146.83	0.030 – 0.050	0.028 – 0.048
12.0	12	26	83	0.20	11.70	36	4	31745120	148.82	0.036 – 0.059	0.034 – 0.057
12.0	12	26	120	0.20	11.70	73	4	31745121	210.67	0.036 – 0.059	0.034 – 0.057
16.0	16	36	92	0.20	15.70	42	4	31745160	276.74	0.045 – 0.071	0.043 – 0.069
16.0	16	36	150	0.20	15.70	100	4	31745161	444.74	0.045 – 0.071	0.043 – 0.069
18.0	18	36	92	0.20	17.60	42	4	31745180	308.39	0.054 – 0.083	0.052 – 0.081
18.0	18	36	150	0.20	17.60	100	4	31745181	473.78	0.054 – 0.083	0.052 – 0.081
20.0	20	41	104	0.20	19.50	52	4	31745200	398.29	0.058 – 0.090	0.056 – 0.089
20.0	20	41	150	0.20	19.50	98	4	31745201	573.11	0.058 – 0.090	0.056 – 0.089
25.0	25	50	125	0.30	24.50	65	4	31745250	684.09	0.078 – 0.125	0.076 – 0.123

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrN coating
- High machining performance up to 1xD into solid
- Smooth running due to axial and radial unequal spacing

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	410	200	165	100	95	115	100
V_c (m/min) Roughing	395	185	150	85	80	100	85

Product family 160

10509




Solid Carbide End Mill for Aluminium

Long version

d_1	d_2	l_2	l_1		uncoated	
mm	mm	mm	mm	Z	Part No.	€/pc.
4.0	6	8	62	4	10509040	13.12
5.0	6	15	62	4	10509050	14.59
6.0	6	18	62	4	10509060	16.05
8.0	8	24	68	4	10509080	21.92
10.0	10	30	80	4	10509100	27.79
12.0	12	36	93	4	10509120	41.86
16.0	16	48	108	4	10509160	74.91
20.0	20	60	126	4	10509200	107.62

f_z Roughing			f_z Finishing		
mm/Z			mm/Z		
0.012	–	0.021	0.007	–	0.013
0.012	–	0.023	0.010	–	0.021
0.015	–	0.029	0.013	–	0.027
0.022	–	0.040	0.020	–	0.038
0.028	–	0.048	0.026	–	0.046
0.034	–	0.059	0.032	–	0.055
0.043	–	0.069	0.041	–	0.067
0.056	–	0.091	0.054	–	0.086

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 0.5xD

- For Aluminium, Brass and Plastics
- Sharp cutting edges

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	350	300	300	280	350	420
V_c (m/min) Roughing	300	280	200	250	300	360

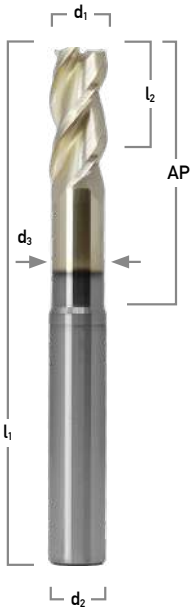
Product family 163

31940

ZrN | Z 3–4 | HA | ≠ | VHM | Type W | HPC | Manufacturer standard

Solid Carbide HPC End Mill for Aluminium

Extra-long version



d_1	d_2	l_2	l_1	d_3	AP		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
3.0	6	8	70	2.7	20	3	31940030	61.50	0.007	–	0.015	0.006	–	0.013
4.0	6	11	70	3.7	25	3	31940040	61.50	0.012	–	0.023	0.010	–	0.021
5.0	6	13	70	4.7	30	3	31940050	61.50	0.014	–	0.025	0.012	–	0.023
6.0	6	13	70	5.7	30	3	31940060	61.50	0.017	–	0.031	0.015	–	0.029
8.0	8	20	80	7.4	35	3	31940080	83.05	0.024	–	0.042	0.022	–	0.040
10.0	10	22	90	9.2	45	3	31940100	116.27	0.030	–	0.050	0.028	–	0.048
12.0	12	26	100	11.0	55	4	31940120	160.33	0.036	–	0.059	0.034	–	0.057
16.0	16	36	115	15.0	65	4	31940160	271.59	0.045	–	0.071	0.043	–	0.069
20.0	20	41	125	19.0	75	4	31940200	357.14	0.058	–	0.090	0.056	–	0.089
25.0	25	52	150	24.0	95	4	31940250	527.00	0.078	–	0.125	0.076	–	0.123

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 0.75xD

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrN coating
- High machining performance up to 0.75xD into solid material
- Smooth running due to axial and radial unequal spacing

d_1	d_2
h10	h6

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	410	200	165	100	95	115	100
V_c (m/min) Roughing	395	185	150	85	80	100	85

Product family 160

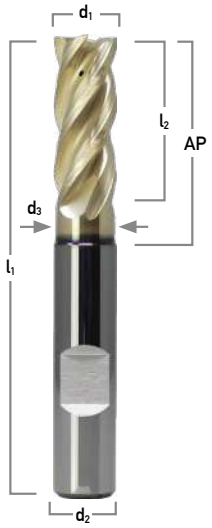
60408





Solid Carbide HPC End Mill for Aluminium

Long version with internal coolant and corner chamfer, polished design



d_1	d_2	l_2	l_1	Corner chamfer	d_3	AP		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
3.0	6	11	57	0.15x45°	2.8	18	4	60408030	50.27	0.010 –	0.018	0.008 –	0.016
4.0	6	12	57	0.15x45°	3.6	21	4	60408040	50.27	0.018 –	0.025	0.016 –	0.023
5.0	6	15	57	0.15x45°	4.5	21	4	60408050	50.27	0.025 –	0.033	0.023 –	0.031
6.0	6	15	57	0.2x45°	5.5	21	4	60408060	50.27	0.033 –	0.040	0.031 –	0.038
8.0	8	21	63	0.2x45°	7.5	28	4	60408080	62.10	0.040 –	0.047	0.038 –	0.045
10.0	10	22	72	0.3x45°	9.5	32	4	60408100	91.04	0.047 –	0.055	0.045 –	0.053
12.0	12	28	83	0.3x45°	11.5	38	4	60408120	122.42	0.055 –	0.062	0.053 –	0.060
14.0	14	30	83	0.3x45°	13.5	42	4	60408140	180.63	0.062 –	0.069	0.060 –	0.067
16.0	16	35	92	0.4x45°	15.5	45	4	60408160	248.08	0.069 –	0.076	0.067 –	0.075
20.0	20	41	104	0.5x45°	19.5	55	4	60408200	312.52	0.076 –	0.083	0.074 –	0.080
25.0	25	51	125	0.5x45°	24	65	4	60408250	438.16	0.118 –	0.125	0.115 –	0.122

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

- High-performance end mill for roughing and finishing
- Ultra-micro grain solid carbide with ZrN coating
- High machining performance up to 0.75xD into solid material
- Smooth running due to axial and radial unequal spacing

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic	Bronze	Kupfer
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²				
V_c (m/min) Finishing	500	400	240	100	95	115	100	160	135
V_c (m/min) Roughing	485	385	225	85	80	100	85	145	120

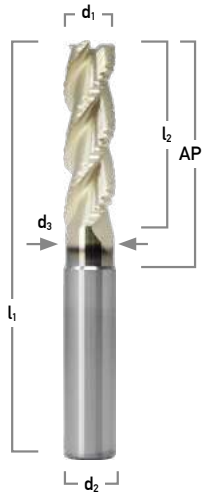
Product family 164

31901




Solid Carbide Roughing End Mill for Aluminium

Long version with corner chamfer



d_1	d_2	l_2	l_1	Corner chamfer	d_3	AP		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm		mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
6.0	6	22	63	0.4	5.7	29	3	31901060	62.76	0.019	–	0.036	0.017	–	0.031
8.0	8	28	80	0.4	7.4	36	3	31901080	75.64	0.026	–	0.047	0.024	–	0.042
10.0	10	33	80	0.4	9.2	43	3	31901100	101.61	0.032	–	0.055	0.030	–	0.050
12.0	12	33	100	0.4	11.0	54	3	31901120	127.55	0.038	–	0.064	0.036	–	0.059
16.0	16	55	125	0.4	15.0	69	3	31901160	222.70	0.047	–	0.076	0.045	–	0.071
20.0	20	68	150	0.4	19.4	84	3	31901200	380.62	0.060	–	0.095	0.058	–	0.090

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

- High-performance end mill for roughing
- Ultra-micro grain solid carbide with ZrN coating
- High machining performance up to 2xD into solid material

d_1	d_2
h10	h6

Material	Alu & Al Alloys	Alu & Al Alloys <10% Si	Alu & Al Alloys >10% Si	Brass, short-chipping	Brass, long-chipping	Plastics, thermosetting	Plastics, thermoplastic
Tensile strength / Hardness	< 450 N/mm²	< 600 N/mm²	> 600 N/mm²	< 600 N/mm²	< 600 N/mm²		
V_c (m/min) Finishing	515	415	255	110	105	130	115
V_c (m/min) Roughing	500	400	240	95	90	115	100

ToolFactory
Cutting Tool Solutions

Composite Line

Solid Carbide End Mill

Composite Line

Versatility
Precision
Efficiency

53002


Uncoated
HA

VHM
GFK
CFK
Graphite

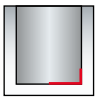
Manu-facturer standard

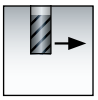
Solid Carbide Fibre Glass Router
No End

d_2 h8

d_1	d_2	l_2	l_1	uncoated		Speed			vf		
mm	mm	mm	mm	Part No.	€/pc.	rev/min			mm/min		
1.6	3	5	38	53002001	13.86	40.000	–	44.840	100	–	1.500
2.4	3	9.5	38	53002004	14.69	20.000	–	24.000	800	–	1.600
3.0	3	12	38	53002007	14.07	20.000	–	24.000	800	–	1.600
4.0	4	16	50	53002010	23.07	20.000	–	24.000	800	–	1.600
4.0	6	16	50	53002013	24.17	20.000	–	24.000	800	–	1.600
6.0	6	19	50	53002016	25.05	20.000	–	24.000	800	–	1.600
6.0	6	19	63	53002019	26.37	20.000	–	24.000	800	–	1.600
6.0	6	25	75	53002022	33.65	20.000	–	24.000	800	–	1.600
8.0	8	25	63	53002025	52.03	15.000	–	20.000	600	–	1.400
10.0	10	25	75	53002028	64.88	15.000	–	20.000	550	–	1.350
12.0	12	25	75	53002031	89.01	10.000	–	15.000	500	–	1.300

53003


Uncoated
HA

VHM
GFK
CFK
Graphite

Manu-facturer standard

Solid Carbide Fibre Glass Router
Bur End

d_2 h8

d_1	d_2	l_2	l_1	uncoated		Speed			vf		
mm	mm	mm	mm	Part No.	€/pc.	rev/min			mm/min		
1.6	3	5	38	53003001	16.46	40.000	–	44.840	100	–	1.500
2.4	3	9.5	38	53003004	16.46	20.000	–	24.000	800	–	1.600
3.0	3	12	38	53003007	15.68	20.000	–	24.000	800	–	1.600
4.0	4	16	50	53003010	25.60	20.000	–	24.000	800	–	1.600
4.0	6	16	50	53003013	25.60	20.000	–	24.000	800	–	1.600
6.0	6	19	50	53003016	27.99	20.000	–	24.000	800	–	1.600
6.0	6	19	63	53003019	29.86	20.000	–	24.000	800	–	1.600
6.0	6	25	75	53003022	36.57	20.000	–	24.000	800	–	1.600
8.0	8	25	63	53003025	55.54	15.000	–	20.000	600	–	1.400
10.0	10	25	75	53003028	70.44	15.000	–	20.000	550	–	1.350
12.0	12	25	75	53003031	97.98	10.000	–	15.000	500	–	1.300

53004



VHM GFK CFK Graphite

Manu-facturer standard

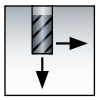
Solid Carbide Fibre Glass Router
End Mill End

d_1	d_2	l_2	l_1	uncoated		Speed		vf	
mm	mm	mm	mm	Part No.	€/pc.	rev/min		mm/min	
1.6	3	5	38	53004001	16.49	40.000	– 44.840	100	– 1.500
2.4	3	9.5	38	53004004	17.79	20.000	– 24.000	800	– 1.600
3.0	3	12	38	53004007	16.94	20.000	– 24.000	800	– 1.600
4.0	4	16	50	53004010	26.63	20.000	– 24.000	800	– 1.600
4.0	6	16	50	53004013	27.99	20.000	– 24.000	800	– 1.600
6.0	6	19	50	53004016	29.86	20.000	– 24.000	800	– 1.600
6.0	6	19	63	53004019	31.40	20.000	– 24.000	800	– 1.600
6.0	6	25	75	53004022	38.36	20.000	– 24.000	800	– 1.600
8.0	8	25	63	53004025	57.63	15.000	– 20.000	600	– 1.400
10.0	10	25	75	53004028	73.24	15.000	– 20.000	550	– 1.350
12.0	12	25	75	53004031	102.66	10.000	– 15.000	500	– 1.300

d_2
h8

53005



VHM GFK CKF Graphite

Manu-facturer standard

Solid Carbide Fibre Glass Router
Drill End

d_1	d_2	l_2	l_1	uncoated		Speed		vf	
mm	mm	mm	mm	Part No.	€/pc.	rev/min		mm/min	
1.6	3	5	38	53005001	17.47	40.000	– 44.840	100	– 1.500
2.4	3	9.5	38	53005004	18.83	20.000	– 24.000	800	– 1.600
3.0	3	12	38	53005007	17.95	20.000	– 24.000	800	– 1.600
4.0	4	16	50	53005010	29.15	20.000	– 24.000	800	– 1.600
4.0	6	16	50	53005013	30.54	20.000	– 24.000	800	– 1.600
6.0	6	19	50	53005016	31.11	20.000	– 24.000	800	– 1.600
6.0	6	19	63	53005019	32.56	20.000	– 24.000	800	– 1.600
6.0	6	25	75	53005022	39.66	20.000	– 24.000	800	– 1.600
8.0	8	25	63	53005025	59.36	15.000	– 20.000	600	– 1.400
10.0	10	25	75	53005028	76.06	15.000	– 20.000	550	– 1.350
12.0	12	25	75	53005031	107.46	10.000	– 15.000	500	– 1.300

d_2
h8

ToolFactory
Cutting Tool Solutions

Standard Line

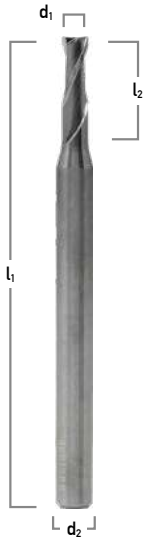
Solid Carbide End Mill

Performance
Tool Life
Selection

29002

Solid Carbide Micro End Mill

Short version



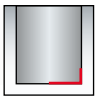
d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
0.10	3	0.3	38	2	29002001	77.48	29002001A	90.75	0.002 – 0.008
0.15	3	0.3	38	2	290020015	65.34	290020015A	78.65	0.002 – 0.008
0.20	3	0.5	38	2	29002002	55.49	29002002A	68.90	0.002 – 0.008
0.25	3	0.5	38	2	290020025	55.49	290020025A	68.90	0.002 – 0.008
0.30	3	1.0	38	2	29002003	32.55	29002003A	45.91	0.002 – 0.008
0.40	3	1.0	38	2	29002004	26.02	29002004A	39.53	0.002 – 0.008
0.50	3	1.5	38	2	29002005	22.93	29002005A	36.23	0.002 – 0.008
0.60	3	1.5	38	2	29002006	22.93	29002006A	36.23	0.002 – 0.008
0.70	3	2.0	38	2	29002007	22.93	29002007A	36.23	0.002 – 0.008
0.80	3	2.0	38	2	29002008	22.93	29002008A	36.23	0.002 – 0.008
0.90	3	2.5	38	2	29002009	22.93	29002009A	36.23	0.002 – 0.008
1.00	3	3.0	38	2	29002010	22.93	29002010A	36.23	0.003 – 0.010
1.10	3	3.0	38	2	29002011	22.93	29002011A	36.23	0.003 – 0.010
1.20	3	4.0	38	2	29002012	22.93	29002012A	36.23	0.003 – 0.010
1.40	3	4.0	38	2	29002014	24.64	29002014A	38.06	0.003 – 0.010
1.50	3	4.0	38	2	29002015	24.64	29002015A	38.06	0.005 – 0.018
1.60	3	4.0	38	2	29002016	26.02	29002016A	39.53	0.005 – 0.018
1.70	3	4.0	38	2	29002017	26.02	29002017A	39.53	0.005 – 0.018
1.80	3	5.0	38	2	29002018	26.02	29002018A	39.53	0.005 – 0.018
1.90	3	5.0	38	2	29002019	26.02	29002019A	39.53	0.010 – 0.020
2.00	3	5.0	38	2	29002020	24.64	29002020A	38.06	0.010 – 0.020

Peripheral milling
a_e = 0.02xD
a_p = 0.05xD

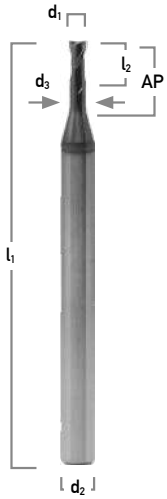
Full slot milling
a_p = 0.5xD

29302



VHM-Mini-Shankfräser

Extra-long version



d_1	d_2
h10	h6

d_1	d_2	d_3	AP	l_2	l_1		coated		f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
0.80	4	0.76	6	1.2	50	2	293020806A	61.28	0.002 – 0.005
0.90	4	0.86	6	1.4	50	2	293020906A	61.28	0.002 – 0.005
1.00	4	0.96	6	1.5	50	2	293021006A	57.48	0.003 – 0.010
1.00	4	0.96	12	1.5	55	2	293021012A	61.28	0.003 – 0.010
1.20	4	1.15	8	1.8	50	2	293021208A	57.48	0.003 – 0.010
1.20	4	1.15	12	1.8	55	2	293021212A	61.28	0.003 – 0.010
1.40	4	1.34	12	2.1	55	2	293021412A	61.28	0.003 – 0.010
1.50	4	1.44	14	2.3	55	2	293021514A	61.28	0.005 – 0.018
1.60	4	1.54	16	2.4	55	2	293021616A	61.28	0.005 – 0.018
1.80	4	1.74	16	2.7	55	2	293021816A	61.28	0.005 – 0.018
2.00	4	1.92	8	3.0	50	2	293022008A	57.48	0.010 – 0.020
2.00	4	1.92	12	3.0	50	2	293022012A	57.48	0.010 – 0.020
2.00	4	1.92	16	3.0	55	2	293022016A	61.28	0.010 – 0.020
2.00	4	1.92	20	3.0	60	2	293022020A	61.28	0.010 – 0.020
2.50	4	2.40	14	3.7	55	2	293022514A	61.28	0.012 – 0.025
3.00	6	2.88	12	4.5	55	2	293023012A	69.65	0.018 – 0.030
3.00	6	2.88	20	4.5	60	2	293023020A	69.65	0.018 – 0.030

Peripheral milling
a_e = 0.02xD
a_p = 0.05xD

Full slot milling
a_p = 0.2xD

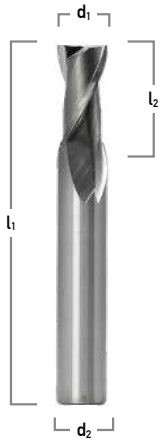
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Non-alloy case-hardened steels	Tool steels	Stainless steels	Cast iron	Cast iron (GGG,GT)	Aluminium
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 1400 N/mm²	< 850 N/mm²	< 180 HB – > 180 HB	> 260 HB	> 600 N/mm²
V_c (m/min) Finishing	85	70	70	100	70	45	110	90	200

Product family 160

25021

Uncoated | Alcrona Pro | Z 2 | HA | 30° | VHM | Type N | Manufacturer standard

Solid Carbide End Mill
Short version



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	3	3	38	2	25021010	15.04	25021010A	22.08	0.004 – 0.009	0.002 – 0.004
1.5	3	5	38	2	25021015	13.93	25021015A	20.88	0.004 – 0.009	0.002 – 0.004
2.0	3	7	38	2	25021020	13.93	25021020A	20.88	0.004 – 0.010	0.002 – 0.005
2.5	3	7	38	2	25021025	13.93	25021025A	20.88	0.004 – 0.010	0.002 – 0.005
3.0	3	9	38	2	25021030	13.93	25021030A	20.88	0.005 – 0.015	0.003 – 0.010
3.5	4	11	50	2	25021035	18.40	25021035A	25.57	0.005 – 0.015	0.003 – 0.010
4.0	4	11	50	2	25021040	18.40	25021040A	25.57	0.009 – 0.023	0.007 – 0.018
5.0	5	10	50	2	25021050	17.96	25021050A	25.16	0.011 – 0.025	0.009 – 0.020
5.5	6	10	57	2	25021055	21.85	25021055A	29.12	0.011 – 0.025	0.009 – 0.020
6.0	6	10	57	2	25021060	20.09	25021060A	26.68	0.013 – 0.029	0.011 – 0.024
6.75	8	13	63	2	250210675	28.73	250210675A	43.25	0.013 – 0.029	0.011 – 0.024
7.0	8	13	63	2	25021070	27.04	25021070A	35.79	0.016 – 0.034	0.014 – 0.029
7.75	8	16	63	2	250210775	28.73	250210775A	43.25	0.016 – 0.034	0.014 – 0.029
8.0	8	16	63	2	25021080	23.38	25021080A	31.00	0.018 – 0.037	0.016 – 0.032
8.7	10	19	72	2	25021087	46.49	25021087A	65.34	0.018 – 0.037	0.016 – 0.032
9.0	10	16	72	2	25021090	40.61	25021090A	48.30	0.021 – 0.041	0.019 – 0.036
9.7	10	19	72	2	25021097	46.49	25021097A	61.21	0.021 – 0.041	0.019 – 0.036
10.0	10	19	72	2	25021100	38.79	25021100A	51.18	0.023 – 0.043	0.021 – 0.038
11.0	12	22	72	2	25021110	61.59	25021110A	77.87	0.026 – 0.047	0.024 – 0.043
11.7	12	22	83	2	25021117	74.62	25021117A	95.67	0.026 – 0.047	0.024 – 0.043
12.0	12	22	83	2	25021120	56.15	25021120A	74.72	0.028 – 0.051	0.026 – 0.046
13.7	14	22	83	2	25021137	78.82	25021137A	107.17	0.032 – 0.055	0.030 – 0.050
14.0	14	22	83	2	25021140	75.50	25021140A	100.06	0.032 – 0.055	0.030 – 0.050
15.7	16	26	92	2	25021157	108.86	25021157A	137.74	0.034 – 0.058	0.032 – 0.054
16.0	16	26	92	2	25021160	95.14	25021160A	126.53	0.034 – 0.058	0.032 – 0.054
17.7	18	26	92	2	25021177	137.68	25021177A	186.19	0.036 – 0.067	0.034 – 0.062
19.7	20	32	104	2	25021197	178.28	25021197A	210.07	0.038 – 0.069	0.036 – 0.064
20.0	20	32	104	2	25021200	156.74	25021200A	198.37	0.040 – 0.071	0.038 – 0.066
25.0	25	32	104	2	25021250	288.97	25021250A	348.73	0.064 – 0.089	0.062 – 0.084
32.0	32	32	104	2	25021320	607.87	25021320A	665.91	0.097 – 0.115	0.095 – 0.110

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Non-alloy case-hardened steels	Tool steels	Stainless steels	Cast iron	Cast iron (GGG,GT)	Aluminium
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 1400 N/mm²	< 850 N/mm²	< 180 HB – > 180 HB	> 260 HB	> 600 N/mm²
V_c (m/min) Finishing	90	70	70	100	95	45	110	90	200
V_c (m/min) Roughing	75	55	55	85	80	30	95	75	180

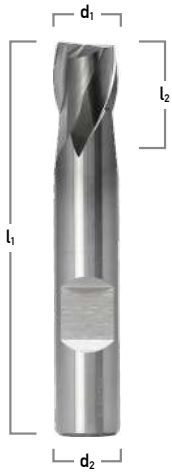
Product family 160

26001

Manu-facturer standard

Solid Carbide End Mill

Short version



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	3	50	2	26001020	23.67	26001020A	32.48	0.004 – 0.010	0.002 – 0.005
2.5	6	3	50	2	26001025	23.67	26001025A	32.48	0.004 – 0.010	0.002 – 0.005
3.0	6	4	50	2	26001030	21.56	26001030A	29.91	0.006 – 0.015	0.004 – 0.010
3.5	6	4	50	2	26001035	23.67	26001035A	32.48	0.006 – 0.015	0.004 – 0.010
4.0	6	5	54	2	26001040	21.33	26001040A	29.91	0.009 – 0.023	0.007 – 0.018
5.0	6	6	54	2	26001050	21.33	26001050A	29.91	0.011 – 0.025	0.009 – 0.020
6.0	6	7	54	2	26001060	20.68	26001060A	30.65	0.013 – 0.029	0.011 – 0.025
7.0	8	8	58	2	26001070	26.62	26001070A	41.69	0.016 – 0.035	0.014 – 0.030
8.0	8	9	58	2	26001080	23.67	26001080A	38.98	0.016 – 0.037	0.016 – 0.032
9.0	10	10	66	2	26001090	43.34	26001090A	60.50	0.021 – 0.039	0.019 – 0.034
10.0	10	11	66	2	26001100	38.93	26001100A	55.71	0.023 – 0.043	0.021 – 0.038
12.0	12	12	73	2	26001120	54.17	26001120A	77.61	0.028 – 0.051	0.026 – 0.046
14.0	14	14	75	2	26001140	73.07	26001140A	100.86	0.031 – 0.049	0.029 – 0.044
16.0	16	16	82	2	26001160	90.54	26001160A	124.55	0.034 – 0.059	0.032 – 0.054
18.0	18	18	84	2	26001180	127.69	26001180A	171.03	0.037 – 0.063	0.035 – 0.058
20.0	20	20	92	2	26001200	148.37	26001200A	196.76	0.040 – 0.071	0.038 – 0.066

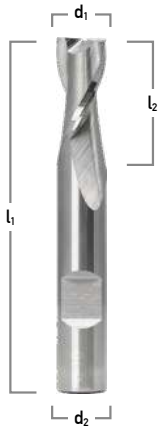
Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

26021

Manu-facturer standard

Solid Carbide End Mill



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	5	50	2	26021010	23.60	26021010A	31.51	0.004 – 0.009	0.002 – 0.004
1.5	6	5	50	2	26021015	23.60	26021015A	31.51	0.004 – 0.009	0.002 – 0.004
2.0	6	5	50	2	26021020	21.56	26021020A	28.80	0.004 – 0.010	0.002 – 0.005
2.5	6	5	50	2	26021025	21.56	26021025A	28.80	0.004 – 0.010	0.002 – 0.005
3.0	6	7	57	2	26021030	21.56	26021030A	28.80	0.005 – 0.015	0.003 – 0.010
3.5	6	7	57	2	26021035	21.56	26021035A	28.80	0.005 – 0.015	0.003 – 0.010
4.0	6	8	57	2	26021040	21.20	26021040A	28.38	0.009 – 0.023	0.007 – 0.018
4.5	6	8	57	2	26021045	23.60	26021045A	31.31	0.009 – 0.023	0.007 – 0.018
5.0	6	10	57	2	26021050	21.20	26021050A	28.38	0.011 – 0.025	0.009 – 0.020
5.5	6	10	57	2	26021055	23.60	26021055A	31.31	0.011 – 0.025	0.009 – 0.020
6.0	6	10	57	2	26021060	21.20	26021060A	28.38	0.013 – 0.029	0.011 – 0.024
7.0	8	13	63	2	26021070	27.28	26021070A	42.29	0.015 – 0.034	0.013 – 0.029
8.0	8	16	63	2	26021080	25.00	26021080A	32.61	0.018 – 0.037	0.016 – 0.032
9.0	10	16	72	2	26021090	42.45	26021090A	53.29	0.021 – 0.040	0.019 – 0.035
10.0	10	19	72	2	26021100	39.71	26021100A	51.53	0.023 – 0.043	0.021 – 0.038
12.0	12	22	83	2	26021120	57.38	26021120A	75.79	0.028 – 0.051	0.026 – 0.046
14.0	14	22	83	2	26021140	76.61	26021140A	101.67	0.031 – 0.055	0.029 – 0.050
16.0	16	26	92	2	26021160	100.86	26021160A	132.76	0.034 – 0.059	0.032 – 0.054
18.0	18	26	92	2	26021180	130.71	26021180A	172.78	0.037 – 0.063	0.035 – 0.058
20.0	20	32	104	2	26021200	158.62	26021200A	210.47	0.043 – 0.071	0.038 – 0.066

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

Material	General structured steels	Free machining steels	Alloy Q & T steels	Non-alloy case-hardened steels	Tool steels	Stainless steels	Cast iron	Cast iron (GGG,GT)	Aluminium
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 1400 N/mm²	< 850 N/mm²	< 180 HB – > 180 HB	> 260 HB	> 600 N/mm²
V_c (m/min) Finishing	90	70	70	100	95	45	110	90	200
V_c (m/min) Roughing	75	55	55	85	80	30	95	75	185

Product family 160

10209




Solid Carbide End Mill

Short version

d_1	d_2	l_2	l_1		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
1.0	6	5	50	2	10209010	11.64	0.004	–	0.009	0.002	–	0.004
2.0	6	6	50	2	10209020	11.64	0.004	–	0.010	0.002	–	0.005
3.0	6	6	50	2	10209030	11.64	0.005	–	0.015	0.003	–	0.010
4.0	6	8	50	2	10209040	11.64	0.009	–	0.023	0.007	–	0.018
5.0	6	8	50	2	10209050	11.64	0.011	–	0.025	0.009	–	0.020
6.0	6	16	50	2	10209060	13.12	0.013	–	0.029	0.011	–	0.024
8.0	8	20	60	2	10209080	18.99	0.018	–	0.037	0.016	–	0.032
10.0	10	22	70	2	10209100	26.30	0.023	–	0.043	0.021	–	0.038
12.0	12	22	70	2	10209120	34.46	0.028	–	0.051	0.026	–	0.046
16.0	16	25	75	2	10209160	57.48	0.034	–	0.059	0.032	–	0.054
20.0	20	32	100	2	10209200	95.73	0.043	–	0.071	0.038	–	0.066

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

- For universal applications
- Centre-cut

d_1	d_2
h10	h6

Material	General structured steels	Free machining steels	Alloy Q & T steels	Non-alloy case-hardened steels	Tool steels	Stainless steels	Cast iron	Cast iron (GGG,GT)	Aluminium
Tensile strength / Hardness	< 850 N/mm²	< 1000 N/mm²	< 1200 N/mm²	< 750 N/mm²	< 1400 N/mm²	< 850 N/mm²	< 180 HB – > 180 HB	> 260 HB	> 600 N/mm²
V_c (m/min) Finishing	90	70	70	100	40	45	115	90	200
V_c (m/min) Roughing	75	55	55	85	25	30	100	75	180

Product family 163

25321

Manu-facturer standard

Solid Carbide End Mill
Long version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	19	57	2	25321030	23.53	25321030A	31.08	0.005 – 0.012	0.003 – 0.010
4.0	4	19	57	2	25321040	26.02	25321040A	34.84	0.009 – 0.020	0.007 – 0.018
4.5	5	25	75	2	25321045	29.78	25321045A	43.76	0.009 – 0.020	0.007 – 0.018
5.0	5	25	75	2	25321050	29.78	25321050A	43.76	0.011 – 0.022	0.009 – 0.020
5.5	6	30	75	2	25321055	34.53	25321055A	45.73	0.011 – 0.022	0.009 – 0.020
6.0	6	30	75	2	25321060	34.53	25321060A	45.73	0.013 – 0.026	0.011 – 0.024
8.0	8	30	75	2	25321080	42.45	25321080A	56.08	0.018 – 0.034	0.016 – 0.032
10.0	10	32	75	2	25321100	63.86	25321100A	77.87	0.023 – 0.040	0.021 – 0.038
12.0	12	45	100	2	25321120	98.15	25321120A	118.38	0.028 – 0.046	0.026 – 0.046
14.0	14	45	100	2	25321140	150.14	25321140A	171.03	0.028 – 0.046	0.026 – 0.046
16.0	16	45	100	2	25321160	182.98	25321160A	201.52	0.034 – 0.056	0.032 – 0.054
18.0	18	45	100	2	25321180	231.22	25321180A	269.10	0.034 – 0.056	0.032 – 0.054
20.0	20	45	100	2	25321200	274.08	25321200A	318.21	0.040 – 0.068	0.038 – 0.066
25.0	25	45	100	2	25321250	471.13	25321250A	527.74	0.040 – 0.068	0.038 – 0.066

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

28002

Manu-facturer standard

Solid Carbide End Mill
Extra-long version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	20	60	2	28002030	26.97	28002030A	35.61	0.005 – 0.012	0.003 – 0.010
4.0	4	25	60	2	28002040	28.88	28002040A	38.49	0.009 – 0.020	0.007 – 0.018
5.0	5	32	100	2	28002050	31.58	28002050A	41.86	0.011 – 0.022	0.009 – 0.020
6.0	6	38	100	2	28002060	42.29	28002060A	55.71	0.013 – 0.026	0.011 – 0.024
8.0	8	45	100	2	28002080	53.29	28002080A	70.50	0.018 – 0.034	0.016 – 0.032
10.0	10	45	100	2	28002100	81.65	28002100A	102.06	0.023 – 0.040	0.021 – 0.038
12.0	12	75	150	2	28002120	156.44	28002120A	179.18	0.028 – 0.046	0.026 – 0.046
14.0	14	75	150	2	28002140	206.89	28002140A	232.52	0.028 – 0.046	0.026 – 0.046
16.0	16	75	150	2	28002160	253.06	28002160A	285.23	0.034 – 0.056	0.032 – 0.054
18.0	18	75	150	2	28002180	288.73	28002180A	327.75	0.034 – 0.056	0.032 – 0.054
20.0	20	75	150	2	28002200	353.03	28002200A	398.57	0.040 – 0.068	0.038 – 0.066
25.0	25	75	150	2	28002250	570.03	28002250A	629.78	0.040 – 0.068	0.038 – 0.066

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	105	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 160

23001




Solid Carbide End Mill

Short version

d_1	d_2	l_2	l_1		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
1.0	6	2	50	3	23001010A	17.66	0.004	–	0.009	0.002	–	0.004
1.8	6	2	50	3	23001018A	17.66	0.004	–	0.010	0.002	–	0.005
2.0	6	4	50	3	23001020A	17.66	0.004	–	0.010	0.002	–	0.005
2.8	6	4	50	3	23001028A	17.66	0.005	–	0.015	0.003	–	0.010
3.0	6	5	50	3	23001030A	17.66	0.005	–	0.015	0.003	–	0.010
4.0	6	7	50	3	23001040A	17.66	0.009	–	0.023	0.007	–	0.018
4.8	6	7	50	3	23001048A	17.66	0.011	–	0.025	0.009	–	0.020
5.0	6	8	50	3	23001050A	17.66	0.011	–	0.025	0.009	–	0.020

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

d_1	d_2
h10	h6

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

25031




Solid Carbide End Mill

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	3	3	38	3	25031010	15.04	25031010A	22.08	0.004 – 0.009	0.002 – 0.004
1.5	3	5	38	3	25031015	13.93	25031015A	20.88	0.004 – 0.009	0.002 – 0.004
2.0	3	7	38	3	25031020	13.93	25031020A	20.88	0.004 – 0.010	0.002 – 0.005
2.5	3	7	38	3	25031025	13.93	25031025A	20.88	0.004 – 0.010	0.002 – 0.005
3.0	3	9	38	3	25031030	13.93	25031030A	20.88	0.005 – 0.015	0.003 – 0.010
3.5	4	11	50	3	25031035	18.40	25031035A	25.57	0.005 – 0.015	0.003 – 0.010
4.0	4	11	50	3	25031040	18.40	25031040A	25.57	0.009 – 0.023	0.007 – 0.018
4.5	5	11	50	3	25031045	20.53	25031045A	27.04	0.009 – 0.023	0.007 – 0.018
5.0	5	10	50	3	25031050	17.96	25031050A	25.16	0.011 – 0.025	0.009 – 0.020
5.5	6	10	57	3	25031055	21.85	25031055A	29.12	0.011 – 0.025	0.009 – 0.020
6.0	6	10	57	3	25031060	20.09	25031060A	26.68	0.013 – 0.029	0.011 – 0.024
6.75	8	13	63	3	250310675	28.73	250310675A	43.25	0.013 – 0.029	0.011 – 0.024
7.0	8	13	63	3	25031070	27.04	25031070A	35.79	0.016 – 0.034	0.014 – 0.029
7.75	8	16	63	3	250310775	28.73	250310775A	43.25	0.016 – 0.034	0.014 – 0.029
8.0	8	16	63	3	25031080	23.38	25031080A	31.00	0.018 – 0.037	0.016 – 0.032
8.7	10	19	72	3	25031087	46.49	25031087A	65.34	0.018 – 0.037	0.016 – 0.032
9.0	10	16	72	3	25031090	40.61	25031090A	48.30	0.021 – 0.041	0.019 – 0.036
9.7	10	19	72	3	25031097	46.49	25031097A	61.21	0.021 – 0.041	0.019 – 0.036
10.0	10	19	72	3	25031100	38.79	25031100A	51.18	0.023 – 0.043	0.021 – 0.038
11.0	12	22	72	3	25031110	61.59	25031110A	77.87	0.026 – 0.048	0.024 – 0.043
11.7	12	22	83	3	25031117	74.62	25031117A	95.67	0.026 – 0.048	0.024 – 0.043
12.0	12	22	83	3	25031120	56.15	25031120A	74.72	0.028 – 0.051	0.026 – 0.046
13.7	14	22	83	3	25031137	78.82	25031137A	107.17	0.032 – 0.055	0.030 – 0.050
14.0	14	22	83	3	25031140	75.50	25031140A	100.06	0.032 – 0.055	0.030 – 0.050
15.7	16	26	92	3	25031157	108.86	25031157A	137.74	0.034 – 0.059	0.032 – 0.054
16.0	16	26	92	3	25031160	95.14	25031160A	126.53	0.034 – 0.059	0.032 – 0.054
17.7	18	26	92	3	25031177	137.68	25031177A	186.19	0.036 – 0.067	0.034 – 0.062
18.0	18	26	92	3	25031180	128.80	25031180A	162.14	0.038 – 0.069	0.036 – 0.064
19.7	20	32	104	3	25031197	178.28	25031197A	210.07	0.038 – 0.069	0.036 – 0.064
20.0	20	32	104	3	25031200	156.74	25031200A	198.37	0.040 – 0.071	0.038 – 0.066
22.0	22	32	104	3	25031220	252.02	25031220A	316.08	0.043 – 0.074	0.041 – 0.069
25.0	25	32	104	3	25031250	288.97	25031250A	348.73	0.064 – 0.089	0.062 – 0.084
32.0	32	32	104	3	25031320	607.87	25031320A	665.91	0.097 – 0.115	0.095 – 0.110

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

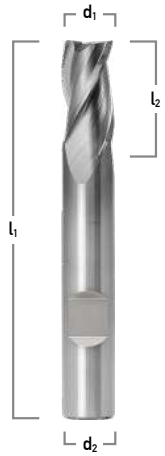
Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 160

26031

Solid Carbide End Mill



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	5	50	3	26031010	23.60	26031010A	31.51	0.012 – 0.042	0.010 – 0.040
1.5	6	5	50	3	26031015	23.60	26031015A	31.51	0.012 – 0.042	0.010 – 0.040
2.0	6	5	50	3	26031020	21.56	26031020A	28.80	0.012 – 0.042	0.010 – 0.040
2.5	6	5	50	3	26031025	21.56	26031025A	28.80	0.012 – 0.042	0.010 – 0.040
3.0	6	7	57	3	26031030	21.56	26031030A	28.80	0.012 – 0.042	0.010 – 0.040
3.5	6	7	57	3	26031035	21.56	26031035A	28.80	0.012 – 0.042	0.010 – 0.040
4.0	6	8	57	3	26031040	21.20	26031040A	28.38	0.022 – 0.062	0.020 – 0.060
4.5	6	8	57	3	26031045	23.60	26031045A	31.31	0.022 – 0.062	0.020 – 0.060
5.0	6	10	57	3	26031050	21.20	26031050A	28.38	0.022 – 0.062	0.020 – 0.060
5.5	6	10	57	3	26031055	23.60	26031055A	31.31	0.022 – 0.062	0.020 – 0.060
6.0	6	10	57	3	26031060	21.20	26031060A	28.38	0.052 – 0.082	0.050 – 0.080
7.0	8	13	63	3	26031070	27.28	26031070A	42.29	0.052 – 0.082	0.050 – 0.080
8.0	8	16	63	3	26031080	25.00	26031080A	32.61	0.052 – 0.082	0.050 – 0.080
9.0	10	16	72	3	26031090	42.45	26031090A	53.29	0.052 – 0.082	0.050 – 0.080
10.0	10	19	72	3	26031100	39.71	26031100A	51.53	0.082 – 0.132	0.080 – 0.130
12.0	12	22	83	3	26031120	57.38	26031120A	75.79	0.082 – 0.132	0.080 – 0.130
14.0	14	22	83	3	26031140	76.61	26031140A	101.67	0.082 – 0.132	0.080 – 0.130
16.0	16	26	92	3	26031160	100.86	26031160A	132.76	0.142 – 0.212	0.140 – 0.210
18.0	18	26	92	3	26031180	130.71	26031180A	172.78	0.142 – 0.212	0.140 – 0.210
20.0	20	32	104	3	26031200	158.62	26031200A	210.47	0.142 – 0.212	0.140 – 0.210

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 160

25331


Uncoated
Alcrona Pro
Z 3
HA
30°

VHM
Type N

Manu-facturer standard

Solid Carbide End Mill

Long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	19	57	3	25331030	23.53	25331030A	31.08	0.009 – 0.030	0.007 – 0.028
4.0	4	19	57	3	25331040	26.02	25331040A	34.84	0.012 – 0.037	0.010 – 0.035
4.5	5	25	75	3	25331045	29.78	25331045A	43.76	0.012 – 0.037	0.010 – 0.035
5.0	5	25	75	3	25331050	29.78	25331050A	43.76	0.017 – 0.037	0.015 – 0.035
6.0	6	30	75	3	25331060	34.53	25331060A	45.73	0.027 – 0.042	0.025 – 0.040
8.0	8	30	75	3	25331080	42.45	25331080A	56.08	0.032 – 0.052	0.030 – 0.050
10.0	10	32	75	3	25331100	63.86	25331100A	77.87	0042 – 0.072	0.040 – 0.070
12.0	12	45	100	3	25331120	98.15	25331120A	118.38	0.062 – 0.092	0.060 – 0.090
14.0	14	45	100	3	25331140	150.14	25331140A	171.03	0.072 – 0.112	0.070 – 0.110
16.0	16	45	100	3	25331160	182.98	25331160A	201.52	0.092 – 0.132	0.090 – 0.130
18.0	18	45	100	3	25331180	231.22	25331180A	269.10	0.112 – 0.152	0.110 – 0.150
20.0	20	45	100	3	25331200	274.08	25331200A	318.21	0.132 – 0.172	0.130 – 0.170
25.0	25	45	100	3	25331250	471.13	25331250A	527.74	0.152 – 0.192	0.150 – 0.190

d_1	d_2
h10	h6


Peripheral milling
a_e = 0.25xD
a_p = 2.0xD


Full slot milling
a_p = 0.5xD

Product family 160

10309


TiAlN
Z 3

HB
30°

VHM
Type N

Manu-facturer standard

Solid Carbide End Mill

Short version

d_1	d_2	l_2	l_1		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	5	50	3	10309010	11.64	0.008 – 0.017	0.006 – 0.015
2.0	6	6	50	3	10309020	11.64	0.008 – 0.017	0.006 – 0.015
3.0	6	6	50	3	10309030	11.64	0.009 – 0.030	0.007 – 0.028
4.0	6	8	50	3	10309040	11.64	0.012 – 0.037	0.010 – 0.035
5.0	6	8	50	3	10309050	11.64	0.017 – 0.037	0.015 – 0.035
6.0	6	16	50	3	10309060	13.12	0.027 – 0.042	0.025 – 0.040
8.0	8	20	60	3	10309080	18.99	0.032 – 0.052	0.030 – 0.050
10.0	10	22	70	3	10309100	26.30	0.042 – 0.072	0.040 – 0.070
12.0	12	22	70	3	10309120	34.46	0.062 – 0.092	0.060 – 0.090
16.0	16	25	75	3	10309160	57.48	0.092 – 0.132	0.090 – 0.130
20.0	20	32	100	3	10309200	95.73	0.132 – 0.172	0.130 – 0.170

d_1	d_2
h10	h6


Peripheral milling
a_e = 0.25xD
a_p = 2.0xD


Full slot milling
a_p = 0.5xD

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 163

46031

Solid Carbide End Mill

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	3*	2	38	3	46031010	25.09	46031010A	32.99	0.004 – 0.010	0.002 – 0.006
1.5	3*	3	38	3	46031015	25.09	46031015A	32.99	0.004 – 0.010	0.002 – 0.006
2.0	6	6	57	3	46031020	25.09	46031020A	32.99	0.005 – 0.010	0.003 – 0.008
2.5	6	7	57	3	46031025	25.09	46031025A	32.99	0.005 – 0.010	0.003 – 0.008
3.0	6	7	57	3	46031030	25.09	46031030A	32.99	0.006 – 0.015	0.004 – 0.010
3.5	6	8	57	3	46031035	25.09	46031035A	32.99	0.009 – 0.030	0.007 – 0.028
4.0	6	8	57	3	46031040	25.09	46031040A	32.99	0.012 – 0.037	0.010 – 0.035
4.5	6	10	57	3	46031045	25.09	46031045A	32.99	0.012 – 0.037	0.010 – 0.035
5.0	6	10	57	3	46031050	25.09	46031050A	32.99	0.017 – 0.037	0.015 – 0.035
5.5	6	10	57	3	46031055	25.09	46031055A	32.99	0.017 – 0.037	0.015 – 0.035
6.0	6	10	57	3	46031060	25.09	46031060A	32.99	0.027 – 0.042	0.025 – 0.040
6.5	8	16	63	3	46031065	29.47	46031065A	38.66	0.015 – 0.030	0.013 – 0.025
7.0	8	16	63	3	46031070	29.47	46031070A	38.66	0.018 – 0.034	0.016 – 0.029
7.5	8	19	63	3	46031075	29.47	46031075A	38.66	0.018 – 0.034	0.016 – 0.029
8.0	8	19	63	3	46031080	29.69	46031080A	39.03	0.032 – 0.052	0.030 – 0.050
9.0	10	19	72	3	46031090	46.10	46031090A	60.59	0.024 – 0.041	0.022 – 0.036
10.0	10	22	72	3	46031100	48.60	46031100A	58.29	0.042 – 0.072	0.040 – 0.070
12.0	12	22	83	3	46031120	69.88	46031120A	83.50	0.062 – 0.092	0.060 – 0.090
14.0	14	22	83	3	46031140	87.90	46031140A	104.42	0.072 – 0.112	0.070 – 0.110
16.0	16	26	92	3	46031160	116.53	46031160A	137.77	0.092 – 0.132	0.090 – 0.130
18.0	18	26	92	3	46031180	139.86	46031180A	165.88	0.112 – 0.152	0.110 – 0.150
20.0	20	32	104	3	46031200	184.86	46031200A	282.59	0.132 – 0.172	0.130 – 0.170

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

10319

TiAlN | Z 3 | HB | 45° | VHM | Type N | Manufacturer standard

Solid Carbide End Mill
Long version

d_1	d_2	l_2	l_1		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
1.0	6	5	57	3	10319010	11.95	0.004 –	0.010	0.002 –	0.006
2.0	6	6	57	3	10319020	11.95	0.005 –	0.010	0.003 –	0.008
3.0	6	7	57	3	10319030	11.95	0.009 –	0.030	0.007 –	0.028
4.0	6	8	57	3	10319040	11.95	0.012 –	0.037	0.010 –	0.035
5.0	6	10	57	3	10319050	11.95	0.017 –	0.037	0.015 –	0.035
6.0	6	10	57	3	10319060	13.43	0.027 –	0.042	0.025 –	0.040
8.0	8	16	63	3	10319080	20.23	0.032 –	0.052	0.030 –	0.050
10.0	10	19	72	3	10319100	26.30	0.042 –	0.072	0.040 –	0.070
12.0	12	22	83	3	10319120	38.26	0.062 –	0.092	0.060 –	0.090
16.0	16	26	92	3	10319160	64.75	0.092 –	0.132	0.090 –	0.130
20.0	20	32	104	3	10319200	99.84	0.132 –	0.172	0.130 –	0.170

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

d_1	d_2
h10	h6

Product family 163

28003

Uncoated | Alcrona Pro | Z 3 | HA | 30° | VHM | Type N | Manufacturer standard

Solid Carbide End Mill
Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z		mm/Z	
3.0	3	20	60	3	28003030	26.97	28003030A	35.61	0.009 –	0.030	0.007 –	0.028
4.0	4	25	60	3	28003040	28.88	28003040A	38.49	0.012 –	0.037	0.010 –	0.035
5.0	5	32	100	3	28003050	31.58	28003050A	41.86	0.017 –	0.037	0.015 –	0.035
6.0	6	38	100	3	28003060	42.29	28003060A	55.71	0.027 –	0.042	0.025 –	0.040
8.0	8	45	100	3	28003080	53.29	28003080A	70.50	0.032 –	0.052	0.030 –	0.050
10.0	10	45	100	3	28003100	81.65	28003100A	102.06	0.042 –	0.072	0.040 –	0.070
12.0	12	75	150	3	28003120	156.44	28003120A	179.18	0.062 –	0.092	0.060 –	0.090
14.0	14	75	150	3	28003140	206.89	28003140A	232.52	0.072 –	0.112	0.070 –	0.110
16.0	16	75	150	3	28003160	253.06	28003160A	285.23	0.092 –	0.132	0.090 –	0.130
18.0	18	75	150	3	28003180	288.73	28003180A	327.75	0.112 –	0.152	0.110 –	0.150
20.0	20	75	150	3	28003200	353.03	28003200A	398.57	0.132 –	0.172	0.130 –	0.170
25.0	25	75	150	3	28003250	570.10	28003250A	629.78	0.152 –	0.192	0.150 –	0.190

Peripheral milling
a_e = 0.2xD
a_p = 3.0xD

Full slot milling
a_p = 0.25xD

d_1	d_2
h10	h6

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 160

25041

Solid Carbide End Mill

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	3	3	38	4	25041010	15.04	25041010A	22.08	0.003 – 0.010	0.002 – 0.005
1.5	3	5	38	4	25041015	13.93	25041015A	20.88	0.003 – 0.010	0.002 – 0.005
2.0	3	7	38	4	25041020	13.93	25041020A	20.88	0.004 – 0.014	0.003 – 0.010
2.5	3	7	38	4	25041025	13.93	25041025A	20.88	0.004 – 0.014	0.003 – 0.010
3.0	3	9	38	4	25041030	13.93	25041030A	20.88	0.007 – 0.019	0.004 – 0.015
3.5	4	11	50	4	25041035	18.40	25041035A	25.57	0.007 – 0.019	0.004 – 0.015
4.0	4	11	50	4	25041040	18.40	25041040A	25.57	0.012 – 0.026	0.005 – 0.020
4.5	5	11	50	4	25041045	20.53	25041045A	27.04	0.012 – 0.026	0.005 – 0.020
5.0	5	13	50	4	25041050	17.96	25041050A	25.16	0.014 – 0.028	0.010 – 0.015
5.5	6	13	57	4	25041055	21.85	25041055A	29.12	0.014 – 0.028	0.010 – 0.015
6.0	6	13	57	4	25041060	20.09	25041060A	26.68	0.017 – 0.039	0.015 – 0.020
7.0	8	16	63	4	25041070	27.04	25041070A	35.79	0.024 – 0.053	0.020 – 0.025
8.0	8	16	63	4	25041080	23.38	25041080A	31.00	0.028 – 0.060	0.025 – 0.045
9.0	10	19	72	4	25041090	40.61	25041090A	48.30	0.028 – 0.060	0.025 – 0.045
10.0	10	22	72	4	25041100	38.79	25041100A	51.18	0.035 – 0.065	0.030 – 0.050
11.0	12	22	72	4	25041110	61.59	25041110A	77.87	0.040 – 0.072	0.035 – 0.060
12.0	12	26	83	4	25041120	56.15	25041120A	74.72	0.060 – 0.083	0.055 – 0.070
14.0	14	26	83	4	25041140	75.50	25041140A	100.06	0.070 – 0.090	0.065 – 0.085
16.0	16	32	92	4	25041160	95.14	25041160A	126.53	0.080 – 0.110	0.075 – 0.105
18.0	18	32	92	4	25041180	128.80	25041180A	162.14	0.095 – 0.120	0.085 – 0.115
20.0	20	38	104	4	25041200	156.74	25041200A	198.37	0.110 – 0.130	0.095 – 0.125
22.0	22	38	104	4	25041220	252.02	25041220A	316.08	0.130 – 0.155	0.120 – 0.150
25.0	25	38	104	4	25041250	288.97	25041250A	348.73	0.140 – 0.175	0.135 – 0.165
32.0	32	38	104	4	25041320	607.87	25041320A	665.91	0.180 – 0.200	0.160 – 0.190

Peripheral milling
a_e = 0.3xD
a_p = 1.0xD

Full slot milling
a_p = 0.75xD

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 160

26041



Solid Carbide End Mill

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	5	50	4	26041010	23.60	26041010A	31.51	0.003 – 0.010	0.002 – 0.005
1.5	6	5	50	4	26041015	23.60	26041015A	31.51	0.003 – 0.010	0.002 – 0.005
2.0	6	5	50	4	26041020	21.56	26041020A	28.80	0.004 – 0.014	0.003 – 0.010
2.5	6	8	50	4	26041025	21.56	26041025A	28.80	0.004 – 0.014	0.003 – 0.010
3.0	6	8	57	4	26041030	21.56	26041030A	28.80	0.007 – 0.019	0.005 – 0.012
3.5	6	10	57	4	26041035	21.56	26041035A	28.80	0.007 – 0.019	0.005 – 0.012
4.0	6	11	57	4	26041040	21.20	26041040A	28.38	0.012 – 0.026	0.010 – 0.017
4.5	6	11	57	4	26041045	23.60	26041045A	31.31	0.012 – 0.026	0.010 – 0.017
5.0	6	13	57	4	26041050	21.20	26041050A	28.38	0.014 – 0.028	0.012 – 0.022
5.5	6	13	57	4	26041055	23.60	26041055A	31.31	0.014 – 0.028	0.012 – 0.022
6.0	6	13	57	4	26041060	21.20	26041060A	28.38	0.017 – 0.039	0.015 – 0.025
7.0	8	16	63	4	26041070	27.28	26041070A	42.29	0.020 – 0.045	0.018 – 0.035
8.0	8	19	63	4	26041080	25.00	26041080A	32.61	0.024 – 0.053	0.021 – 0.045
9.0	10	19	72	4	26041090	42.45	26041090A	53.29	0.028 – 0.060	0.024 – 0.045
10.0	10	22	72	4	26041100	39.71	26041100A	51.53	0.030 – 0.065	0.026 – 0.050
12.0	12	26	83	4	26041120	57.38	26041120A	75.79	0.036 – 0.079	0.029 – 0.060
14.0	14	26	83	4	26041140	76.61	26041140A	101.67	0.040 – 0.086	0.035 – 0.070
16.0	16	32	92	4	26041160	100.86	26041160A	132.76	0.045 – 0.095	0.040 – 0.080
18.0	18	32	92	4	26041180	130.71	26041180A	172.78	0.050 – 0.105	0.045 – 0.090
20.0	20	38	104	4	26041200	158.62	26041200A	210.47	0.057 – 0.110	0.050 – 0.100

Peripheral milling
a_e = 0.3xD
a_p = 1.0xD

Full slot milling
a_p = 0.75xD

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 160

25341

Solid Carbide End Mill
Long version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	19	57	4	25341030	23.53	25341030A	31.08	0.003 – 0.010	0.002 – 0.005
4.0	4	19	57	4	25341040	26.02	25341040A	34.84	0.005 – 0.019	0.003 – 0.010
5.0	5	25	75	4	25341050	29.78	25341050A	43.76	0.006 – 0.020	0.005 – 0.015
6.0	6	30	75	4	25341060	34.53	25341060A	45.73	0.008 – 0.025	0.006 – 0.020
8.0	8	30	75	4	25341080	42.45	25341080A	56.08	0.012 – 0.032	0.010 – 0.025
10.0	10	32	75	4	25341100	63.86	25341100A	77.87	0.015 – 0.039	0.013 – 0.030
12.0	12	45	100	4	25341120	98.15	25341120A	118.38	0.018 – 0.048	0.015 – 0.040
14.0	14	45	100	4	25341140	150.14	25341140A	171.03	0.021 – 0.053	0.018 – 0.045
16.0	16	45	100	4	25341160	182.98	25341160A	201.52	0.023 – 0.058	0.021 – 0.050
18.0	18	45	100	4	25341180	231.22	25341180A	269.10	0.025 – 0.066	0.023 – 0.055
20.0	20	45	100	4	25341200	274.08	25341200A	318.21	0.028 – 0.073	0.025 – 0.060

Peripheral milling
a_e = 0.3xD
a_p = 1.0xD

Full slot milling
a_p = 0.35xD

Product family 160

10409

Solid Carbide End Mill
Short version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	5	50	4	10409010	11.64	0.003 – 0.010	0.002 – 0.005
2.0	6	7	50	4	10409020	11.64	0.003 – 0.010	0.002 – 0.005
3.0	6	8	50	4	10409030	11.64	0.004 – 0.014	0.003 – 0.010
4.0	6	11	50	4	10409040	11.64	0.005 – 0.019	0.003 – 0.010
5.0	6	13	50	4	10409050	11.64	0.006 – 0.020	0.005 – 0.015
6.0	6	16	50	4	10409060	13.12	0.008 – 0.025	0.006 – 0.020
8.0	8	20	60	4	10409080	18.99	0.012 – 0.032	0.010 – 0.025
10.0	10	22	70	4	10409100	26.30	0.015 – 0.039	0.013 – 0.030
12.0	12	22	70	4	10409120	34.46	0.018 – 0.048	0.015 – 0.040
16.0	16	25	75	4	10409160	57.48	0.023 – 0.058	0.021 – 0.050
20.0	20	32	100	4	10409200	95.73	0.028 – 0.073	0.025 – 0.060

Peripheral milling
a_e = 0.25xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 163

10419




Solid Carbide End Mill

Long version

d_1	d_2	l_2	l_1		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	3	50	4	10419010	11.64	0.003 – 0.010	0.002 – 0.005
2.0	6	4	50	4	10419020	11.64	0.003 – 0.010	0.002 – 0.005
3.0	6	6	50	4	10419030	11.64	0.004 – 0.014	0.003 – 0.010
4.0	6	8	50	4	10419040	11.64	0.005 – 0.019	0.003 – 0.010
5.0	6	8	50	4	10419050	11.64	0.006 – 0.020	0.005 – 0.015
6.0	6	13	57	4	10419060	13.43	0.008 – 0.025	0.006 – 0.020
8.0	8	19	63	4	10419080	20.23	0.012 – 0.032	0.010 – 0.025
10.0	10	22	72	4	10419100	26.30	0.015 – 0.039	0.013 – 0.030
12.0	12	26	83	4	10419120	38.26	0.018 – 0.048	0.015 – 0.040
16.0	16	32	92	4	10419160	64.75	0.023 – 0.058	0.021 – 0.050
20.0	20	38	104	4	10419200	99.84	0.028 – 0.073	0.025 – 0.060

Peripheral milling
$a_e = 0.25xD$
$a_p = 2.0xD$

Full slot milling
$a_p = 1.0xD$

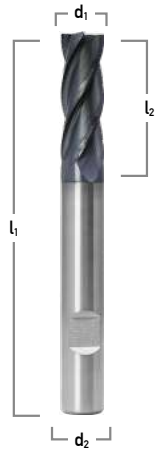
d_1	d_2
h10	h6

10429




Solid Carbide End Mill

Extra-long version



d_1	d_2	l_2	l_1		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
3.0	6	12	50	4	10429030	11.95	0.009 – 0.030	0.007 – 0.028
4.0	6	15	50	4	10429040	11.95	0.012 – 0.037	0.010 – 0.035
5.0	6	20	60	4	10429050	16.05	0.017 – 0.037	0.015 – 0.035
6.0	6	20	60	4	10429060	17.52	0.027 – 0.042	0.025 – 0.040
8.0	8	25	70	4	10429080	21.92	0.032 – 0.052	0.030 – 0.050
10.0	10	30	90	4	10429100	31.44	0.042 – 0.072	0.040 – 0.070
12.0	12	30	90	4	10429120	41.86	0.062 – 0.092	0.060 – 0.090
16.0	16	50	110	4	10429160	74.91	0.092 – 0.132	0.090 – 0.130
20.0	20	55	110	4	10429200	110.26	0.132 – 0.172	0.130 – 0.170

Peripheral milling
$a_e = 0.2xD$
$a_p = 2.0xD$

Full slot milling
$a_p = 0.3xD$

d_1	d_2
h10	h6

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 163

28004

Solid Carbide End Mill

Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	20	60	4	28004030	26.97	28004030A	35.61	0.004 – 0.015	0.002 – 0.010
4.0	4	25	60	4	28004040	28.88	28004040A	38.49	0.007 – 0.024	0.005 – 0.019
5.0	5	32	100	4	28004050	31.58	28004050A	41.86	0.008 – 0.025	0.006 – 0.020
6.0	6	38	100	4	28004060	42.29	28004060A	55.71	0.010 – 0.035	0.008 – 0.025
8.0	8	45	100	4	28004080	53.29	28004080A	70.50	0.014 – 0.037	0.012 – 0.032
10.0	10	45	100	4	28004100	81.65	28004100A	102.06	0.017 – 0.044	0.015 – 0.039
12.0	12	75	150	4	28004120	156.44	28004120A	179.18	0.020 – 0.053	0.018 – 0.048
14.0	14	75	150	4	28004140	206.89	28004140A	232.52	0.023 – 0.059	0.021 – 0.054
16.0	16	75	150	4	28004160	253.06	28004160A	285.23	0.025 – 0.063	0.023 – 0.058
18.0	18	75	150	4	28004180	288.73	28004180A	327.75	0.027 – 0.069	0.025 – 0.064
20.0	20	75	150	4	28004200	353.03	28004200A	398.57	0.030 – 0.078	0.028 – 0.073
25.0	25	75	150	4	28004250	570.10	28004250A	629.78	0.038 – 0.103	0.035 – 0.098

Peripheral milling
a_e = 0.2xD
a_p = 2.0xD

Full slot milling
a_p = 0.3xD

d_1	d_2
h10	h6

Material	Steel	Stainless	Cast	Alu	Titanium
Tensile strength / Hardness	< 1200 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²	<850 N/mm²
V_c (m/min) Finishing	100	65	125	220	70
V_c (m/min) Roughing	85	45	105	200	50

Product family 160

10609




Solid Carbide Finishing End Mill

Long version

d_1	d_2	l_2	l_1		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
6.0	6	13	57	6	10609060	15.89	0.030	–	0.040	0.025	–	0.040
8.0	8	19	63	6	10609080	20.44	0.040	–	0.050	0.030	–	0.045
10.0	10	22	72	6	10609100	32.11	0.050	–	0.065	0.040	–	0.065
12.0	12	26	83	6	10609120	39.37	0.060	–	0.080	0.050	–	0.080
16.0	16	32	92	6	10609160	67.06	0.070	–	0.095	0.060	–	0.095
20.0	20	38	104	8	10609200	102.56	0.090	–	0.120	0.075	–	0.115

Peripheral milling
$a_e = 0.3xD$
$a_p = 3.0xD$

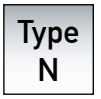
Full slot milling
$a_p = 0.25xD$

d_1	d_2
h10	h6

Material	Steel	Stainless	Cast
Tensile strength / Hardness	< 750N/mm²	< 900 N/mm²	< 800 N/mm²
V_c (m/min) Finishing	110	70	110
V_c (m/min) Roughing	90	50	90

Product family 163

28550A


Solid Carbide Finishing End Mill

d_1	d_2	l_2	l_1		coated		f_z Finishing		
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		
3.0	6	13	57	6	28550030A	37.53	0.002	–	0.013
4.0	6	13	57	6	28550040A	32.86	0.006	–	0.024
5.0	6	13	57	6	28550050A	32.86	0.010	–	0.025
6.0	6	13	57	6	28550060A	32.03	0.013	–	0.033
7.0	8	16	63	6	28550070A	39.22	0.016	–	0.040
8.0	8	19	63	6	28550080A	37.60	0.019	–	0.047
9.0	10	19	72	6	28550090A	62.38	0.021	–	0.051
10.0	10	22	72	6	28550100A	60.50	0.025	–	0.060
12.0	12	26	83	6	28550120A	80.43	0.030	–	0.072
14.0	14	26	83	6	28550140A	109.44	0.035	–	0.080
16.0	16	32	92	8	28550160A	144.63	0.038	–	0.088
18.0	18	32	92	8	28550180A	167.28	0.042	–	0.095
20.0	20	38	104	8	28550200A	205.41	0.045	–	0.100

Peripheral milling
$a_e = 0.3xD$
$a_p = 3.0xD$

Full slot milling
$a_p = 0.25xD$

d_1	d_2
h10	h6

Material	Steel	Stainless	Cast
Tensile strength / Hardness	< 750N/mm²	< 900 N/mm²	< 800 N/mm²
V_c (m/min) Finishing	110	70	110

28620


Z 4



VHM
Type N

Manu-facturer standard
HPC

Solid Carbide Torus Cutter

Short version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	CR		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	6	50	0.3	4	286203003	60.33	0.003 – 0.008	0.002 – 0.006
3.0	3	6	50	0.5	4	286203005	60.33	0.003 – 0.008	0.002 – 0.006
4.0	4	8	60	0.3	4	286204003	67.89	0.005 – 0.015	0.003 – 0.013
4.0	4	8	60	0.5	4	286204005	67.89	0.005 – 0.015	0.003 – 0.013
4.0	4	8	60	1.0	4	286204010	67.89	0.005 – 0.015	0.003 – 0.013
4.0	4	8	60	1.5	4	286204015	67.89	0.005 – 0.015	0.003 – 0.013
5.0	5	10	60	0.3	4	286205003	69.42	0.010 – 0.025	0.008 – 0.023
5.0	5	10	60	0.5	4	286205005	69.42	0.010 – 0.025	0.008 – 0.023
5.0	5	10	60	1.0	4	286205010	69.42	0.010 – 0.025	0.008 – 0.023
5.0	5	10	60	1.5	4	286205015	69.42	0.010 – 0.025	0.008 – 0.023
5.0	5	10	60	2.0	4	286205020	69.42	0.010 – 0.025	0.008 – 0.023
6.0	6	12	70	0.3	4	286206003	72.41	0.017 – 0.030	0.015 – 0.028
6.0	6	12	70	0.5	4	286206005	72.41	0.017 – 0.030	0.015 – 0.028
6.0	6	12	70	1.0	4	286206010	72.41	0.017 – 0.030	0.015 – 0.028
6.0	6	12	70	1.5	4	286206015	72.41	0.017 – 0.030	0.015 – 0.028
6.0	6	12	70	2.0	4	286206020	72.41	0.017 – 0.030	0.015 – 0.028
6.0	6	12	70	2.5	4	286206025	72.41	0.017 – 0.030	0.015 – 0.028
8.0	8	16	70	0.3	4	286208003	75.45	0.024 – 0.035	0.022 – 0.033
8.0	8	16	70	0.5	4	286208005	75.45	0.024 – 0.035	0.022 – 0.033
8.0	8	16	70	1.0	4	286208010	75.45	0.024 – 0.035	0.022 – 0.033
8.0	8	16	70	1.5	4	286208015	75.45	0.024 – 0.035	0.022 – 0.033
8.0	8	16	70	2.0	4	286208020	75.45	0.024 – 0.035	0.022 – 0.033
8.0	8	16	70	2.5	4	286208025	75.45	0.024 – 0.035	0.022 – 0.033
8.0	8	16	70	3.0	4	286208030	75.45	0.024 – 0.035	0.022 – 0.033
10.0	10	20	70	0.3	4	2862010003	108.65	0.030 – 0.065	0.028 – 0.063
10.0	10	20	70	0.5	4	2862010005	108.65	0.030 – 0.065	0.028 – 0.063
10.0	10	20	70	1.0	4	2862010010	108.65	0.030 – 0.065	0.028 – 0.063
10.0	10	20	70	1.5	4	2862010015	108.65	0.030 – 0.065	0.028 – 0.063
10.0	10	20	70	2.0	4	2862010020	108.65	0.030 – 0.065	0.028 – 0.063
10.0	10	20	70	2.5	4	2862010025	108.65	0.030 – 0.065	0.028 – 0.063
10.0	10	20	70	3.0	4	2862010030	108.65	0.030 – 0.065	0.028 – 0.063
12.0	12	24	80	0.3	4	2862012003	116.19	0.036 – 0.079	0.034 – 0.077
12.0	12	24	80	0.5	4	2862012005	116.19	0.036 – 0.079	0.034 – 0.077
12.0	12	24	80	1.0	4	2862012010	116.19	0.036 – 0.079	0.034 – 0.077
12.0	12	24	80	1.5	4	2862012015	116.19	0.036 – 0.079	0.034 – 0.077
12.0	12	24	80	2.0	4	2862012020	116.19	0.036 – 0.079	0.034 – 0.077
12.0	12	24	80	2.5	4	2862012025	116.19	0.036 – 0.079	0.034 – 0.077
12.0	12	24	80	3.0	4	2862012030	116.19	0.036 – 0.079	0.034 – 0.077
14.0	14	28	90	0.5	4	2862014005	147.93	0.040 – 0.083	0.038 – 0.081
14.0	14	28	90	1.0	4	2862014010	147.93	0.040 – 0.083	0.038 – 0.081
14.0	14	28	90	1.5	4	2862014015	147.93	0.040 – 0.083	0.038 – 0.081
14.0	14	28	90	2.0	4	2862014020	147.93	0.040 – 0.083	0.038 – 0.081
14.0	14	28	90	2.5	4	2862014025	147.93	0.040 – 0.083	0.038 – 0.081
14.0	14	28	90	3.0	4	2862014030	147.93	0.040 – 0.083	0.038 – 0.081
16.0	16	32	90	1.0	4	2862016010	166.06	0.045 – 0.095	0.043 – 0.093
16.0	16	32	90	2.0	4	2862016020	166.06	0.045 – 0.095	0.043 – 0.093
16.0	16	32	90	3.0	4	2862016030	166.06	0.045 – 0.095	0.043 – 0.093
20.0	20	40	120	1.0	4	2862020010	256.65	0.081 – 0.131	0.079 – 0.129
20.0	20	40	120	2.0	4	2862020020	256.65	0.081 – 0.131	0.079 – 0.129
20.0	20	40	120	3.0	4	2862020030	256.65	0.081 – 0.131	0.079 – 0.129


Peripheral milling
a_e = 0.25xD
a_p = 2.0xD


Full slot milling
a_p = 1.0xD

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Hardened steel	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	40 – 50 HRC	850 – 1200 N/mm²	< 850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) Finishing	75	75	70	35	70	50	90	45
V_c (m/min) Roughing	60	60	55	25	55	35	75	30

Product family 160

28630

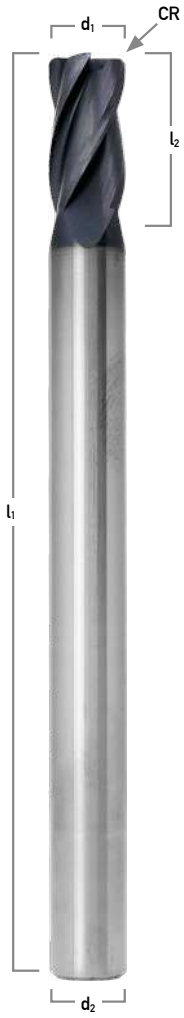

AlTiN
Z 4
HA
30°

VHM
Type N

Manu-facturer standard
HPC

Solid Carbide Torus Cutter

Extra-long version



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	CR		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	6	70	0.3	4	286303003	63.33	0.002 – 0.015	0.002 – 0.013
3.0	3	6	70	0.5	4	286303005	63.33	0.002 – 0.015	0.002 – 0.013
4.0	4	8	80	0.3	4	286304003	72.41	0.004 – 0.017	0.003 – 0.015
4.0	4	8	80	0.5	4	286304005	72.41	0.004 – 0.017	0.003 – 0.015
4.0	4	8	80	1.0	4	286304010	72.41	0.004 – 0.017	0.003 – 0.015
4.0	4	8	80	1.5	4	286304015	72.41	0.004 – 0.017	0.003 – 0.015
5.0	5	10	100	0.3	4	286305003	72.41	0.006 – 0.021	0.005 – 0.019
5.0	5	10	100	0.5	4	286305005	72.41	0.006 – 0.021	0.005 – 0.019
5.0	5	10	100	1.0	4	286305010	72.41	0.006 – 0.021	0.005 – 0.019
5.0	5	10	100	1.5	4	286305015	72.41	0.006 – 0.021	0.005 – 0.019
5.0	5	10	100	2.0	4	286305020	72.41	0.006 – 0.021	0.005 – 0.019
6.0	6	12	100	0.3	4	286306003	83.00	0.008 – 0.024	0.006 – 0.022
6.0	6	12	100	0.5	4	286306005	83.00	0.008 – 0.024	0.006 – 0.022
6.0	6	12	100	1.0	4	286306010	83.00	0.008 – 0.024	0.006 – 0.022
6.0	6	12	100	1.5	4	286306015	83.00	0.008 – 0.024	0.006 – 0.022
6.0	6	12	100	2.0	4	286306020	83.00	0.008 – 0.024	0.006 – 0.022
6.0	6	12	100	2.5	4	286306025	83.00	0.008 – 0.024	0.006 – 0.022
8.0	8	16	100	0.3	4	286308003	90.54	0.012 – 0.032	0.010 – 0.030
8.0	8	16	100	0.5	4	286308005	90.54	0.012 – 0.032	0.010 – 0.030
8.0	8	16	100	1.0	4	286308010	90.54	0.012 – 0.032	0.010 – 0.030
8.0	8	16	100	1.5	4	286308015	90.54	0.012 – 0.032	0.010 – 0.030
8.0	8	16	100	2.0	4	286308020	90.54	0.012 – 0.032	0.010 – 0.030
8.0	8	16	100	2.5	4	286308025	90.54	0.012 – 0.032	0.010 – 0.030
8.0	8	16	100	3.0	4	286308030	90.54	0.012 – 0.032	0.010 – 0.030
10.0	10	20	120	0.3	4	2863010003	131.30	0.015 – 0.038	0.013 – 0.036
10.0	10	20	120	0.5	4	2863010005	131.30	0.015 – 0.038	0.013 – 0.036
10.0	10	20	120	1.0	4	2863010010	131.30	0.015 – 0.038	0.013 – 0.036
10.0	10	20	120	1.5	4	2863010015	131.30	0.015 – 0.038	0.013 – 0.036
10.0	10	20	120	2.0	4	2863010020	131.30	0.015 – 0.038	0.013 – 0.036
10.0	10	20	120	2.5	4	2863010025	131.30	0.015 – 0.038	0.013 – 0.036
10.0	10	20	120	3.0	4	2863010030	131.30	0.015 – 0.038	0.013 – 0.036
12.0	12	24	120	0.3	4	2863012003	138.85	0.018 – 0.046	0.016 – 0.042
12.0	12	24	120	0.5	4	2863012005	138.85	0.018 – 0.046	0.016 – 0.042
12.0	12	24	120	1.0	4	2863012010	138.85	0.018 – 0.046	0.016 – 0.042
12.0	12	24	120	1.5	4	2863012015	138.85	0.018 – 0.046	0.016 – 0.042
12.0	12	24	120	2.0	4	2863012020	138.85	0.018 – 0.046	0.016 – 0.042
12.0	12	24	120	2.5	4	2863012025	138.85	0.018 – 0.046	0.016 – 0.042
12.0	12	24	120	3.0	4	2863012030	138.85	0.018 – 0.046	0.016 – 0.042
14.0	14	28	120	0.5	4	2863014005	173.60	0.021 – 0.054	0.019 – 0.052
14.0	14	28	120	1.0	4	2863014010	173.60	0.021 – 0.054	0.019 – 0.052
14.0	14	28	120	1.5	4	2863014015	173.60	0.021 – 0.054	0.019 – 0.052
14.0	14	28	120	2.0	4	2863014020	173.60	0.021 – 0.054	0.019 – 0.052
14.0	14	28	120	2.5	4	2863014025	173.60	0.021 – 0.054	0.019 – 0.052
14.0	14	28	120	3.0	4	2863014030	173.60	0.021 – 0.054	0.019 – 0.052
16.0	16	32	120	1.0	4	2863016010	196.26	0.024 – 0.062	0.022 – 0.060
16.0	16	32	120	2.0	4	2863016020	196.26	0.024 – 0.062	0.022 – 0.060
16.0	16	32	120	3.0	4	2863016030	196.26	0.024 – 0.062	0.022 – 0.060
20.0	20	40	160	1.0	4	2863020010	317.05	0.036 – 0.094	0.034 – 0.092
20.0	20	40	160	2.0	4	2863020020	317.05	0.036 – 0.094	0.034 – 0.092
20.0	20	40	160	3.0	4	2863020030	317.05	0.036 – 0.094	0.034 – 0.092


Peripheral milling
a_e = 0.1xD
a_p = 2.0xD


Full slot milling
a_p = 0.5xD

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Hardened steel	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	40 – 50 HRC	850 – 1200 N/mm²	< 850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) Finishing	75	75	70	35	70	50	90	45
V_c (m/min) Roughing	60	60	55	25	55	35	75	30

Product family 160

10229

Solid Carbide Ball-Nosed End Mill
Short version

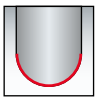
d_1	d_2	l_2	l_1		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
1.0	6	3	50	2	10229010	11.64	0.005	–	0.017	0.003	–	0.012
2.0	6	4	50	2	10229020	11.64	0.007	–	0.019	0.005	–	0.014
3.0	6	5	50	2	10229030	11.64	0.012	–	0.024	0.010	–	0.019
4.0	6	6	50	2	10229040	11.64	0.020	–	0.030	0.018	–	0.025
5.0	6	7	50	2	10229050	11.64	0.022	–	0.033	0.020	–	0.028
6.0	6	7	51	2	10229060	13.43	0.026	–	0.044	0.024	–	0.039
8.0	8	9	59	2	10229080	18.99	0.034	–	0.058	0.032	–	0.053
10.0	10	10	60	2	10229100	24.84	0.040	–	0.070	0.038	–	0.065
12.0	12	14	71	2	10229120	34.46	0.047	–	0.084	0.045	–	0.079
16.0	16	16	76	2	10229160	57.48	0.056	–	0.100	0.054	–	0.095
20.0	20	20	82	2	10229200	86.71	0.068	–	0.115	0.066	–	0.110

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

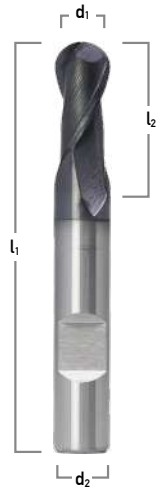
Full slot milling
a_p = 1.0xD

d_1	d_2
h10	h6

10239



Solid Carbide Ball-Nosed End Mill
Long version



d_1	d_2	l_2	l_1		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
6.0	6	10	57	2	10239060	14.88	0.026	–	0.044	0.024	–	0.039
8.0	8	16	63	2	10239080	19.43	0.034	–	0.058	0.032	–	0.053
10.0	10	19	72	2	10239100	27.04	0.040	–	0.070	0.038	–	0.065
12.0	12	22	83	2	10239120	38.70	0.047	–	0.084	0.045	–	0.079
16.0	16	26	92	2	10239160	66.41	0.056	–	0.100	0.054	–	0.095
20.0	20	32	104	2	10239200	102.56	0.068	–	0.115	0.066	–	0.110

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

d_1	d_2
h10	h6

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) TiAlN	155	130	165	150	125	90	160	30

25022

Solid Carbide Ball-Nosed End Mill

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	3	3	38	2	25022010	17.16	25022010A	24.64	0.005 – 0.017	0.003 – 0.012
1.5	3	5	38	2	25022015	15.89	25022015A	23.11	0.005 – 0.017	0.003 – 0.012
2.0	3	7	38	2	25022020	15.89	25022020A	23.11	0.007 – 0.019	0.005 – 0.014
2.5	3	7	38	2	25022025	15.89	25022025A	23.11	0.007 – 0.019	0.005 – 0.014
3.0	3	9	38	2	25022030	15.89	25022030A	23.11	0.012 – 0.024	0.010 – 0.019
3.5	4	12	50	2	25022035	21.20	25022035A	28.21	0.012 – 0.024	0.010 – 0.019
4.0	4	14	50	2	25022040	21.20	25022040A	28.21	0.020 – 0.030	0.018 – 0.025
4.5	5	14	50	2	25022045	23.44	25022045A	31.23	0.020 – 0.030	0.018 – 0.025
5.0	5	16	50	2	25022050	23.44	25022050A	31.23	0.022 – 0.033	0.020 – 0.028
5.5	6	19	64	2	25022055	30.65	25022055A	40.69	0.022 – 0.033	0.020 – 0.028
6.0	6	19	64	2	25022060	30.65	25022060A	40.69	0.026 – 0.044	0.024 – 0.039
7.0	8	19	64	2	25022070	39.53	25022070A	56.74	0.030 – 0.047	0.028 – 0.042
8.0	8	21	64	2	25022080	43.25	25022080A	56.74	0.034 – 0.058	0.032 – 0.053
9.0	10	22	70	2	25022090	59.37	25022090A	74.72	0.037 – 0.064	0.035 – 0.059
10.0	10	22	70	2	25022100	59.37	25022100A	74.72	0.040 – 0.070	0.038 – 0.065
11.0	12	25	70	2	25022110	67.80	25022110A	84.15	0.043 – 0.077	0.041 – 0.072
12.0	12	25	75	2	25022120	81.89	25022120A	97.86	0.047 – 0.084	0.045 – 0.079
14.0	14	30	90	2	25022140	110.85	25022140A	132.17	0.053 – 0.093	0.051 – 0.088
16.0	16	32	90	2	25022160	127.86	25022160A	158.85	0.056 – 0.100	0.054 – 0.095
18.0	18	35	100	2	25022180	180.63	25022180A	217.58	0.065 – 0.110	0.063 – 0.105
20.0	20	38	100	2	25022200	217.35	25022200A	259.56	0.068 – 0.115	0.066 – 0.110
22.0	22	38	100	2	25022220	316.33	25022220A	364.99	0.071 – 0.120	0.069 – 0.115
25.0	25	38	100	2	25022250	335.75	25022250A	387.93	0.080 – 0.135	0.078 – 0.130

Peripheral milling
$a_e = 0.25xD$
$a_p = 1.0xD$

Full slot milling
$a_p = 1.0xD$

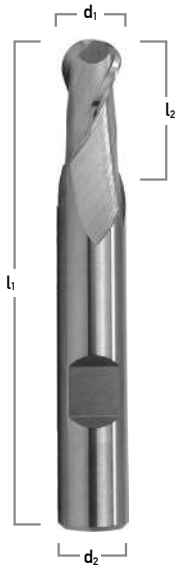
Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

Product family 160

26022

DIN 6527L

Solid Carbide Ball-Nosed End Mill



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	6	50	2	26022020	34.96	26022020A	41.19	0.007 – 0.019	0.005 – 0.014
2.5	6	6	50	2	26022025	34.96	26022025A	41.19	0.007 – 0.019	0.005 – 0.014
3.0	6	7	57	2	26022030	31.38	26022030A	37.60	0.012 – 0.024	0.010 – 0.019
4.0	6	8	57	2	26022040	32.70	26022040A	38.85	0.020 – 0.030	0.018 – 0.025
5.0	6	10	57	2	26022050	32.70	26022050A	38.85	0.022 – 0.033	0.020 – 0.028
6.0	6	10	57	2	26022060	32.70	26022060A	38.85	0.026 – 0.044	0.024 – 0.039
7.0	8	13	63	2	26022070	55.71	26022070A	64.43	0.030 – 0.052	0.028 – 0.047
8.0	8	16	63	2	26022080	55.71	26022080A	64.43	0.034 – 0.058	0.032 – 0.053
9.0	10	16	72	2	26022090	73.52	26022090A	87.54	0.038 – 0.063	0.036 – 0.059
10.0	10	19	72	2	26022100	73.52	26022100A	87.54	0.040 – 0.070	0.038 – 0.065
12.0	12	22	83	2	26022120	94.12	26022120A	107.62	0.047 – 0.077	0.045 – 0.072
14.0	14	22	83	2	26022140	131.51	26022140A	146.52	0.054 – 0.093	0.052 – 0.088
16.0	16	26	92	2	26022160	155.84	26022160A	174.18	0.056 – 0.100	0.054 – 0.095
18.0	18	26	92	2	26022180	212.96	26022180A	225.41	0.060 – 0.105	0.058 – 0.100
20.0	20	32	104	2	26022200	250.77	26022200A	281.94	0.068 – 0.115	0.066 – 0.110

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

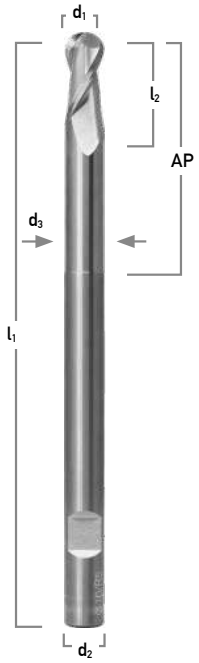
Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

Product family 160

32002

Solid Carbide HPC Copying Mill

Extra-long version



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1	d_3	AP		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	20	100	1.8	40	2	320022040	91.04	320022040A	121.82	0.012 – 0.023	0.010 – 0.018
3.0	6	20	100	2.8	40	2	320023040	80.94	320023040A	108.50	0.018 – 0.029	0.016 – 0.024
4.0	6	20	100	3.8	40	2	320024040	70.88	320024040A	95.00	0.025 – 0.035	0.023 – 0.030
5.0	6	20	100	4.8	40	2	320025040	48.30	320025040A	65.67	0.028 – 0.037	0.026 – 0.032
6.0	6	20	100	5.8	40	2	320026040	48.30	320026040A	65.67	0.031 – 0.046	0.029 – 0.041
8.0	8	20	100	7.8	40	2	320028040	62.53	320028040A	83.20	0.044 – 0.063	0.042 – 0.058
10.0	10	20	100	9.8	40	2	320021040	77.36	320021040A	104.69	0.055 – 0.078	0.053 – 0.073
10.0	10	20	150	9.8	60	2	320021060	113.84	320021060A	164.57	0.055 – 0.078	0.053 – 0.073
12.0	12	20	100	11.7	40	2	320021240	101.67	320021240A	132.30	0.065 – 0.095	0.063 – 0.090
12.0	12	20	150	11.7	60	2	320021260	131.51	320021260A	189.20	0.065 – 0.095	0.063 – 0.090
16.0	16	30	150	15.7	70	2	320021670	187.58	320021670A	253.06	0.081 – 0.115	0.079 – 0.110
18.0	18	30	150	17.7	70	2	320021870	222.05	320021870A	299.68	0.090 – 0.125	0.088 – 0.120
20.0	20	30	150	19.7	80	2	320022080	268.73	320022080A	355.91	0.099 – 0.135	0.097 – 0.130

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

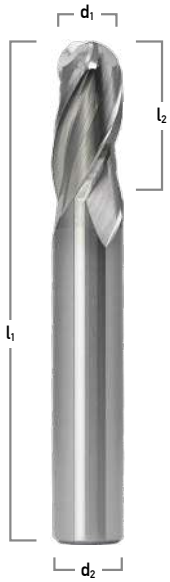
Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

Product family 160

25032




Solid Carbide Ball-Nosed End Mill



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	3	3	38	3	25032010	17.16	25032010A	24.64	0.005 – 0.017	0.003 – 0.012
1.5	3	5	38	3	25032015	15.89	25032015A	23.11	0.005 – 0.017	0.003 – 0.012
2.0	3	7	38	3	25032020	15.89	25032020A	23.11	0.007 – 0.019	0.005 – 0.014
2.5	3	7	38	3	25032025	15.89	25032025A	23.11	0.007 – 0.019	0.005 – 0.014
3.0	3	9	38	3	25032030	15.89	25032030A	23.11	0.012 – 0.024	0.010 – 0.019
3.5	4	12	50	3	25032035	21.20	25032035A	28.21	0.012 – 0.024	0.010 – 0.019
4.0	4	14	50	3	25032040	21.20	25032040A	28.21	0.020 – 0.030	0.018 – 0.025
4.5	5	14	50	3	25032045	23.44	25032045A	31.23	0.020 – 0.030	0.018 – 0.025
5.0	5	16	50	3	25032050	23.44	25032050A	31.23	0.022 – 0.033	0.020 – 0.028
5.5	6	19	64	3	25032055	30.65	25032055A	40.69	0.022 – 0.033	0.020 – 0.028
6.0	6	19	64	3	25032060	30.65	25032060A	40.69	0.026 – 0.041	0.024 – 0.039
7.0	8	19	64	3	25032070	39.53	25032070A	56.74	0.030 – 0.047	0.028 – 0.042
8.0	8	21	64	3	25032080	43.25	25032080A	56.74	0.034 – 0.058	0.032 – 0.053
8.5	10	22	70	3	25032085	59.37	25032085A	74.72	0.034 – 0.058	0.032 – 0.053
9.0	10	22	70	3	25032090	59.37	25032090A	74.72	0.037 – 0.064	0.035 – 0.059
10.0	10	22	70	3	25032100	59.37	25032100A	74.72	0.040 – 0.070	0.038 – 0.065
11.0	12	25	70	3	25032110	67.80	25032110A	84.15	0.043 – 0.077	0.041 – 0.072
12.0	12	25	75	3	25032120	81.89	25032120A	97.86	0.047 – 0.084	0.045 – 0.079
14.0	14	30	90	3	25032140	110.85	25032140A	132.17	0.053 – 0.093	0.051 – 0.088
16.0	16	32	90	3	25032160	127.86	25032160A	158.85	0.056 – 0.100	0.054 – 0.095
18.0	18	35	100	3	25032180	180.63	25032180A	217.58	0.065 – 0.110	0.063 – 0.105
20.0	20	38	100	3	25032200	217.35	25032200A	259.56	0.068 – 0.115	0.066 – 0.110
22.0	22	38	100	3	25032220	316.33	25032220A	364.99	0.071 – 0.120	0.069 – 0.115
25.0	25	38	100	3	25032250	335.75	25032250A	387.93	0.080 – 0.135	0.078 – 0.130

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

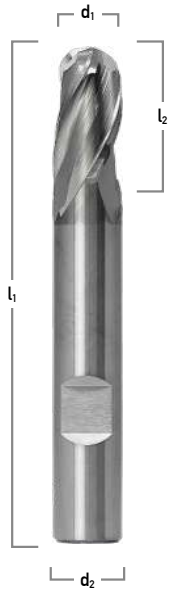
Product family 160

26032



DIN 6527L

Solid Carbide Ball-Nosed End Mill



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	6	50	3	26032020	34.96	26032020A	41.19	0.007 – 0.019	0.005 – 0.014
2.5	6	6	50	3	26032025	34.96	26032025A	41.19	0.007 – 0.019	0.005 – 0.014
3.0	6	7	57	3	26032030	31.38	26032030A	37.60	0.012 – 0.024	0.010 – 0.019
4.0	6	8	57	3	26032040	32.70	26032040A	38.85	0.020 – 0.030	0.018 – 0.025
5.0	6	10	57	3	26032050	32.70	26032050A	38.85	0.022 – 0.033	0.020 – 0.028
6.0	6	10	57	3	26032060	32.70	26032060A	38.85	0.026 – 0.044	0.024 – 0.039
7.0	8	13	63	3	26032070	55.71	26032070A	64.43	0.030 – 0.052	0.028 – 0.047
8.0	8	16	63	3	26032080	55.71	26032080A	64.43	0.034 – 0.058	0.032 – 0.053
9.0	10	16	72	3	26032090	73.52	26032090A	87.54	0.038 – 0.064	0.036 – 0.059
10.0	10	19	72	3	26032100	73.52	26032100A	87.54	0.040 – 0.070	0.038 – 0.065
12.0	12	22	83	3	26032120	94.12	26032120A	107.62	0.047 – 0.077	0.045 – 0.072
14.0	14	22	83	3	26032140	131.51	26032140A	146.52	0.054 – 0.093	0.052 – 0.088
16.0	16	26	92	3	26032160	155.84	26032160A	174.18	0.056 – 0.100	0.054 – 0.095
18.0	18	26	92	3	26032180	212.96	26032180A	225.41	0.060 – 0.105	0.058 – 0.100
20.0	20	32	104	3	26032200	250.77	26032200A	281.94	0.068 – 0.115	0.066 – 0.110

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

Product family 160

28103




Solid Carbide Ball-Nosed End Mill

Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	20	60	3	28103030	33.13	28103030A	43.93	0.012 – 0.024	0.010 – 0.019
4.0	4	25	60	3	28103040	36.05	28103040A	47.69	0.020 – 0.030	0.018 – 0.025
5.0	5	32	100	3	28103050	39.14	28103050A	51.82	0.022 – 0.033	0.020 – 0.028
6.0	6	38	100	3	28103060	42.96	28103060A	56.80	0.026 – 0.044	0.024 – 0.039
8.0	8	45	100	3	28103080	66.27	28103080A	86.07	0.034 – 0.058	0.032 – 0.053
10.0	10	45	100	3	28103100	98.88	28103100A	120.30	0.040 – 0.070	0.038 – 0.065
12.0	12	75	150	3	28103120	193.14	28103120A	217.35	0.047 – 0.077	0.045 – 0.072
14.0	14	75	150	3	28103140	250.49	28103140A	275.26	0.054 – 0.093	0.052 – 0.088
16.0	16	75	150	3	28103160	313.18	28103160A	338.23	0.056 – 0.100	0.054 – 0.095
18.0	18	75	150	3	28103180	349.83	28103180A	390.92	0.060 – 0.105	0.058 – 0.100
20.0	20	75	150	3	28103200	426.28	28103200A	474.58	0.068 – 0.115	0.066 – 0.110
25.0	25	75	150	3	28103250	706.16	28103250A	769.56	0.076 – 0.123	0.075 – 0.119

Peripheral milling
a_e = 0.1xD
a_p = 3.0xD

Full slot milling
a_p = 0.5xD

d_1	d_2
h10	h6

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

Product family 160

25042

Solid Carbide Ball-Nosed End Mill

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	3	3	38	4	25042010	17.16	25042010A	24.64	0.005 – 0.017	0.003 – 0.012
1.5	3	5	38	4	25042015	15.89	25042015A	23.11	0.005 – 0.017	0.003 – 0.012
2.0	3	7	38	4	25042020	15.89	25042020A	23.11	0.007 – 0.019	0.005 – 0.014
2.5	3	7	38	4	25042025	15.89	25042025A	23.11	0.007 – 0.019	0.005 – 0.014
3.0	3	9	38	4	25042030	15.89	25042030A	23.11	0.012 – 0.024	0.010 – 0.019
3.5	4	12	50	4	25042035	21.20	25042035A	28.21	0.012 – 0.024	0.010 – 0.019
4.0	4	14	50	4	25042040	21.20	25042040A	28.21	0.020 – 0.030	0.018 – 0.025
4.5	5	14	50	4	25042045	23.44	25042045A	31.23	0.020 – 0.030	0.018 – 0.025
5.0	5	16	50	4	25042050	23.44	25042050A	31.23	0.022 – 0.033	0.020 – 0.028
5.5	6	19	64	4	25042055	30.65	25042055A	40.69	0.022 – 0.033	0.020 – 0.028
6.0	6	19	64	4	25042060	30.65	25042060A	40.69	0.026 – 0.044	0.024 – 0.039
7.0	8	19	64	4	25042070	39.53	25042070A	56.74	0.030 – 0.047	0.028 – 0.042
8.0	8	21	64	4	25042080	43.25	25042080A	56.74	0.034 – 0.058	0.032 – 0.053
9.0	10	22	70	4	25042090	59.37	25042090A	74.72	0.037 – 0.064	0.035 – 0.059
10.0	10	22	70	4	25042100	59.37	25042100A	74.72	0.040 – 0.070	0.038 – 0.065
11.0	12	25	70	4	25042110	67.80	25042110A	84.15	0.043 – 0.077	0.041 – 0.072
12.0	12	25	75	4	25042120	81.89	25042120A	97.86	0.047 – 0.084	0.045 – 0.079
14.0	14	30	90	4	25042140	110.85	25042140A	132.17	0.053 – 0.093	0.051 – 0.088
16.0	16	32	90	4	25042160	127.86	25042160A	158.85	0.056 – 0.100	0.054 – 0.095
18.0	18	35	100	4	25042180	180.63	25042180A	217.58	0.065 – 0.110	0.063 – 0.105
20.0	20	38	100	4	25042200	217.35	25042200A	259.56	0.068 – 0.115	0.066 – 0.110
22.0	22	38	100	4	25042220	316.33	25042220A	364.99	0.071 – 0.120	0.069 – 0.115
25.0	25	38	100	4	25042250	335.75	25042250A	387.93	0.080 – 0.135	0.078 – 0.130

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

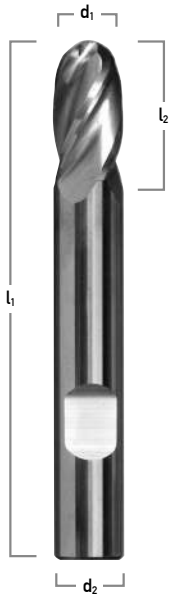
Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

Product family 160

26042




Solid Carbide Ball-Nosed End Mill



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	6	50	4	26042020	34.96	26042020A	41.19	0.005 – 0.010	0.003 – 0.008
2.5	6	6	50	4	26042025	34.96	26042025A	41.19	0.005 – 0.010	0.003 – 0.008
3.0	6	7	57	4	26042030	31.38	26042030A	37.60	0.010 – 0.016	0.008 – 0.014
4.0	6	8	57	4	26042040	32.70	26042040A	38.85	0.018 – 0.024	0.016 – 0.022
5.0	6	10	57	4	26042050	32.70	26042050A	38.85	0.020 – 0.026	0.020 – 0.024
6.0	6	10	57	4	26042060	32.70	26042060A	38.85	0.024 – 0.029	0.022 – 0.027
7.0	8	13	63	4	26042070	55.71	26042070A	64.43	0.028 – 0.032	0.026 – 0.030
8.0	8	16	63	4	26042080	55.71	26042080A	64.43	0.032 – 0.042	0.030 – 0.040
9.0	10	16	72	4	26042090	73.52	26042090A	87.54	0.036 – 0.050	0.034 – 0.048
10.0	10	19	72	4	26042100	73.52	26042100A	87.54	0.038 – 0.053	0.036 – 0.051
12.0	12	22	83	4	26042120	94.12	26042120A	107.62	0.046 – 0.063	0.044 – 0.061
14.0	14	22	83	4	26042140	131.51	26042140A	146.52	0.050 – 0.071	0.048 – 0.069
16.0	16	26	92	4	26042160	155.84	26042160A	174.18	0.054 – 0.079	0.052 – 0.077
18.0	18	26	92	4	26042180	212.96	26042180A	225.41	0.063 – 0.090	0.061 – 0.088
20.0	20	32	104	4	26042200	250.77	26042200A	281.94	0.066 – 0.097	0.064 – 0.095

Peripheral milling
a_e = 0.25xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

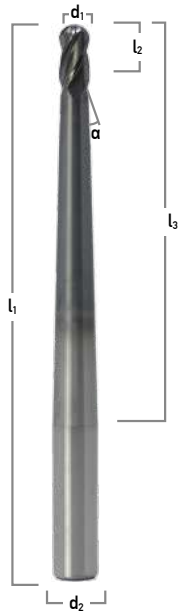
Product family 160

30042

Alcrona Pro | Z 4 | HA | 30° | VHM | Type N | Manu-facturer standard

Solid Carbide High Performance Ball-Nosed End Mill

Extra-long version



d_1	d_2	l_2	l_1	l_3			coated	
mm	mm	mm	mm	mm	α	Z	Part No.	€/pc.
2.0	4	5	65	45	0.90°	4	30042020A	49.48
3.0	4	6	65	45	0.45°	4	30042030A	49.48
4.0	6	8	75	54	0.78°	4	30042040A	60.98
5.0	6	8	75	54	0.40°	4	30042050A	102.85
6.0	10	9	100	60	1.18°	4	30042060A	102.85
8.0	10	12	100	60	0.60°	4	30042080A	102.85

f_z Roughing	f_z Finishing
mm/Z	mm/Z
0.010 – 0.018	0.008 – 0.016
0.013 – 0.024	0.010 – 0.022
0.023 – 0.030	0.021 – 0.028
0.026 – 0.032	0.024 – 0.030
0.029 – 0.041	0.027 – 0.039
0.042 – 0.058	0.040 – 0.056

Peripheral milling
$a_e = 0.25xD$
$a_p = 1.0xD$

Full slot milling
$a_p = 0.5xD$

- Ball-nosed end mill for roughing and finishing
- With 4 cutting edges for highest cutting performance
- Short cutting edges for highest stability
- For universal applications

d_1	d_2	l_2	l_1	d_3	AP		coated	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.
10.0	10	16	100	9.5	60	4	30042100A	102.85
12.0	12	20	100	11.5	60	4	30042120A	136.00

f_z Roughing	f_z Finishing
mm/Z	mm/Z
0.053 – 0.073	0.051 – 0.071
0.063 – 0.090	0.061 – 0.088

Peripheral milling
$a_e = 0.25xD$
$a_p = 1.0xD$

Full slot milling
$a_p = 0.5xD$

- Ball-nosed end mill for roughing and finishing
- With 4 cutting edges for highest cutting performance
- Short cutting edges for highest stability
- For universal applications

d_1	d_2
h10	h6

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

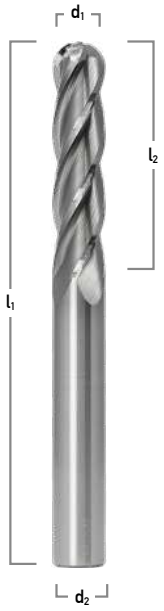
28104



Manu-facturer standard

Solid Carbide Ball-Nosed End Mill

Extra-long version



d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	20	60	4	28104030	33.13	28104030A	43.93	0.010 – 0.016	0.008 – 0.014
4.0	4	25	60	4	28104040	36.05	28104040A	47.69	0.018 – 0.024	0.016 – 0.022
5.0	5	32	100	4	28104050	39.14	28104050A	51.82	0.020 – 0.026	0.020 – 0.024
6.0	6	38	100	4	28104060	42.96	28104060A	56.80	0.024 – 0.029	0.022 – 0.027
8.0	8	45	100	4	28104080	66.27	28104080A	86.07	0.032 – 0.042	0.030 – 0.040
10.0	10	45	100	4	28104100	98.88	28104100A	120.30	0.038 – 0.053	0.036 – 0.051
12.0	12	75	150	4	28104120	193.14	28104120A	217.35	0.046 – 0.063	0.044 – 0.061
14.0	14	75	150	4	28104140	250.49	28104140A	275.26	0.050 – 0.071	0.048 – 0.069
16.0	16	75	150	4	28104160	313.18	28104160A	338.23	0.054 – 0.079	0.052 – 0.077
18.0	18	75	150	4	28104180	349.83	28104180A	390.92	0.063 – 0.090	0.061 – 0.088
20.0	20	75	150	4	28104200	426.28	28104200A	474.58	0.066 – 0.097	0.064 – 0.095
25.0	25	75	150	4	28104250	706.16	28104250A	769.56	0.076 – 0.125	0.074 – 0.119

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.1xD
a_p = 1.0xD

Full slot milling
a_p = 0.5xD

Material	General structured steels	Non-alloy Q & T steels	Alloy Q & T steels	Nitrided steels	Tool steels	Stainless steels	Cast iron (GGG,GT)	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) uncoated	95	80	100	90	80	65	95	–
V_c (m/min) Alcrona Pro	155	130	165	150	125	90	160	30

Product family 160

28510

Aldura | Z 4 | HB | 25° | VHM | Type HR | HRC ≤63 | Manufacturer standard

Solid Carbide Roughing End Mill

d1	d2	l2	l1		coated		fz Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
3.0	6	6	57	4	28510030AD	57.99	0.012 – 0.038
4.0	6	8	57	4	28510040AD	57.99	0.012 – 0.038
5.0	6	10	57	4	28510050AD	57.99	0.015 – 0.044
6.0	6	13	57	4	28510060AD	57.99	0.015 – 0.044
8.0	8	19	63	4	28510080AD	76.01	0.021 – 0.058
10.0	10	22	72	4	28510100AD	89.95	0.027 – 0.063
12.0	12	26	83	4	28510120AD	125.88	0.032 – 0.084
16.0	16	32	92	4	28510160AD	201.72	0.040 – 0.100
20.0	20	38	104	4	28510200AD	268.88	0.047 – 0.115
25.0	25	38	104	4	28510250AD	384.12	0.067 – 0.135

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

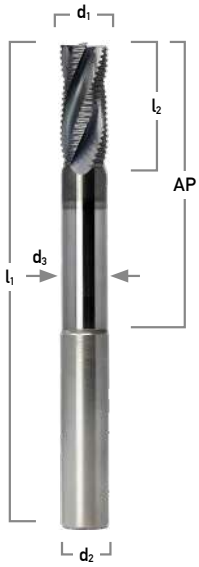
d1	d2
h10	h6

28512

Aldura | Z 4 | HA | 25° | VHM | Type HR | HRC ≤63 | Manufacturer standard

Solid Carbide Roughing End Mill

Long version



d1	d2	l2	l1	d3	AP		coated		fz Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
6.0	6	15	80	5.5	44	4	28512060AD	107.62	0.015 – 0.044
8.0	8	21	85	7.5	49	4	28512080AD	132.30	0.024 – 0.058
10.0	10	24	100	9.5	60	4	28512100AD	144.40	0.027 – 0.070
12.0	12	28	110	11.5	65	4	28512120AD	191.98	0.032 – 0.084
14.0	14	28	110	13.5	65	4	28512140AD	280.99	0.036 – 0.095
16.0	16	34	125	15.5	77	4	28512160AD	313.02	0.040 – 0.100
18.0	18	34	125	17.5	77	4	28512180AD	424.52	0.043 – 0.110
20.0	20	42	140	19.5	90	4	28512200AD	462.99	0.047 – 0.115

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

d1	d2
h10	h6

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Stainless steels	Cast iron	Hard materials	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 850 N/mm²	< 300 HB	48 – 60 HRC	850 – 1200 N/mm²
V_c (m/min) Finishing	115	95	95	95	95	70	125	50	65
V_c (m/min) Roughing	100	80	80	80	80	55	110	35	45

Product family 160

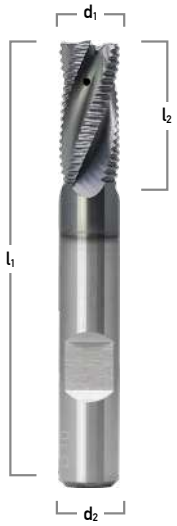
28515





Solid Carbide High Performance Roughing End Mill

With internal coolant



d_1	d_2	l_2	l_1		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
5.0	6	13	57	4	28515050AD	108.13	0.012 – 0.045
6.0	6	13	57	4	28515060AD	108.13	0.019 – 0.053
7.0	8	16	63	4	28515070AD	129.89	0.022 – 0.059
8.0	8	16	63	4	28515080AD	127.69	0.027 – 0.068
9.0	10	19	72	4	28515090AD	159.37	0.032 – 0.079
10.0	10	22	72	4	28515100AD	138.61	0.035 – 0.087
12.0	12	26	83	4	28515120AD	159.08	0.041 – 0.105
14.0	14	26	83	4	28515140AD	219.64	0.044 – 0.117
16.0	16	32	92	4	28515160AD	263.82	0.051 – 0.126
18.0	18	32	92	4	28515180AD	341.96	0.056 – 0.132
20.0	20	38	104	4	28515200AD	383.53	0.061 – 0.145

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

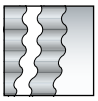
- For universal applications
- With internal coolant for long tool life

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Stainless steels	Cast iron	Hard materials	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 850 N/mm²	< 300 HB	48 – 60 HRC	850 – 1200 N/mm²
V_c (m/min) Finishing	115	95	95	95	95	70	125	50	65
V_c (m/min) Roughing	100	80	80	80	80	55	110	35	45

Product family 160

28505




Solid Carbide Roughing/Finishing End Mill

Long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	3	25	64	4	28505030	33.72	28505030A	45.91	0.004 – 0.015	0.002 – 0.010
4.0	4	25	75	4	28505040	38.70	28505040A	50.58	0.007 – 0.024	0.005 – 0.019
5.0	5	25	75	4	28505050	50.14	28505050A	65.09	0.008 – 0.025	0.006 – 0.020
6.0	6	30	75	4	28505060	64.66	28505060A	84.73	0.010 – 0.030	0.008 – 0.025
8.0	8	30	75	4	28505080	71.09	28505080A	94.21	0.014 – 0.037	0.012 – 0.032
10.0	10	45	100	4	28505100	115.01	28505100A	151.23	0.020 – 0.044	0.015 – 0.039
12.0	12	45	100	4	28505120	155.84	28505120A	205.49	0.023 – 0.053	0.018 – 0.048
16.0	16	60	110	4	28505160	292.12	28505160A	347.10	0.025 – 0.063	0.023 – 0.058
20.0	20	80	150	4	28505200	598.41	28505200A	659.03	0.032 – 0.078	0.028 – 0.073

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

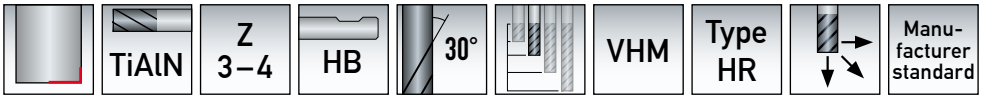
Full slot milling
a_p = 1.5xD

d_1	d_2
h10	h6

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Stainless steels	Cast iron	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) Finishing	105	90	85	85	80	70	135	50
V_c (m/min) Roughing	65	55	50	50	45	45	85	30

Product family 160

10709



Solid Carbide Roughing End Mill

Long version

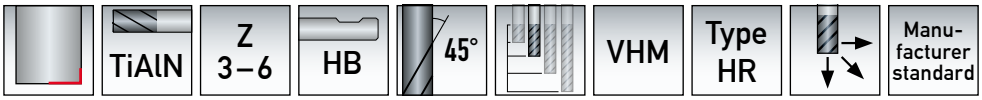
d_1	d_2	l_2	l_1		coated		f_z Roughing
mm	mm	mm	mm	Z	Art.Nr.	€/pc.	mm/Z
3.0	6	6	57	3	10709030	14.88	0.012 – 0.038
4.0	6	8	57	3	10709040	14.88	0.012 – 0.038
5.0	6	10	57	3	10709050	14.88	0.015 – 0.044
6.0	6	16	57	3	10709060	16.05	0.015 – 0.044
8.0	8	16	63	3	10709080	21.92	0.021 – 0.058
10.0	10	22	72	4	10709100	31.38	0.027 – 0.063
12.0	12	26	83	4	10709120	46.40	0.032 – 0.084
16.0	16	32	92	4	10709160	76.08	0.040 – 0.100
20.0	20	38	104	4	10709200	125.19	0.047 – 0.115

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

d_1	d_2
h10	h6

10719



Solid Carbide Roughing End Mill

Long version

d_1	d_2	l_2	l_1		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
4.0	6	11	57	3	10719040	16.05	0.022 – 0.045
5.0	6	13	57	4	10719050	16.05	0.027 – 0.055
6.0	6	16	57	4	10719060	17.52	0.032 – 0.065
8.0	8	16	69	4	10719080	23.38	0.042 – 0.075
10.0	10	22	72	4	10719100	31.23	0.062 – 0.085
12.0	12	28	83	4	10719120	46.17	0.082 – 0.105
16.0	16	32	92	5	10719160	78.07	0.122 – 0.155
20.0	20	38	104	6	10719200	131.86	0.142 – 0.205

Peripheral milling
a_e = 0.4xD
a_p = 2.5xD

Full slot milling
a_p = 1.0xD

d_1	d_2
h10	h6

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy Q & T steels	Tool steels	Stainless steels	Cast iron	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 850 N/mm²	< 300 HB	850 – 1200 N/mm²
V_c (m/min) Finishing	115	95	95	95	95	70	125	65
V_c (m/min) Roughing	100	80	80	80	80	55	110	45

Product family 163

28520


Z 3–6



VHM
Type HR

Manu-facturer standard

Solid Carbide Roughing End Mill INOX/Titanium

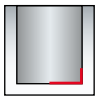
d1	d2	l2	l1		coated		fz Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
4.0	6	11	57	3	28520040A	86.65	0.022 – 0.045
5.0	6	13	57	4	28520050A	86.65	0.027 – 0.055
6.0	6	16	57	4	28520060A	86.65	0.032 – 0.065
7.0	8	16	63	4	28520070A	95.67	0.047 – 0.070
8.0	8	16	63	4	28520080A	95.67	0.050 – 0.075
9.0	10	19	72	4	28520090A	104.38	0.052 – 0.080
10.0	10	22	72	4	28520100A	104.38	0.062 – 0.085
12.0	12	26	83	4	28520120A	127.55	0.082 – 0.105
14.0	14	26	83	5	28520140A	175.28	0.102 – 0.125
16.0	16	32	92	5	28520160A	221.30	0.122 – 0.155
20.0	20	38	104	6	28520200A	334.64	0.142 – 0.205
25.0	25	45	121	6	28520250A	521.00	0.182 – 0.355


Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

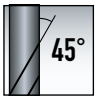

Full slot milling
a_p = 2.0xD

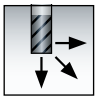
d1	d2
h10	h6

28521

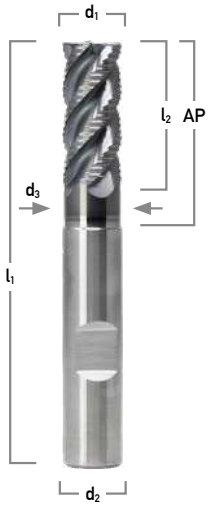



Z 4–6


VHM
Type HR

Manu-facturer standard

Solid Carbide Roughing End Mill INOX/Titanium
Long version



d1	d2	l2	l1	d3	AP		coated		fz Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
6.0	6	16	57	5.50	20	4	28521060A	91.94	0.032 – 0.065
8.0	8	16	63	7.50	26	4	28521080A	101.38	0.042 – 0.075
10.0	10	22	72	9.50	31	4	28521100A	120.08	0.062 – 0.085
12.0	12	26	83	11.50	37	4	28521120A	136.14	0.082 – 0.105
16.0	16	32	100	15.50	51	5	28521160A	235.68	0.122 – 0.155
20.0	20	38	110	19.50	59	6	28521200A	358.03	0.142 – 0.205


Peripheral milling
a_e = 0.5xD
a_p = 2.0xD


Full slot milling
a_p = 1.5xD

d1	d2
h10	h6

Material	Legierter Steel	Stainless steels	Hardox, Inconel, Waspaloy	Special and Titanium alloys
Tensile strength / Hardness	≤ 1200 N/mm²	< 850 N/mm²	< 1400 N/mm²	< 1500 N/mm²
V_c (m/min) Finishing	120	100	35	50
V_c (m/min) Roughing	180	90	40	60

35060



Manu-facturer standard

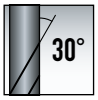
Solid Carbide Multi-Functional Tool
60°

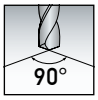
d_1	d_2	l_2	l_1		uncoated		Drilling & Counter sinking	V-Slot milling	Chamfering/milling/circular milling
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z	mm/Z
3.0	4	6	50	2	35060030	44.87	0.045 – 0.050	0.004 – 0.008	0.006 – 0.010
4.0	5	8	50	2	35060040	47.22	0.050 – 0.070	0.005 – 0.010	0.008 – 0.012
5.0	6	10	50	2	35060050	49.48	0.060 – 0.080	0.006 – 0.012	0.009 – 0.012
6.0	8	12	60	2	35060060	60.63	0.070 – 0.090	0.007 – 0.015	0.013 – 0.012
8.0	10	16	70	2	35060080	84.89	0.090 – 0.150	0.009 – 0.020	0.020 – 0.030
10.0	12	18	90	2	35060100	109.21	0.110 – 0.190	0.010 – 0.025	0.025 – 0.035
12.0	12	20	90	2	35060120	105.40	0.160 – 0.200	0.013 – 0.033	0.036 – 0.050
16.0	16	26	92	2	35060160	153.06	0.200 – 0.270	0.018 – 0.045	0.045 – 0.053
20.0	20	32	100	2	35060200	263.97	0.250 – 0.350	0.027 – 0.056	0.060 – 0.070

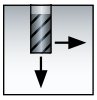
· Universal tool for spot drilling, chamfering, deburring and drilling

d_1	d_2
h10	h6

35090



Manu-facturer standard

Solid Carbide Multi-Functional Tool
90°

d_1	d_2	l_2	l_1		uncoated		Drilling & Counter sinking	V-Slot milling	Chamfering/milling/circular milling
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z	mm/Z
3.0	4	6	50	2	35090030	44.87	0.045 – 0.050	0.004 – 0.008	0.006 – 0.010
4.0	5	8	50	2	35090040	47.22	0.050 – 0.070	0.005 – 0.010	0.008 – 0.012
5.0	6	10	50	2	35090050	49.48	0.060 – 0.080	0.006 – 0.012	0.009 – 0.012
6.0	8	12	60	2	35090060	60.63	0.070 – 0.090	0.007 – 0.015	0.013 – 0.012
8.0	10	16	70	2	35090080	84.89	0.090 – 0.150	0.009 – 0.020	0.020 – 0.030
10.0	12	18	90	2	35090100	109.21	0.110 – 0.190	0.010 – 0.025	0.025 – 0.035
12.0	12	20	90	2	35090120	105.40	0.160 – 0.200	0.013 – 0.033	0.036 – 0.050
16.0	16	26	92	2	35090160	153.06	0.200 – 0.270	0.018 – 0.045	0.045 – 0.053
20.0	20	32	100	2	35090200	263.97	0.250 – 0.350	0.027 – 0.056	0.060 – 0.070

· Universal tool for spot drilling, chamfering, deburring and drilling

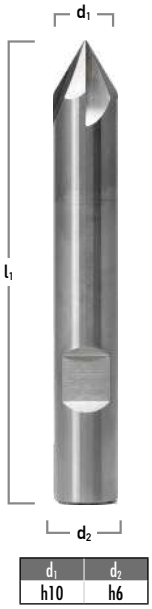
d_1	d_2
h10	h6

Material	General structured steels	Free machining steels	Alloy case-hardened steels	Stainless steels	Cast iron (GGG,GT)	Aluminium	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	< 850 N/mm²	< 300 HB	< 600 N/mm²	850 – 1200 N/mm²
V_c (m/min)	150	100	100	70	120	200	50

Product family 160

34060

Solid Carbide NC Deburring Cutter
60°



d1	d2
h10	h6

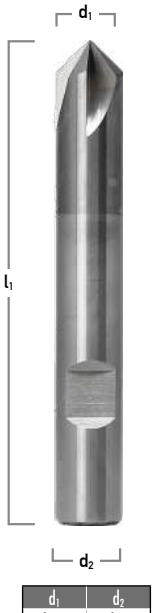
d1	d2	l1		uncoated		coated Alcrona Pro		coated Aldura		Chamfering/deburring
Ø	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	Part No.	€/pc.	mm/Z
4.0	4*	54	4	34060040	23.60	34060040A	28.51	34060040AD	40.39	0.008 – 0.015
6.0	6	57	4	34060060	26.97	34060060A	31.38	34060060AD	42.45	0.010 – 0.020
8.0	8	63	4	34060080	31.58	34060080A	37.17	34060080AD	59.03	0.015 – 0.030
10.0	10	72	4	34060100	43.76	34060100A	49.48	34060100AD	72.21	0.025 – 0.040
12.0	12	83	4	34060120	63.41	34060120A	79.98	34060120AD	99.63	0.035 – 0.050
16.0	16	92	4	34060160	116.73	34060160A	146.52	34060160AD	175.12	0.045 – 0.065
20.0	20	104	4	34060200	168.82	34060200A	210.07	34060200AD	244.54	0.060 – 0.075

TIP

In our white paper "Tools for machine deburring", you can learn why deburring is important.

34090

Solid Carbide NC Deburring Cutter
90°



d1	d2
h10	h6

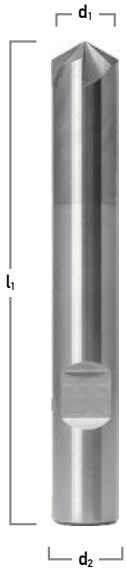
d1	d2	l1		uncoated		coated Alcrona Pro		coated Aldura		Chamfering/deburring
Ø	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	Part No.	€/pc.	mm/Z
1.0	3*	38	3	34090010	23.60	34090010A	28.51	–	–	0.002 – 0.005
2.0	3*	38	3	34090020	23.60	34090020A	28.51	–	–	0.004 – 0.007
3.0	3*	38	4	34090030	23.60	34090030A	28.51	–	–	0.006 – 0.010
4.0	4*	54	4	34090040	23.60	34090040A	28.51	34090040AD	40.39	0.008 – 0.015
6.0	6	57	4	34090060	26.97	34090060A	31.38	34090060AD	42.45	0.010 – 0.020
8.0	8	63	4	34090080	31.58	34090080A	37.17	34090080AD	59.03	0.015 – 0.030
10.0	10	72	4	34090100	43.76	34090100A	49.48	34090100AD	72.21	0.025 – 0.040
12.0	12	83	4	34090120	63.41	34090120A	79.98	34090120AD	99.63	0.035 – 0.050
16.0	16	92	4	34090160	116.73	34090160A	146.52	34090160AD	175.12	0.045 – 0.065
20.0	20	104	4	34090200	168.82	34090200A	210.17	34090200AD	244.54	0.060 – 0.075

Material	General structured steels	Alloy case-hardened steels	Free machining steels	Stainless steels	Cast iron (GG6,GT)	Aluminium	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 850 N/mm²	< 300 HB	< 600 N/mm²	850 – 1200 N/mm²
V_c (m/min) uncoated	100	60	100	70	100	100	50
V_c (m/min) Alcrona Pro	120	80	120	80	120	150	60
V_c (m/min) Aldura	150	100	150	90	150	200	70

Product family 162

34120

Solid Carbide NC Deburring Cutter
120°



d_1	d_2
h10	h6

d_1	d_2	l_1		uncoated		coated Alcrona Pro		coated Aldura		Chamfering/deburring
Ø	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	Part No.	€/pc.	mm/Z
4.0	4*	54	4	34120040	23.60	34120040A	28.51	34120040AD	40.39	0.008 – 0.015
6.0	6	57	4	34120060	26.97	34120060A	31.38	34120060AD	42.45	0.010 – 0.020
8.0	8	63	4	34120080	31.58	34120080A	37.17	34120080AD	59.03	0.015 – 0.030
10.0	10	72	4	34120100	43.76	34120100A	49.48	34120100AD	72.21	0.025 – 0.040
12.0	12	83	4	34120120	63.41	34120120A	79.98	34120120AD	99.63	0.035 – 0.050
16.0	16	92	4	34120160	116.73	34120160A	146.52	34120160AD	175.12	0.045 – 0.065
20.0	20	104	4	34120200	168.82	34120200A	210.07	34120200AD	244.54	0.060 – 0.075

Material	General structured steels	Alloy case-hardened steels	Free machining steels	Stainless steels	Cast iron (GGG,GT)	Aluminium	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	1000 – 1200 N/mm²	850 – 1000 N/mm²	< 850 N/mm²	< 300 HB	< 600 N/mm²	850 – 1200 N/mm²
V_c (m/min) uncoated	100	60	100	70	100	100	50
V_c (m/min) Alcrona Pro	120	80	120	80	120	150	60
V_c (m/min) Aldura	150	100	150	90	150	200	70

Product family 162

33060

Manufacturer standard

Solid Carbide Countersink
60°

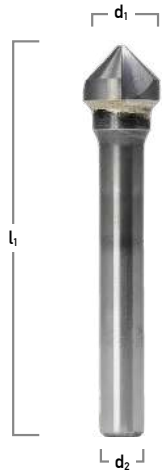
d_1	d_2	l_1		uncoated		coated Alcrona Pro		coated Aldura		Feed
mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	Part No.	€/pc.	mm/rev
4.30	6	50	3	330600436	62.38	330600436A	70.01	330600436AD	81.07	0.02 – 0.10
6.30	6	51	3	330600636	62.38	330600636A	70.01	330600636AD	81.07	0.05 – 0.11
8.30	6	55	3	330600836	63.57	330600836A	73.60	330600836AD	86.87	0.05 – 0.12
10.40	6	56	3	330601046	65.67	330601046A	83.05	330601046AD	94.49	0.06 – 0.13
12.40	8	59	3	330601248	75.50	330601248A	91.04	330601248AD	108.55	0.07 – 0.14
16.50	10	63	3	330601651	99.19	330601651A	128.88	330601651AD	155.20	0.08 – 0.16
20.50	10	67	3	330602051	135.83	330602051A	148.82	330602051AD	160.39	0.13 – 0.18
25.00	10	73	3	330602501	199.03	330602501A	220.79	330602501AD	247.33	0.14 – 0.20
31.00	10	79	3	330603101	278.18	330603101A	315.65	330603101AD	347.69	0.16 – 0.25

d_1	d_2
h10	h6

33090

Manufacturer standard

Solid Carbide Countersink
90°



d_1	d_2	l_1		uncoated		coated Alcrona Pro		coated Aldura		Feed
mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	Part No.	€/pc.	mm/rev
4.30	6	50	3	330900436	62.38	330900436A	70.01	330900436AD	81.07	0.02 – 0.10
6.30	6	51	3	330900636	62.38	330900636A	70.01	330900636AD	81.07	0.05 – 0.11
8.30	6	52	3	330900836	63.57	330900836A	73.60	330900836AD	86.87	0.04 – 0.12
10.40	6	53	3	330901046	65.67	330901046A	83.00	330901046AD	94.49	0.06 – 0.13
12.40	8	55	3	330901248	75.50	330901248A	91.04	330901248AD	108.55	0.07 – 0.14
16.50	10	58	3	330901651	99.19	330901651A	128.88	330901651AD	155.20	0.08 – 0.16
20.50	10	61	3	330902051	135.83	330902051A	148.82	330902051AD	160.39	0.13 – 0.18
25.00	10	64	3	330902501	199.03	330902501A	220.79	330902501AD	247.33	0.14 – 0.20
31.00	10	68	3	330903101	278.18	330903101A	315.65	330903101AD	347.69	0.16 – 0.25

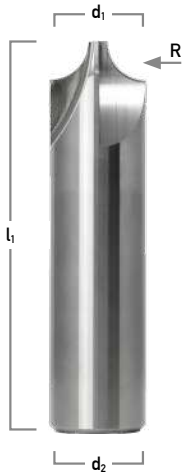
d_1	d_2
h10	h6

Material	General structured steels	Free machining steels	Alloy case-hardened steels	Stainless steels	Cast iron (GGG,GT)	Aluminium	Plastics	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	< 850 N/mm²	< 300 HB	< 600 N/mm²		850 – 1200 N/mm²
V_c (m/min) uncoated	60	65	55	20	35	100	200	20
V_c (m/min) Alcrona Pro	70	75	65	25	45	125	245	25
V_c (m/min) Aldura	85	95	80	30	55	155	305	30

Product family 161

36040


Solid Carbide Corner Rounding Cutter, Concave



d_1	d_2
h10	h6

Radius	d_1	d_2	l_1		uncoated		coated		Chamfering		
	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z		
0.50	7	8	70	4	36040005	98.01	36040005A	113.99	0.010	–	0.020
1.00	6	8	70	4	36040010	98.01	36040010A	113.99	0.010	–	0.020
1.50	7	10	75	4	36040015	102.25	36040015A	127.42	0.015	–	0.030
2.00	6	10	75	4	36040020	102.25	36040020A	127.42	0.020	–	0.040
2.50	7	12	75	4	36040025	110.19	36040025A	131.30	0.020	–	0.040
3.00	6	12	75	4	36040030	110.19	36040030A	131.30	0.025	–	0.050
3.50	9	16	80	4	36040035	137.09	36040035A	166.48	0.025	–	0.050
4.00	8	16	80	4	36040040	137.09	36040040A	166.48	0.030	–	0.060
4.50	7	16	80	4	36040045	137.09	36040045A	166.48	0.030	–	0.060
5.00	10	20	80	4	36040050	199.61	36040050A	233.99	0.035	–	0.070
6.00	8	20	80	4	36040060	199.61	36040060A	233.99	0.040	–	0.080
8.00	9	25	100	4	36040080	310.95	36040080A	345.19	0.060	–	0.090
10.00	5	25	100	4	36040100	318.45	36040100A	355.61	0.065	–	0.100

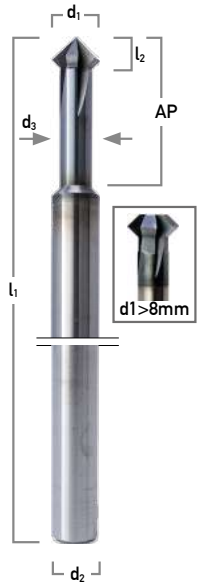
Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy case-hardened steels	Stainless steels	HartCast	Cast iron (GGG,GT)	Aluminium	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	< 850 N/mm²	> 350 HB	< 300 HB	< 600 N/mm²	850 – 1200 N/mm²
V_c (m/min) uncoated	70	65	65	50	35	50	60	285	30
V_c (m/min) Alcrona Pro	80	75	75	60	45	60	70	320	35

Product family 160

38040

Alcrona Pro | Z 3–4 | HA | VHM | Type N | Manu-facturer standard

Solid Carbide Forward / Backward Deburring Cutter, Angle 45°



d_1	d_2	l_2	l_1	d_3	AP		coated		f_z
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
2.0	4	1.0	75	1.4	9	3	38040020AS4	59.21	0.004 – 0.010
3.0	4	1.5	75	2.2	12	4	38040030AS4	59.21	0.005 – 0.010
4.0	4	2.0	75	2.7	17	4	38040040AS4	59.46	0.005 – 0.013

d_1	d_2	l_2	l_1	d_3	AP		coated		f_z
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
2.0	6	1.4	100	1.2	8	3	38040020A	69.77	0.004 – 0.010
3.0	6	2.0	100	2.2	8	4	38040030A	69.77	0.005 – 0.010
4.0	6	3.0	100	2.7	13	4	38040040A	70.36	0.005 – 0.013
5.0	6	4.0	100	3.5	15	4	38040050A	81.89	0.005 – 0.013
6.0	6	4.0	100	4.0	19	4	38040060A	81.89	0.008 – 0.015
8.0	6	3.2	100	–	–	4	38040080A	106.44	0.010 – 0.018
10.0	6	4.3	100	–	–	4	38040100A	131.30	0.010 – 0.020
12.0	6	5.0	100	–	–	4	38040120A	156.00	0.012 – 0.023
16.0	10	8.0	100	–	–	4	38040160A	207.31	0.015 – 0.030

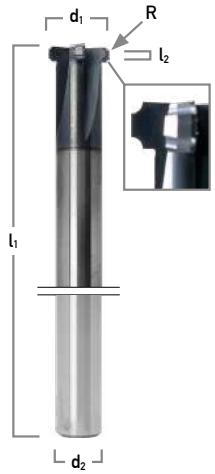
· Up to d1=6 mm front tapered
· From d1=8 mm tip flattened

d_1	d_2
h10	h6

39040

Alcrona Pro | Z 4 | HA | VHM | Type N | Manu-facturer standard

Solid Carbide Forward / Backward Corner Rounding Cutter



Radius	largest Cutting Ø d_1	smallest Cutting Ø d_1	d_2	l_2	l_1		coated		f_z
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
0.2	8	7.6	6	2	100	4	39040020A	169.92	0.010 – 0.050
0.3	8	7.4	6	2	100	4	39040030A	169.92	0.010 – 0.050
0.4	8	7.2	6	2	100	4	39040040A	169.92	0.010 – 0.050
0.5	8	7.0	6	2	100	4	39040050A	169.92	0.010 – 0.050
0.8	10	8.4	6	4	100	4	39040080A	177.99	0.020 – 0.060
1.0	10	8.0	6	4	100	4	39040100A	177.99	0.020 – 0.060
1.2	10	7.6	6	4	100	4	39040120A	177.99	0.020 – 0.060
1.5	10	7.0	6	4	100	4	39040150A	177.99	0.020 – 0.060

d_1	d_2
h10	h6

Material	General structured steels	Free machining steels	Non-alloy Q & T steels	Alloy case-hardened steels	Stainless steels	HartCast	Cast iron (GGG,GT)	Aluminium	Special and Titanium alloys
Tensile strength / Hardness	500 – 850 N/mm²	850 – 1000 N/mm²	850 – 1000 N/mm²	1000 – 1200 N/mm²	< 850 N/mm²	> 350 HB	< 300 HB	< 600 N/mm²	850 – 1200 N/mm²
V_c (m/min) Alcrona Pro	80	75	75	60	40	60	70	320	35

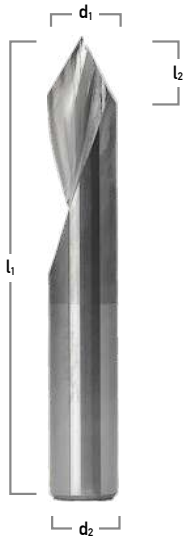
52000


Uncoated
Z 1
HA

VHM
Type N


Manu-facturer standard

Solid Carbide Engraving Cutter
60°



d_1	l_2	l_1		uncoated		Feed
mm	mm	mm	Z	Part No.	€/pc.	mm/Z
3.0	15	40	1	52000030	17.60	0.010 – 0.020
4.0	15	40	1	52000040	22.67	0.015 – 0.027
6.0	15	40	1	52000060	28.73	0.020 – 0.032

d_1
h11

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 1000 N/mm²	< 600 N/mm²
V_c (m/min)	65	40	55	140

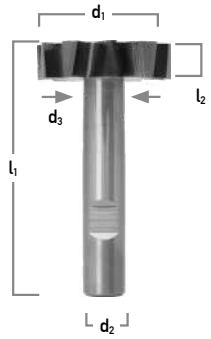
Product family 160

58501

Alcrona Pro | Z 6–10 | HB | VHM | Type N | DIN 850B

Solid Carbide Keyseating Cutter

For Slot Milling Acc. To DIN 6888 Fit P9



d_1	d_2	l_2
h11	h6	e8

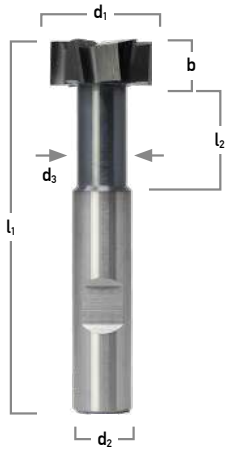
d_1	d_2	l_2	l_1	d_3		coated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
10.5	6	2	50	4.0	6	58501105020	280.74	0.030	–	0.040	0.028	–	0.035
10.5	6	3	50	4.2	6	58501105030	304.23	0.030	–	0.040	0.028	–	0.035
13.5	10	2	56	4.6	8	58501135020	380.03	0.030	–	0.040	0.028	–	0.035
13.5	10	3	56	4.6	8	58501135030	404.21	0.030	–	0.040	0.028	–	0.035
13.5	10	4	56	4.6	8	58501135040	425.31	0.030	–	0.040	0.028	–	0.035
16.5	10	3	56	4.6	10	58501165030	436.02	0.030	–	0.040	0.028	–	0.035
16.5	10	4	56	4.6	10	58501165040	464.77	0.030	–	0.040	0.028	–	0.035
19.5	10	3	63	5.6	10	58501195030	443.50	0.030	–	0.040	0.028	–	0.035
19.5	10	4	63	5.6	10	58501195040	472.26	0.030	–	0.040	0.028	–	0.035
22.5	10	4	63	6.6	10	58501225040	554.03	0.035	–	0.045	0.033	–	0.040
25.5	10	5	63	7.5	10	58501255050	631.31	0.035	–	0.045	0.033	–	0.040
28.5	10	5	63	8.5	10	58501285050	718.98	0.035	–	0.045	0.033	–	0.040
32.5	12	5	71	8.5	10	58501325050	847.71	0.038	–	0.050	0.036	–	0.045
38.5	12	10	71	11.8	10	58501385100	937.01	0.038	–	0.050	0.036	–	0.045
45.5	12	10	71	11.8	10	58501455100	1003.55	0.038	–	0.050	0.036	–	0.045

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 900 N/mm²	< 900 N/mm²	< 1000 N/mm²	< 500 N/mm²
V_c (m/min) Finishing	65	40	50	75
V_c (m/min) Roughing	50	25	35	60

58511

Alcrona Pro | Z 6 | HB | VHM | Type N | DIN 851B

Solid Carbide T-Slot Cutter



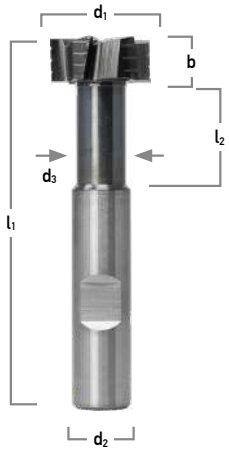
d_1	d_2	Corner chamfer	b	l_2	l_1	d_3		t-Slots	coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	mm	mm	Z	DIN 650	Part No.	€/pc.	mm/Z	mm/Z
12.5	10	0.20	6	7	57	5	6	6	58511125060	460.20	0.030 – 0.040	0.028 – 0.035
16.0	10	0.20	8	10	62	7	6	8	58511160080	578.24	0.030 – 0.040	0.028 – 0.035
18.0	12	0.20	8	13	70	8	6	10	58511180080	591.88	0.030 – 0.040	0.028 – 0.035
21.0	12	0.20	9	16	74	10	6	12	58511210090	678.21	0.035 – 0.045	0.033 – 0.040
25.0	16	0.20	11	17	82	12	6	14	58511250110	785.71	0.035 – 0.045	0.033 – 0.040
28.0	16	0.20	12	22	85	13	6	16	58511280120	870.44	0.035 – 0.045	0.033 – 0.040
32.0	16	0.20	14	22	90	15	6	18	58511320140	1020.28	0.038 – 0.050	0.036 – 0.045

d_1	d_2	b
d11	h6	d11

58512

Alcrona Pro | Z 6 | HB | VHM | Type NF | DIN 851B

Solid Carbide Roughing / Finishing T-Slot Cutter



d_1	d_2	Corner chamfer	b	l_2	l_1	d_3		t-Slots	coated		f_z Roughing	f_z Finishing
mm	mm		mm	mm	mm	mm	Z	DIN 650	Part No.	€/pc.	mm/Z	mm/Z
12.5	10	0.20	6	7	57	5	6	6	58512125060	502.60	0.030 – 0.040	0.028 – 0.035
16.0	10	0.20	8	10	62	7	6	8	58512160080	637.34	0.030 – 0.040	0.028 – 0.035
18.0	12	0.20	8	13	70	8	6	10	58512180080	652.42	0.030 – 0.040	0.028 – 0.035
21.0	12	0.20	9	16	74	10	6	12	58512210090	747.87	0.035 – 0.045	0.033 – 0.040
25.0	16	0.20	11	17	82	12	6	14	58512250110	862.80	0.035 – 0.045	0.033 – 0.040
28.0	16	0.20	12	22	85	13	6	16	58512280120	956.64	0.035 – 0.045	0.033 – 0.040
32.0	16	0.20	14	22	90	15	6	18	58512320140	1120.26	0.038 – 0.050	0.036 – 0.045

d_1	d_2	b
d11	h6	d11

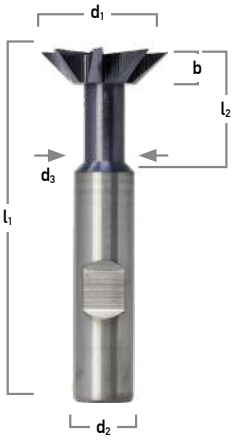
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 900 N/mm²	< 900 N/mm²	< 1000 N/mm²	< 500 N/mm²
V_c (m/min) Finishing	70	40	55	75
V_c (m/min) Roughing	55	25	40	65

Product family 160

51833C

Alcrona Pro | Z 6–9 | HB | VHM | Type N | DIN 1833C

Solid Carbide Dovetail Cutter
45°



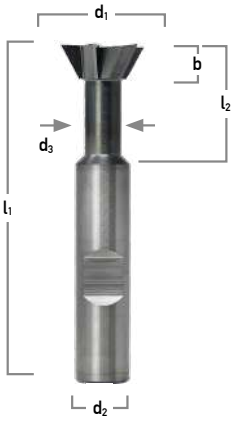
Winkel	d_1	d_2	Corner chamfer	b	l_2	l_1	d_3		coated		f_z Roughing	f_z Finishing
	mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
45°	16.0	10	0.20	4	14	60	6.7	6	51833C4516	472.26	0.040 – 0.050	0.035 – 0.045
45°	20.0	12	0.20	5	11	63	7	8	51833C4520	541.88	0.040 – 0.050	0.035 – 0.045
45°	22.0	12	0.20	6	14	67	8	8	51833C4522	610.05	0.040 – 0.050	0.035 – 0.045
45°	25.0	12	0.20	6.3	14	67	8	8	51833C4525	666.05	0.045 – 0.055	0.040 – 0.050
45°	28.0	16	0.20	7.5	20	80	8.5	9	51833C4528	788.63	0.045 – 0.055	0.040 – 0.050
45°	32.0	16	0.20	8	14	71	13	9	51833C4532	902.24	0.045 – 0.055	0.040 – 0.050
45°	38.0	16	0.20	10	20	80	15	9	51833C4538	1027.88	0.045 – 0.060	0.045 – 0.055

d_1	d_2	b
js16	h6	js14

51833C

Alcrona Pro | Z 6–9 | HB | VHM | Type N | DIN 1833C

Solid Carbide Dovetail Cutter
60°



Winkel	d_1	d_2	Corner chamfer	b	l_2	l_1	d_3		coated		f_z Roughing	f_z Finishing
	mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
60°	16.0	10	0.20	6.3	11	60	6.7	6	51833C6016	452.58	0.040 – 0.050	0.035 – 0.045
60°	20.0	12	0.20	8	7	63	7	8	51833C6020	516.23	0.040 – 0.050	0.035 – 0.045
60°	22.0	12	0.20	9	11	67	8	8	51833C6022	582.79	0.040 – 0.050	0.035 – 0.045
60°	25.0	12	0.20	10	11	67	8	8	51833C6025	637.34	0.045 – 0.055	0.040 – 0.050
60°	28.0	16	0.20	11	17	80	8.5	9	51833C6028	755.34	0.045 – 0.055	0.040 – 0.050
60°	32.0	16	0.20	12.5	10	71	13	9	51833C6032	859.88	0.045 – 0.055	0.040 – 0.050
60°	38.0	16	0.20	16	14	80	15	9	51833C6038	982.44	0.045 – 0.060	0.045 – 0.055

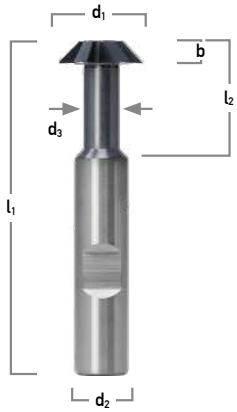
d_1	d_2	b
js16	h6	js14

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 900 N/mm²	< 900 N/mm²	< 1000 N/mm²	< 500 N/mm²
V_c (m/min) Finishing	70	40	55	75
V_c (m/min) Roughing	55	25	40	65

51833D

Alcrona Pro | Z 6–9 | HB | VHM | Type N | DIN 1833D

Solid Carbide Dovetail Cutter
45°



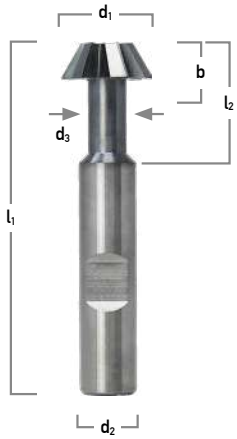
Winkel	d_1	d_2	Corner chamfer	b	l_2	l_1	d_3		coated		f_z Roughing	f_z Finishing
	mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
45°	16.0	10	0.20	4	14	60	6.7	6	51833D4516	428.39	0.040 – 0.050	0.035 – 0.045
45°	20.0	12	0.20	5	11	63	7	8	51833D4520	492.03	0.040 – 0.050	0.035 – 0.045
45°	22.0	12	0.20	6	14	67	8	8	51833D4522	557.12	0.040 – 0.050	0.035 – 0.045
45°	25.0	12	0.20	6.3	15	67	8	8	51833D4525	605.51	0.045 – 0.055	0.040 – 0.050
45°	28.0	16	0.20	7.5	20	80	8.5	9	51833D4528	720.58	0.045 – 0.055	0.040 – 0.050
45°	32.0	16	0.20	8	13	71	13	9	51833D4532	820.43	0.045 – 0.055	0.040 – 0.050
45°	38.0	16	0.20	10	21	80	15	9	51833D4538	934.06	0.045 – 0.060	0.045 – 0.055

d_1	d_2	b
js16	h6	js14

51833D

Alcrona Pro | Z 6–9 | HB | VHM | Type N | DIN 1833D

Solid Carbide Dovetail Cutter
60°



Winkel	d_1	d_2	Corner chamfer	b	l_2	l_1	d_3		coated		f_z Roughing	f_z Finishing
	mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
60°	16.0	10	0.20	6.3	12	60	6.7	6	51833D6016	428.39	0.040 – 0.050	0.035 – 0.045
60°	20.0	12	0.20	8	8	63	7	8	51833D6020	492.03	0.040 – 0.050	0.035 – 0.045
60°	22.0	12	0.20	9	10	67	8	8	51833D6022	557.12	0.040 – 0.050	0.035 – 0.045
60°	25.0	12	0.20	10	12	67	8	8	51833D6025	605.51	0.045 – 0.055	0.040 – 0.050
60°	28.0	16	0.20	11	17	80	8.5	9	51833D6028	720.58	0.045 – 0.055	0.040 – 0.050
60°	32.0	16	0.20	12.5	9	71	13	9	51833D6032	820.43	0.045 – 0.055	0.040 – 0.050
60°	38.0	16	0.20	16	15	80	15	9	51833D6038	934.06	0.045 – 0.060	0.045 – 0.055

d_1	d_2	b
js16	h6	js14

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 900 N/mm²	< 900 N/mm²	< 1000 N/mm²	< 500 N/mm²
V_c (m/min) Finishing	70	40	55	75
V_c (m/min) Roughing	55	25	40	65

Artikelgruppe 160

ToolFactory
Cutting Tool Solutions

HSS Line

PM & HSS End Mills

Performance
Endurance
Affordable

AZ333A


Uncoated | TiN | Z 2 | 60° | Shape A | DIN 333A

HSS Center Drill

d_1	d_2	l_1	uncoated		coated		Feed
mm	mm	mm	Part No.	€/pc.	Part No.	€/pc.	mm/rev
1.00	3.15	31.5	AZ333A0100	3.58	AZ333A0100TIN	6.07	0.02
1.25	3.15	31.5	AZ333A0125	3.58	AZ333A0125TIN	6.07	0.02
1.60	4.00	35.5	AZ333A0160	3.72	AZ333A0160TIN	6.80	0.02
2.00	5.00	40.0	AZ333A0200	4.30	AZ333A0200TIN	8.03	0.02
2.50	6.30	45.0	AZ333A0250	4.84	AZ333A0250TIN	9.55	0.03
3.15	8.00	50.0	AZ333A0315	5.63	AZ333A0315TIN	10.22	0.03
4.00	10.00	56.0	AZ333A0400	8.36	AZ333A0400TIN	12.17	0.03
5.00	12.50	63.0	AZ333A0500	11.15	AZ333A0500TIN	15.89	0.04
6.30	16.00	71.0	AZ333A0630	19.32	AZ333A0630TIN	23.16	0.05

d_1		d_2
1 – 2.5	0/+0.14	h9
3.15 – 5	0/+0.18	
6.3	0/+0.22	

AZ333A


Uncoated | Z 2 | 60° | HSS-Co8 | Shape A | DIN 333A

HSS Co8 Center Drill

d_1	d_2	l_1	uncoated		Feed
mm	mm	mm	Part No.	€/pc.	mm/rev
1.00	3.15	31.5	AZ333A0100E	5.14	0.02
1.60	4.00	35.5	AZ333A0160E	5.84	0.02
2.00	5.00	40.0	AZ333A0200E	7.12	0.02
2.50	6.30	45.0	AZ333A0250E	9.05	0.03
3.15	8.00	50.0	AZ333A0315E	10.82	0.03
4.00	10.00	56.0	AZ333A0400E	11.45	0.03
5.00	12.50	63.0	AZ333A0500E	20.24	0.04

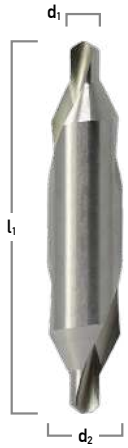
d_1		d_2
1 – 2.5	0/+0.14	h9
3.15 – 5	0/+0.18	

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 900 N/mm²	< 750 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min)	30	10	15	70

Product family 333

AZ333R

HSS Center Drill Radius Type



d_1	d_2	l_1	uncoated		Feed
mm	mm	mm	Part No.	€/pc.	mm/rev
1.00	3.15	31.5	AZ333R0100	4.74	0.02
1.25	3.15	31.5	AZ333R0125	4.74	0.02
1.60	4.00	35.5	AZ333R0160	4.74	0.02
2.00	5.00	40.0	AZ333R0200	5.15	0.02
2.50	6.30	45.0	AZ333R0250	5.88	0.03
3.15	8.00	50.0	AZ333R0315	7.32	0.03
4.00	10.00	56.0	AZ333R0400	10.35	0.03
5.00	12.50	63.0	AZ333R0500	12.93	0.04
6.30	16.00	71.0	AZ333R0630	22.44	0.05

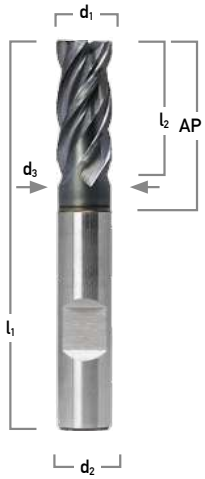
d_1		d_2
1 – 2.5	0/+0.14	h9
3.15 – 5	0/+0.18	
6.3	0/+0.22	

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 900 N/mm²	< 750 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min)	30	10	15	70

PM 35382




PM HPC End Mill



d_1	d_2	Corner chamfer	l_2	AP	l_1	d_3		coated		f_z Roughing			f_z Finishing		
mm	mm		mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
6.0	6	0.20	13	21.5	57	5.5	4	PM3538206A	25.91	0.026	–	0.044	0.025	–	0.038
8.0	10	0.20	19	29.0	63	7.5	4	PM3538208A	33.43	0.032	–	0.055	0.029	–	0.048
10.0	10	0.20	22	32.0	72	9.5	4	PM3538210A	37.22	0.042	–	0.077	0.039	–	0.067
12.0	12	0.20	26	38.0	83	11.5	4	PM3538212A	47.59	0.063	–	0.099	0.059	–	0.086
16.0	16	0.20	32	44.0	92	15.5	5	PM3538216A	77.07	0.095	–	0.143	0.088	–	0.124
18.0	16	0.20	32	43.5	92	15.5	5	PM3538218A	92.92	0.116	–	0.143	0.108	–	0.124
20.0	20	0.20	38	54.0	104	19.5	5	PM3538220A	109.55	0.137	–	0.187	0.127	–	0.162
25.0	25	0.20	45	64.0	121	24.5	6	PM3538225A	188.47	0.145	–	0.205	0.130	–	0.180

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

d_1	d_2
h10	h6

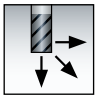
V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB
Full slot a_p=1xD	70	60	55	55	50	50	70	60
Trimming a_e = 0,2xD	95	80	75	75	70	70	100	80

V_c (m/min)	Stainless austenitic	Stainless acid-resistant austenitic	Heat-resistant materials	Titanium alloy	Alu & Al Alloys	Alu & Al Alloys
Tensile strength / Hardness	1.4301	1.4571	≤1200 N/mm²	≤850 N/mm²	< 10 % Si	> 10 % Si
Full slot a_p=1xD	40	30	60	40	155	95
Trimming a_e = 0,2xD	60	40	80	60	195	130

Product family 48

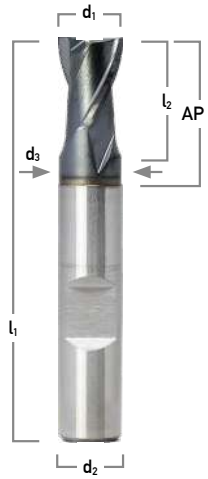
PM 122-0






PM End Mill

Short version



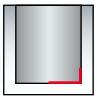
d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
4.0	6	7	–	51	–	2	PM122004A	18.11	0.014 –	0.014	0.012 –	0.025
5.0	6	8	–	52	–	2	PM122005A	18.11	0.014 –	0.028	0.012 –	0.025
6.0	6	8	16	52	5.5	2	PM122006A	18.11	0.025 –	0.045	0.025 –	0.042
7.0	10	10	–	60	–	2	PM122007A	23.57	0.025 –	0.045	0.025 –	0.042
8.0	10	11	–	61	–	2	PM122008A	23.57	0.032 –	0.065	0.030 –	0.062
9.0	10	11	–	61	–	2	PM122009A	24.05	0.032 –	0.065	0.030 –	0.062
10.0	10	13	22	63	10	2	PM122010A	27.48	0.052 –	0.080	0.052 –	0.077
12.0	12	16	27	73	11	2	PM122012A	37.64	0.053 –	0.095	0.052 –	0.092
14.0	12	16	–	73	–	2	PM122014A	45.26	0.075 –	0.118	0.075 –	0.115
16.0	16	19	29	79	15	2	PM122016A	51.24	0.080 –	0.128	0.080 –	0.125
18.0	16	19	–	79	–	2	PM122018A	62.41	0.082 –	0.153	0.080 –	0.150
20.0	20	22	35	88	19	2	PM122020A	80.03	0.082 –	0.153	0.082 –	0.150

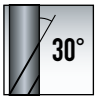
Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

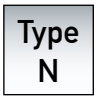
Full slot milling
a_p = 1.5xD

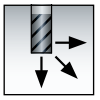
d_1	d_2
e10	h6

PM 132-2

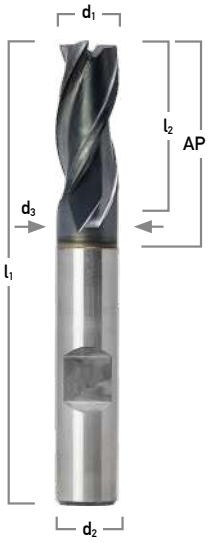





PM End Mill



d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
2.0	6	7	–	51	–	3	PM132202A	21.91	0.008 –	0.015	0.008 –	0.012
3.0	6	8	–	52	–	3	PM132203A	21.91	0.010 –	0.015	0.008 –	0.012
4.0	6	11	–	55	–	3	PM132204A	21.91	0.014 –	0.028	0.012 –	0.025
5.0	6	13	–	57	–	3	PM132205A	21.91	0.014 –	0.028	0.012 –	0.025
6.0	6	13	21	57	5.5	3	PM132206A	21.91	0.025 –	0.045	0.025 –	0.042
7.0	10	16	–	66	–	3	PM132207A	31.65	0.025 –	0.045	0.025 –	0.042
8.0	10	19	–	69	–	3	PM132208A	31.73	0.032 –	0.065	0.030 –	0.062
9.0	10	19	–	69	–	3	PM132209A	31.73	0.032 –	0.065	0.030 –	0.062
10.0	10	22	31	72	9	3	PM132210A	33.98	0.052 –	0.080	0.052 –	0.077
12.0	12	26	37	83	11	3	PM132212A	45.26	0.053 –	0.095	0.052 –	0.092
14.0	12	26	–	83	–	3	PM132214A	55.77	0.075 –	0.118	0.075 –	0.115
16.0	16	32	–	92	–	3	PM132216A	64.80	0.080 –	0.128	0.080 –	0.125
18.0	16	32	–	92	–	3	PM132218A	73.67	0.082 –	0.153	0.080 –	0.150
20.0	20	38	52	104	19	3	PM132220A	94.75	0.082 –	0.153	0.082 –	0.150
25.0	25	45	64	121	24	3	PM132225A	150.89	0.084 –	0.158	0.082 –	0.155

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.5xD

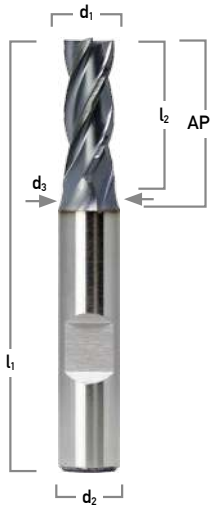
d_1	d_2
e10	h6

Material	Steel	Stainless	Cast	Alu	Special and Titanium alloys
Tensile strength / Hardness	< 850 N/mm²	< 1100 N/mm²	< 800 N/mm²	< 600 N/mm²	< 1400 N/mm²
V_c (m/min) Finishing	85	60	75	195	60
V_c (m/min) Roughing	65	40	50	155	40

PM 142-2




PM End Mill



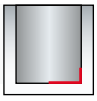
d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
2.0	6	7	–	51	–	4	PM142202A	18.05	0.008 – 0.015		0.008 – 0.012	
3.0	6	8	–	52	–	4	PM142203A	18.05	0.010 – 0.015		0.008 – 0.012	
4.0	6	11	–	55	–	4	PM142204A	18.05	0.014 – 0.021		0.012 – 0.025	
5.0	6	13	–	57	–	4	PM142205A	18.05	0.014 – 0.028		0.012 – 0.025	
6.0	6	13	21	57	5.5	4	PM142206A	18.05	0.025 – 0.045		0.025 – 0.042	
7.0	10	16	–	66	–	4	PM142207A	25.68	0.025 – 0.045		0.025 – 0.042	
8.0	10	19	–	69	–	4	PM142208A	25.68	0.032 – 0.065		0.030 – 0.062	
9.0	10	19	–	69	–	4	PM142209A	26.51	0.032 – 0.065		0.030 – 0.062	
10.0	10	22	32	72	9	4	PM142210A	26.25	0.052 – 0.080		0.052 – 0.077	
12.0	12	26	37	83	11	4	PM142212A	33.14	0.053 – 0.095		0.052 – 0.092	
14.0	12	26	–	83	–	4	PM142214A	49.70	0.075 – 0.118		0.075 – 0.115	
16.0	16	32	42	92	15	4	PM142216A	54.23	0.080 – 0.128		0.080 – 0.125	
18.0	16	32	–	92	–	4	PM142218A	70.92	0.082 – 0.153		0.080 – 0.150	
20.0	20	38	52	104	19	4	PM142220A	69.52	0.082 – 0.153		0.082 – 0.150	

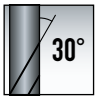
Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

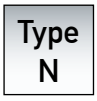
Full slot milling
a_p = 1.5xD

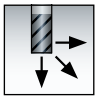
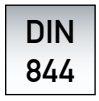
d_1	d_2
k10	h6

PM 162-2

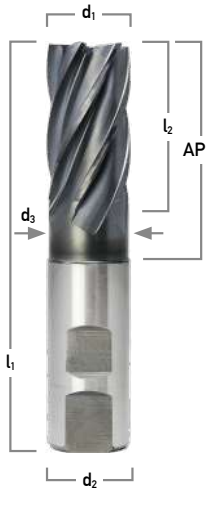


PM End Mill



d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
25.0	25	45	64	121	24	6	PM162225A	119.29	0.084 – 0.158		0.082 – 0.155	
30.0	25	45	–	121	–	6	PM162230A	138.68	0.084 – 0.158		0.082 – 0.155	
32.0	32	53	71	133	31	6	PM162232A	146.58	0.084 – 0.158		0.082 – 0.155	

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.5xD

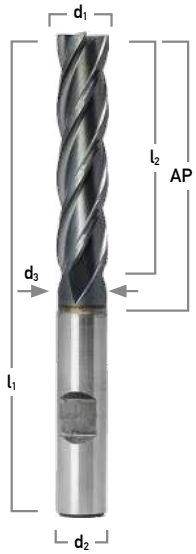
d_1	d_2
k10	h6

Material	Steel	Stainless	Cast	Alu	Special and Titanium alloys
Tensile strength / Hardness	< 850 N/mm²	< 1100 N/mm²	< 800 N/mm²	< 600 N/mm²	< 1400 N/mm²
V_c (m/min) Finishing	85	60	75	195	60
V_c (m/min) Roughing	65	40	50	155	40

Product family 48

PM 142-4

PM End Mill
Extra-long version



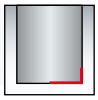
d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
6.0	6	24	32	68	5.5	4	PM142406A	26.01	0.025 – 0.045		0.025 – 0.042	
8.0	10	38	–	88	–	4	PM142408A	33.98	0.032 – 0.065		0.030 – 0.062	
10.0	10	45	54	95	9	4	PM142410A	34.11	0.052 – 0.080		0.052 – 0.077	
12.0	12	53	64	110	11	4	PM142412A	46.97	0.053 – 0.095		0.052 – 0.092	
14.0	12	53	–	110	–	4	PM142414A	54.03	0.075 – 0.118		0.075 – 0.115	
16.0	16	63	73	123	15	4	PM142416A	67.42	0.080 – 0.128		0.080 – 0.125	
18.0	16	63	–	123	–	4	PM142418A	82.77	0.082 – 0.153		0.080 – 0.150	
20.0	20	75	89	141	19	4	PM142420A	95.52	0.082 – 0.153		0.082 – 0.150	

Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 1.5xD

d_1	d_2
k10	h6

PM 162-4



PM End Mill
Long version

d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
25.0	25	90	108	166	24	6	PM162425A	158.28	0.084 – 0.158		0.082 – 0.155	
32.0	32	106	124	186	31	6	PM162432A	218.51	0.084 – 0.158		0.082 – 0.155	

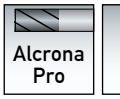
Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.5xD

d_1	d_2
k10	h6

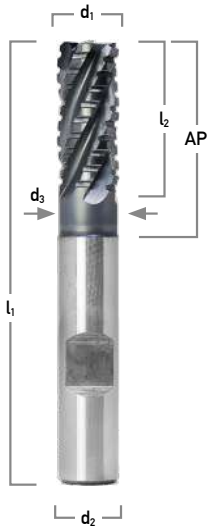
Material	Steel	Stainless	Cast	Alu	Special and Titanium alloys
Tensile strength / Hardness	< 850 N/mm²	< 1100 N/mm²	< 800 N/mm²	< 600 N/mm²	< 1400 N/mm²
V_c (m/min) Finishing	85	60	75	195	60
V_c (m/min) Roughing	65	40	50	155	40

PM 442-4





PM Roughing / Finishing End Mill



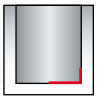
d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
6.0	6	13	21.5	57	5.5	4	PM442406A	46.89	0.025 –	0.045	0.025 –	0.042
8.0	10	19	23.0	69	7.5	4	PM442408A	58.82	0.032 –	0.065	0.030 –	0.062
10.0	10	22	32.0	72	9.5	5	PM442410A	45.80	0.052 –	0.080	0.052 –	0.077
12.0	12	26	38.0	83	11.5	5	PM442412A	60.94	0.053 –	0.095	0.052 –	0.092
14.0	12	26	37.0	83	11.4	5	PM442414A	69.48	0.075 –	0.118	0.075 –	0.115
16.0	16	32	44.0	92	15.5	5	PM442416A	81.68	0.080 –	0.128	0.080 –	0.125
20.0	20	38	53.0	104	19.5	5	PM442420A	120.00	0.082 –	0.153	0.082 –	0.150

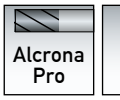
Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

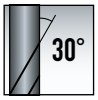
Full slot milling
a_p = 2.0xD

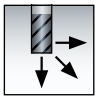
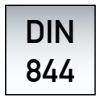
d_1	d_2
k12	h6

PM 542-4



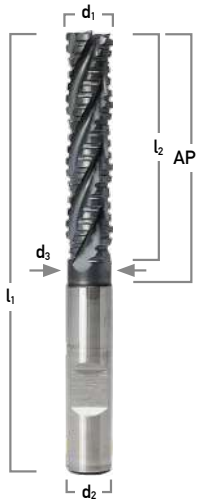




PM Roughing / Finishing End Mill

Long version



d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
6.0	6	24	33.5	68	5.5	4	PM542406A	63.60	0.025 –	0.045	0.025 –	0.042
8.0	10	38	38.0	88	7.5	4	PM542408A	73.21	0.032 –	0.065	0.030 –	0.062
10.0	10	45	54.0	95	9.5	4	PM542410A	68.48	0.052 –	0.080	0.052 –	0.077
12.0	12	53	64.0	110	11.5	4	PM542412A	93.39	0.053 –	0.095	0.052 –	0.092
16.0	16	63	74.0	123	15.5	4	PM542416A	128.38	0.080 –	0.128	0.080 –	0.125
20.0	20	75	90.0	141	19.5	4	PM542420A	177.46	0.082 –	0.153	0.082 –	0.150

d_1	d_2
k12	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

V_c (m/min)	General structured steels		Free machining steels	Non-alloy Q & T steels	Alloyed Q & T steels	Tool steels	Cast iron (GG)	Cast iron (GGG, GT)
Tensile strength / Hardness / etc.	≤ 500 N/mm²	≤ 850 N/mm²	≤ 1000 N/mm²	≤ 1000 N/mm²	≤ 1200 N/mm²	≤ 1300 N/mm²	< 450 N/mm²	> 260 HB
Full slot a_p=1xD	70	60	55	55	50	50	70	60
Trimming a_e = 0,2xD	90	80	75	75	70	70	100	80

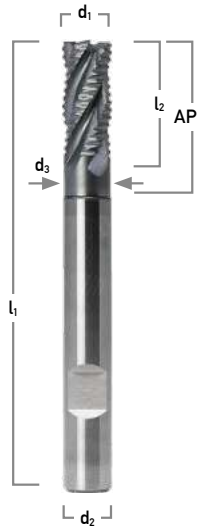
V_c (m/min)	Stainless austenitic	Stainless acid-resistant austenitic	Heat-resistant materials	Titanium alloy
Tensile strength / Hardness	1.4301	1.4571	≤1200 N/mm²	≤850 N/mm²
Full slot a_p=1xD	40	30	60	40
Trimming a_e = 0,2xD	60	40	80	60

Product family 48

PM 642-2

Z 4 | HB | 30° | PM | Type HR | DIN 844

PM Roughing End Mill



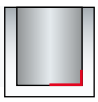
d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
6.0	6	13	21	57	5.5	4	PM642206A	34.11	0.025 – 0.045
7.0	10	16	–	66	–	4	PM642207A	43.37	0.025 – 0.045
8.0	10	19	–	69	–	4	PM642208A	36.24	0.032 – 0.065
9.0	10	19	–	69	–	4	PM642209A	45.34	0.032 – 0.065

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

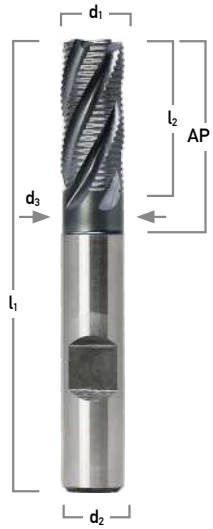
d_1	d_2
k12	h6

PM 652-2



Z 5 | HB | 30° | PM | Type HR | DIN 844

PM Roughing End Mill



d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
10.0	10	22	31	72	9	5	PM652210A	39.13	0.052 – 0.080
12.0	12	26	37	83	11	5	PM652212A	46.83	0.053 – 0.095
14.0	12	26	–	83	–	5	PM652214A	58.86	0.075 – 0.118
16.0	16	32	42	92	15	5	PM652216A	67.25	0.080 – 0.128
18.0	16	32	–	92	–	5	PM652218A	82.92	0.082 – 0.153
20.0	20	38	52	104	19	5	PM652220A	88.98	0.082 – 0.153
22.0	20	38	–	104	–	5	PM652222A	117.06	0.082 – 0.153
25.0	25	45	64	121	24	5	PM652225A	138.91	0.048 – 0.158
30.0	25	45	–	121	–	5	PM652230A	188.83	0.084 – 0.158

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

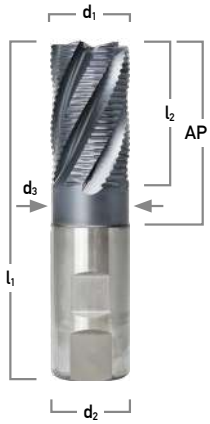
d_1	d_2
k12	h6

Material	Steel	Stainless	Cast	Alu	Special and Titanium alloys
Tensile strength / Hardness	< 850 N/mm²	< 1100 N/mm²	< 800 N/mm²	< 600 N/mm²	< 1400 N/mm²
V_c (m/min) Finishing	85	60	75	195	60
V_c (m/min) Roughing	65	40	50	155	40

PM 662-2




PM Roughing End Mill



d_1	d_2	l_2	AP	l_1	d_3		coated	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.
32.0	32	53	71	133	31	6	PM662232A	225.07

f_z Roughing
mm/Z
0.084 – 0.158

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

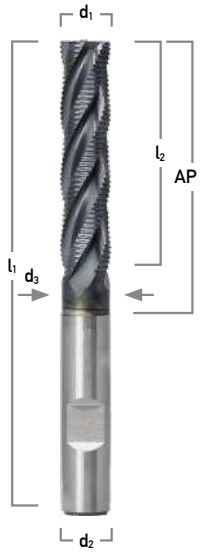
d_1	d_2
k12	h6

Material	Steel	Stainless	Cast	Alu	Special and Titanium alloys
Tensile strength / Hardness	< 850 N/mm²	< 1100 N/mm²	< 800 N/mm²	< 600 N/mm²	< 1400 N/mm²
V_c (m/min) Finishing	85	60	75	195	60
V_c (m/min) Roughing	65	40	50	155	40

Product family 48

PM 642-4

PM Roughing End Mill
Extra-long version



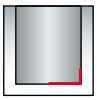
d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		
6.0	6	24	32	68	5.5	4	PM642406A	61.98	0.025	–	0.045
8.0	10	38	–	88	–	4	PM642408A	64.93	0.032	–	0.065
10.0	10	45	54	95	9	4	PM642410A	60.36	0.052	–	0.080
12.0	12	53	64	110	11	4	PM642412A	73.62	0.053	–	0.095
14.0	12	53	–	110	–	4	PM642414A	88.69	0.075	–	0.118
16.0	16	63	73	123	15	4	PM642416A	105.68	0.080	–	0.128
18.0	16	63	–	123	–	4	PM642418A	124.57	0.082	–	0.153
20.0	20	75	89	141	19	4	PM642420A	140.18	0.082	–	0.153

Peripheral milling
a_e = 0.3xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

d_1	d_2
k12	h6

PM 652-4



PM Roughing End Mill
Extra-long version

d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing		
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		
25.0	25	90	108	166	24	5	PM652425A	213.00	0.048	–	0.158

d_1	d_2
k12	h6

Peripheral milling
a_e = 0.3xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

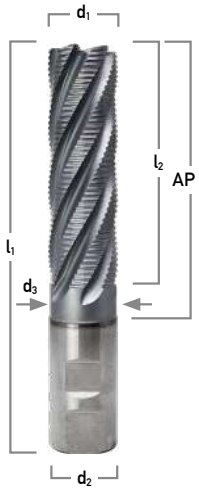
Material	Steel	Stainless	Cast	Alu	Special and Titanium alloys
Tensile strength / Hardness	< 850 N/mm²	< 1100 N/mm²	< 800 N/mm²	< 600 N/mm²	< 1400 N/mm²
V_c (m/min) Finishing	85	60	75	195	60
V_c (m/min) Roughing	65	40	50	155	40

PM 662-4




PM Roughing End Mill

Extra-long version



d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
32.0	32	106	124	186	31	6	PM662432A	300.57	0.084 – 0.158

Peripheral milling
a_e = 0.3xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

d_1	d_2
k12	h6

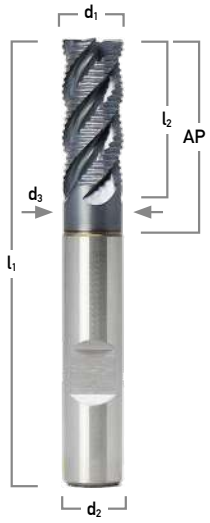
Material	Steel	Stainless	Cast	Alu	Special and Titanium alloys
Tensile strength / Hardness	< 850 N/mm²	< 1100 N/mm²	< 800 N/mm²	< 600 N/mm²	< 1400 N/mm²
V_c (m/min) Finishing	85	60	75	195	60
V_c (m/min) Roughing	65	40	50	155	40

Product family 48

PM 645-2



PM Roughing End Mill



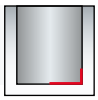
d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
6.0	6	13	20	57	5.5	4	PM645206A	62.11	0.025 – 0.045
7.0	10	16	–	66	–	4	PM645207A	76.80	0.025 – 0.045
8.0	10	19	–	69	–	4	PM645208A	67.91	0.032 – 0.065
9.0	10	19	–	69	–	4	PM645209A	80.22	0.032 – 0.065
10.0	10	22	31	72	9	4	PM645210A	65.86	0.052 – 0.080
12.0	12	26	37	83	11	4	PM645212A	84.75	0.053 – 0.095
14.0	12	26	–	83	–	4	PM645214A	101.19	0.075 – 0.118

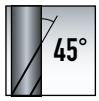
Peripheral milling
a_e = 0.3xD
a_p = 2.0xD

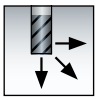
Full slot milling
a_p = 2.0xD

d_1	d_2
k12	h6

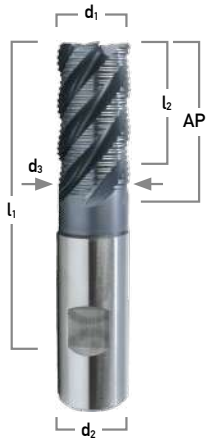
PM 645-2






PM Roughing End Mill



d_1	d_2	l_2	AP	l_1	d_3		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
16.0	16	32	42	92	15	5	PM645216A	124.22	0.080 – 0.128
18.0	16	32	–	92	–	5	PM645218A	135.79	0.082 – 0.153
20.0	20	38	52	104	19	5	PM645220A	168.50	0.082 – 0.153
22.0	20	38	–	104	–	5	PM645222A	208.75	0.082 – 0.153
25.0	25	45	64	121	24	5	PM645225A	247.05	0.084 – 0.158

Peripheral milling
a_e = 0.3xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

d_1	d_2
k12	h6

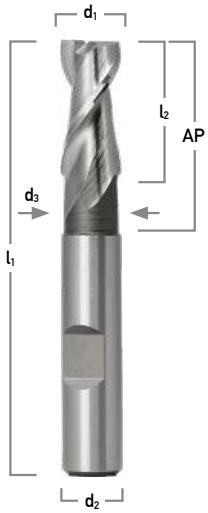
Material	Steel	Stainless	Cast	Alu	Special and Titanium alloys
Tensile strength / Hardness	< 850 N/mm²	< 1100 N/mm²	< 800 N/mm²	< 600 N/mm²	< 1400 N/mm²
V_c (m/min) Finishing	85	60	75	195	60
V_c (m/min) Roughing	65	40	50	155	40

AG 022-2




HSS End Mill for Aluminium

Short version



d_1	d_2
e10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
2.0	6	7	–	51	–	2	AG022202	10.02	0.003	–	0.007	0.001	–	0.005
2.5	6	8	–	52	–	2	AG0222025	10.40	0.003	–	0.007	0.001	–	0.005
3.0	6	8	–	52	–	2	AG022203	9.58	0.005	–	0.012	0.003	–	0.010
3.5	6	10	–	54	–	2	AG0222035	10.40	0.005	–	0.012	0.003	–	0.010
4.0	6	11	–	55	–	2	AG022204	9.58	0.007	–	0.017	0.005	–	0.015
4.5	6	13	–	57	–	2	AG0222045	10.40	0.007	–	0.017	0.005	–	0.015
5.0	6	13	–	57	–	2	AG022205	9.58	0.009	–	0.022	0.007	–	0.020
5.5	6	13	–	57	–	2	AG0222055	10.40	0.009	–	0.022	0.007	–	0.020
6.0	6	13	21	57	5.5	2	AG022206	9.65	0.011	–	0.026	0.009	–	0.024
6.5	8	16	–	60	–	2	AG0222065	14.54	0.011	–	0.026	0.009	–	0.024
7.0	8	16	–	60	–	2	AG022207	11.80	0.014	–	0.031	0.012	–	0.029
7.0	10	16	–	60	–	2	AG022207S10	17.97	0.014	–	0.031	0.012	–	0.029
7.5	8	19	–	63	–	2	AG0222075	11.80	0.014	–	0.031	0.012	–	0.029
8.0	8	19	33	69	7.5	2	AG022208	11.57	0.016	–	0.034	0.014	–	0.032
8.0	10	19	–	69	–	2	AG022208S10	16.26	0.016	–	0.034	0.014	–	0.032
8.5	10	19	–	69	–	2	AG0222085	13.65	0.016	–	0.034	0.014	–	0.032
9.0	10	19	–	69	–	2	AG022209	13.37	0.018	–	0.037	0.016	–	0.035
9.5	10	22	–	72	–	2	AG0222095	14.42	0.018	–	0.037	0.016	–	0.035
10.0	10	22	32	72	9.0	2	AG022210	12.84	0.020	–	0.040	0.018	–	0.038
11.0	12	22	–	79	–	2	AG022211	19.38	0.020	–	0.040	0.018	–	0.038
12.0	12	26	38	83	11.0	2	AG022212	14.71	0.024	–	0.048	0.022	–	0.046
13.0	12	26	–	83	–	2	AG022213	21.90	0.026	–	0.055	0.024	–	0.053
14.0	12	26	–	83	–	2	AG022214	17.96	0.026	–	0.055	0.024	–	0.053
15.0	16	32	–	92	–	2	AG022215	20.41	0.029	–	0.056	0.027	–	0.054
16.0	16	32	44	92	15.0	2	AG022216	21.81	0.029	–	0.056	0.027	–	0.054
18.0	16	32	–	92	–	2	AG022218	24.81	0.035	–	0.062	0.033	–	0.060
20.0	20	38	54	104	19.0	2	AG022220	30.38	0.035	–	0.062	0.033	–	0.060
22.0	20	38	–	104	–	2	AG022222	34.95	0.038	–	0.065	0.036	–	0.063
24.0	25	45	–	121	–	2	AG022224	43.27	0.041	–	0.068	0.039	–	0.066
25.0	25	45	65	121	24.0	2	AG022225	44.85	0.041	–	0.068	0.039	–	0.066
28.0	25	45	–	121	–	2	AG022228	66.73	0.050	–	0.077	0.048	–	0.075
30.0	25	45	–	121	–	2	AG022230	59.14	0.050	–	0.077	0.048	–	0.075

Peripheral milling
$a_e = 0.3xD$
$a_p = 1.5xD$

Full slot milling
$a_p = 1.0xD$

Material	ALU	Plastics	Brass	Bronze
Tensile strength / Hardness	< 600 N/mm²		< 600 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	120	125	95	60
V_c (m/min) Roughing	80	85	55	35

Product family 45

AG 022-4




HSS End Mill for Aluminium

Long version

d_1	d_2	l_2	l_1		uncoated		f_z Roughing			f_z Finishing		
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
2.5	6	10	54	2	AG0224025	12.25	0.003	–	0.007	0.001	–	0.005
3.0	6	12	56	2	AG022403	12.25	0.005	–	0.012	0.003	–	0.010
4.0	6	19	63	2	AG022404	12.25	0.007	–	0.017	0.005	–	0.015
5.0	6	24	68	2	AG022405	12.25	0.009	–	0.022	0.007	–	0.020
6.0	6	24	68	2	AG022406	12.25	0.011	–	0.026	0.009	–	0.024
7.0	8	30	74	2	AG022407	15.29	0.014	–	0.031	0.012	–	0.029
8.0	8	38	82	2	AG022408	14.78	0.016	–	0.034	0.014	–	0.032
9.0	10	38	88	2	AG022409	16.86	0.018	–	0.037	0.016	–	0.035
10.0	10	45	95	2	AG022410	15.21	0.020	–	0.040	0.018	–	0.038
11.0	12	45	102	2	AG022411	19.91	0.020	–	0.040	0.018	–	0.038
12.0	12	53	110	2	AG022412	17.91	0.024	–	0.048	0.022	–	0.046
14.0	12	53	110	2	AG022414	23.89	0.026	–	0.055	0.024	–	0.053
16.0	16	63	123	2	AG022416	25.98	0.029	–	0.056	0.027	–	0.054
18.0	16	63	123	2	AG022418	39.70	0.035	–	0.062	0.033	–	0.060
20.0	20	75	141	2	AG022420	44.85	0.035	–	0.062	0.033	–	0.060

Peripheral milling
a_e = 0.2xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

d_1	d_2
e10	h6

Material	ALU	Plastics	Brass	Bronze
Tensile strength / Hardness	< 600 N/mm²		< 600 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	120	125	95	60
V_c (m/min) Roughing	80	85	55	35

AG 032-2

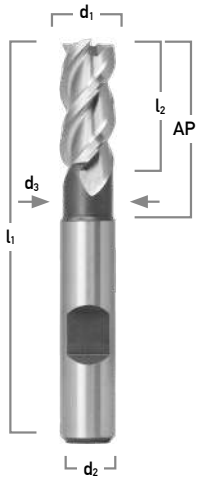

Z 3
HB



HSS
Type W

DIN 844

HSS End Mill for Aluminium



d_1	d_2
h10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		f_z Roughing		f_z Finishing	
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z		mm/Z	
2.0	6	7	–	51	–	3	AG032202	10.02	0.003 – 0.007		0.001 – 0.005	
2.5	6	8	–	52	–	3	AG0322025	10.40	0.003 – 0.007		0.001 – 0.005	
3.0	6	8	–	52	–	3	AG032203	9.58	0.005 – 0.012		0.003 – 0.010	
3.5	6	10	–	54	–	3	AG0322035	10.40	0.005 – 0.012		0.003 – 0.010	
4.0	6	11	–	55	–	3	AG032204	9.58	0.007 – 0.017		0.005 – 0.015	
4.5	6	13	–	57	–	3	AG0322045	10.40	0.007 – 0.017		0.005 – 0.015	
5.0	6	13	–	57	–	3	AG032205	9.58	0.009 – 0.022		0.007 – 0.020	
5.5	6	13	–	57	–	3	AG0322055	10.40	0.009 – 0.022		0.007 – 0.020	
6.0	6	13	21	57	5.5	3	AG032206	9.65	0.011 – 0.026		0.009 – 0.024	
6.5	8	16	–	60	–	3	AG0322065	14.54	0.011 – 0.026		0.009 – 0.024	
7.0	8	16	–	60	–	3	AG032207	11.80	0.014 – 0.031		0.012 – 0.029	
7.5	8	19	–	63	–	3	AG0322075	11.80	0.014 – 0.031		0.012 – 0.029	
8.0	8	19	33	69	7.5	3	AG032208	11.57	0.016 – 0.034		0.014 – 0.032	
8.0	10	19	–	69	–	3	AG032208S10	17.50	0.016 – 0.034		0.014 – 0.032	
8.5	10	19	–	69	–	3	AG0322085	13.65	0.016 – 0.034		0.014 – 0.032	
9.0	10	19	–	69	–	3	AG032209	13.37	0.018 – 0.037		0.016 – 0.035	
9.5	10	22	–	72	–	3	AG0322095	14.33	0.018 – 0.037		0.016 – 0.035	
10.0	10	22	32	72	9.0	3	AG032210	12.84	0.020 – 0.040		0.018 – 0.038	
11.0	12	22	–	79	–	3	AG032211	19.38	0.020 – 0.040		0.018 – 0.038	
12.0	12	26	38	83	11.0	3	AG032212	14.71	0.024 – 0.048		0.022 – 0.046	
13.0	12	26	–	83	–	3	AG032213	21.90	0.026 – 0.055		0.024 – 0.053	
14.0	12	26	–	83	–	3	AG032214	17.96	0.026 – 0.055		0.024 – 0.053	
15.0	16	32	–	92	–	3	AG032215	20.41	0.029 – 0.056		0.027 – 0.054	
16.0	16	32	44	92	15.0	3	AG032216	21.81	0.029 – 0.056		0.027 – 0.054	
18.0	16	32	–	92	–	3	AG032218	24.81	0.035 – 0.062		0.033 – 0.060	
20.0	20	38	54	104	19.0	3	AG032220	30.38	0.035 – 0.062		0.033 – 0.060	
22.0	20	38	–	104	–	3	AG032222	34.95	0.038 – 0.065		0.036 – 0.063	
24.0	25	45	–	121	–	3	AG032224	43.27	0.041 – 0.068		0.039 – 0.066	
25.0	25	45	65	121	24.0	3	AG032225	44.85	0.041 – 0.068		0.039 – 0.066	
28.0	25	45	–	121	–	3	AG032228	66.73	0.050 – 0.077		0.048 – 0.075	
30.0	25	45	–	121	–	3	AG032230	59.14	0.050 – 0.077		0.048 – 0.075	

Peripheral milling
a_e = 0.2xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

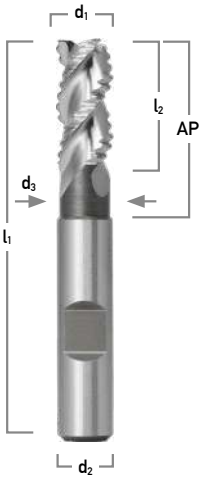
Material	Alu	Plastics	Brass	Bronze
Tensile strength / Hardness	< 600 N/mm²		< 600 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	120	125	95	60
V_c (m/min) Roughing	80	85	55	35

Product family 45

AG 832-2




HSS Roughing End Mill for Aluminium



d_1	d_2	l_2	AP	l_1	d_3		uncoated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z
6.0	6	13	21	57	5.5	3	AG832206	32.27	0.008 – 0.015
8.0	8	19	33	69	7.5	3	AG832208	34.51	0.012 – 0.021
10.0	10	22	32	72	9.0	3	AG832210	35.47	0.015 – 0.027
12.0	12	26	38	83	11.0	3	AG832212	42.37	0.018 – 0.032
14.0	12	26	–	83	–	3	AG832214	48.90	0.020 – 0.034
16.0	16	32	–	92	–	3	AG832216	54.86	0.022 – 0.040
18.0	16	32	–	92	–	3	AG832218	57.97	0.024 – 0.043
20.0	20	38	54	104	19.0	3	AG832220	66.86	0.025 – 0.047
25.0	25	45	65	121	24.0	3	AG832225	102.86	0.037 – 0.062
30.0	25	45	–	121	–	3	AG832230	110.42	0.045 – 0.074

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 2.0xD

d_1	d_2
js14	h6

Material	Alu	Plastics	Brass	Bronze
Tensile strength / Hardness	< 600 N/mm²		< 600 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	120	125	95	60
V_c (m/min) Roughing	80	85	55	35

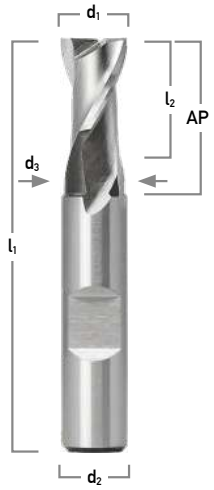
AG 122-0



DIN 327

HSS End Mill

Short version



d_1	d_2
e10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	3	–	48	–	2	AG122001	8.02	AG122001A	15.74	0.003 – 0.006	0.001 – 0.004
1.5	6	3	–	48	–	2	AG1220015	8.02	AG1220015A	15.74	0.003 – 0.006	0.001 – 0.004
2.0	6	4	–	48	–	2	AG122002	7.06	AG122002A	14.42	0.003 – 0.007	0.001 – 0.005
2.5	6	5	–	49	–	2	AG1220025	8.02	AG1220025A	15.74	0.003 – 0.007	0.001 – 0.005
2.8	6	5	–	49	–	2	AG1220028	8.83	AG1220028A	17.37	0.005 – 0.012	0.003 – 0.010
3.0	6	5	–	49	–	2	AG122003	7.06	AG122003A	14.42	0.005 – 0.012	0.003 – 0.010
3.5	6	6	–	50	–	2	AG1220035	8.02	AG1220035A	15.74	0.005 – 0.012	0.003 – 0.010
3.8	6	7	–	51	–	2	AG1220038	8.83	AG1220038A	17.37	0.007 – 0.017	0.005 – 0.015
4.0	6	7	–	51	–	2	AG122004	7.06	AG122004A	14.42	0.007 – 0.017	0.005 – 0.015
4.5	6	8	–	52	–	2	AG1220045	7.06	AG1220045A	14.42	0.007 – 0.017	0.005 – 0.015
4.8	6	8	–	52	–	2	AG1220048	8.83	AG1220048A	17.37	0.009 – 0.022	0.007 – 0.020
5.0	6	8	–	52	–	2	AG122005	7.06	AG122005A	14.42	0.009 – 0.022	0.007 – 0.020
5.5	6	8	–	52	–	2	AG1220055	8.02	AG1220055A	15.74	0.009 – 0.022	0.007 – 0.020
5.75	6	8	–	52	–	2	AG12200575	8.83	AG12200575A	17.37	0.011 – 0.026	0.009 – 0.024
6.0	6	8	16	52	5.5	2	AG122006	7.06	AG122006A	14.42	0.011 – 0.026	0.009 – 0.024
6.5	8	10	–	54	–	2	AG1220065	8.22	AG1220065A	17.37	0.011 – 0.026	0.009 – 0.024
6.75	8	10	–	54	–	2	AG12200675	9.65	AG12200675A	18.10	0.014 – 0.031	0.012 – 0.029
7.0	8	10	–	54	–	2	AG122007	8.83	AG122007A	17.43	0.014 – 0.031	0.012 – 0.029
7.5	8	11	–	55	–	2	AG1220075	8.83	AG1220075A	17.37	0.014 – 0.031	0.012 – 0.029
7.75	8	11	–	55	–	2	AG12200775	9.65	AG12200775A	19.23	0.016 – 0.034	0.014 – 0.032
8.0	8	11	19	55	7.5	2	AG122008	9.07	AG122008A	16.69	0.016 – 0.034	0.014 – 0.032
8.5	10	11	–	61	–	2	AG1220085	9.94	AG1220085A	18.04	0.016 – 0.034	0.014 – 0.032
8.7	10	11	–	61	–	2	AG1220087	11.15	AG1220087A	20.18	0.018 – 0.037	0.016 – 0.035
9.0	10	11	–	61	–	2	AG122009	11.95	AG122009A	20.04	0.018 – 0.037	0.016 – 0.035
9.5	10	13	–	63	–	2	AG1220095	13.28	AG1220095A	22.19	0.018 – 0.037	0.016 – 0.035
9.7	10	13	–	63	–	2	AG1220097	13.28	AG1220097A	22.19	0.020 – 0.040	0.018 – 0.038
10.0	10	13	23	63	9.0	2	AG122010	9.73	AG122010A	18.17	0.020 – 0.040	0.018 – 0.038
10.5	12	13	–	70	–	2	AG1220105	12.39	AG1220105A	19.65	0.020 – 0.040	0.018 – 0.038
11.0	12	13	–	70	–	2	AG122011	10.54	AG122011A	22.41	0.022 – 0.045	0.020 – 0.043
11.7	12	16	–	73	–	2	AG1220117	12.39	AG1220117A	19.65	0.024 – 0.048	0.022 – 0.046
12.0	12	16	28	73	11.0	2	AG122012	10.69	AG122012A	20.33	0.024 – 0.048	0.022 – 0.046
13.0	12	16	–	73	–	2	AG122013	19.23	AG122013A	31.99	0.026 – 0.055	0.024 – 0.053
14.0	12	16	–	73	–	2	AG122014	12.84	AG122014A	26.27	0.026 – 0.055	0.024 – 0.053
15.0	16	19	–	79	–	2	AG122015	19.52	AG122015A	34.29	0.029 – 0.056	0.027 – 0.054
16.0	16	19	31	79	15.0	2	AG122016	14.98	AG122016A	37.42	0.029 – 0.056	0.027 – 0.054
17.0	16	19	–	79	–	2	AG122017	26.57	AG122017A	52.12	0.032 – 0.058	0.030 – 0.056
18.0	16	19	–	79	–	2	AG122018	17.37	AG122018A	31.99	0.035 – 0.062	0.033 – 0.060
19.0	20	22	–	88	–	2	AG122019	31.75	AG122019A	58.69	0.035 – 0.062	0.033 – 0.060
20.0	20	22	38	88	19.0	2	AG122020	19.99	AG122020A	41.19	0.035 – 0.062	0.033 – 0.060
21.0	20	22	–	88	–	2	AG122021	38.27	AG122021A	63.75	0.038 – 0.065	0.036 – 0.063
22.0	20	22	–	88	–	2	AG122022	29.41	AG122022A	66.81	0.038 – 0.065	0.036 – 0.063
24.0	25	26	–	102	–	2	AG122024	38.52	AG122024A	72.15	0.041 – 0.068	0.039 – 0.066
25.0	25	26	46	102	24.0	2	AG122025	38.52	AG122025A	72.15	0.041 – 0.068	0.039 – 0.066
26.0	25	26	–	102	–	2	AG122026	50.32	AG122026A	84.97	0.043 – 0.071	0.041 – 0.068
28.0	25	26	–	102	–	2	AG122028	54.86	AG122028A	89.00	0.050 – 0.077	0.048 – 0.075
30.0	25	26	–	102	–	2	AG122030	56.70	AG122030A	103.30	0.050 – 0.077	0.048 – 0.075
32.0	32	32	52	112	31.0	2	AG122032	64.20	AG122032A	108.07	0.054 – 0.081	0.052 – 0.079
36.0	32	32	–	112	–	2	AG122036	83.71	AG122036A	126.97	0.062 – 0.089	0.060 – 0.087
40.0	40	38	60	130	39.0	2	AG122040	103.30	AG122040A	145.77	0.066 – 0.093	0.064 – 0.091

Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

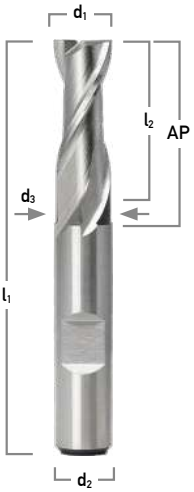
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	70	55	65	135
V_c (m/min) Roughing	50	35	45	115

Product family 45

AG 122-2

DIN 844

HSS End Mill
Long version



d_1	d_2
e10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.5	6	7	–	51	–	2	AG1222015	10.85	AG1222015A	18.70	0.003 – 0.006	0.001 – 0.004
2.0	6	7	–	51	–	2	AG122202	9.07	AG122202A	16.86	0.003 – 0.007	0.001 – 0.005
2.5	6	8	–	52	–	2	AG1222025	9.58	AG1222025A	17.29	0.003 – 0.007	0.001 – 0.005
2.8	6	8	–	52	–	2	AG1222028	10.85	AG1222028A	18.70	0.005 – 0.012	0.003 – 0.010
3.0	6	8	–	52	–	2	AG122203	8.68	AG122203A	15.43	0.005 – 0.012	0.003 – 0.010
3.5	6	10	–	54	–	2	AG1222035	9.58	AG1222035A	17.29	0.005 – 0.012	0.003 – 0.010
3.8	6	11	–	55	–	2	AG1222038	10.85	AG1222038A	18.70	0.007 – 0.017	0.005 – 0.015
4.0	6	11	–	55	–	2	AG122204	8.68	AG122204A	15.43	0.007 – 0.017	0.005 – 0.015
4.5	6	13	–	57	–	2	AG1222045	9.58	AG1222045A	17.29	0.007 – 0.017	0.005 – 0.015
4.8	6	13	–	57	–	2	AG1222048	10.85	AG1222048A	18.70	0.009 – 0.022	0.007 – 0.020
5.0	6	13	–	57	–	2	AG122205	8.68	AG122205A	15.43	0.009 – 0.022	0.007 – 0.020
5.5	6	13	–	57	–	2	AG1222055	9.65	AG1222055A	16.86	0.009 – 0.022	0.007 – 0.020
5.75	6	13	–	57	–	2	AG12220575	10.40	AG12220575A	18.25	0.011 – 0.026	0.009 – 0.024
6.0	6	13	21	57	5.5	2	AG122206	8.68	AG122206A	15.53	0.011 – 0.026	0.009 – 0.024
6.5	8	16	–	60	–	2	AG1222065	12.55	AG1222065A	23.16	0.011 – 0.026	0.009 – 0.024
6.75	8	16	–	60	–	2	AG12220675	14.54	AG12220675A	25.61	0.014 – 0.031	0.012 – 0.029
7.0	8	16	–	60	–	2	AG122207	10.69	AG122207A	19.15	0.014 – 0.031	0.012 – 0.029
7.5	8	19	–	63	–	2	AG1222075	10.69	AG1222075A	19.15	0.014 – 0.031	0.012 – 0.029
7.75	8	19	–	63	–	2	AG12220775	12.17	AG12220775A	20.65	0.016 – 0.034	0.014 – 0.032
8.0	8	19	33	69	7.5	2	AG122208	10.40	AG122208A	17.51	0.016 – 0.034	0.014 – 0.032
8.5	10	19	–	69	–	2	AG1222085	12.46	AG1222085A	19.52	0.016 – 0.034	0.014 – 0.032
8.7	10	19	–	69	–	2	AG1222087	13.80	AG1222087A	21.45	0.018 – 0.037	0.016 – 0.035
9.0	10	19	–	69	–	2	AG122209	12.17	AG122209A	20.65	0.018 – 0.037	0.016 – 0.035
9.5	10	22	–	72	–	2	AG1222095	13.07	AG1222095A	22.93	0.018 – 0.037	0.016 – 0.035
9.7	10	22	–	72	–	2	AG1222097	14.78	AG1222097A	23.53	0.020 – 0.040	0.018 – 0.038
10.0	10	22	32	72	9.0	2	AG122210	11.64	AG122210A	19.23	0.020 – 0.040	0.018 – 0.038
11.0	12	22	–	79	–	2	AG122211	17.51	AG122211A	25.01	0.022 – 0.045	0.020 – 0.043
12.0	12	26	38	83	11.0	2	AG122212	13.37	AG122212A	23.06	0.024 – 0.048	0.022 – 0.046
13.0	12	26	–	83	–	2	AG122213	19.91	AG122213A	32.89	0.026 – 0.055	0.024 – 0.053
14.0	12	26	–	83	–	2	AG122214	16.25	AG122214A	29.78	0.026 – 0.055	0.024 – 0.053
15.0	16	32	–	92	–	2	AG122215	19.91	AG122215A	34.29	0.029 – 0.056	0.027 – 0.054
16.0	16	32	44	92	15.0	2	AG122216	18.10	AG122216A	31.62	0.029 – 0.056	0.027 – 0.054
17.0	16	32	–	92	–	2	AG122217	31.00	AG122217A	44.66	0.032 – 0.058	0.030 – 0.056
18.0	16	32	–	92	–	2	AG122218	22.64	AG122218A	40.35	0.035 – 0.062	0.033 – 0.060
19.0	20	38	–	104	–	2	AG122219	37.27	AG122219A	61.33	0.035 – 0.062	0.033 – 0.060
20.0	20	38	54	104	19.0	2	AG122220	27.62	AG122220A	42.96	0.035 – 0.062	0.033 – 0.060
21.0	20	38	–	104	–	2	AG122221	29.11	AG122221A	43.94	0.038 – 0.065	0.036 – 0.063
22.0	20	38	–	104	–	2	AG122222	30.87	AG122222A	53.87	0.038 – 0.065	0.036 – 0.063
24.0	25	45	–	121	–	2	AG122224	40.22	AG122224A	73.10	0.041 – 0.068	0.039 – 0.066
25.0	25	45	65	121	24.0	2	AG122225	40.22	AG122225A	73.10	0.041 – 0.068	0.039 – 0.066
28.0	25	45	–	121	–	2	AG122228	62.70	AG122228A	91.34	0.050 – 0.077	0.048 – 0.075
30.0	25	45	–	121	–	2	AG122230	73.04	AG122230A	105.60	0.050 – 0.077	0.048 – 0.075
32.0	32	53	73	133	31.0	2	AG122232	87.22	AG122232A	115.49	0.054 – 0.081	0.052 – 0.079
36.0	32	53	–	133	–	2	AG122236	107.74	AG122236A	132.49	0.062 – 0.089	0.060 – 0.087
40.0	40	63	85	155	39.0	2	AG122240	156.98	AG122240A	193.87	0.066 – 0.093	0.064 – 0.091

Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

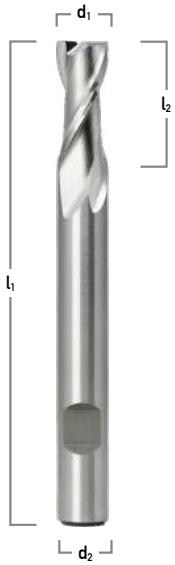
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	70	55	65	135
V_c (m/min) Roughing	50	35	45	115

AG 122-3




HSS End Mill

Extra-long version



d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.5	6	8	56	2	AG1223025	11.73	AG1223025A	21.90	0.003 – 0.007	0.001 – 0.005
3.0	6	8	56	2	AG122303	11.73	AG122303A	21.90	0.005 – 0.012	0.003 – 0.010
3.5	6	10	59	2	AG1223035	11.73	AG1223035A	21.90	0.005 – 0.012	0.003 – 0.010
4.0	6	11	63	2	AG122304	11.73	AG122304A	21.90	0.007 – 0.017	0.005 – 0.015
4.5	6	11	63	2	AG1223045	11.73	AG1223045A	21.90	0.007 – 0.017	0.005 – 0.015
5.0	6	13	68	2	AG122305	11.73	AG122305A	21.90	0.009 – 0.022	0.007 – 0.020
5.5	6	13	68	2	AG1223055	11.73	AG1223055A	21.90	0.009 – 0.022	0.007 – 0.020
6.0	6	13	68	2	AG122306	11.73	AG122306A	21.90	0.011 – 0.026	0.009 – 0.024
6.5	10	16	80	2	AG1223065	13.80	AG1223065A	24.34	0.011 – 0.026	0.009 – 0.024
7.0	10	16	80	2	AG122307	13.80	AG122307A	24.34	0.014 – 0.031	0.012 – 0.029
8.0	10	19	88	2	AG122308	12.70	AG122308A	23.24	0.016 – 0.034	0.014 – 0.032
10.0	10	22	95	2	AG122310	13.43	AG122310A	25.23	0.020 – 0.040	0.018 – 0.038
12.0	12	26	110	2	AG122312	16.03	AG122312A	29.45	0.024 – 0.048	0.022 – 0.046
14.0	12	26	110	2	AG122314	21.81	AG122314A	37.55	0.026 – 0.055	0.024 – 0.053
16.0	16	32	123	2	AG122316	23.61	AG122316A	46.61	0.029 – 0.056	0.027 – 0.054
18.0	16	32	123	2	AG122318	28.27	AG122318A	58.86	0.035 – 0.062	0.033 – 0.060
20.0	20	38	141	2	AG122320	34.95	AG122320A	68.81	0.035 – 0.062	0.033 – 0.060
22.0	20	38	141	2	AG122322	48.01	AG122322A	81.51	0.038 – 0.065	0.036 – 0.063
24.0	25	45	166	2	AG122324	62.04	AG122324A	114.08	0.041 – 0.068	0.039 – 0.066
25.0	25	45	166	2	AG122325	62.04	AG122325A	114.08	0.041 – 0.068	0.039 – 0.066

d_1	d_2
e10	h6

Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

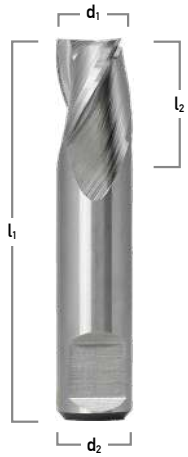
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	70	55	65	135
V_c (m/min) Roughing	50	35	45	115

Product family 45

AG 112-0

Uncoated | Alcrona Pro | Z 3 | HB | 30° | HSS | Type N | Manufacturer standard

HSS End Mill
Short version



d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.0	6	2.0	34	3	AG112001	8.22	AG112001A	14.25	0.003 – 0.006	0.001 – 0.004
1.5	6	3.0	34	3	AG1120015	8.22	AG1120015A	14.25	0.003 – 0.006	0.001 – 0.004
1.8	6	3.0	34	3	AG1120018	8.22	AG1120018A	14.25	0.003 – 0.007	0.001 – 0.005
2.0	6	4.5	35	3	AG112002	8.22	AG112002A	14.25	0.003 – 0.007	0.001 – 0.005
2.3	6	4.0	35	3	AG1120023	8.22	AG1120023A	14.25	0.003 – 0.007	0.001 – 0.005
2.5	6	5.5	36	3	AG1120025	8.22	AG1120025A	14.25	0.003 – 0.007	0.001 – 0.005
2.8	6	5.5	36	3	AG1120028	8.22	AG1120028A	14.25	0.005 – 0.012	0.003 – 0.010
3.0	6	5.5	37	3	AG112003	8.22	AG112003A	14.25	0.005 – 0.012	0.003 – 0.010
3.3	6	6.0	37	3	AG1120033	8.22	AG1120033A	14.25	0.005 – 0.012	0.003 – 0.010
3.5	6	6.5	38	3	AG1120035	8.22	AG1120035A	14.25	0.005 – 0.012	0.003 – 0.010
3.8	6	7.5	38	3	AG1120038	8.22	AG1120038A	14.25	0.007 – 0.017	0.005 – 0.015
4.0	6	7.5	38	3	AG112004	8.22	AG112004A	14.25	0.007 – 0.017	0.005 – 0.015
4.3	6	7.5	38	3	AG1120043	8.22	AG1120043A	14.25	0.007 – 0.017	0.005 – 0.015
4.5	6	7.5	38	3	AG1120045	8.22	AG1120045A	14.25	0.009 – 0.022	0.007 – 0.020
4.8	6	8.5	39	3	AG1120048	8.22	AG1120048A	14.25	0.009 – 0.022	0.007 – 0.020
5.0	6	8.5	39	3	AG112005	8.22	AG112005A	14.25	0.009 – 0.022	0.007 – 0.020
5.3	6	8.0	39	3	AG1120053	8.22	AG1120053A	14.25	0.009 – 0.022	0.007 – 0.020
5.5	6	8.5	39	3	AG1120055	8.22	AG1120055A	14.25	0.011 – 0.026	0.009 – 0.024
5.75	6	8.5	39	3	AG11200575	8.22	AG11200575A	14.25	0.011 – 0.026	0.009 – 0.024
6.0	6	8.5	39	3	AG112006	8.22	AG112006A	14.25	0.014 – 0.031	0.012 – 0.029
6.5	8	10.0	42	3	AG1120065	9.65	AG1120065A	14.98	0.014 – 0.031	0.012 – 0.029
7.0	8	10.0	42	3	AG112007	9.65	AG112007A	14.98	0.014 – 0.031	0.012 – 0.029
8.0	8	11.0	43	3	AG112008	9.65	AG112008A	14.98	0.016 – 0.034	0.014 – 0.032
8.5	10	11.0	48	3	AG1120085	12.62	AG1120085A	17.96	0.018 – 0.037	0.016 – 0.035
9.0	10	11.0	48	3	AG112009	12.62	AG112009A	17.96	0.018 – 0.037	0.016 – 0.035
10.0	10	13.0	50	3	AG112010	12.62	AG112010A	17.96	0.020 – 0.040	0.018 – 0.038
12.0	12	16.0	58	3	AG112012	19.65	AG112012A	25.90	0.024 – 0.048	0.022 – 0.046
16.0	16	19.0	64	3	AG112016	27.46	AG112016A	43.42	0.029 – 0.056	0.027 – 0.054
20.0	20	22.0	78	3	AG112020	37.27	AG112020A	65.16	0.035 – 0.062	0.033 – 0.060

Peripheral milling
a_e = 0.3xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	65	55	65	130
V_c (m/min) Roughing	45	35	45	115

AG 112-4

HSS End Mill

Short version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.5	6	7.5	38	3	AG1124015	9.27	AG1124015A	14.78	0.003 – 0.006	0.001 – 0.004
2.0	6	7.5	38	3	AG112402	9.27	AG112402A	14.78	0.003 – 0.007	0.001 – 0.005
2.5	6	8.5	39	3	AG1124025	9.27	AG1124025A	14.78	0.003 – 0.007	0.001 – 0.005
3.0	6	8.5	39	3	AG112403	9.27	AG112403A	14.78	0.005 – 0.012	0.003 – 0.010
3.5	6	10.5	41	3	AG1124035	9.27	AG1124035A	14.78	0.005 – 0.012	0.003 – 0.010
4.0	6	11.5	42	3	AG112404	9.27	AG112404A	14.78	0.007 – 0.017	0.005 – 0.015
4.5	6	11.5	42	3	AG1124045	9.27	AG1124045A	14.78	0.007 – 0.017	0.005 – 0.015
5.0	6	13.5	44	3	AG112405	9.27	AG112405A	14.78	0.009 – 0.022	0.007 – 0.020
5.5	6	13.5	44	3	AG1124055	9.27	AG1124055A	14.78	0.009 – 0.022	0.007 – 0.020
6.0	6	13.5	44	3	AG112406	9.27	AG112406A	14.78	0.011 – 0.026	0.009 – 0.024
6.5	8	16.0	48	3	AG1124065	10.62	AG1124065A	16.78	0.011 – 0.026	0.009 – 0.024
7.0	8	16.0	48	3	AG112407	10.62	AG112407A	16.78	0.014 – 0.031	0.012 – 0.029
8.0	8	19.0	51	3	AG112408	10.62	AG112408A	16.78	0.016 – 0.034	0.014 – 0.032
9.0	10	19.0	56	3	AG112409	13.65	AG112409A	19.81	0.018 – 0.037	0.016 – 0.035
10.0	10	22.0	59	3	AG112410	13.65	AG112410A	19.81	0.020 – 0.040	0.018 – 0.038

Peripheral milling
$a_e = 0.3xD$
$a_p = 1.5xD$

Full slot milling
$a_p = 1.0xD$

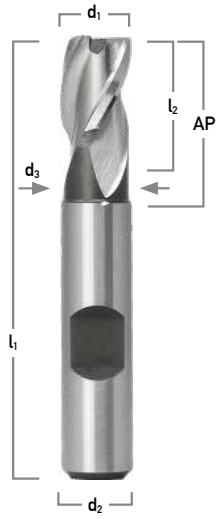
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	65	55	65	130
V_c (m/min) Roughing	45	35	45	115

Product family 45

AG 132-0

Uncoated | Alcrona Pro | Z 3 | HB | 30° | HSS | Type N | DIN 327

HSS End Mill
Short version



d_1	d_2
h10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	4	–	48	–	3	AG132002	7.06	AG132002A	14.42	0.003 – 0.007	0.001 – 0.005
2.5	6	5	–	49	–	3	AG1320025	8.02	AG1320025A	15.74	0.003 – 0.007	0.001 – 0.005
2.8	6	5	–	49	–	3	AG1320028	8.83	AG1320028A	17.37	0.005 – 0.012	0.003 – 0.010
3.0	6	5	–	49	–	3	AG132003	7.06	AG132003A	14.42	0.005 – 0.012	0.003 – 0.010
3.5	6	6	–	50	–	3	AG1320035	8.02	AG1320035A	15.74	0.005 – 0.012	0.003 – 0.010
3.8	6	7	–	51	–	3	AG1320038	8.83	AG1320038A	17.37	0.007 – 0.017	0.005 – 0.015
4.0	6	7	–	51	–	3	AG132004	7.06	AG132004A	14.42	0.007 – 0.017	0.005 – 0.015
4.5	6	8	–	52	–	3	AG1320045	7.06	AG1320045A	14.42	0.007 – 0.017	0.005 – 0.015
4.8	6	8	–	52	–	3	AG1320048	8.83	AG1320048A	17.37	0.009 – 0.022	0.007 – 0.020
5.0	6	8	–	52	–	3	AG132005	7.06	AG132005A	14.42	0.009 – 0.022	0.007 – 0.020
5.5	6	8	–	52	–	3	AG1320055	8.02	AG1320055A	15.74	0.009 – 0.022	0.007 – 0.020
5.75	6	8	–	52	–	3	AG13200575	8.83	AG13200575A	17.37	0.011 – 0.026	0.009 – 0.024
6.0	6	8	16	52	5.5	3	AG132006	7.06	AG132006A	14.42	0.011 – 0.026	0.009 – 0.024
6.5	8	10	–	54	–	3	AG1320065	8.22	AG1320065A	17.37	0.011 – 0.026	0.009 – 0.024
6.75	8	10	–	54	–	3	AG13200675	9.65	AG13200675A	18.10	0.014 – 0.031	0.012 – 0.029
7.0	8	10	–	54	–	3	AG132007	8.83	AG132007A	17.37	0.014 – 0.031	0.012 – 0.029
7.5	8	11	–	55	–	3	AG1320075	8.83	AG1320075A	17.37	0.014 – 0.031	0.012 – 0.029
7.75	8	11	–	55	–	3	AG13200775	9.65	AG13200775A	19.23	0.016 – 0.034	0.014 – 0.032
8.0	8	11	19	55	7.5	3	AG132008	9.07	AG132008A	16.69	0.016 – 0.034	0.014 – 0.032
8.5	10	11	–	61	–	3	AG1320085	9.94	AG1320085A	18.04	0.016 – 0.034	0.014 – 0.032
8.7	10	11	–	61	–	3	AG1320087	11.15	AG1320087A	20.18	0.018 – 0.037	0.016 – 0.035
9.0	10	11	–	61	–	3	AG132009	11.95	AG132009A	20.04	0.018 – 0.037	0.016 – 0.035
9.5	10	13	–	63	–	3	AG1320095	13.28	AG1320095A	22.19	0.018 – 0.037	0.016 – 0.035
9.7	10	13	–	63	–	3	AG1320097	13.28	AG1320097A	22.19	0.020 – 0.040	0.018 – 0.038
10.0	10	13	23	63	9.0	3	AG132010	10.97	AG132010A	18.17	0.020 – 0.040	0.018 – 0.038
11.0	12	13	–	70	–	3	AG132011	10.54	AG132011A	22.41	0.022 – 0.045	0.020 – 0.043
12.0	12	16	28	73	11.0	3	AG132012	10.69	AG132012A	20.33	0.024 – 0.048	0.022 – 0.046
13.0	12	16	–	73	–	3	AG132013	19.23	AG132013A	31.99	0.026 – 0.055	0.024 – 0.053
14.0	12	16	–	73	–	3	AG132014	12.84	AG132014A	26.27	0.026 – 0.055	0.024 – 0.053
15.0	16	19	–	79	–	3	AG132015	19.52	AG132015A	34.29	0.029 – 0.056	0.027 – 0.054
16.0	16	19	31	79	15.0	3	AG132016	14.98	AG132016A	35.90	0.029 – 0.056	0.027 – 0.054
17.0	16	19	–	79	–	3	AG132017	26.57	AG132017A	52.05	0.032 – 0.058	0.030 – 0.056
18.0	16	19	–	79	–	3	AG132018	17.37	AG132018A	31.99	0.035 – 0.062	0.033 – 0.060
19.0	20	22	–	88	–	3	AG132019	31.75	AG132019A	58.69	0.035 – 0.062	0.033 – 0.060
20.0	20	22	38	88	19.0	3	AG132020	19.99	AG132020A	41.19	0.035 – 0.062	0.033 – 0.060
21.0	20	22	–	88	–	3	AG132021	38.27	AG132021A	63.75	0.038 – 0.065	0.036 – 0.063
22.0	20	22	–	88	–	3	AG132022	29.45	AG132022A	66.81	0.038 – 0.065	0.036 – 0.063
24.0	25	26	–	102	–	3	AG132024	38.52	AG132024A	72.15	0.041 – 0.068	0.039 – 0.066
25.0	25	26	46	102	24.0	3	AG132025	38.52	AG132025A	72.15	0.041 – 0.068	0.039 – 0.066
28.0	25	26	–	102	–	3	AG132028	54.86	AG132028A	89.00	0.050 – 0.077	0.048 – 0.075
30.0	25	26	–	102	–	3	AG132030	56.70	AG132030A	103.30	0.050 – 0.077	0.048 – 0.075
32.0	32	32	52	112	31.0	3	AG132032	64.20	AG132032A	108.07	0.054 – 0.081	0.052 – 0.079
36.0	32	32	–	112	–	3	AG132036	83.71	AG132036A	126.97	0.062 – 0.089	0.060 – 0.087
40.0	40	38	60	130	39.0	3	AG132040	103.30	AG132040A	145.70	0.066 – 0.093	0.064 – 0.091

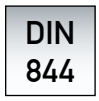
Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

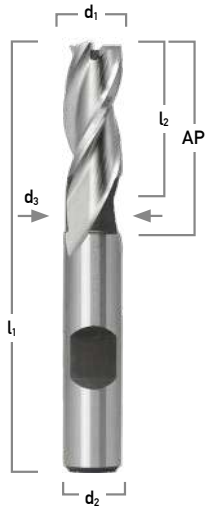
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	65	55	65	130
V_c (m/min) Roughing	45	35	45	115

AG 132-2



HSS End Mill



d_1	d_2
e10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
1.5	6	7	–	51	–	3	AG1322015	9.58	AG1322015A	17.29	0.003 – 0.006	0.001 – 0.004
2.0	6	7	–	51	–	3	AG132202	9.07	AG132202A	16.86	0.003 – 0.007	0.001 – 0.005
2.5	6	8	–	52	–	3	AG1322025	9.58	AG1322025A	17.29	0.003 – 0.007	0.001 – 0.005
2.8	6	8	–	52	–	3	AG1322028	10.85	AG1322028A	18.62	0.005 – 0.012	0.003 – 0.010
3.0	6	8	–	52	–	3	AG132203	8.68	AG132203A	15.43	0.005 – 0.012	0.003 – 0.010
3.5	6	10	–	54	–	3	AG1322035	9.58	AG1322035A	17.29	0.005 – 0.012	0.003 – 0.010
3.8	6	11	–	55	–	3	AG1322038	10.85	AG1322038A	18.62	0.007 – 0.017	0.005 – 0.015
4.0	6	11	–	55	–	3	AG132204	8.68	AG132204A	15.43	0.007 – 0.017	0.005 – 0.015
4.5	6	13	–	57	–	3	AG1322045	9.58	AG1322045A	17.29	0.007 – 0.017	0.005 – 0.015
4.8	6	13	–	57	–	3	AG1322048	10.85	AG1322048A	18.62	0.009 – 0.022	0.007 – 0.020
5.0	6	13	–	57	–	3	AG132205	8.68	AG132205A	15.43	0.009 – 0.022	0.007 – 0.020
5.5	6	13	–	57	–	3	AG1322055	9.65	AG1322055A	16.81	0.009 – 0.022	0.007 – 0.020
5.75	6	13	–	57	–	3	AG13220575	10.40	AG13220575A	18.25	0.011 – 0.026	0.009 – 0.024
6.0	6	13	21	57	5.5	3	AG132206	8.68	AG132206A	15.53	0.011 – 0.026	0.009 – 0.024
6.5	8	16	–	60	–	3	AG1322065	12.55	AG1322065A	23.16	0.011 – 0.026	0.009 – 0.024
6.75	8	16	–	60	–	3	AG13220675	14.54	AG13220675A	25.61	0.014 – 0.031	0.012 – 0.029
7.0	8	16	–	60	–	3	AG132207	10.69	AG132207A	19.15	0.014 – 0.031	0.012 – 0.029
7.5	8	19	–	63	–	3	AG1322075	10.69	AG1322075A	19.15	0.014 – 0.031	0.012 – 0.029
7.75	8	19	–	63	–	3	AG13220775	12.17	AG13220775A	20.65	0.016 – 0.034	0.014 – 0.032
8.0	8	19	33	69	7.5	3	AG132208	10.40	AG132208A	17.51	0.016 – 0.034	0.014 – 0.032
8.5	10	19	–	69	–	3	AG1322085	12.46	AG1322085A	19.52	0.016 – 0.034	0.014 – 0.032
8.7	10	19	–	69	–	3	AG1322087	13.80	AG1322087A	21.45	0.018 – 0.037	0.016 – 0.035
9.0	10	19	–	69	–	3	AG132209	12.17	AG132209A	20.65	0.018 – 0.037	0.016 – 0.035
9.5	10	22	–	72	–	3	AG1322095	13.07	AG1322095A	22.93	0.018 – 0.037	0.016 – 0.035
9.7	10	22	–	72	–	3	AG1322097	14.78	AG1322097A	23.53	0.020 – 0.040	0.018 – 0.038
10.0	10	22	32	72	9.0	3	AG132210	11.64	AG132210A	19.23	0.020 – 0.040	0.018 – 0.038
11.0	12	22	–	79	–	3	AG132211	17.51	AG132211A	25.01	0.022 – 0.045	0.020 – 0.043
12.0	12	26	38	83	11.0	3	AG132212	13.37	AG132212A	23.06	0.024 – 0.048	0.022 – 0.046
13.0	12	26	–	83	–	3	AG132213	19.91	AG132213A	32.89	0.026 – 0.055	0.024 – 0.053
14.0	12	26	–	83	–	3	AG132214	16.25	AG132214A	29.78	0.026 – 0.055	0.024 – 0.053
15.0	16	32	–	92	–	3	AG132215	19.91	AG132215A	34.29	0.029 – 0.056	0.027 – 0.054
16.0	16	32	44	92	15.0	3	AG132216	18.10	AG132216A	31.62	0.029 – 0.056	0.027 – 0.054
17.0	16	32	–	92	–	3	AG132217	31.00	AG132217A	44.66	0.032 – 0.058	0.030 – 0.056
18.0	16	32	–	92	–	3	AG132218	22.64	AG132218A	40.35	0.035 – 0.062	0.033 – 0.060
19.0	20	38	–	104	–	3	AG132219	37.27	AG132219A	61.33	0.035 – 0.062	0.033 – 0.060
20.0	20	38	54	104	19.0	3	AG132220	27.62	AG132220A	42.96	0.035 – 0.062	0.033 – 0.060
21.0	20	38	–	104	–	3	AG132221	29.00	AG132221A	43.94	0.038 – 0.065	0.036 – 0.063
22.0	20	38	–	104	–	3	AG132222	30.87	AG132222A	53.87	0.038 – 0.065	0.036 – 0.063
24.0	25	45	–	121	–	3	AG132224	40.22	AG132224A	73.10	0.041 – 0.068	0.039 – 0.066
25.0	25	45	65	121	24.0	3	AG132225	40.22	AG132225A	73.10	0.041 – 0.068	0.039 – 0.066
28.0	25	45	–	121	–	3	AG132228	62.70	AG132228A	91.34	0.050 – 0.077	0.048 – 0.075
30.0	25	45	–	121	–	3	AG132230	73.04	AG132230A	105.60	0.050 – 0.077	0.048 – 0.075
32.0	32	53	73	133	31.0	3	AG132232	87.22	AG132232A	115.57	0.054 – 0.081	0.052 – 0.079
36.0	32	53	–	133	–	3	AG132236	107.74	AG132236A	132.49	0.062 – 0.089	0.060 – 0.087
40.0	40	63	85	155	39.0	3	AG132240	156.98	AG132240A	193.87	0.066 – 0.093	0.064 – 0.091

Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	65	55	65	130
V_c (m/min) Roughing	45	35	45	115

Product family 45

AG 132-4

Uncoated | Alcrona Pro | Z 3 | HB | 30° | HSS | Type N | DIN 844L

HSS End Mill
Extra-long version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	10	54	3	AG132402	10.24	AG132402A	18.04	0.003 – 0.007	0.001 – 0.005
2.5	6	10	54	3	AG1324025	11.35	AG1324025A	19.00	0.003 – 0.007	0.001 – 0.005
3.0	6	12	56	3	AG132403	10.24	AG132403A	18.04	0.005 – 0.012	0.003 – 0.010
3.5	6	15	59	3	AG1324035	12.99	AG1324035A	21.01	0.005 – 0.012	0.003 – 0.010
4.0	6	19	63	3	AG132404	10.24	AG132404A	18.04	0.007 – 0.017	0.005 – 0.015
4.5	6	19	63	3	AG1324045	12.99	AG1324045A	21.01	0.007 – 0.017	0.005 – 0.015
5.0	6	24	68	3	AG132405	10.24	AG132405A	18.04	0.009 – 0.022	0.007 – 0.020
5.5	6	24	68	3	AG1324055	12.99	AG1324055A	21.01	0.009 – 0.022	0.007 – 0.020
6.0	6	24	68	3	AG132406	10.24	AG132406A	18.04	0.011 – 0.026	0.009 – 0.024
7.0	8	30	74	3	AG132407	13.80	AG132407A	24.34	0.014 – 0.031	0.012 – 0.029
8.0	8	38	82	3	AG132408	12.70	AG132408A	23.24	0.016 – 0.034	0.014 – 0.032
9.0	10	38	88	3	AG132409	15.88	AG132409A	29.11	0.018 – 0.037	0.016 – 0.035
10.0	10	45	95	3	AG132410	13.43	AG132410A	25.23	0.020 – 0.040	0.018 – 0.038
11.0	12	45	102	3	AG132411	17.68	AG132411A	33.99	0.022 – 0.045	0.020 – 0.043
12.0	12	53	110	3	AG132412	16.03	AG132412A	29.45	0.024 – 0.048	0.022 – 0.046
14.0	12	53	110	3	AG132414	21.81	AG132414A	37.55	0.026 – 0.055	0.024 – 0.053
16.0	16	63	123	3	AG132416	23.61	AG132416A	46.61	0.029 – 0.056	0.027 – 0.054
18.0	16	63	123	3	AG132418	28.27	AG132418A	58.86	0.035 – 0.062	0.033 – 0.060
20.0	20	75	141	3	AG132420	34.95	AG132420A	68.81	0.035 – 0.062	0.033 – 0.060
22.0	20	75	141	3	AG132422	59.02	AG132422A	84.45	0.038 – 0.065	0.036 – 0.063
24.0	25	90	166	3	AG132424	83.64	AG132424A	142.80	0.041 – 0.068	0.039 – 0.066
25.0	25	90	166	3	AG132425	84.97	AG132425A	144.64	0.041 – 0.068	0.039 – 0.066
30.0	25	90	166	3	AG132430	146.29	AG132430A	209.58	0.050 – 0.077	0.048 – 0.075

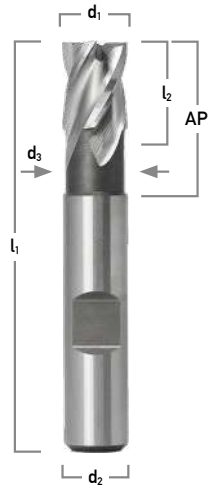
Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 0.5xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	65	55	65	130
V_c (m/min) Roughing	45	35	45	115

AG 142-0

HSS End Mill
Short version



d_1	d_2
h10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	4	–	48	–	4	AG142002	9.07	AG142002A	16.54	0.003 – 0.008	0.001 – 0.006
2.5	6	5	–	49	–	4	AG1420025	9.65	AG1420025A	16.78	0.003 – 0.008	0.001 – 0.006
3.0	6	5	–	49	–	4	AG142003	9.07	AG142003A	16.54	0.004 – 0.012	0.002 – 0.010
3.5	6	6	–	50	–	4	AG1420035	9.65	AG1420035A	16.78	0.004 – 0.012	0.002 – 0.010
4.0	6	7	–	51	–	4	AG142004	9.07	AG142004A	14.78	0.007 – 0.017	0.005 – 0.015
4.5	6	8	–	52	–	4	AG1420045	9.07	AG1420045A	14.78	0.007 – 0.017	0.005 – 0.015
5.0	6	8	–	52	–	4	AG142005	9.07	AG142005A	14.78	0.008 – 0.022	0.006 – 0.020
6.0	6	8	16	52	5.5	4	AG142006	9.07	AG142006A	14.78	0.010 – 0.027	0.008 – 0.025
7.0	8	10	–	54	–	4	AG142007	11.35	AG142007A	18.25	0.011 – 0.031	0.009 – 0.029
8.0	8	11	19	55	7.5	4	AG142008	11.49	AG142008A	20.04	0.014 – 0.034	0.012 – 0.032
9.0	10	11	–	61	–	4	AG142009	15.16	AG142009A	26.04	0.014 – 0.034	0.012 – 0.032
9.5	10	13	–	63	–	4	AG1420095	16.69	AG1420095A	28.49	0.017 – 0.041	0.015 – 0.039
10.0	10	13	23	63	9.0	4	AG142010	12.25	AG142010A	21.07	0.017 – 0.041	0.015 – 0.039
12.0	12	16	28	73	11.0	4	AG142012	13.57	AG142012A	23.31	0.020 – 0.050	0.018 – 0.048
14.0	12	16	–	73	–	4	AG142014	16.25	AG142014A	32.27	0.022 – 0.057	0.020 – 0.055
16.0	16	19	31	79	15.0	4	AG142016	18.77	AG142016A	38.46	0.025 – 0.060	0.023 – 0.058
18.0	16	19	–	79	–	4	AG142018	21.60	AG142018A	36.06	0.027 – 0.067	0.025 – 0.065
20.0	20	22	38	88	19.0	4	AG142020	26.42	AG142020A	50.92	0.030 – 0.075	0.028 – 0.073
22.0	20	22	–	88	–	4	AG142022	37.03	AG142022A	72.97	0.032 – 0.078	0.031 – 0.076
24.0	25	26	–	102	–	4	AG142024	48.62	AG142024A	80.98	0.036 – 0.081	0.034 – 0.079
25.0	25	26	46	102	24.0	4	AG142025	48.62	AG142025A	81.28	0.039 – 0.084	0.037 – 0.082
28.0	25	26	–	102	–	4	AG142028	68.95	AG142028A	90.90	0.043 – 0.088	0.041 – 0.086
30.0	25	26	–	102	–	4	AG142030	71.31	AG142030A	95.88	0.046 – 0.091	0.044 – 0.089

Peripheral milling
$a_e = 0.3xD$
$a_p = 1.0xD$

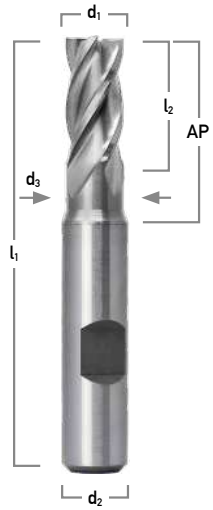
Full slot milling
$a_p = 1.0xD$

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	55	70	150
V_c (m/min) Roughing	55	35	50	130

Product family 45

AG 142-2

HSS End Mill



d_1	d_2
h10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	7	–	51	–	4	AG142202	9.79	AG142202A	20.04	0.003 – 0.008	0.001 – 0.006
2.5	6	8	–	52	–	4	AG1422025	10.47	AG1422025A	19.15	0.003 – 0.008	0.001 – 0.006
3.0	6	8	–	52	–	4	AG142203	9.07	AG142203A	18.04	0.004 – 0.012	0.002 – 0.010
3.5	6	10	–	54	–	4	AG1422035	10.47	AG1422035A	19.15	0.004 – 0.012	0.002 – 0.010
3.8	6	11	–	55	–	4	AG1422038	11.95	AG1422038A	21.36	0.007 – 0.017	0.005 – 0.015
4.0	6	11	–	55	–	4	AG142204	9.07	AG142204A	18.04	0.007 – 0.017	0.005 – 0.015
4.5	6	13	–	57	–	4	AG1422045	10.47	AG1422045A	19.15	0.007 – 0.017	0.005 – 0.015
4.8	6	13	–	57	–	4	AG1422048	11.95	AG1422048A	21.36	0.008 – 0.022	0.006 – 0.020
5.0	6	13	–	57	–	4	AG142205	9.07	AG142205A	18.04	0.008 – 0.022	0.006 – 0.020
5.5	6	13	–	57	–	4	AG1422055	10.69	AG1422055A	18.62	0.008 – 0.022	0.006 – 0.020
5.75	6	13	–	57	–	4	AG14220575	11.57	AG14220575A	20.41	0.010 – 0.027	0.008 – 0.025
6.0	6	13	21	57	5.5	4	AG142206	9.21	AG142206A	18.17	0.010 – 0.027	0.008 – 0.025
6.75	8	16	–	60	–	4	AG14220675	15.29	AG14220675A	25.61	0.011 – 0.031	0.009 – 0.029
7.0	8	16	–	60	–	4	AG142207	11.95	AG142207A	21.81	0.011 – 0.031	0.009 – 0.029
7.5	8	19	–	63	–	4	AG1422075	11.95	AG1422075A	21.81	0.011 – 0.031	0.009 – 0.029
7.75	8	19	–	63	–	4	AG14220775	13.28	AG14220775A	23.53	0.014 – 0.034	0.012 – 0.032
8.0	8	19	33	69	7.5	4	AG142208	11.29	AG142208A	20.04	0.014 – 0.034	0.012 – 0.032
8.5	10	19	–	69	–	4	AG1422085	13.21	AG1422085A	21.60	0.014 – 0.034	0.012 – 0.032
8.7	10	19	–	69	–	4	AG1422087	14.71	AG1422087A	24.27	0.014 – 0.034	0.012 – 0.032
9.0	10	19	–	69	–	4	AG142209	13.28	AG142209A	23.53	0.014 – 0.034	0.012 – 0.032
9.7	10	22	–	72	–	4	AG1422097	15.53	AG1422097A	25.83	0.017 – 0.041	0.015 – 0.039
10.0	10	22	32	72	9.0	4	AG142210	12.70	AG142210A	21.31	0.017 – 0.041	0.015 – 0.039
10.5	12	22	–	79	–	4	AG1422105	18.10	AG1422105A	25.61	0.017 – 0.041	0.015 – 0.039
11.0	12	22	–	79	–	4	AG142211	18.10	AG142211A	25.61	0.018 – 0.047	0.016 – 0.045
11.5	12	26	–	83	–	4	AG1422115	19.91	AG1422115A	29.83	0.018 – 0.047	0.016 – 0.045
12.0	12	26	38	83	11.0	4	AG142212	14.42	AG142212A	23.61	0.020 – 0.050	0.018 – 0.048
13.0	12	26	–	83	–	4	AG142213	21.54	AG142213A	34.72	0.020 – 0.050	0.018 – 0.048
14.0	12	26	–	83	–	4	AG142214	17.91	AG142214A	32.58	0.022 – 0.057	0.020 – 0.055
15.0	16	32	–	92	–	4	AG142215	21.31	AG142215A	36.51	0.022 – 0.057	0.020 – 0.055
16.0	16	32	44	92	15.0	4	AG142216	19.99	AG142216A	34.16	0.025 – 0.060	0.023 – 0.058
17.0	16	32	–	92	–	4	AG142217	32.89	AG142217A	53.87	0.025 – 0.060	0.023 – 0.058
18.0	16	32	–	92	–	4	AG142218	25.08	AG142218A	44.16	0.027 – 0.067	0.025 – 0.065
19.0	20	38	–	104	–	4	AG142219	41.48	AG142219A	65.69	0.027 – 0.067	0.025 – 0.065
20.0	20	38	54	104	19.0	4	AG142220	30.20	AG142220A	47.06	0.030 – 0.075	0.028 – 0.073
21.0	20	38	–	104	–	4	AG142221	31.99	AG142221A	48.62	0.032 – 0.078	0.031 – 0.076

Peripheral milling
$a_e = 0.3xD$
$a_p = 1.5xD$

Full slot milling
$a_p = 1.0xD$

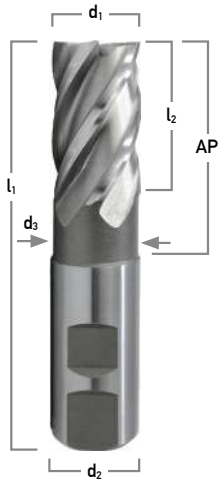
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	55	70	150
V_c (m/min) Roughing	55	35	50	130

AG 152-2



DIN 844

HSS End Mill



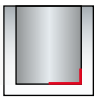
d_1	d_2
h10	h6

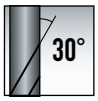
d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
22.0	20	38	–	104	–	5	AG152222	34.60	AG152222A	52.31	0.032 – 0.078	0.031 – 0.076
24.0	25	45	–	121	–	5	AG152224	44.08	AG152224A	75.47	0.036 – 0.081	0.034 – 0.079
25.0	25	45	65	121	24.0	5	AG152225	44.08	AG152225A	75.47	0.039 – 0.084	0.037 – 0.082

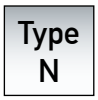
Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

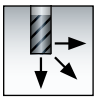
Full slot milling
a_p = 1.0xD

AG 162-2



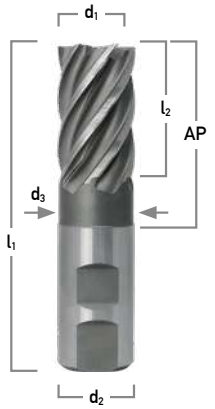





DIN 844

HSS End Mill



d_1	d_2
h10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
22.0	20	38	–	104	–	6	AG162222	34.60	AG162222A	52.31	0.032 – 0.078	0.031 – 0.076
24.0	25	45	–	121	–	6	AG162224	44.08	AG162224A	75.47	0.036 – 0.081	0.034 – 0.079
26.0	25	45	–	121	–	6	AG162226	52.12	AG162226A	91.20	0.039 – 0.084	0.037 – 0.082
28.0	25	45	–	121	–	6	AG162228	72.15	AG162228A	96.04	0.043 – 0.088	0.041 – 0.086
30.0	25	45	–	121	–	6	AG162230	81.86	AG162230A	109.54	0.046 – 0.091	0.044 – 0.089
32.0	32	53	73	133	31.0	6	AG162232	91.34	AG162232A	123.13	0.049 – 0.094	0.047 – 0.092
36.0	32	53	–	133	–	6	AG162236	116.90	AG162236A	137.68	0.058 – 0.100	0.056 – 0.083
40.0	40	63	85	155	39.0	6	AG162240	167.44	AG162240A	200.53	0.062 – 0.120	0.060 – 0.087

Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	55	70	150
V_c (m/min) Roughing	55	35	50	130

Product family 45

AG 142-4

Uncoated | Alcrona Pro | Z 4 | HB | 30° | HSS | Type N | DIN 844L

HSS End Mill
Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	10	54	4	AG142402	10.85	AG142402A	18.50	0.003 – 0.008	0.001 – 0.006
2.5	6	10	54	4	AG1424025	11.80	AG1424025A	19.99	0.003 – 0.008	0.001 – 0.006
3.0	6	12	56	4	AG142403	10.85	AG142403A	18.50	0.004 – 0.012	0.002 – 0.010
3.5	6	15	59	4	AG1424035	10.85	AG1424035A	18.50	0.004 – 0.012	0.002 – 0.010
4.0	6	19	63	4	AG142404	10.85	AG142404A	18.50	0.007 – 0.017	0.005 – 0.015
4.5	6	19	63	4	AG1424045	10.85	AG1424045A	18.50	0.007 – 0.017	0.005 – 0.015
5.0	6	24	68	4	AG142405	10.85	AG142405A	18.50	0.008 – 0.022	0.006 – 0.020
5.5	6	24	68	4	AG1424055	10.85	AG1424055A	18.50	0.008 – 0.022	0.006 – 0.020
6.0	6	24	68	4	AG142406	10.85	AG142406A	18.50	0.010 – 0.027	0.008 – 0.025
7.0	8	30	74	4	AG142407	14.78	AG142407A	25.15	0.011 – 0.031	0.009 – 0.029
8.0	8	38	82	4	AG142408	13.72	AG142408A	23.97	0.014 – 0.034	0.012 – 0.032
9.0	10	38	88	4	AG142409	16.86	AG142409A	30.44	0.014 – 0.034	0.012 – 0.032
10.0	10	45	95	4	AG142410	14.78	AG142410A	26.27	0.017 – 0.041	0.015 – 0.039
11.0	12	45	102	4	AG142411	18.50	AG142411A	34.95	0.018 – 0.047	0.016 – 0.045
12.0	12	53	110	4	AG142412	17.16	AG142412A	31.00	0.020 – 0.050	0.018 – 0.048
14.0	12	53	110	4	AG142414	23.24	AG142414A	39.85	0.022 – 0.057	0.020 – 0.055
16.0	16	63	123	4	AG142416	25.23	AG142416A	48.84	0.025 – 0.060	0.023 – 0.058
18.0	16	63	123	4	AG142418	30.57	AG142418A	61.09	0.027 – 0.067	0.025 – 0.065
20.0	20	75	141	4	AG142420	37.19	AG142420A	72.66	0.030 – 0.075	0.028 – 0.073
22.0	20	75	141	4	AG142422	50.09	AG142422A	83.79	0.032 – 0.078	0.031 – 0.076

d_1	d_2
h10	h6

Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 0.5xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	55	70	150
V_c (m/min) Roughing	55	35	50	130

AG 152-4



DIN 844L

HSS End Mill

Extra-long version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
22.0	20	75	141	5	AG152422	50.09	AG152422A	83.79	0.032 – 0.078	0.031 – 0.076
25.0	25	90	166	5	AG152425	64.04	AG152425A	117.18	0.039 – 0.084	0.037 – 0.082

Peripheral milling
a_e = 0.3xD
a_p = 1.5xD

Full slot milling
a_p = 0.5xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	55	70	150
V_c (m/min) Roughing	55	35	50	130

Product family 45

AG 162-4




HSS End Mill

Extra-long version

d_1	d_2
h10	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
22.0	20	75	141	6	AG162422	59.22	AG162422A	91.66	0.033 – 0.079	0.032 – 0.077
25.0	25	90	166	6	AG162425	64.04	AG162425A	113.77	0.040 – 0.085	0.038 – 0.083
28.0	25	90	166	6	AG162428	93.29	AG162428A	175.46	0.044 – 0.089	0.042 – 0.08
30.0	25	90	166	6	AG162430	98.54	AG162430A	179.17	0.044 – 0.089	0.042 – 0.08
32.0	32	106	186	6	AG162432	118.31	AG162432A	195.56	0.049 – 0.089	0.047 – 0.092
36.0	32	106	186	6	AG162436	127.66	AG162436A	213.89	0.058 – 0.091	0.056 – 0.083
40.0	40	125	217	6	AG162440	232.15	AG162440A	303.70	0.062 – 0.093	0.060 – 0.087

Peripheral milling
$a_e = 0.3xD$
$a_p = 1.5xD$

Full slot milling
$a_p = 0.5xD$

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	55	70	150
V_c (m/min) Roughing	55	35	50	130

AG 140-4



HSS End Mill

Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
6.0	6	40	100	4	AG140406	16.86	AG140406A	28.73	0.010 – 0.027	0.008 – 0.025
8.0	8	65	115	4	AG140408	18.25	AG140408A	31.00	0.014 – 0.034	0.012 – 0.032
10.0	10	65	115	4	AG140410	24.14	AG140410A	40.97	0.017 – 0.041	0.015 – 0.039
12.0	12	75	132	4	AG140412	27.99	AG140412A	47.57	0.020 – 0.050	0.018 – 0.048
14.0	12	80	137	4	AG140414	31.69	AG140414A	53.87	0.022 – 0.057	0.020 – 0.055
16.0	16	100	160	4	AG140416	46.22	AG140416A	78.43	0.025 – 0.060	0.023 – 0.058
18.0	16	100	160	4	AG140418	51.86	AG140418A	88.40	0.027 – 0.067	0.025 – 0.065
20.0	20	100	166	4	AG140420	64.50	AG140420A	109.54	0.030 – 0.075	0.028 – 0.073
20.0	20	125	191	4	AG140520	75.12	AG140520A	127.72	0.030 – 0.075	0.028 – 0.073
22.0	20	110	176	4	AG140422	91.44	AG140422A	154.95	0.032 – 0.078	0.028 – 0.078
25.0	25	125	201	4	AG140425	99.37	AG140425A	168.55	0.039 – 0.084	0.037 – 0.082
25.0	25	140	216	4	AG140525	104.93	AG140525A	178.42	0.039 – 0.084	0.037 – 0.082
25.0	25	160	236	4	AG140625	133.96	AG140625A	227.46	0.039 – 0.084	0.037 – 0.082
28.0	25	140	216	4	AG140428	119.42	AG140428A	202.90	0.043 – 0.088	0.041 – 0.086
28.0	25	160	236	4	AG140528	129.80	AG140528A	219.39	0.043 – 0.088	0.041 – 0.086
30.0	25	140	216	4	AG140430	132.93	AG140430A	225.86	0.046 – 0.091	0.044 – 0.089
32.0	32	140	220	4	AG140432	143.46	AG140432A	243.26	0.049 – 0.094	0.047 – 0.092
32.0	32	160	240	4	AG140532	152.15	AG140532A	257.76	0.049 – 0.094	0.047 – 0.092
32.0	32	180	260	4	AG140632	162.68	AG140632A	276.61	0.049 – 0.094	0.047 – 0.092

Peripheral milling
a_e = 0.2xD
a_p = 1.5xD

Full slot milling
a_p = 0.3xD

d_1	d_2
h10	h6

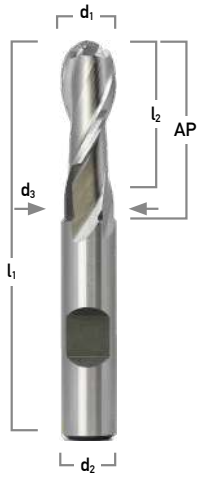
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	60	45	60	120
V_c (m/min) Roughing	40	30	40	90

Product family 45

AQ 122-2

HSS Ball-Nosed End Mill

Long version



d_1	d_2
e10	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm		mm		Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
3.0	6	8	–	52	–	2	AQ122203	15.53	AQ122203A	23.31	0.005 – 0.012	0.003 – 0.010
3.5	6	10	–	54	–	2	AQ1222035	15.53	AQ1222035A	23.31	0.005 – 0.012	0.003 – 0.010
4.0	6	11	–	55	–	2	AQ122204	15.53	AQ122204A	23.31	0.008 – 0.017	0.006 – 0.015
5.0	6	13	–	57	–	2	AQ122205	15.53	AQ122205A	23.31	0.009 – 0.022	0.007 – 0.020
6.0	6	13	21	57	5.5	2	AQ122206	15.53	AQ122206A	23.31	0.011 – 0.027	0.009 – 0.025
7.0	8	16	–	60	–	2	AQ122207	23.68	AQ122207A	31.33	0.013 – 0.029	0.011 – 0.027
8.0	8	19	33	69	7.5	2	AQ122208	18.25	AQ122208A	28.92	0.016 – 0.032	0.014 – 0.030
9.0	10	19	–	69	–	2	AQ122209	19.65	AQ122209A	31.46	0.018 – 0.035	0.016 – 0.033
10.0	10	22	32	72	9.0	2	AQ122210	19.65	AQ122210A	30.95	0.020 – 0.037	0.018 – 0.035
11.0	12	22	–	79	–	2	AQ122211	22.80	AQ122211A	36.14	0.022 – 0.045	0.020 – 0.043
12.0	12	26	38	83	11.0	2	AQ122212	25.38	AQ122212A	39.11	0.024 – 0.047	0.022 – 0.045
14.0	12	26	–	83	–	2	AQ122214	27.90	AQ122214A	41.57	0.028 – 0.054	0.026 – 0.052
16.0	16	32	44	92	15.0	2	AQ122216	31.27	AQ122216A	54.54	0.029 – 0.057	0.027 – 0.055
18.0	16	32	–	92	–	2	AQ122218	35.64	AQ122218A	66.20	0.032 – 0.064	0.030 – 0.062
20.0	20	38	54	104	19.0	2	AQ122220	40.68	AQ122220A	74.65	0.035 – 0.066	0.033 – 0.065
22.0	20	38	–	104	–	2	AQ122222	50.92	AQ122222A	91.34	0.038 – 0.073	0.036 – 0.071
25.0	25	45	65	121	24.0	2	AQ122225	60.87	AQ122225A	103.61	0.047 – 0.082	0.045 – 0.080
28.0	25	45	–	121	–	2	AQ122228	81.18	AQ122228A	133.01	0.056 – 0.090	0.054 – 0.089
30.0	25	45	–	121	–	2	AQ122230	95.88	AQ122230A	148.14	0.065 – 0.100	0.063 – 0.098

Peripheral milling
a_e = 0.5xD
a_p = 1.5xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	60	50	55	110
V_c (m/min) Roughing	40	30	35	90

AQ 122-4

Uncoated | Alcrona Pro | Z 2 | HB | 30° | HSS | Type N | DIN 844L

HSS Ball-Nosed End Mill

Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
2.0	6	7	54	2	AQ122402	17.43	AQ122402A	25.38	0.003 – 0.006	0.001 – 0.004
3.0	6	8	56	2	AQ122403	17.43	AQ122403A	25.38	0.005 – 0.012	0.003 – 0.010
4.0	6	19	63	2	AQ122404	17.43	AQ122404A	25.38	0.008 – 0.017	0.006 – 0.015
5.0	6	24	68	2	AQ122405	17.43	AQ122405A	25.38	0.009 – 0.022	0.007 – 0.020
6.0	6	24	68	2	AQ122406	17.43	AQ122406A	25.38	0.011 – 0.027	0.009 – 0.025
7.0	8	30	74	2	AQ122407	25.61	AQ122407A	31.69	0.013 – 0.029	0.011 – 0.027
8.0	8	38	82	2	AQ122408	21.17	AQ122408A	31.69	0.016 – 0.032	0.014 – 0.030
9.0	10	38	88	2	AQ122409	24.81	AQ122409A	37.10	0.018 – 0.035	0.016 – 0.033
10.0	10	45	95	2	AQ122410	22.64	AQ122410A	34.60	0.020 – 0.037	0.018 – 0.035
11.0	12	45	102	2	AQ122411	31.55	AQ122411A	45.22	0.022 – 0.045	0.020 – 0.043
12.0	12	53	110	2	AQ122412	29.18	AQ122412A	43.12	0.024 – 0.047	0.022 – 0.045
14.0	12	53	110	2	AQ122414	31.91	AQ122414A	45.80	0.028 – 0.054	0.026 – 0.052
16.0	16	63	123	2	AQ122416	36.06	AQ122416A	59.44	0.029 – 0.057	0.027 – 0.055
18.0	16	63	123	2	AQ122418	40.54	AQ122418A	71.56	0.032 – 0.064	0.030 – 0.062
20.0	20	75	141	2	AQ122420	46.61	AQ122420A	81.18	0.035 – 0.066	0.033 – 0.065
22.0	20	75	141	2	AQ122422	58.78	AQ122422A	100.13	0.038 – 0.073	0.036 – 0.071
25.0	25	90	166	2	AQ122425	69.76	AQ122425A	112.88	0.047 – 0.082	0.045 – 0.080
28.0	25	90	166	2	AQ122428	93.43	AQ122428A	145.15	0.056 – 0.090	0.054 – 0.089
30.0	25	90	166	2	AQ122430	110.73	AQ122430A	162.92	0.065 – 0.100	0.063 – 0.098

d_1	d_2
e10	h6

Peripheral milling
a_e = 0.5xD
a_p = 1.0xD

Full slot milling
a_p = 1.0xD

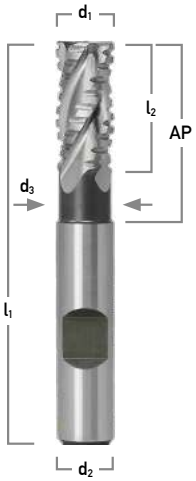
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	60	50	55	110
V_c (m/min) Roughing	40	30	35	90

Product family 45

AG 932-2




HSS Roughing / Finishing End Mill



d_1	d_2
js14	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
6.0	6	13	21	57	5.5	3	AG932206	33.24	AG932206A	51.20	0.008 – 0.015	0.006 – 0.013
8.0	8	19	33	69	7.5	3	AG932208	36.30	AG932208A	53.35	0.012 – 0.021	0.010 – 0.019
8.0	10	19	–	69	–	3	AG932208S10	36.30	AG932208AS10	53.35	0.013 – 0.024	0.011 – 0.019
10.0	10	22	32	72	9.0	3	AG932210	36.89	AG932210A	60.39	0.015 – 0.027	0.013 – 0.025
12.0	12	26	38	83	11.0	3	AG932212	43.94	AG932212A	71.17	0.018 – 0.032	0.016 – 0.030
14.0	12	26	–	83	–	3	AG932214	48.54	AG932214A	86.38	0.020 – 0.036	0.018 – 0.034
16.0	16	32	44	92	15.0	3	AG932216	53.74	AG932216A	101.22	0.022 – 0.040	0.020 – 0.038
18.0	16	32	–	92	–	3	AG932218	69.09	AG932218A	116.81	0.023 – 0.043	0.021 – 0.041
20.0	20	38	54	104	19.0	3	AG932220	83.44	AG932220A	131.83	0.025 – 0.047	0.023 – 0.045
22.0	20	38	–	104	–	3	AG932222	95.08	AG932222A	152.54	0.027 – 0.051	0.025 – 0.049
25.0	25	45	–	121	–	3	AG932225	116.97	AG932225A	171.21	0.031 – 0.055	0.029 – 0.053
28.0	25	45	–	121	–	3	AG932228	139.15	AG932228A	209.42	0.035 – 0.059	0.033 – 0.057
30.0	25	45	–	121	–	3	AG932230	152.80	AG932230A	221.70	0.037 – 0.061	0.035 – 0.059
32.0	32	53	73	133	31.0	3	AG932232	177.37	AG932232A	248.49	0.040 – 0.065	0.038 – 0.063
36.0	32	53	–	133	–	3	AG932236	248.49	AG932236A	296.28	0.046 – 0.070	0.044 – 0.068
40.0	32	63	85	155	39.0	3	AG932240	294.34	AG932240A	305.70	0.052 – 0.076	0.050 – 0.074

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

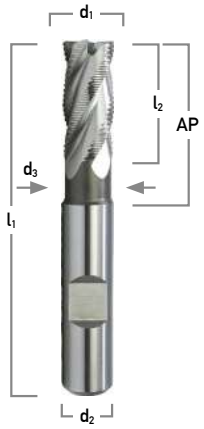
Full slot milling
a_p = 1.5xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

AG 642-2




HSS Roughing End Mill



d_1	d_2
js14	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
4.0	6	11	–	55	–	4	AG642204	18.17	AG642204A	23.68	0.005 – 0.010
5.0	6	13	–	57	–	4	AG642205	18.17	AG642205A	23.68	0.007 – 0.012
6.0	6	13	21	57	5.5	4	AG642206	15.35	AG642206A	21.54	0.008 – 0.015
7.0	8	16	–	60	–	4	AG642207	20.25	AG642207A	26.27	0.010 – 0.018
8.0	8	19	33	69	7.5	4	AG642208	17.51	AG642208A	23.61	0.012 – 0.021
8.0	10	19	–	69	–	4	AG642208S10	16.33	AG642208AS10	29.62	0.013 – 0.023
9.0	10	19	–	69	–	4	AG642209	22.80	AG642209A	29.62	0.014 – 0.025
10.0	10	22	32	72	9.0	4	AG642210	17.96	AG642210A	23.82	0.015 – 0.027
11.0	12	22	–	79	–	4	AG642211	25.75	AG642211A	32.58	0.018 – 0.032
12.0	12	26	38	83	11.0	4	AG642212	20.25	AG642212A	27.09	0.020 – 0.036
13.0	12	26	–	83	–	4	AG642213	29.83	AG642213A	45.93	0.022 – 0.040
14.0	12	26	–	83	–	4	AG642214	24.14	AG642214A	38.27	0.020 – 0.036
15.0	16	32	–	92	–	4	AG642215	36.51	AG642215A	51.13	0.021 – 0.038
16.0	16	32	44	92	15.0	4	AG642216	26.27	AG642216A	41.11	0.022 – 0.040
17.0	16	32	–	92	–	4	AG642217	40.01	AG642217A	55.95	0.023 – 0.043
18.0	16	32	–	92	–	4	AG642218	31.55	AG642218A	48.99	0.023 – 0.043
19.0	20	38	–	104	–	4	AG642219	44.16	AG642219A	71.63	0.025 – 0.047
20.0	20	38	54	104	19.0	4	AG642220	38.66	AG642220A	58.18	0.025 – 0.047
22.0	20	38	–	104	–	4	AG642222	48.90	AG642222A	76.81	0.027 – 0.051

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

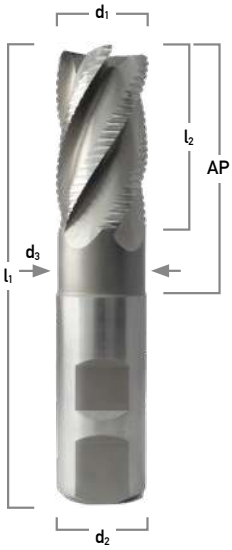
Full slot milling
a_p = 1.5xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

Product family 45

AG 652-2

HSS Roughing End Mill



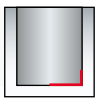
d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
25.0	25	45	65	121	24.0	5	AG652225	61.39	AG652225A	84.97	0.032 – 0.057

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

d_1	d_2
js14	h6

AG 662-2



HSS Roughing End Mill

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
26.0	25	45	–	121	–	6	AG662226	72.66	AG662226A	99.08	0.035 – 0.059
28.0	25	45	–	121	–	6	AG662228	72.66	AG662228A	99.08	0.037 – 0.062
30.0	25	45	–	121	–	6	AG662230	84.09	AG662230A	108.58	0.039 – 0.063
32.0	32	53	73	133	31.0	6	AG662232	89.07	AG662232A	140.34	0.039 – 0.063
36.0	32	53	–	133	–	6	AG662236	113.84	AG662236A	200.09	0.043 – 0.067
40.0	40	63	85	155	39.0	6	AG662240	166.99	AG662240A	227.33	0.046 – 0.070

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

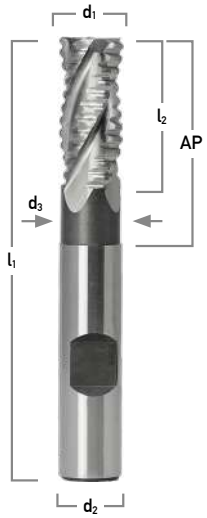
d_1	d_2
js14	h6

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

AG 732-2

HSS Roughing End Mill

DIN 844



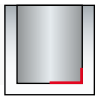
d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
6.0	6	13	21	57	5.5	3	AG732206	30.38	AG732206A	32.42	0.008 – 0.015
7.0	10	16	–	66	–	3	AG732207	32.73	AG732207A	35.11	0.010 – 0.018
8.0	10	19	33	69	7.5	3	AG732208	32.73	AG732208A	35.11	0.012 – 0.021
9.0	10	19	–	69	–	3	AG732209	32.73	AG732209A	35.11	0.014 – 0.025
10.0	10	22	32	72	9.0	3	AG732210	35.47	AG732210A	37.85	0.015 – 0.027
12.0	12	26	38	83	11.0	3	AG732212	42.37	AG732212A	44.74	0.018 – 0.032
14.0	12	26	–	83	–	3	AG732214	46.22	AG732214A	53.45	0.020 – 0.036
16.0	16	32	44	92	15.0	3	AG732216	53.29	AG732216A	61.83	0.022 – 0.040
18.0	16	32	–	92	–	3	AG732218	61.68	AG732218A	77.34	0.023 – 0.043
20.0	20	38	54	104	19.0	3	AG732220	73.79	AG732220A	86.46	0.025 – 0.047
22.0	20	38	–	104	–	3	AG732222	73.79	AG732222A	86.46	0.027 – 0.051
25.0	25	45	65	121	24.0	3	AG732225	110.42	AG732225A	123.13	0.031 – 0.055

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

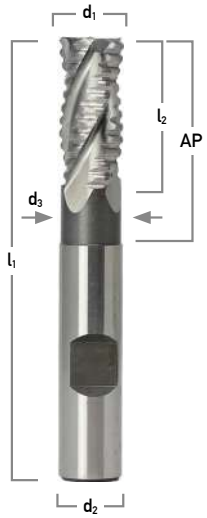
d_1	d_2
js14	h6

AG 742-2



HSS Roughing End Mill

DIN 844



d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/z
5.0	6	13	–	57	–	4	AG742205	18.17	AG742205A	23.68	0.007 – 0.012
6.0	6	13	21	57	5.5	4	AG742206	15.35	AG742206A	21.54	0.008 – 0.015
7.0	8	16	–	60	–	4	AG742207	20.25	AG742207A	26.27	0.010 – 0.018
8.0	8	19	33	69	7.5	4	AG742208	17.51	AG742208A	23.61	0.012 – 0.021
9.0	10	19	–	69	–	4	AG742209	22.80	AG742209A	29.62	0.014 – 0.025
10.0	10	22	32	72	9.0	4	AG742210	17.96	AG742210A	23.82	0.015 – 0.027
11.0	12	22	–	79	–	4	AG742211	25.75	AG742211A	32.58	0.018 – 0.032
12.0	12	26	38	83	11.0	4	AG742212	20.25	AG742212A	27.09	0.020 – 0.036
13.0	12	26	–	83	–	4	AG742213	29.83	AG742213A	45.93	0.020 – 0.036
14.0	12	26	–	83	–	4	AG742214	24.14	AG742214A	38.27	0.022 – 0.040
15.0	16	32	–	92	–	4	AG742215	36.51	AG742215A	51.13	0.021 – 0.038
15.0	12	26	–	83	–	4	AG742215S12	36.54	AG742215AS12	51.14	0.022 – 0.040
16.0	16	32	44	92	15.0	4	AG742216	26.27	AG742216A	41.11	0.022 – 0.040
18.0	16	32	–	92	–	4	AG742218	31.55	AG742218A	48.99	0.023 – 0.043
20.0	20	38	54	104	19.0	4	AG742220	38.66	AG742220A	56.70	0.025 – 0.047

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

d_1	d_2
js14	h6

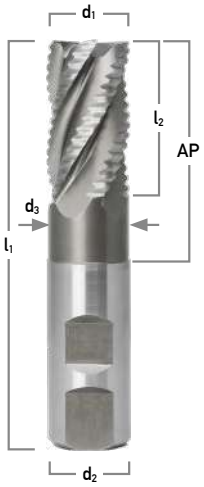
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

Product family 45

AG 752-2

Uncoated | Alcrona Pro | Z 5 | HB | 30° | HSS | Type NR | DIN 844

HSS Roughing End Mill



d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		fz Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/z
22.0	20	38	–	104	–	5	AG752222	48.90	AG752222A	76.81	0.027 – 0.051
24.0	25	45	–	121	–	5	AG752224	61.39	AG752224A	84.97	0.029 – 0.053
25.0	25	45	65	121	24.0	5	AG752225	61.39	AG752225A	84.97	0.035 – 0.059
26.0	25	45	–	121	–	5	AG752226	72.66	AG752226A	99.08	0.035 – 0.059
28.0	25	45	–	121	–	5	AG752228	72.66	AG752228A	99.08	0.037 – 0.062
30.0	25	45	–	121	–	5	AG752230	84.09	AG752230A	108.58	0.039 – 0.063

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

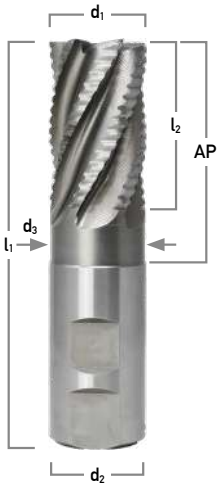
Full slot milling
a_p = 1.5xD

d_1	d_2
js14	h6

AG 762-2

Uncoated | Alcrona Pro | Z 6 | HB | 38° | HSS | Type NR | DIN 844

HSS Roughing End Mill



d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		fz Roughing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/z
26.0	25	45	–	121	–	6	AG762226	72.66	AG762226A	99.08	0.035 – 0.059
28.0	25	45	–	121	–	6	AG762228	72.66	AG762228A	99.08	0.037 – 0.062
30.0	25	45	–	121	–	6	AG762230	84.09	AG762230A	108.58	0.039 – 0.063
32.0	32	53	73	133	31.0	6	AG762232	89.07	AG762232A	140.34	0.039 – 0.063
36.0	32	53	–	133	–	6	AG762236	113.84	AG762236A	200.09	0.042 – 0.068
40.0	40	63	85	155	39.0	6	AG762240	166.99	AG762240A	227.33	0.052 – 0.076

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

d_1	d_2
js14	h6

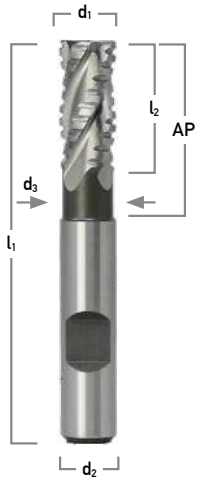
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

AG 942-2



DIN 844

HSS Roughing / Finishing End Mill



d_1	d_2
js14	h6

d_1	d_2	l_2	AP	l_1	d_3		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
6.0	6	13	21	57	5.5	4	AG942206	19.59	AG942206A	24.49	0.008 – 0.015	0.006 – 0.013
7.0	8	16	–	60	–	4	AG942207	25.08	AG942207A	32.27	0.010 – 0.018	0.008 – 0.016
8.0	8	19	33	69	7.5	4	AG942208	20.49	AG942208A	25.61	0.012 – 0.021	0.010 – 0.019
9.0	10	19	–	69	–	4	AG942209	25.75	AG942209A	32.42	0.014 – 0.025	0.012 – 0.022
10.0	10	22	32	72	9.0	4	AG942210	21.67	AG942210A	26.57	0.015 – 0.027	0.013 – 0.025
11.0	12	22	–	79	–	4	AG942211	28.58	AG942211A	35.64	0.018 – 0.032	0.016 – 0.030
12.0	12	26	38	83	11.0	4	AG942212	22.19	AG942212A	29.00	0.020 – 0.036	0.018 – 0.034
14.0	12	26	–	83	–	4	AG942214	26.42	AG942214A	41.34	0.022 – 0.040	0.020 – 0.038
16.0	16	32	44	92	15.0	4	AG942216	29.18	AG942216A	45.42	0.022 – 0.040	0.020 – 0.038
18.0	16	32	–	92	–	4	AG942218	34.95	AG942218A	52.48	0.023 – 0.043	0.021 – 0.041
20.0	20	38	54	104	19.0	4	AG942220	41.71	AG942220A	53.35	0.025 – 0.047	0.023 – 0.045
22.0	20	38	–	104	–	4	AG942222	48.30	AG942222A	78.82	0.027 – 0.051	0.025 – 0.049
24.0	25	45	–	121	–	4	AG942224	47.13	AG942224A	75.87	0.029 – 0.053	0.027 – 0.051

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

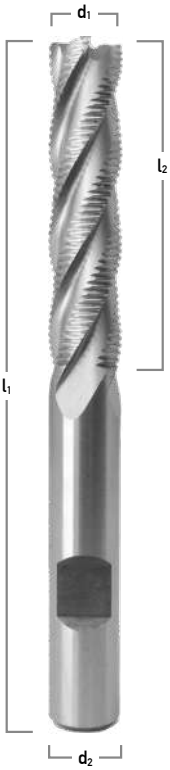
Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

Product family 45

AG 642-4

Uncoated | Alcrona Pro | Z 4 | HB | 30° | HSS | Type HR | DIN 844

HSS Roughing End Mill
Extra-long version



d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
6.0	6	24	68	4	AG642406	23.31	AG642406A	31.33	0.008 – 0.015
8.0	8	38	88	4	AG642408	24.61	AG642408A	35.26	0.012 – 0.021
10.0	10	45	95	4	AG642410	27.70	AG642410A	39.70	0.015 – 0.027
12.0	12	53	110	4	AG642412	32.14	AG642412A	46.03	0.020 – 0.036
14.0	12	53	110	4	AG642414	35.64	AG642414A	52.48	0.022 – 0.040
16.0	16	63	123	4	AG642416	42.16	AG642416A	65.54	0.022 – 0.040
18.0	16	63	123	4	AG642418	51.06	AG642418A	85.27	0.023 – 0.043
20.0	20	75	141	4	AG642420	55.82	AG642420A	93.15	0.025 – 0.047
25.0	25	90	166	4	AG642425	73.18	AG642425A	112.96	0.035 – 0.059

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

d_1	d_2
js14	h6

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

AG 652-4

HSS Roughing End Mill
Extra-long version

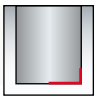
d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
22.0	20	75	141	5	AG652422	63.02	AG652422A	101.08	0.027 – 0.051
25.0	25	90	166	5	AG652425	73.18	AG652425A	112.96	0.035 – 0.059

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

d_1	d_2
js14	h6

AG 662-4



HSS Roughing End Mill
Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.		€/pc.	mm/Z
28.0	25	90	166	6	AG662428	106.87	AG662428A	150.46	0.037 – 0.062
30.0	25	90	166	6	AG662430	136.70	AG662430A	179.84	0.039 – 0.063

d_1	d_2
js14	h6

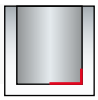
Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

Product family 45

AG 742-4



HSS Roughing End Mill
Extra-long version

d_1	d_2
js14	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
6.0	6	24	68	4	AG742406	24.61	AG742406A	31.33	0.008 – 0.015
8.0	8	38	88	4	AG742408	26.12	AG742408A	33.63	0.012 – 0.021
10.0	10	45	95	4	AG742410	27.70	AG742410A	39.70	0.015 – 0.027
11.0	12	45	102	4	AG742411	32.42	AG742411A	45.74	0.016 – 0.040
12.0	12	53	110	4	AG742412	32.14	AG742412A	46.03	0.020 – 0.040
14.0	12	53	110	4	AG742414	35.64	AG742414A	52.48	0.022 – 0.040
16.0	16	63	123	4	AG742416	42.16	AG742416A	65.54	0.022 – 0.040
18.0	16	63	123	4	AG742418	51.06	AG742418A	85.27	0.023 – 0.043
20.0	20	75	141	4	AG742420	55.82	AG742420A	93.15	0.025 – 0.047
22.0	20	75	141	4	AG742422	58.26	AG742422A	99.37	0.027 – 0.051

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

AG 752-4

Uncoated | Alcrona Pro | Z 5 | HB | 30° | HSS | Type NR | DIN 844

HSS Roughing End Mill
Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
22.0	20	75	141	5	AG752422	58.26	AG752422A	99.37	0.027 – 0.051
25.0	25	90	166	5	AG752425	73.18	AG752425A	112.88	0.035 – 0.059
28.0	25	90	166	5	AG752428	87.50	AG752428A	139.45	0.037 – 0.062
30.0	25	90	166	5	AG752430	97.23	AG752430A	149.18	0.039 – 0.063

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

d_1	d_2
js14	h6

AG 762-4

Uncoated | Alcrona Pro | Z 6 | HB | 38° | HSS | Type NR | DIN 844

HSS Roughing End Mill
Extra-long version

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
28.0	25	90	166	6	AG762428	87.50	AG762428A	139.45	0.037 – 0.062
30.0	25	90	166	6	AG762430	97.23	AG762430A	149.18	0.039 – 0.063
32.0	32	106	186	6	AG762432	109.69	AG762432A	161.94	0.039 – 0.063
36.0	32	106	186	6	AG762436	163.57	AG762436A	287.57	0.041 – 0.065
40.0	32	125	217	6	AG762440	274.24	AG762440A	402.26	0.045 – 0.068
45.0	32	125	217	6	AG762445	308.08	AG762445A	449.68	0.049 – 0.073

d_1	d_2
js14	h6

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.5xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	75	60	70	135
V_c (m/min) Roughing	55	40	50	115

Product family 45

AG 740-4

Uncoated | Alcrona Pro | Z 4 | HB | 30° | HSS | Type NR | Manufacturer standard

HSS Roughing End Mill

Extra-long version

d_1	d_2
js14	h6

d_1	d_2	l_2	l_1		uncoated		coated		f_z Roughing
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
6.0	6	40	100	4	AG740406	34.72	AG740406A	58.86	0.010 – 0.027
8.0	8	65	115	4	AG740408	37.10	AG740408A	63.08	0.014 – 0.034
10.0	10	65	115	4	AG740410	39.63	AG740410A	67.16	0.017 – 0.041
12.0	12	75	132	4	AG740412	41.51	AG740412A	70.35	0.020 – 0.050
14.0	12	80	137	4	AG740414	47.06	AG740414A	80.02	0.022 – 0.057
16.0	16	100	160	4	AG740416	66.81	AG740416A	113.56	0.025 – 0.060
18.0	16	100	160	4	AG740418	76.29	AG740418A	129.68	0.027 – 0.067
20.0	20	100	166	4	AG740420	85.50	AG740420A	145.48	0.030 – 0.075
20.0	20	125	191	4	AG740520	108.20	AG740520A	184.06	0.030 – 0.075
22.0	20	110	176	4	AG740422	119.42	AG740422A	202.99	0.032 – 0.078
25.0	25	125	201	4	AG740425	129.80	AG740425A	220.87	0.039 – 0.084
25.0	25	140	216	4	AG740525	133.52	AG740525A	227.19	0.039 – 0.084
25.0	25	160	236	4	AG740625	137.51	AG740625A	231.34	0.039 – 0.084
28.0	25	140	216	4	AG740428	152.15	AG740428A	257.76	0.043 – 0.088
28.0	25	160	236	4	AG740528	168.55	AG740528A	284.23	0.043 – 0.088
30.0	25	140	216	4	AG740430	170.40	AG740430A	288.86	0.046 – 0.091
32.0	32	140	220	4	AG740432	187.77	AG740432A	319.59	0.049 – 0.094
32.0	32	160	240	4	AG740532	191.57	AG740532A	323.94	0.049 – 0.094
32.0	32	180	260	4	AG740632	207.06	AG740632A	352.08	0.049 – 0.094

Peripheral milling
a_e = 0.5xD
a_p = 2.0xD

Full slot milling
a_p = 1.0xD

Material	Steel	Stainless	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 850 N/mm²	< 800 N/mm²	< 600 N/mm²
V_c (m/min) Finishing	60	45	55	120
V_c (m/min) Roughing	40	30	35	90

AX 850B

Uncoated | Z 6–12 | HB | HSS-Co5 | Type N | DIN 850B

HSS-Co5 Keyseating Cutter

For Slot Milling Acc. To DIN 6888 Fit P9

d_1	d_2
h12	h6

l_2
e8

d_1	d_2	l_2	l_1		uncoated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
4.5	6	1	50	6	AX850B04510	44,74	0.06	0.03
7.5	6	1.5	50	6	AX850B07515	35,77	0.06	0.03
7.5	6	2	50	6	AX850B07520	35,77	0.06	0.03
10.5	6	2	50	6	AX850B10520	42,83	0.075	0.045
10.5	6	2.5	50	6	AX850B10525	42,83	0.075	0.045
10.5	6	3	50	6	AX850B10530	42,83	0.075	0.045
13.5	10	2	56	6	AX850B13520	44,91	0.075	0.045
13.5	10	3	56	6	AX850B13530	44,91	0.075	0.045
13.5	10	4	56	6	AX850B13540	44,91	0.075	0.045
16.5	10	3	56	6	AX850B16530	53,06	0.09	0.06
16.5	10	4	56	6	AX850B16540	53,06	0.09	0.06
16.5	10	5	56	6	AX850B16550	53,06	0.09	0.06
19.5	10	3	63	8	AX850B19530	65,16	0.09	0.06
19.5	10	4	63	8	AX850B19540	65,16	0.09	0.06
19.5	10	5	63	8	AX850B19550	65,16	0.09	0.06
19.5	10	6	63	8	AX850B19560	65,16	0.09	0.06
22.5	10	4	63	8	AX850B22540	73,79	0.11	0.08
22.5	10	5	63	8	AX850B22550	73,79	0.11	0.08
22.5	10	6	63	8	AX850B22560	73,79	0.11	0.08
22.5	10	8	63	8	AX850B22580	73,79	0.11	0.08
25.5	10	5	63	10	AX850B25550	82,53	0.11	0.08
25.5	10	6	63	10	AX850B25560	82,53	0.11	0.08
28.5	10	6	63	10	AX850B28560	83,64	0.11	0.08
28.5	10	8	63	10	AX850B28580	83,64	0.11	0.08
28.5	12	10	71	10	AX850B28510	83,64	0.11	0.08
32.5	12	6	71	10	AX850B32560	86,33	0.12	0.09
32.5	12	7	71	10	AX850B32570	86,33	0.12	0.09
32.5	12	8	71	10	AX850B32580	86,33	0.12	0.09
32.5	12	10	71	10	AX850B32510	86,33	0.12	0.09
38.5	12	8	71	10	AX850B38580	102,44	0.12	0.09
45.5	12	8	71	12	AX850B45580	122,54	0.12	0.09
45.5	12	10	71	12	AX850B45510	122,54	0.12	0.09

Material	Steel	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 800 N/mm²	< 450 N/mm²
V_c (m/min) Finishing	46	45	190
V_c (m/min) Roughing	26	25	170

Product family 45

AX 851B


Uncoated

Z 6–10

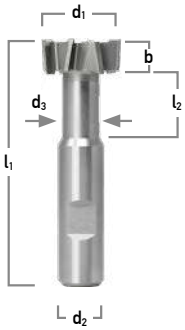

HB

HSS-Co5

Type N

DIN 851B

HSS-Co5 T-Slot Cutter



d_1	d_2
d11	h6

d_3	b
h12	d11

d_1	d_2	b	l_2	l_1	d_3		T-Slots	uncoated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	mm	mm	Z	DIN 650	Part No.	€/pc.	mm/Z	mm/Z
11.0	10	4	6.5	53.5	4	6	5	AX851B11040	66,15	0.09	0.06
12.5	10	6	7	57	5	6	6	AX851B12560	66,34	0.09	0.06
16.0	10	8	10	62	7	6	8	AX851B16080	69,32	0.09	0.06
18.0	12	8	13	70	8	6	10	AX851B18080	72,15	0.09	0.06
19.0	12	9	13	71	8	6	>8	AX851B19090	75,05	0.09	0.06
21.0	12	9	16	74	10	6	12	AX851B21090	77,63	0.11	0.08
22.0	12	10	17	75	10	6	>10	AX851B22100	81,11	0.11	0.08
25.0	16	11	17	82	12	8	14	AX851B25110	85,57	0.11	0.08
28.0	16	12	22	85	13	8	>13	AX851B28120	102,50	0.11	0.08
32.0	16	14	22	90	15	8	18	AX851B32140	108,44	0.12	0.09
36.0	25	16	22	103	17	8	>17	AX851B36160	146,21	0.12	0.09
40.0	25	18	27	108	19	10	22	AX851B40180	188,21	0.12	0.09
45.0	25	20	34	113	21	10	>21	AX851B45200	228,89	0.14	0.11
50.0	32	22	34	124	25	10	28	AX851B50220	271,49	0.14	0.11
60.0	32	28	43	139	30	10	36	AX851B60280	331,45	0.14	0.11

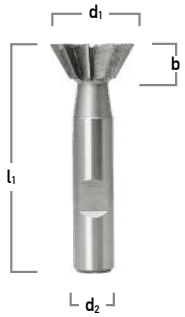
Material	Steel	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 800 N/mm²	< 450 N/mm²
V_c (m/min) Finishing	46	45	190
V_c (m/min) Roughing	26	25	170

AX 1833C

Uncoated | Z 10 – 12 | HB | HSS-Co5 | Type N | DIN 1833C

HSS-Co5 Dovetail Cutter

45° | 60°



Winkel	d_1	d_2	b	l_1		uncoated		f_z Roughing	f_z Finishing
	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
45°	16.0	12	4	60	10	AX1833C4516	44.47	0.09	0.06
45°	20.0	12	5	63	10	AX1833C4520	56.76	0.11	0.08
45°	25.0	12	6.3	67	10	AX1833C4525	70.79	0.11	0.08
45°	32.0	16	8	71	12	AX1833C4532	91.72	0.12	0.09
60°	16.0	12	6.3	60	10	AX1833C6016	44.47	0.09	0.06
60°	20.0	12	8	63	10	AX1833C6020	56.76	0.11	0.08
60°	25.0	12	10	67	10	AX1833C6025	70.79	0.11	0.08
60°	32.0	16	12.5	71	12	AX1833C6032	91.72	0.12	0.09

d_1	d_2
js16	h6

b
js14

AX 1833D

Uncoated | Z 10 – 12 | HB | HSS-Co5 | Type N | DIN 1833D

HSS-Co5 Dovetail Cutter

45° | 60°

Winkel	d_1	d_2	b	l_2	l_1		uncoated		f_z Roughing	f_z Finishing
	mm	mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
45°	16.0	12	4	–	60	10	AX1833D4516	44.47	0.09	0.06
45°	20.0	12	5	–	63	10	AX1833D4520	56.76	0.11	0.08
45°	25.0	12	6.3	14	67	10	AX1833D4525	70.79	0.11	0.08
45°	32.0	16	8	14	71	12	AX1833D4532	91.72	0.12	0.09
60°	16.0	12	6.3	–	60	10	AX1833D6016	44.47	0.09	0.06
60°	20.0	12	8	–	63	10	AX1833D6020	56.76	0.11	0.08
60°	25.0	12	10	10	67	10	AX1833D6025	70.79	0.11	0.08
60°	32.0	16	12.5	10	71	12	AX1833D6032	91.72	0.12	0.09

d_1	d_2
js16	h6

b
js14

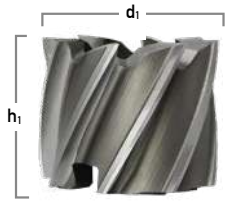
Material	Steel	Cast	Alu
Tensile strength / Hardness	< 850 N/mm²	< 800 N/mm²	< 450 N/mm²
V_c (m/min) Finishing	46	45	190
V_c (m/min) Roughing	26	25	170

Product family 45

AX 514

Uncoated | Alcrona Pro | Z 8–14 | 30° | HSS | Type N | DIN 1880

HSS Shell End Mill



d_1	h_1	d		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm		Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
40.0	32	16	8	AX514001	62.34	AX514001A	106.73	0.070	0.050
50.0	36	22	8	AX514002	75.05	AX514002A	133.52	0.075	0.055
63.0	40	27	10	AX514003	93.43	AX514003A	183.61	0.080	0.060
80.0	45	27	10	AX514004	128.86	AX514004A	303.70	0.095	0.075
100.0	50	32	10	AX514005	200.30	AX514005A	446.32	0.105	0.085
125.0	56	40	14	AX514006	246.47	AX514006A	507.19	0.120	0.100

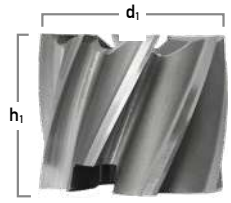
d_1	d
js16	H7

Peripheral milling
a_e = 0,75xD
a_p = 0,5xD

AX 814

Uncoated | Alcrona Pro | Z 8–12 | 30° | HSS-Co5 | Type N | DIN 1880

HSS-Co5 Shell End Mill



d_1	h_1	d		uncoated		coated		f_z Roughing	f_z Finishing
mm	mm		Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z	mm/Z
40.0	32	16	8	AX814001	83.50	AX814001A	118.51	0.070	0.050
50.0	36	22	8	AX814002	106.18	AX814002A	154.62	0.075	0.055
63.0	40	27	8	AX814003	144.51	AX814003A	208.90	0.080	0.060
80.0	45	27	10	AX814004	211.74	AX814004A	299.91	0.095	0.075
100.0	50	32	12	AX814005	334.78	AX814005A	446.25	0.105	0.085

d_1	d
js16	H7

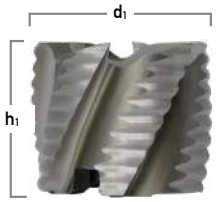
Peripheral milling
a_e = 0,75xD
a_p = 0,5xD

Material	Steel	Stainless	Cast
Tensile strength / Hardness	< 850 N/mm²	< 750 N/mm²	< 800 N/mm²
V_c (m/min) Finishing	40	25	30
V_c (m/min) Roughing	25	15	20

AX 518

Uncoated | Alcrona Pro | Z 6–12 | 30° | HSS | Type NR | DIN 1880

HSS Shell End Mill



d_1	h_1	d		uncoated		coated		f_z Roughing
mm	mm		Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
40.0	32	16	6	AX518001	87.80	AX518001A	129.93	0.070
50.0	36	22	6	AX518002	105.65	AX518002A	163.73	0.075
63.0	40	27	8	AX518003	129.93	AX518003A	221.01	0.080
80.0	45	27	8	AX518004	180.50	AX518004A	356.18	0.095
100.0	50	32	10	AX518005	276.68	AX518005A	537.39	0.105
125.0	56	40	12	AX518006	359.35	AX518006A	602.57	0.120

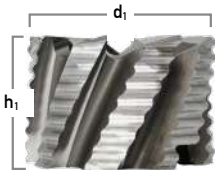
d_1	d
js16	H7

Peripheral milling
a_e = 0.75xD
a_p = 0.5xD

AX 818

Uncoated | Alcrona Pro | Z 6–10 | 30° | HSS-Co5 | Type NR | DIN 1880

HSS-Co5 Shell End Mill



d_1	h_1	d		uncoated		coated		f_z Roughing
mm	mm		Z	Part No.	€/pc.	Part No.	€/pc.	mm/Z
40.0	32	16	6	AX818001	123.22	AX818001A	158.24	0.070
50.0	36	22	6	AX818002	153.19	AX818002A	200.84	0.075
63.0	40	27	8	AX818003	198.01	AX818003A	262.73	0.080
80.0	45	27	8	AX818004	271.85	AX818004A	363.57	0.095
100.0	50	32	10	AX818005	427.42	AX818005A	537.71	0.105

d_1	d
js16	H7

Peripheral milling
a_e = 0.75xD
a_p = 0.5xD

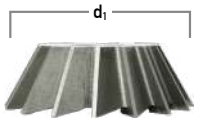
Material	Steel	Stainless	Cast
Tensile strength / Hardness	< 850 N/mm²	< 750 N/mm²	< 800 N/mm²
V_c (m/min) Finishing	40	25	30
V_c (m/min) Roughing	25	15	20

Product family 45

AX 842A

Uncoated | Z 14–28 | HSS | Type N | DIN 842A

HSS Angle Milling Cutter



d1	S
js16	js14

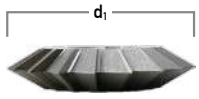
d
H7

Winkel	d1	S	d		uncoated		fz Roughing	fz Finishing
	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
45°	40.0	10	10	14	AX842A4540	116.52	0.027 – 0.027	0.025 – 0.028
45°	50.0	13	13	16	AX842A4550	121.26	0.032 – 0.032	0.030 – 0.033
45°	63.0	18	16	18	AX842A4563	129.35	0.037 – 0.037	0.035 – 0.039
45°	80.0	22	22	20	AX842A4580	174.40	0.042 – 0.042	0.040 – 0.044
45°	100.0	28	27	22	AX842A45100	285.58	0.047 – 0.047	0.045 – 0.050
45°	125.0	36	32	24	AX842A45125	499.93	0.057 – 0.057	0.055 – 0.060
45°	160.0	45	40	28	AX842A45160	848.36	0.072 – 0.072	0.070 – 0.075
60°	40.0	13	10	14	AX842A6040	116.52	0.027 – 0.030	0.025 – 0.028
60°	50.0	16	13	16	AX842A6050	121.26	0.032 – 0.035	0.030 – 0.033
60°	63.0	20	16	18	AX842A6063	129.35	0.037 – 0.041	0.035 – 0.039
60°	80.0	25	22	20	AX842A6080	174.40	0.042 – 0.046	0.040 – 0.044
60°	100.0	32	27	22	AX842A60100	285.58	0.047 – 0.052	0.045 – 0.050
60°	125.0	40	32	26	AX842A60125	499.93	0.057 – 0.062	0.055 – 0.060
60°	160.0	50	40	28	AX842A60160	848.36	0.072 – 0.077	0.070 – 0.075

AX 847

Uncoated | Z 16–28 | HSS | Type N | DIN 847

HSS Angle Milling Cutter



d1	S
js16	js16

d
H7

Winkel	d1	S	d		uncoated		fz Roughing	fz Finishing
	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
45°	50.0	8	16	22	AX8474550	90.69	0.032 – 0.035	0.030 – 0.033
45°	63.0	10	22	24	AX8474563	120.59	0.037 – 0.041	0.035 – 0.039
45°	80.0	12	27	26	AX8474580	167.14	0.042 – 0.046	0.040 – 0.044
45°	100.0	18	32	28	AX84745100	211.16	0.047 – 0.052	0.045 – 0.050
60°	50.0	10	16	18	AX8476050	97.07	0.032 – 0.035	0.030 – 0.033
60°	63.0	14	22	20	AX8476063	131.95	0.037 – 0.041	0.035 – 0.039
60°	80.0	18	27	22	AX8476080	185.55	0.042 – 0.046	0.040 – 0.044
60°	100.0	25	32	24	AX84760100	238.67	0.047 – 0.052	0.045 – 0.050
90°	50.0	14	16	16	AX8479050	108.74	0.032 – 0.035	0.030 – 0.033
90°	63.0	20	22	18	AX8479063	148.88	0.037 – 0.041	0.035 – 0.039
90°	80.0	22	27	20	AX8479080	207.06	0.042 – 0.046	0.040 – 0.044
90°	100.0	32	32	24	AX84790100	265.23	0.047 – 0.052	0.045 – 0.050

Material	Steel	Cast	Alu	Plastics
Tensile strength / Hardness	< 850 N/mm²	< 240 N/mm²	< 450 N/mm²	
V_c (m/min) Finishing	35	30	190	120
V_c (m/min) Roughing	30	20	170	100

AX 856

Uncoated | Z 10 – 14 | HSS-E | Type N | DIN 856

HSS Angle Milling Cutter

R	d_1
k11	js16

S	d
s10	H7

R	d_1	s	d		uncoated		f_z Roughing	f_z Finishing
mm	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
1.00	50	2	16	14	AX8565010	82.23	0.082 – 0.090	0.080 – 0.088
1.25	50	2.5	16	14	AX85650125	82.23	0.082 – 0.090	0.080 – 0.088
1.60	50	3.2	16	14	AX8565016	82.23	0.082 – 0.090	0.080 – 0.088
2.00	50	4	16	14	AX8565020	82.23	0.082 – 0.090	0.080 – 0.088
2.50	63	5	22	12	AX8566325	102.71	0.102 – 0.112	0.100 – 0.110
3.00	63	6	22	12	AX8566330	106.28	0.102 – 0.112	0.100 – 0.110
3.15	63	6.3	22	12	AX85663315	110.88	0.102 – 0.112	0.100 – 0.110
3.50	63	7	22	12	AX8566335	110.88	0.102 – 0.112	0.100 – 0.110
4.00	63	8	22	12	AX8566340	122.03	0.102 – 0.112	0.100 – 0.110
4.50	63	9	22	12	AX8566345	127.79	0.102 – 0.112	0.100 – 0.110
5.00	63	10	22	12	AX8566350	150.88	0.102 – 0.112	0.100 – 0.110
6.00	80	12	27	12	AX8568060	161.94	0.122 – 0.134	0.120 – 0.132
6.30	80	12.6	27	12	AX8568063	177.97	0.122 – 0.134	0.120 – 0.132
7.00	80	14	27	12	AX8568070	190.95	0.122 – 0.134	0.120 – 0.132
8.00	80	16	27	12	AX8568080	213.30	0.122 – 0.134	0.120 – 0.132
9.00	100	18	32	12	AX85610090	254.28	0.142 – 0.154	0.140 – 0.152
10.00	100	20	32	12	AX856100100	304.07	0.142 – 0.154	0.140 – 0.152
12.00	100	24	32	12	AX856100120	349.48	0.142 – 0.154	0.140 – 0.152
12.50	100	25	32	12	AX856100125	428.09	0.142 – 0.154	0.140 – 0.152
16.00	125	32	32	10	AX856125160	626.84	0.162 – 0.174	0.160 – 0.172
20.00	125	40	32	10	AX856125200	795.02	0.162 – 0.174	0.160 – 0.172

Material	Steel	Cast	Alu	Plastics
Tensile strength / Hardness	< 850 N/mm²	< 240 N/mm²	< 450 N/mm²	
V_c (m/min) Finishing	50	40	190	120
V_c (m/min) Roughing	30	20	170	100

Product family 45

AX 1834A

Uncoated | Z 24–52 | HSS-Co5 | Type N | DIN 1834A

HSS-Co5 Side Milling Cutter

d_1	s
js16	k11

d
H7

d_1	s	d		uncoated		f_z Roughing	f_z Finishing
mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
50.0	1.6	16	24	AX1834A5016	91.66	0.052 – 0.057	0.050 – 0.055
50.0	2.0	16	24	AX1834A5020	89.12	0.052 – 0.057	0.050 – 0.055
50.0	2.5	16	24	AX1834A5025	90.69	0.052 – 0.057	0.050 – 0.055
50.0	3.0	16	24	AX1834A5030	92.18	0.052 – 0.057	0.050 – 0.055
63.0	1.6	22	28	AX1834A6316	95.88	0.062 – 0.062	0.062 – 0.062
63.0	2.0	22	28	AX1834A6320	84.83	0.062 – 0.062	0.062 – 0.062
63.0	2.5	22	28	AX1834A6325	86.61	0.062 – 0.062	0.062 – 0.062
63.0	3.0	22	28	AX1834A6330	89.07	0.062 – 0.062	0.062 – 0.062
63.0	4.0	22	28	AX1834A6340	97.07	0.062 – 0.062	0.062 – 0.062
63.0	5.0	22	28	AX1834A6350	102.35	0.062 – 0.062	0.062 – 0.062
63.0	6.0	22	28	AX1834A6360	112.37	0.062 – 0.062	0.062 – 0.062
80.0	1.6	27	32	AX1834A8016	102.50	0.072 – 0.079	0.070 – 0.077
80.0	2.0	27	32	AX1834A8020	99.54	0.072 – 0.079	0.070 – 0.077
80.0	2.5	27	32	AX1834A8025	101.22	0.072 – 0.079	0.070 – 0.077
80.0	3.0	27	32	AX1834A8030	104.04	0.072 – 0.079	0.070 – 0.077
80.0	4.0	27	32	AX1834A8040	111.46	0.072 – 0.079	0.070 – 0.077
80.0	5.0	27	32	AX1834A8050	124.83	0.072 – 0.079	0.070 – 0.077
80.0	6.0	27	32	AX1834A8060	132.49	0.072 – 0.079	0.070 – 0.077
100.0	1.6	32	36	AX1834A10016	122.62	0.082 – 0.090	0.080 – 0.088
100.0	2.0	32	36	AX1834A10020	121.95	0.082 – 0.090	0.080 – 0.088
100.0	2.5	32	36	AX1834A10025	121.86	0.082 – 0.090	0.080 – 0.088
100.0	3.0	32	36	AX1834A10030	124.02	0.082 – 0.090	0.080 – 0.088
100.0	4.0	32	36	AX1834A10040	133.83	0.082 – 0.090	0.080 – 0.088
100.0	5.0	32	36	AX1834A10050	141.82	0.082 – 0.090	0.080 – 0.088
100.0	6.0	32	36	AX1834A10060	159.34	0.082 – 0.090	0.080 – 0.088
100.0	8.0	32	28	AX1834A10080	176.04	0.082 – 0.090	0.080 – 0.088
125.0	1.6	32	40	AX1834A12516	155.03	0.092 – 0.101	0.090 – 0.099
125.0	2.0	32	40	AX1834A12520	149.18	0.092 – 0.101	0.090 – 0.099
125.0	2.5	32	40	AX1834A12525	152.80	0.092 – 0.101	0.090 – 0.099
125.0	3.0	32	40	AX1834A12530	156.59	0.092 – 0.101	0.090 – 0.099
125.0	4.0	32	40	AX1834A12540	167.65	0.092 – 0.101	0.090 – 0.099
125.0	5.0	32	40	AX1834A12550	179.51	0.092 – 0.101	0.090 – 0.099
125.0	6.0	32	40	AX1834A12560	192.89	0.092 – 0.101	0.090 – 0.099
125.0	8.0	32	32	AX1834A12580	225.54	0.092 – 0.101	0.090 – 0.099
125.0	10.0	32	32	AX1834A125100	249.95	0.092 – 0.101	0.090 – 0.099
160.0	2.0	40	48	AX1834A16020	240.32	0.092 – 0.101	0.090 – 0.099
160.0	2.5	40	48	AX1834A16025	231.34	0.092 – 0.101	0.090 – 0.099
160.0	3.0	40	48	AX1834A16030	235.79	0.092 – 0.101	0.090 – 0.099
160.0	4.0	40	48	AX1834A16040	249.11	0.092 – 0.101	0.090 – 0.099
160.0	5.0	40	48	AX1834A16050	263.85	0.092 – 0.101	0.090 – 0.099
160.0	6.0	40	48	AX1834A16060	288.71	0.092 – 0.101	0.090 – 0.099
160.0	8.0	40	36	AX1834A16080	329.44	0.092 – 0.101	0.090 – 0.099
160.0	10.0	40	36	AX1834A160100	360.17	0.092 – 0.101	0.090 – 0.099
160.0	12.0	40	36	AX1834A160120	380.35	0.092 – 0.101	0.090 – 0.099
200.0	2.0	40	52	AX1834A20020	445.74	0.092 – 0.101	0.090 – 0.099
200.0	2.5	40	52	AX1834A20025	429.63	0.092 – 0.101	0.090 – 0.099
200.0	3.0	40	52	AX1834A20030	438.56	0.092 – 0.101	0.090 – 0.099
200.0	4.0	40	52	AX1834A20040	460.23	0.092 – 0.101	0.090 – 0.099
200.0	5.0	40	52	AX1834A20050	482.34	0.092 – 0.101	0.090 – 0.099
200.0	6.0	40	52	AX1834A20060	519.82	0.092 – 0.101	0.090 – 0.099
200.0	8.0	40	40	AX1834A20080	591.66	0.092 – 0.101	0.090 – 0.099
200.0	10.0	40	40	AX1834A200100	599.31	0.092 – 0.101	0.090 – 0.099
200.0	12.0	40	40	AX1834A200120	654.37	0.092 – 0.101	0.090 – 0.099

Material	Steel	Cast	Alu	Plastics
Tensile strength / Hardness	< 850 N/mm²	< 240 N/mm²	< 450 N/mm²	
V_c (m/min) Finishing	40	40	190	120
V_c (m/min) Roughing	30	25	170	100

AX 885A

Uncoated | Z 12 – 24 | HSS-Co5 | Type N | DIN 885A

HSS-Co5 Side Milling Cutter

d_1	s
js16	k11

d
H7

d_1	s	d		uncoated		f_z Roughing			f_z Finishing		
mm	mm	mm	Z	Part No.	€/pc.	mm/Z			mm/Z		
50.0	4	16	12	AX885A5040	75.24	0.052	–	0.057	0.050	–	0.055
50.0	5	16	12	AX885A5050	76.46	0.052	–	0.057	0.050	–	0.055
50.0	6	16	12	AX885A5060	77.77	0.052	–	0.057	0.050	–	0.055
50.0	8	16	12	AX885A5080	86.46	0.052	–	0.057	0.050	–	0.055
50.0	10	16	12	AX885A50100	92.91	0.052	–	0.057	0.050	–	0.055
63.0	4	22	12	AX885A6340	96.33	0.062	–	0.062	0.062	–	0.062
63.0	5	22	12	AX885A6350	100.13	0.062	–	0.062	0.062	–	0.062
63.0	6	22	12	AX885A6360	101.22	0.062	–	0.062	0.062	–	0.062
63.0	8	22	12	AX885A6380	106.64	0.062	–	0.062	0.062	–	0.062
63.0	10	22	12	AX885A63100	119.18	0.062	–	0.062	0.062	–	0.062
63.0	12	22	12	AX885A63120	127.20	0.062	–	0.062	0.062	–	0.062
63.0	14	22	12	AX885A63140	135.75	0.062	–	0.062	0.062	–	0.062
63.0	16	22	12	AX885A63160	143.08	0.062	–	0.062	0.062	–	0.062
63.0	18	22	12	AX885A63180	150.29	0.062	–	0.062	0.062	–	0.062
80.0	4	27	14	AX885A8040	119.18	0.072	–	0.079	0.070	–	0.077
80.0	5	27	14	AX885A8050	123.72	0.072	–	0.079	0.070	–	0.077
80.0	6	27	14	AX885A8060	126.69	0.072	–	0.079	0.070	–	0.077
80.0	8	27	14	AX885A8080	134.18	0.072	–	0.079	0.070	–	0.077
80.0	10	27	14	AX885A80100	137.51	0.072	–	0.079	0.070	–	0.077
80.0	12	27	14	AX885A80120	138.34	0.072	–	0.079	0.070	–	0.077
80.0	14	27	14	AX885A80140	162.07	0.072	–	0.079	0.070	–	0.077
80.0	16	27	14	AX885A80160	172.05	0.072	–	0.079	0.070	–	0.077
80.0	18	27	14	AX885A80180	199.63	0.072	–	0.079	0.070	–	0.077
80.0	20	27	14	AX885A80200	213.59	0.072	–	0.079	0.070	–	0.077
100.0	4	32	14	AX885A1004	156.59	0.082	–	0.090	0.080	–	0.088
100.0	5	32	14	AX885A1005	158.75	0.082	–	0.090	0.080	–	0.088
100.0	6	32	14	AX885A1006	159.42	0.082	–	0.090	0.080	–	0.088
100.0	8	32	14	AX885A1008	181.02	0.082	–	0.090	0.080	–	0.088
100.0	10	32	14	AX885A10010	191.39	0.082	–	0.090	0.080	–	0.088
100.0	12	32	14	AX885A10012	206.41	0.082	–	0.090	0.080	–	0.088
100.0	14	32	14	AX885A10014	229.19	0.082	–	0.090	0.080	–	0.088
100.0	16	32	14	AX885A10016	242.77	0.082	–	0.090	0.080	–	0.088
100.0	18	32	14	AX885A10018	254.84	0.082	–	0.090	0.080	–	0.088
100.0	20	32	14	AX885A10020	272.3	0.082	–	0.090	0.080	–	0.088
100.0	25	32	14	AX885A10025	322.64	0.082	–	0.090	0.080	–	0.088
125.0	6	32	16	AX885A12560	225.03	0.092	–	0.101	0.090	–	0.099
125.0	8	32	16	AX885A12580	236.91	0.092	–	0.101	0.090	–	0.099
125.0	10	32	16	AX885A12510	254.03	0.092	–	0.101	0.090	–	0.099
125.0	12	32	16	AX885A12512	275.95	0.092	–	0.101	0.090	–	0.099
125.0	14	32	16	AX885A12514	305.63	0.092	–	0.101	0.090	–	0.099
125.0	16	32	16	AX885A12516	320.93	0.092	–	0.101	0.090	–	0.099
125.0	18	32	16	AX885A12518	335.76	0.092	–	0.101	0.090	–	0.099
125.0	20	32	16	AX885A12520	353.78	0.092	–	0.101	0.090	–	0.099
125.0	25	32	16	AX885A12525	408.31	0.092	–	0.101	0.090	–	0.099
125.0	28	32	16	AX885A12528	432.85	0.092	–	0.101	0.090	–	0.099
160.0	6	40	18	AX885A1606	308.89	0.092	–	0.101	0.090	–	0.099
160.0	8	40	18	AX885A1608	335.39	0.092	–	0.101	0.090	–	0.099
160.0	10	40	18	AX885A16010	357.13	0.092	–	0.101	0.090	–	0.099
160.0	12	40	18	AX885A16012	373.82	0.092	–	0.101	0.090	–	0.099
160.0	14	40	18	AX885A16014	421.32	0.092	–	0.101	0.090	–	0.099
160.0	16	40	18	AX885A16016	458.36	0.092	–	0.101	0.090	–	0.099
160.0	18	40	18	AX885A16018	474.7	0.092	–	0.101	0.090	–	0.099
160.0	20	40	18	AX885A16020	516.86	0.092	–	0.101	0.090	–	0.099
160.0	25	40	18	AX885A16025	610.95	0.092	–	0.101	0.090	–	0.099
160.0	32	40	18	AX885A16032	834.33	0.092	–	0.101	0.090	–	0.099
200.0	8	40	24	AX885A2008	510.83	0.092	–	0.101	0.090	–	0.099
200.0	10	40	24	AX885A20010	546.82	0.092	–	0.101	0.090	–	0.099
200.0	12	40	24	AX885A20012	602.71	0.092	–	0.101	0.090	–	0.099
200.0	14	40	24	AX885A20014	683.03	0.092	–	0.101	0.090	–	0.099
200.0	16	40	24	AX885A20016	693.52	0.092	–	0.101	0.090	–	0.099
200.0	18	40	24	AX885A20018	752.26	0.092	–	0.101	0.090	–	0.099
200.0	20	40	24	AX885A20020	774.56	0.092	–	0.101	0.090	–	0.099
200.0	25	40	24	AX885A20025	916.19	0.092	–	0.101	0.090	–	0.099
200.0	32	40	24	AX885A20032	1199.48	0.092	–	0.101	0.090	–	0.099

Material	Steel	Cast	Alu	Plastics
Tensile strength / Hardness	< 850 N/mm²	< 240 N/mm²	< 450 N/mm²	
V_c (m/min) Finishing	40	40	190	120
V_c (m/min) Roughing	30	25	170	100

Product family 45

335

HSS Countersink

d_1	d min	d_2	l_1		uncoated		coated		Feed
mm	mm	mm	mm	Z	Part No.	€/pc.	Part No.	€/pc.	mm/rev
6.3	1.5	5	45	3	335063	7.71	335063A	17.17	0.040 – 0.120
8.3	2.0	6	50	3	335083	8.57	335083A	18.02	0.050 – 0.140
10.4	2.5	6	50	3	335104	10.31	335104A	19.75	0.050 – 0.140
12.4	2.8	8	56	3	335124	11.01	335124A	21.86	0.060 – 0.180
15.0	3.2	10	60	3	335150	12.83	335150A	23.83	0.060 – 0.180
16.5	3.2	10	60	3	335165	14.09	335165A	25.33	0.080 – 0.200
20.5	3.5	10	63	3	335205	19.02	335205A	34.37	0.090 – 0.240
25.0	3.8	10	67	3	335250	26.27	335250A	43.67	0.120 – 0.300
31.0	4.2	12	71	3	335310	40.68	335310A	65.00	0.120 – 0.300

Material	Steel	Stainless	Cast	Alu	Plastics
Tensile strength / Hardness	< 1000 N/mm²	< 750 N/mm²	< 830 N/mm²	< 600 N/mm²	
V_c (m/min)	23	7	14	50	50

AX 6518B

Z 4–6

HSS-Co8

Type N

DIN 6518

HSS-Co8 Corner Rounding Cutter

Radially And Axially Backed-Off

d_2	R
h6	H11

Radius	d_1	d_2	l_1		uncoated		f_z Roughing	f_z Finishing
	mm	mm	mm	Z	Part No.	€/pc.	mm/Z	mm/Z
1.0	8	10	60	4	AX6518B1010	57.21	0.002 – 0.004	0.002 – 0.003
1.5	9	10	60	4	AX6518B1510	62.50	0.003 – 0.006	0.002 – 0.005
1.6	10	10	60	4	AX6518B1610	62.50	0.003 – 0.006	0.002 – 0.005
2.0	10	10	60	4	AX6518B2010	62.50	0.003 – 0.006	0.002 – 0.005
2.5	11	10	60	4	AX6518B2510	62.50	0.003 – 0.006	0.002 – 0.005
3.0	12	12	60	4	AX6518B3012	65.02	0.003 – 0.006	0.002 – 0.005
3.5	13	12	60	4	AX6518B3512	70.28	0.004 – 0.007	0.003 – 0.006
4.0	14	12	60	4	AX6518B4012	70.28	0.004 – 0.007	0.003 – 0.006
4.5	15	12	60	4	AX6518B4512	75.41	0.004 – 0.007	0.003 – 0.006
5.0	16	12	60	4	AX6518B5012	75.41	0.004 – 0.007	0.003 – 0.006
5.5	19	16	67	4	AX6518B5516	79.35	0.006 – 0.009	0.006 – 0.006
6.0	20	16	67	4	AX6518B6016	79.35	0.006 – 0.009	0.006 – 0.006
6.5	21	16	71	4	AX6518B6516	97.46	0.009 – 0.012	0.008 – 0.011
7.0	22	16	71	4	AX6518B7016	97.46	0.009 – 0.012	0.008 – 0.011
7.5	23	16	71	4	AX6518B7516	97.46	0.009 – 0.012	0.008 – 0.011
8.0	24	16	71	4	AX6518B8016	97.46	0.009 – 0.012	0.008 – 0.011
8.5	25	25	85	4	AX6518B8525	117.34	0.014 – 0.017	0.013 – 0.016
9.0	26	25	85	4	AX6518B9025	117.34	0.014 – 0.017	0.013 – 0.016
9.5	27	25	85	4	AX6518B9525	117.34	0.014 – 0.017	0.013 – 0.016
10.0	28	25	85	4	AX6518B10025	117.34	0.014 – 0.017	0.013 – 0.016
10.5	31	25	90	4	AX6518B10525	129.68	0.021 – 0.024	0.020 – 0.023
11.0	32	25	90	4	AX6518B11025	129.68	0.021 – 0.024	0.020 – 0.023
12.0	34	25	90	4	AX6518B12025	129.68	0.021 – 0.024	0.020 – 0.023
12.5	41	25	100	6	AX6518B12525	181.53	0.021 – 0.024	0.020 – 0.023
13.0	42	25	100	6	AX6518B13025	181.53	0.021 – 0.024	0.020 – 0.023
14.0	44	25	100	6	AX6518B14025	181.53	0.021 – 0.024	0.020 – 0.023
15.0	46	25	100	6	AX6518B15025	207.58	0.025 – 0.028	0.024 – 0.027
16.0	48	25	100	6	AX6518B16025	207.58	0.025 – 0.028	0.024 – 0.027
18.0	52	32	112	6	AX6518B18032	234.23	0.030 – 0.034	0.029 – 0.033
20.0	56	32	112	6	AX6518B20032	260.06	0.033 – 0.037	0.032 – 0.036

Material	Steel	Stainless	Cast	Alu	Plastics
Tensile strength / Hardness	< 1000 N/mm²	< 850 N/mm²	< 240 N/mm²	< 450 N/mm²	
V_c (m/min) Finishing	35	25	35	100	135
V_c (m/min) Roughing	20	15	20	85	125

Product family 45

ToolFactory
Cutting Tool Solutions

Rotary Line
Carbide Burs

Rotary Line

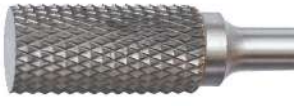
Performance
Tool Life
Selection

Which cut for which material?

Verzahnung		Steel <800 N/mm²	Steel >800 N/mm²	Stainless Steel	Cast iron	Cast iron (GGG, GT)	Plastics	Aluminium	Non-ferrous metals	Super alloys	Titanium	Steel <HRC65
Z 1 Normal		■	■	■	■	■		▨	▨			
Z 3 Double		■	■	■	■	■		▨	▨	▨	▨	▨
Z 41 Fine		■	■	■	■	■		▨	▨	▨	▨	■
Z 5 Diamond		▨	▨		▨	▨						■
Z Alu							■	■	■			
Auf Anfrage		■	■	■	■	■	■	■	■	■	■	■
Z3 Alu pro							■	■	■			
Z3 INOX pro				■						■	■	
Z3 Steel pro		■	■									
Z3 Cast pro					■	■						
Z3 Robust		■	■	■	■	■				■	■	■

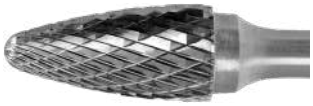
■ Best suitable ▨ Partly suitable □ Not suitable

The right cut for any application

Verzahnung	Anwendung	Vorteil
	**Z 1 Normal** General machining, deburring, chamfering, clean surfaces	• High cutting performance when machining steel and cast steel • For smooth even surfaces
	**Z 3 Double** General machining, deburring, chamfering, clean surfaces, plastering	• High cutting performance when machining steel and cast steel • For smooth even surfaces. • Best handling and control • Smooth milling performance due to optimised cut
	**Z 41 Fine** General works, deburring, chamfering, better surfaces	• High cutting performance when machining steel and cast steel • Better surface finish than Z 1
	**Z 5 Diamond** Deburring and fitting ans correctional work on hard steels	• Good tool life • Smooth milling performance
	**Z Alu** General machining, deburring, chamfering, clean surfaces	• Optimized geometry for aluminium • High cutting performance • Smooth milling performance

Our special cuts at a glance

For our special cuts, we strongly focused on the material-specific geometry. As a result, the burrs deliver an outstanding cutting performance and best surface finishes for the specific material.

Verzahnung	Scope of applications	Benefits
	**Z 3 Alu pro** General machining, deburring, chamfering, clean surfaces	• Optimised geometry for aluminium, with polished cutting edges for best possible surfaces • High cutting performance when machining aluminium • Best handling and control • Smooth milling performance due to a cut optimized for the material
	**Z 3 INOX pro** General machining, deburring, chamfering, clean surfaces	• Optimized geometry for stainless steel or high-temperature materials • High cutting performance • For best surfaces • Best handling and control • Smooth milling performance due to a cut optimized for the material
	**Z 3 Steel pro** General machining, deburring, chamfering, clean surfaces	• Optimized geometry for steel • High cutting performance • For best surfaces • Best handling and control • Smooth milling performance due to a cut optimized for the material
	**Z 3 Cast pro** General machining, deburring, chamfering, better surfaces	• Optimized geometry for cast iron • High cutting performance • For best surfaces • Best handling and control • Smooth milling performance due to a cut optimized for the material
	**Z 3 Robust** General machining, deburring, chamfering, clean surfaces, plastering	• Optimized geometry for severe conditions • Very high cutting performance for steel, cast steel, cast iron and high-temperature alloys • For best surfaces • Best handling and control • Smooth milling performance due to a cut optimized for the material

Recommendations for the best possible operation

Directions for use

- To avoid vibrations, the tools should be used on drives that are as powerful as possible and have an elastically mounted spindle
- For economical use, always work in the upper range of our recommended speed.
- Speeds that are too high or too low may reduce performance and lead to broken teeth or severe wear
- Use the burs with the shortest possible overhang
- Ensure constant movement with only light pressure
- To achieve smooth surfaces, we recommend milling the last passes in synchronous operation.

Performance recommendation for tool drives*:

Ø range (mm)			Watt			Speed (U/min)		
1.0	–	4.0	60	–	190	35.000	–	100.000
5.0	–	8.0	200	–	290	15.000	–	60.000
9.0	–	14.0	300	–	490	6.000	–	35.000
15.0	–	18.0	500	–	990	4.000	–	25.000
19.0	–	25.0	1.000	–	2.000	3.000	–	20.000

* These values are only a recommendation on how to maximise the efficiency of the burs.

Recommended tool drives

- Flexible shaft drives
- Straight grinder
- Robot
- Machine tools

Recommended speed

For selecting the optimal speed, we have included it on the relevant page:

1. Select the material you want to process
2. Then select the required bur diameter

Safety instructions

- Use a maximum of 1/3 of the end mill diameter to ensure smooth milling behaviour
- In no case should the shaft or the flute turn blue or glow.
- Disconnect the mains plug before changing the bur to prevent unintentional rotation
- Please make sure that nothing (such as clothing, hair) can get caught in the tool drive or bur
- Please always wear safety clothing (eye protection, ear protection and gloves) during operation

Recommendations for the best possible use of long shanks

Speed for long shank burs (rpm)		Head Ø					
Maximale speed at:	Shank length	3	6	8	10	12	16
Idling	75 mm	max. 10,000					
	200 mm		max. 8,000	max. 5,000	max. 3,000	max. 2,500	max. 2,000
Workpiece contact	75 mm	max. 35,000					
	200 mm		max. 16,000	max. 10,000	max. 8,000	max. 6,000	max. 5,000

Directions for use

CAUTION: Other cutting parameters and procedures apply to long burs! The greater the run-out error and the longer the overhang, the lower the selected speed must be.

Recommended cutting parameters for long shank burs:

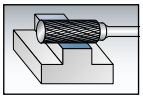
The state of your milling machine also has a major impact here. Generally, only work with machines that are operating properly. Make sure you are always in control of your milling machine.

Working directions for burs with long shank:

1. *Start at idling speed (see above) when bringing the tool in contact with the workpiece (reason: At high speeds and with long overhangs, even a slight out-of-balance can cause the bur to kink!)*
2. *Only accelerate to full working speed (see table) when being in contact with the workpiece (reason: Due to the contact and the pressure in a certain direction, the bur is stabilised and cannot swing up.)*
3. *Before lifting off the workpiece, first reduce the speed back to idling speed*
4. *When feeding into bores, for example, place the tool in position without rotation speed, then follow the same procedure as for step 1-3 (reason: There is a risk that the bur will jam or accidentally hit the workpiece, which could cause it to kick back.)*

Our extra-long versions are marked with this icon: L

ZYA



Cylinder Shape, w/o End Cut, Type ZYA

Shank Ø 3 mm

d_1	d_2	l_2	l_1	Part No.				Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
mm	mm	mm	mm						
1.5	3	6	38	H5011	H5013	H50141	9.10	H5015	11.02
2.5	3	11	38	H5021	H5023	H50241	9.10	H5025	11.02
3.0	3	14	38	H5031	H5033	H50341	9.10	H5035	11.02
L 3.0	3	14	75	H503L1	H503L3	–	15.22	–	–
4.0	3	12	38	H5041	H5043	H50441	19.20	H5045	19.20
5.0	3	12	38	H5051	H5053	H50541	19.20	–	–
6.0	3	13	53	H5061	H5063	H50641	13.07	H5065	15.70
6.0	3	7	47	H5071	H5073	–	13.07	–	–

Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
mm	mm	mm	mm								
4.0	6	16	50	H60001	H60003	H600041	13.62	H60005	16.29	–	–
6.0	6	16	50	H60011	H60013	H600141	13.62	H60015	16.29	H6001Alu	21.94
8.0	6	18	63	H60031	H60033	H600341	17.84	H60035	21.27	H6003Alu	22.20
10.0	6	20	65	H60051	H60053	H600541	19.20	H60055	23.03	H6005Alu	23.93
11.0	6	25	70	H60061	H60063	H600641	22.81	H60065	27.46	H6006Alu	28.48
12.0	6	25	70	H60071	H60073	H600741	29.94	H60075	35.97	H6007Alu	37.36
16.0	6	25	70	H60081	H60083	H600841	37.73	H60085	45.16	H6008Alu	47.05
19.0	6	25	70	H60091	H60093	H600941	56.01	H60095	67.18	H6009Alu	69.93
25.0	6	25	70	H60101	H60103	H601041	78.28	H60105	93.91	H6010Alu	97.79

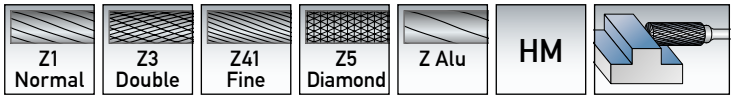
Shank Ø 8 mm

d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
mm	mm	mm	mm								
12.0	8	25	70	H60071S8	H60073S8	H600741S8	29.94	H60075S8	35.97	H6007AluS8	37.36
16.0	8	25	70	H60081S8	H60083S8	H600841S8	37.73	H60085S8	45.16	H6008AluS8	47.05
19.0	8	25	70	H60091S8	H60093S8	H600941S8	56.01	H60095S8	67.18	H6009AluS8	69.93
25.0	8	25	70	H60101S8	H60103S8	H601041S8	78.28	H60105S8	93.91	H6010AluS8	97.79

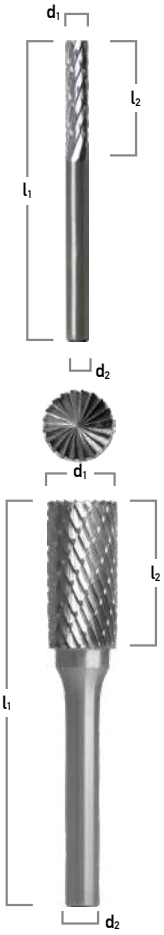
Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75,000 – 100,000	70,000 – 95,000	53,000 – 85,000	40,000 – 80,000	30,000 – 65,000	25,000 – 55,000	20,000 – 40,000	16,000 – 32,000	13,000 – 27,000	12,000 – 25,000	11,000 – 23,000	10,000 – 20,000	8,000 – 17,000	6,000 – 13,000
Stainless Steel	70,000 – 100,000	65,000 – 90,000	40,000 – 60,000	30,000 – 45,000	25,000 – 35,000	20,000 – 30,000	15,000 – 25,000	13,000 – 18,000	12,000 – 15,000	11,000 – 14,000	10,000 – 13,000	8,000 – 12,000	7,000 – 10,000	5,000 – 7,000
Cast iron and Cast steel	80,000 – 100,000	55,000 – 95,000	40,000 – 90,000	30,000 – 70,000	25,000 – 60,000	20,000 – 50,000	15,000 – 35,000	11,000 – 29,000	9,000 – 24,000	9,000 – 22,000	8,000 – 20,000	7,000 – 18,000	6,000 – 15,000	5,000 – 11,000
Plastics, Aluminium and non-ferrous metals	80,000 – 100,000	75,000 – 95,000	70,000 – 90,000	50,000 – 85,000	40,000 – 75,000	35,000 – 65,000	25,000 – 50,000	21,000 – 38,000	17,000 – 32,000	16,000 – 29,000	15,000 – 27,000	13,000 – 24,000	11,000 – 20,000	8,000 – 15,000
Super alloys und Titanium	75,000 – 100,000	35,000 – 70,000	25,000 – 45,000	20,000 – 35,000	15,000 – 30,000	12,000 – 23,000	9,000 – 17,000	7,000 – 14,000	6,000 – 12,000	6,000 – 11,000	5,000 – 10,000	5,000 – 9,000	4,000 – 7,000	3,000 – 6,000
Hardened steel	75,000 – 100,000	35,000 – 85,000	25,000 – 60,000	20,000 – 45,000	15,000 – 35,000	12,000 – 29,000	9,000 – 22,000	7,000 – 18,000	6,000 – 15,000	6,000 – 13,000	5,000 – 12,000	5,000 – 11,000	4,000 – 9,000	3,000 – 7,000

ZYA-S



Cylinder Shape, w/ End Cut, Type ZYA-S



Shank Ø 3 mm

d_1	d_2	l_2	l_1	Part No.				Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
mm	mm	mm	mm						
1.5	3	5	38	H50111	H50113	–	14.02	–	–
2.5	3	11	38	H50211	H50213	–	14.02	–	–
3.0	3	14	38	H50311	H50313	H503141	10.04	H50315	12.10
4.0	3	12	38	H50411	H50413	–	26.88	–	–
5.0	3	12	38	H50511	H50513	–	26.88	–	–
6.0	3	13	53	H50611	H50613	H506141	16.97	H50615	20.36
6.0	3	7	47	H50711	H50713	–	16.97	–	–

Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
mm	mm	mm	mm								
4.0	6	16	50	H6001	H6003	H60041	14.78	H6005	17.75	–	–
6.0	6	16	50	H6011	H6013	H60141	14.78	H6015	17.75	H601Alu	23.81
8.0	6	18	63	H6031	H6033	H60341	19.67	H6035	23.49	H603Alu	28.40
10.0	6	20	65	H6051	H6053	H60541	21.04	H6055	25.25	H605Alu	24.26
11.0	6	25	70	H6061	H6063	H60641	25.02	H6065	30.14	–	–
12.0	6	25	70	H6071	H6073	H60741	32.89	H6075	39.42	H607Alu	37.25
16.0	6	25	70	H6081	H6083	H60841	41.26	H6085	49.59	H608Alu	46.92
19.0	6	25	70	H6091	H6093	H60941	61.68	H6095	73.92	–	–
25.0	6	25	70	H6101	H6103	H61041	86.18	H6105	103.39	–	–

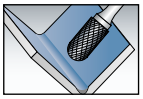
Shank Ø 8 mm

d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
mm	mm	mm	mm								
12.0	8	25	70	H6071S8	H6073S8	H60741S8	32.89	H6075S8	39.42	H607AluS8	37.25
16.0	8	25	70	H6081S8	H6083S8	H60841S8	41.26	H6085S8	49.59	H608AluS8	46.92
19.0	8	25	70	H6091S8	H6093S8	H60941S8	61.68	H6095S8	73.92	–	–

Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

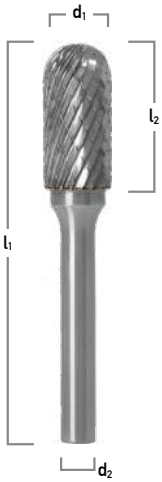
WRC



Ball-Nosed Cylinder Shape, Type WRC

Shank Ø 3 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
	2.5	3	11	38	H5111	H5113	H51141	9.10	H5115	11.02
	3.0	3	14	38	H5121	H5123	H51241	9.10	H5125	11.02
L	3.0	3	14	75	H512L1	H512L3	–	15.22	–	–
	4.0	3	12	38	H5131	H5133	H51341	19.20	H5135	22.41
	5.0	3	12	38	H5141	H5143	–	19.20	–	–
	6.0	3	13	53	H5151	H5153	H51541	13.93	H5155	16.59



Shank Ø 6 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
	4.0	6	16	50	H61101	H61103	H611041	15.85	H61105	18.98	–	–
	6.0	6	16	50	H6111	H6113	H61141	15.85	H6115	18.98	H611Alu	33.84
L	6.0	6	16	200	H611L1	H611L3	–	27.31	–	–	–	–
	8.0	6	18	63	H6131	H6133	H61341	20.49	H6135	24.56	–	–
L	8.0	6	18	200	H613L1	H613L3	–	33.14	–	–	–	–
	10.0	6	20	65	H6151	H6153	H61541	22.20	H6155	26.70	H615Alu	27.85
	11.0	6	25	70	H61501	H61503	H615041	25.09	H61505	30.14	–	–
	10.0	6	38	83	H6161	H6163	H61641	27.63	H6165	33.14	–	–
L	10.0	6	20	200	H615L1	H615L3	–	33.61	–	–	–	–
	12.0	6	25	70	H6171	H6173	H61741	33.61	H6175	40.18	H617Alu	41.93
L	12.0	6	25	200	H617L1	H617L3	–	51.57	–	–	–	–
	16.0	6	25	70	H6181	H6183	H61841	43.85	H6185	52.57	H618Alu	54.72
L	16.0	6	25	200	H618L1	H618L3	–	69.80	–	–	–	–
	19.0	6	25	70	H6191	H6193	H61941	62.75	H6195	75.31	H619Alu	78.36
	25.0	6	25	70	H61901	H61903	H619041	91.67	H61905	110.04	–	–

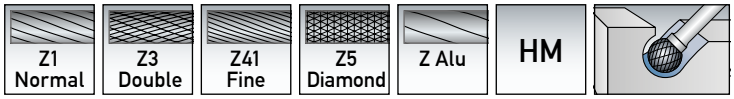
Shank Ø 8 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
L	10.0	8	20	200	H615L1S8	H615L3S8	–	33.61	–	–	–	–
	12.0	8	25	70	H6171S8	H6173S8	H61741S8	33.61	H6175S8	40.18	H617AluS8	41.93
L	12.0	8	25	200	H617L1S8	H617L3S8	–	51.57	–	–	–	–
	16.0	8	25	70	H6181S8	H6183S8	H61841S8	43.85	H6185S8	52.57	H618AluS8	54.72
	19.0	8	25	70	H6191S8	H6193S8	H61941S8	62.75	H6195S8	75.31	H619AluS8	78.36

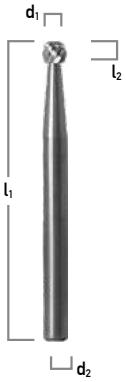
Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

KUD

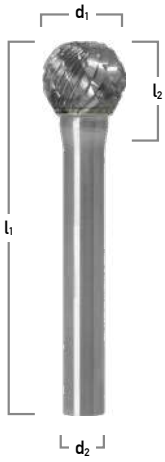


Ball-Nosed Cylinder Shape, Type KUD



Shank Ø 3 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.
	1.0	3	1	38	H5721	H5723	–	16.63	–	–
	1.5	3	1.5	38	H5731	H5733	–	17.37	–	–
	2.0	3	1.8	38	H5741	H5743	–	17.37	–	–
	2.5	3	2.5	38	H5751	H5753	H57541	9.10	H5755	11.02
	3.0	3	2.8	38	H5761	H5763	H57641	9.10	H5765	11.02
L	3.0	3	2.8	75	H576L1	H576L3	–	15.22	–	–
	5.0	3	4	44	H5771	H5773	H57741	13.55	H5775	16.29
	6.0	3	5	45	H5781	H5783	H57841	13.07	H5785	15.70



Shank Ø 6 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.	Part No. Z Alu	€/pc.
	3.0	6	3	50	H6701	H6703	H67041	14.62	H6705	17.60	–	–
	6.0	6	5	50	H6711	H6713	H67141	16.24	H6715	19.58	H671Alu	18.22
L	6.0	6	5	200	H671L1	H671L3	–	27.46	–	–	–	–
	8.0	6	7	52	H6731	H6733	H67341	16.24	H6735	19.58	–	–
L	8.0	6	7	200	H673L1	H673L3	–	28.07	–	–	–	–
	10.0	6	9	54	H6751	H6753	H67541	17.60	H6755	21.04	H675Alu	26.62
L	10.0	6	9	200	H675L1	H675L3	–	29.23	–	–	–	–
	12.0	6	11	56	H6771	H6773	H67741	23.93	H6775	28.76	H677Alu	30.07
L	12.0	6	11	200	H677L1	H677L3	–	33.61	–	–	–	–
	16.0	6	14	59	H6791	H6793	H67941	29.16	H6795	34.96	H679Alu	36.57
L	16.0	6	14	200	H679L1	H679L3	–	63.75	–	–	–	–
	19.0	6	17	62	H6801	H6803	H68041	40.32	H6805	48.43	H680Alu	50.49
	25.0	6	23	68	H68011	H68013	H680141	69.35	H68015	83.27	–	–

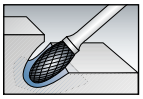
Shank Ø 8 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.	Part No. Z Alu	€/pc.
L	10.0	8	9	200	H675L1S8	H675L3S8	–	29.23	–	–	–	–
	12.0	8	11	56	H6771S8	H6773S8	H67741S8	23.93	H6775S8	28.76	H677AluS8	30.07
L	12.0	8	11	200	H677L1S8	H677L3S8	–	33.61	–	–	–	–
	16.0	8	14	59	H6791S8	H6793S8	H67941S8	29.16	H6795S8	34.96	H679AluS8	36.57
L	16.0	8	14	200	H679L1S8	H679L3S8	–	63.75	–	–	–	–
	19.0	8	17	62	H6801S8	H6803S8	H68041S8	40.32	H6805S8	48.43	H680AluS8	50.49

Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

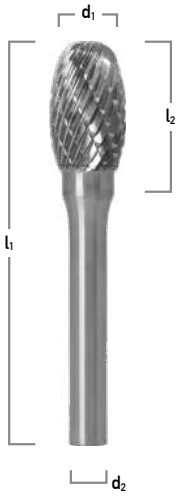
TRE



Oval Shape, Type TRE

Shank Ø 3 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.
	3.0	3	6	38	H5451	H5453	H54541	9.10	H5455	11.02
L	3.0	3	6	75	H545L1	H545L3	–	15.22	–	–
	5.0	3	7	38	H5461	H5463	H54641	19.20	–	–
	6.0	3	9	50	H5471	H5473	H54741	13.07	H5475	15.70



Shank Ø 6 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.	Part No. Z Alu	€/pc.
	6.0	6	10	50	H6411	H6413	H64141	18.37	H6415	21.87	–	–
L	6.0	6	10	200	H641L1	H641L3	–	28.93	–	–	–	–
	8.0	6	13	58	H6421	H6423	H64241	21.11	H6425	25.33	–	–
L	8.0	6	13	200	H642L1	H642L3	–	33.14	–	–	–	–
	10.0	6	16	61	H6431	H6433	H64341	21.87	H6435	26.33	H643Alu	26.62
L	10.0	6	16	200	H643L1	H643L3	–	35.65	–	–	–	–
	12.0	6	20	65	H6451	H6453	H64541	32.14	H6455	37.43	H645Alu	39.04
L	12.0	6	20	200	H645L1	H645L3	–	49.35	–	–	–	–
	16.0	6	25	70	H6471	H6473	H64741	47.59	H6475	55.49	H647Alu	57.78
	19.0	6	25	70	H6491	H6493	H64941	59.90	H6495	69.86	H649Alu	72.69

Shank Ø 8 mm

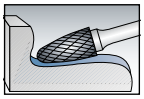
	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.	Part No. Z Alu	€/pc.
L	10.0	8	16	200	H643L1S8	H643L3S8	–	35.65	–	–	–	–
	12.0	8	20	65	H6451S8	H6453S8	H64541S8	32.14	H6455S8	37.43	H645AluS8	39.04
L	12.0	8	20	200	H645L1S8	H645L3S8	–	49.35	–	–	–	–
	16.0	8	25	70	H6471S8	H6473S8	H64741S8	47.59	H6475S8	55.49	H647AluS8	57.78
	19.0	8	25	70	H6491S8	H6493S8	H64941S8	59.90	H6495S8	69.86	H649AluS8	72.69

Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

RBF

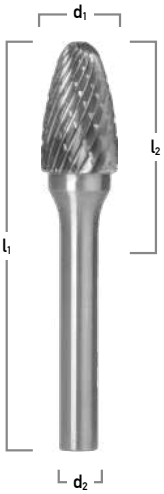
Z1 Normal | Z3 Double | Z41 Fine | Z5 Diamond | Z Alu | HM



Ball-Nosed Tree Shape, Type RBF

Shank Ø 3 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.
2.0	3	6	38	H5341	H5343	H53441	9.10	H5345	11.02
3.0	3	6	38	H5351	H5353	H53541	9.10	H5355	11.02
3.0	3	13	38	H5361	H5363	H53641	9.10	H5365	11.02
5.0	3	13	38	H5371	H5373	H53741	19.20	–	–
6.0	3	13	53	H5381	H5383	H53841	13.07	H5385	15.70



Shank Ø 6 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.	Part No. Z Alu	€/pc.
	6.0	6	18	50	H6311	H6313	H63141	16.45	H6315	19.83	–	–
L	6.0	6	18	200	H631L1	H631L3	–	27.25	–	–	–	–
	8.0	6	18	63	H6331	H6333	H63341	19.67	H6335	23.49	–	–
L	8.0	6	18	200	H633L1	H633L3	–	33.14	–	–	–	–
	10.0	6	20	65	H6351	H6353	H63541	20.91	H6355	25.09	H635Alu	26.08
L	10.0	6	20	200	H635L1	H635L3	–	33.61	–	–	–	–
	12.0	6	25	70	H6371	H6373	H63741	33.07	H6375	39.72	H637Alu	38.57
L	12.0	6	25	200	H637L1	H637L3	–	51.57	–	–	–	–
	16.0	6	25	70	H6381	H6383	H63841	42.55	H6385	51.12	H638Alu	53.17
	19.0	6	25	70	H6391	H6393	H63941	55.93	H6395	67.25	–	–

Shank Ø 8 mm

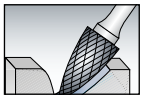
	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.	Part No. Z Alu	€/pc.
L	10.0	8	20	200	H635L1S8	H635L3S8	–	33.61	–	–	–	–
	12.0	8	25	70	H6371S8	H6373S8	H63741S8	33.07	H6375S8	39.72	H637AluS8	38.57
L	12.0	8	25	200	H637L1S8	H637L3S8	–	51.57	–	–	–	–
	16.0	8	25	70	H6381S8	H6383S8	H63841S8	42.55	H6385S8	51.12	H638AluS8	53.17
	19.0	8	25	70	H6391S8	H6393S8	H63941S8	55.93	H6395S8	67.25	–	–

Recommended Speed (rev/min)

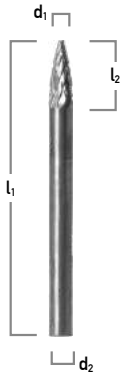
Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

SPG

Z1 Normal | Z3 Double | Z41 Fine | Z5 Diamond | HM



Pointed Tree Shape, Type SPG



Shank Ø 3 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
	2.5	3	6	38	H5241	H5243	H52441	9.10	H5245	11.02
	3.0	3	6	38	H5251	H5253	H52541	9.10	H5255	11.02
	3.0	3	8	38	H5261	H5263	H52641	9.10	H5265	11.02
L	3.0	3	8	75	H526L1	H526L3	–	15.22	–	–
	3.0	3	11	38	H5271	H5273	H52741	9.10	H5275	11.02
L	3.0	3	11	75	H527L1	H527L3	–	15.22	–	–
	3.0	3	13	38	H52711	H52713	H527141	9.10	H52715	11.02
L	3.0	3	13	75	H5271L1	H5271L3	–	15.22	–	–
	5.0	3	13	38	H5281	H5283	–	19.20	–	–
	6.0	3	13	53	H5291	H5293	H52941	13.31	H5295	15.70

Shank Ø 6 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
	6.0	6	18	50	H6211	H6213	H62141	16.45	H6215	19.83
L	6.0	6	18	200	H621L1	H621L3	–	28.15	–	–
	8.0	6	18	63	H6221	H6223	H62241	18.22	H6225	21.87
L	8.0	6	18	200	H622L1	H622L3	–	33.61	–	–
	10.0	6	20	65	H6231	H6233	H62341	22.35	H6235	26.70
L	10.0	6	20	200	H623L1	H623L3	–	37.25	–	–
	12.0	6	20	65	H6261	H6263	H62641	30.30	H6265	36.36
	12.0	6	25	70	H6271	H6273	H62741	32.96	H6275	39.51
L	12.0	6	25	200	H627L1	H627L3	–	48.82	–	–
	16.0	6	25	70	H6281	H6283	H62841	42.17	H6285	50.59
	19.0	6	25	70	H6291	H6293	H62941	55.93	H6295	67.18

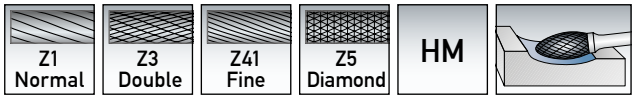
Shank Ø 8 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
L	10.0	8	20	200	H623L1S8	H623L3S8	–	37.25	–	–
	12.0	8	25	70	H6271S8	H6273S8	H62741S8	32.96	H6275S8	39.51
L	12.0	8	25	200	H627L1S8	H627L3S8	–	48.82	–	–
	16.0	8	25	70	H6281S8	H6283S8	H62841S8	42.17	H6285S8	50.59
	19.0	8	25	70	H6291S8	H6293S8	H62941S8	55.93	H6295S8	67.18

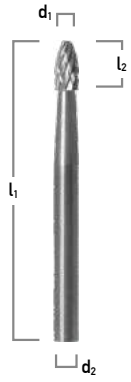
Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

HMB



Flame Shape, Type HMB



Shank Ø 3 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.
	3.0	3	6	38	H5551	H5553	H55541	9.10	H5555	11.02
L	3.0	3	7	75	H555L1	H555L3	–	15.22	–	–
	5.0	3	9.5	38	H5561	H5563	–	19.20	–	–
	6.0	3	12	52	H5571	H5573	H55741	23.33	–	–

Shank Ø 6 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.
	6.0	6	18	50	H6811	H6813	H68141	19.38	H6815	23.33
L	6.0	6	18	200	H681L1	H681L3	–	32.75	–	–
	8.0	6	19	64	H6831	H6833	H68341	21.87	H6835	26.26
L	8.0	6	19	200	H683L1	H683L3	–	37.50	–	–
	10.0	6	25	70	H6851	H6853	–	31.83	H6855	38.18
L	10.0	6	25	200	H685L1	H685L3	–	43.70	–	–
	12.0	6	32	77	H6871	H6873	H68741	44.69	H6875	53.49
L	12.0	6	32	200	H687L1	H687L3	–	69.80	–	–
	16.0	6	36	81	H6881	H6883	H68841	61.68	H6885	73.92
	19.0	6	41	86	H6891	H6893	H68941	78.28	H6895	93.91

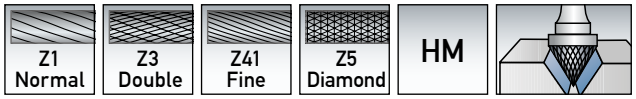
Shank Ø 8 mm

	d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	Part No. Z 3 Double	Part No. Z 41 Fine	€/pc.	Part No. Z 5 Diamond	€/pc.
L	10.0	8	25	200	H685L1S8	H685L3S8	–	43.70	–	–
L	12.0	8	32	200	H687L1S8	H687L3S8	–	69.80	–	–
	16.0	8	36	81	H6881S8	H6883S8	H68841S8	61.68	H6885S8	73.92
	19.0	8	41	86	H6891S8	H6893S8	H68941S8	78.28	H6895S8	93.91

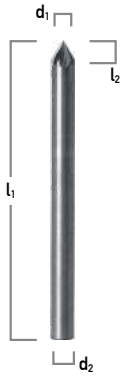
Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

KSJ



Cone Shape 60°, Type KSJ



Shank Ø 3 mm

d_1	d_2	l_2	l_1	Part No.				Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
mm	mm	mm	mm						
3.0	3	2.5	38	H5901	H5903	H59041	9.10	H5905	11.02

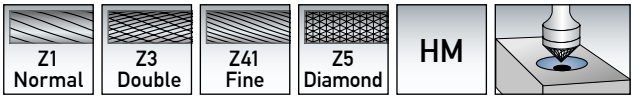
Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.				Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
mm	mm	mm	mm						
6.0	6	4	50	H6611	H6613	H66141	14.62	H6615	17.60
10.0	6	8	58	H66201	H66203	H662041	18.98	H66205	22.89
13.0	6	11	61	H66211	H66213	H662141	23.17	H66215	27.85
16.0	6	14	64	H6651	H6653	H66541	30.83	H6655	37.04
19.0	6	16	66	H66501	H66503	H665041	40.70	H66505	48.82
25.0	6	21	71	H66511	H66513	H665141	65.04	H66515	78.00

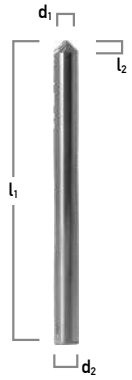
Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

KSK

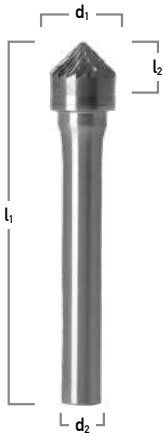


Cone Shape 90°, Type KSK



Shank Ø 3 mm

d_1	d_2	l_2	l_1	Part No.				Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
mm	mm	mm	mm						
3.0	3	2	38	H5911	H5913	H59141	9.10	H5915	11.02



Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.				Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
mm	mm	mm	mm						
6.0	6	3	50	H6631	H6633	H66341	14.62	H6635	17.60
10.0	6	5	55	H66401	H66403	H664041	18.98	H66405	22.89
13.0	6	6	56	H66411	H66413	H664141	23.17	H66415	27.85
16.0	6	8	58	H6671	H6673	H66741	30.83	H6675	37.04
19.0	6	10	60	H66701	H66703	H667041	40.70	H66705	48.82
25.0	6	13	63	H66711	H66713	H667141	65.04	H66715	78.00

Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

SKM


Z1 Normal

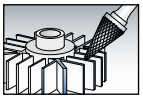

Z3 Double


Z41 Fine

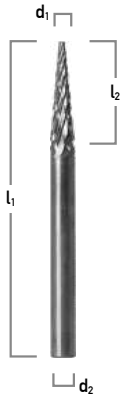

Z5 Diamond


Z Alu

HM



Pointed Cone Shape, Type SKM



Shank Ø 3 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
	2.0	3	8	38	H5941	H5943	H59441	9.10	H5945	11.02
	3.0	3	11	38	H5951	H5953	H59541	9.10	H5955	11.02
	3.0	3	13	38	H5961	H5963	H59641	9.10	H5965	11.02
L	3.0	3	11	75	H596L1	H596L3	–	15.22	–	–
	3.0	3	16	38	H5971	H5973	H59741	9.10	H5975	11.02
	6.0	3	13	53	H5991	H5993	H59941	13.07	H5995	15.70

Shank Ø 6 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
	6.0	6	13	50	H6511	H6513	H65141	16.07	H6515	19.38	–	–
	6.0	6	18	50	H65101	H65103	H651041	16.97	H65105	20.36	–	–
	6.0	6	25	50	H6521	H6523	H65241	18.12	H6525	21.74	–	–
	10.0	6	20	65	H6551	H6553	H65541	26.62	H6555	32.05	–	–
	12.0	6	25	70	H6571	H6573	H65741	33.44	H6575	41.78	H657Alu	41.78
	16.0	6	25	70	H6581	H6583	H65841	45.38	H6585	54.55	–	–

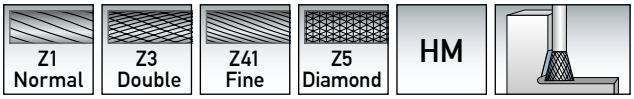
Shank Ø 8 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
	12.0	8	25	70	H6571S8	H6573S8	H65741S8	33.44	H6575S8	41.78	H6575S8	41.78
	16.0	8	25	70	H6581S8	H6583S8	H65841S8	45.38	H6585S8	54.55	H6585S8	54.55

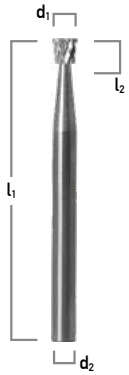
Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

WKN

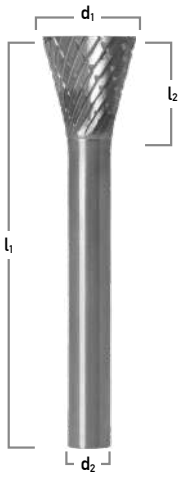


Inverted Cone, w/o End Cut, Type WKN



Shank Ø 3 mm

d_1	d_2	l_2	l_1	Part No.				Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
mm	mm	mm	mm						
2.5	3	3	38	H5801	H5803	H58041	9.10	H5805	11.02
3.0	3	3	38	H5811	H5813	H58141	9.10	H5815	11.02
3.0	3	7	38	H58111	H58113	–	9.10	–	–
5.0	3	5	38	H5821	H5823	–	19.20	–	–
6.0	3	6	46	H5831	H5833	H58341	13.07	H5835	15.70
6.0	3	8	47	H58311	H58313	–	18.83	–	–



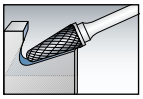
Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.				Part No.	
				Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.
mm	mm	mm	mm						
6.0	6	7	50	H66001	H66003	H660041	16.29	H66005	19.67
10.0	6	10	55	H66011	H66013	H660141	23.66	H66015	28.40
13.0	6	13	58	H66021	H66023	H660241	33.29	H66025	40.01
16.0	6	19	64	H66031	H66033	H660341	42.77	H66035	51.35

Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

KEL



Ball-Nosed Cone Shape, Type KEL

Shank Ø 3 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.		
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	
	3.0	3	10	38	H5601	H5603	H56041	9.10	H5605	11.02	
	3.0	3	13	38	H5611	H5613	H56141	9.10	H5615	11.02	
L	3.0	3	13	75	H561L1	H561L3	–	15.31	–	–	
	5.0	3	13	38	H5621	H5623	–	19.20	–	–	

Shank Ø 6 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
	6.0	6	16	50	H6911	H6913	H69141	17.52	H6915	20.98	–	–
L	6.0	6	16	200	H691L1	H691L3	–	27.25	–	–	–	–
	8.0	6	22	67	H6931	H6933	H69341	23.73	H6935	28.48	–	–
L	8.0	6	22	200	H693L1	H693L3	–	37.36	–	–	–	–
	10.0	6	27	72	H6951	H6953	H69541	27.46	H6955	32.96	H695Alu	33.29
L	10.0	6	27	200	H695L1	H695L3	–	43.00	–	–	–	–
	12.0	6	30	75	H6971	H6973	H69741	33.51	H6975	40.25	H697Alu	40.70
L	12.0	6	30	200	H697L1	H697L3	–	48.90	–	–	–	–
	16.0	6	30	75	H6991	H6993	H69941	65.90	H6995	79.21	H699Alu	80.12
	19.0	6	38	83	H69901	H69903	H699041	86.33	H69905	103.61	H6990Alu	105.60

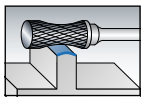
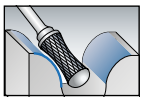
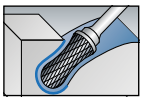
Shank Ø 8 mm

	d_1	d_2	l_2	l_1	Part No.				Part No.		Part No.	
	mm	mm	mm	mm	Z 1 Normal	Z 3 Double	Z 41 Fine	€/pc.	Z 5 Diamond	€/pc.	Z Alu	€/pc.
L	10.0	8	27	200	H695L1S8	H695L3S8	–	43.00	–	–	–	–
	12.0	8	30	75	H6971S8	H6973S8	H69741S8	33.51	H6975S8	40.25	H697AluS8	40.70
L	12.0	8	30	200	H697L1S8	H697L3S8	–	48.90	–	–	–	–
	19.0	8	38	83	H69901S8	H69903S8	H699041S8	86.33	H69905S8	103.61	H6990AluS8	105.60

Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

H10

HM




Radius Shape Cylinder

Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 3 Double	€/pc.
12.7	6	25	70	H1003	57.04

Radius Shape Cylinder w/ End Cut

Shank Ø 6 mm

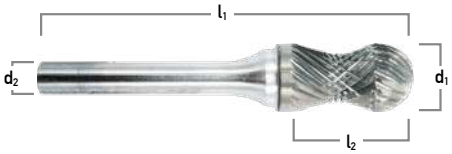
d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 3 Double	€/pc.
12.7	6	25	70	H1013	59.94

Radius Shape Cylinder, Ball, w/o End Cut

Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 1 Normal	€/pc.
12.7	6	25	70	H1021	53.40

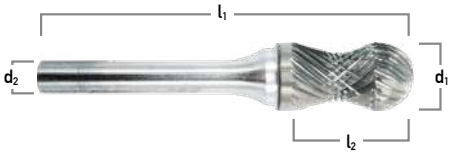
Radius Shape Cylinder, Ball, w/ End Cut



Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 1 Normal	€/pc.
12.7	6	25	70	H1031	55.58

Radius Shape Cylinder, Ball, w/ End Cut



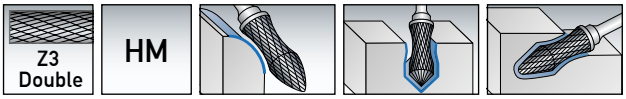
Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 3 Double	€/pc.
12.7	6	25	70	H1043	57.76

Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

H10

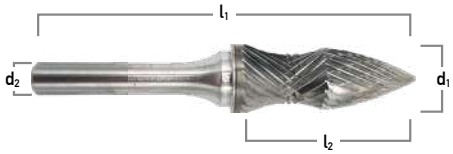


Radius Shape Cylinder, Ball Nose

Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	25	70	H1053	62.87

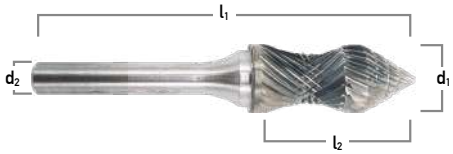
Radius Shape Cylinder, Pointed Tree



Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	35	80	H1063	62.87

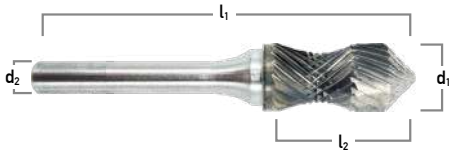
Radius Shape Cylinder, Taper 60°



Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	31	76	H1073	69.39

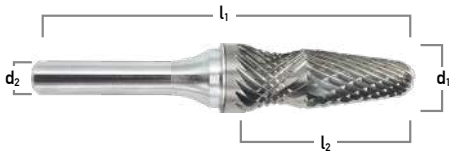
Radius Shape Cylinder, Taper 90°



Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	28	73	H1083	66.49

Radius Shape Cylinder, Ball-Nosed Cone



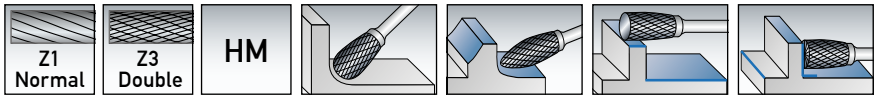
Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	35	80	H1093	67.20

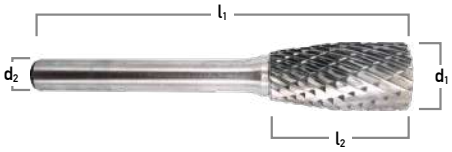
Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

H11



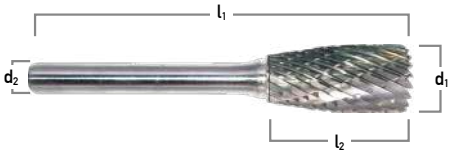
Cylinder Shape, w/ Corner Radius



Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	25	70	H1103	50.74

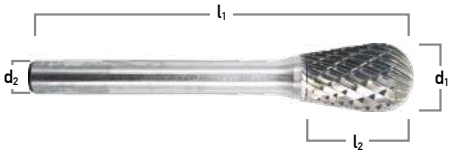
Cylinder Cone Shape, w/ End Cut



Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	25	70	H1113	52.79

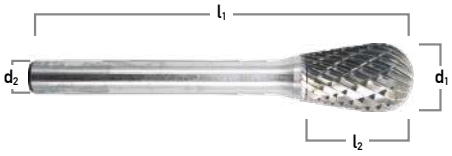
Ball Shape



Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 1 Normal	€/pc.
12.7	6	20	65	H1121	45.93

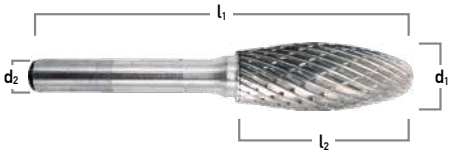
Ball Shape



Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	20	65	H1133	47.30

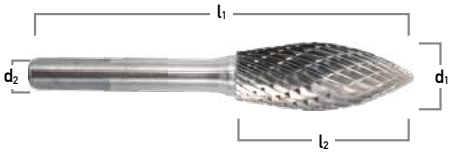
Ball-Nosed Tree Shape



Shank Ø 6 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	32	77	H1143	60.23

Pointed Tree Shape



Shank Ø 6 mm

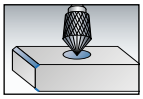
d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
12.7	6	32	77	H1153	60.23

Recommended Speed (rev/min)

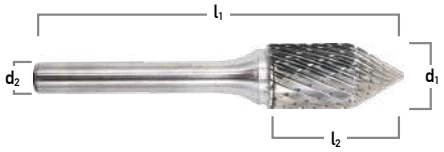
Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

H11

HM



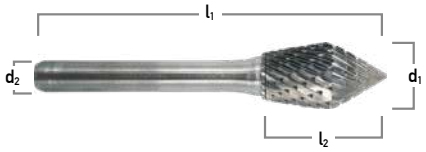
Cylinder, Taper 60°



Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 3 Double	€/pc.
12.7	6	25	70	H1163	52.79

Cylinder, Taper 60°



Shank Ø 6 mm

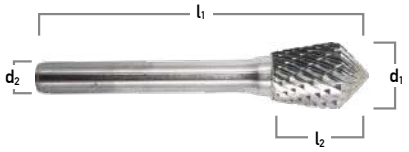
d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 3 Double	€/pc.
12.7	6	23	68	H1173	52.79

Cylinder, Taper 90°

Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 3 Double	€/pc.
12.7	6	25	70	H1183	52.79

Cylinder, Taper 90°



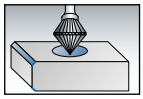
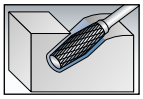
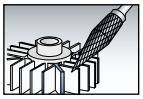
Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No.	
mm	mm	mm	mm	Z 3 Double	€/pc.
12.7	6	18	64	H1193	52.91

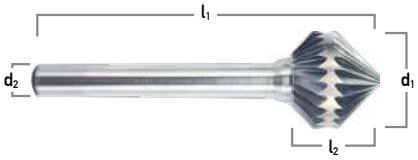
Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

H12

HM




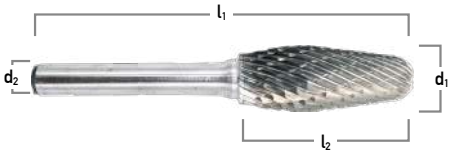
Cone shape 90°



Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No. Z 1 Normal	
mm	mm	mm	mm		€/pc.
16	6	15	60	H1201	49.63

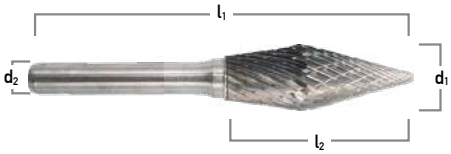
Ball-Nosed Cone



Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No. Z 3 Double	
mm	mm	mm	mm		€/pc.
12.7	6	32	77	H1213	59.56

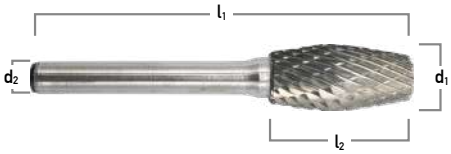
Pointed Cone Shape



Shank Ø 6 mm

d_1	d_2	l_2	l_1	Part No. Z 3 Double	
mm	mm	mm	mm		€/pc.
12.7	6	35	80	H1223	63.65

Cone Shapes



Shank Ø 6 mm

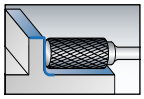
d_1	d_2	l_2	l_1	Part No. Z 3 Double	
mm	mm	mm	mm		€/pc.
12.7	6	25	70	H1233	56.16

Recommended Speed (rev/min)

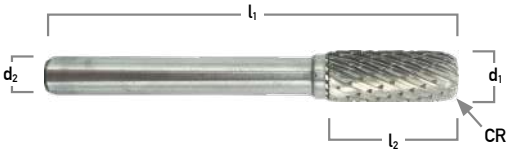
Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

H12

HM



Cylinder Shape, w/ Corner Radius



Shank Ø 3 mm

d_1 mm	d_2 mm	l_2 mm	l_1 mm	Part No. Z 3 Double	€/pc.
3	3	14	38	H1243	23.19
6	6	18	50	H1253	36.89
8	6	20	64	H1263	26.08
9.5	6	19	64	H1273	30.05
12.7	6	25	70	H1283	52.41
16	6	25	70	H1293	66.67

Recommended Speed (rev/min)

Head Ø (mm)	1	2	3	4	5	6	8	10	12	13	14	16	19	25
Steel	75.000 – 100.000	70.000 – 95.000	53.000 – 85.000	40.000 – 80.000	30.000 – 65.000	25.000 – 55.000	20.000 – 40.000	16.000 – 32.000	13.000 – 27.000	12.000 – 25.000	11.000 – 23.000	10.000 – 20.000	8.000 – 17.000	6.000 – 13.000
Stainless Steel	70.000 – 100.000	65.000 – 90.000	40.000 – 60.000	30.000 – 45.000	25.000 – 35.000	20.000 – 30.000	15.000 – 25.000	13.000 – 18.000	12.000 – 15.000	11.000 – 14.000	10.000 – 13.000	8.000 – 12.000	7.000 – 10.000	5.000 – 7.000
Cast iron and Cast steel	80.000 – 100.000	55.000 – 95.000	40.000 – 90.000	30.000 – 70.000	25.000 – 60.000	20.000 – 50.000	15.000 – 35.000	11.000 – 29.000	9.000 – 24.000	9.000 – 22.000	8.000 – 20.000	7.000 – 18.000	6.000 – 15.000	5.000 – 11.000
Plastics, Aluminium and non-ferrous metals	80.000 – 100.000	75.000 – 95.000	70.000 – 90.000	50.000 – 85.000	40.000 – 75.000	35.000 – 65.000	25.000 – 50.000	21.000 – 38.000	17.000 – 32.000	16.000 – 29.000	15.000 – 27.000	13.000 – 24.000	11.000 – 20.000	8.000 – 15.000
Super alloys und Titanium	75.000 – 100.000	35.000 – 70.000	25.000 – 45.000	20.000 – 35.000	15.000 – 30.000	12.000 – 23.000	9.000 – 17.000	7.000 – 14.000	6.000 – 12.000	6.000 – 11.000	5.000 – 10.000	5.000 – 9.000	4.000 – 7.000	3.000 – 6.000
Hardened steel	75.000 – 100.000	35.000 – 85.000	25.000 – 60.000	20.000 – 45.000	15.000 – 35.000	12.000 – 29.000	9.000 – 22.000	7.000 – 18.000	6.000 – 15.000	6.000 – 13.000	5.000 – 12.000	5.000 – 11.000	4.000 – 9.000	3.000 – 7.000

General Terms and Conditions

§ 1 Scope of application – Privacy

1. Our General Terms and Conditions shall apply exclusively to all our deliveries and services including any associated consulting and information services. We do not accept any Terms and Conditions contradicting or dissenting from our Terms unless we had explicitly consented to their application in written form.
2. Our Terms and Conditions shall also apply, if we fully execute delivery to the customer knowing any conflicting or differing Terms and Conditions of the customer.
3. These Terms shall also apply to all future contractual relations with entrepreneurs according to § 310 BGB (German Civil Code). Terms and Conditions that are identified as such shall also apply to them.
4. Within a business relationship between entrepreneurs, receipt of our deliveries and services implies that the customer accepts the legal validity of our Terms and Conditions. Any agreements including collateral agreements that differ from our Terms and Conditions or contain any kind of confirmation from our side shall only be effective in writing.
5. Customer information will be saved (acc. to Sections 28, 33 BDSG, German Federal Data Protection Act).

§ 2 Quotations – Conclusion of the contract

1. The customer's order shall be binding. Upon our choice, we shall be entitled to accept this order within 14 days by providing an order confirmation or by shipping the ordered goods.
2. Our quotations in business transactions with companies shall always be non-binding unless otherwise provided in the order confirmation. Oral agreements and confirmations only apply if we have confirmed the same in writing.

§ 3 Prices – Delivery and payment terms

1. Unless another price agreement has been agreed upon in written form, our prices are net plus applicable VAT according to our latest catalogues and price lists valid on the day of order. Catalogues and price lists are accessible at our premises or can be ordered from us.
2. Our deliveries are supplied carriage paid including packaging from an net order value of €200,00. Any other orders will be shipped at the owner's expense.
3. Unless otherwise agreed, our invoices are payable within 8 days from date of invoice with 2% discount or 30 days net. Checks and payment orders will only be accepted on account of performance. Payment shall be deemed completed when the amount is credited to our account.
4. The customer is in default at the latest, if he fails to pay within 30 days when an invoice is due or after the receipt of the invoice or another payment schedule. Thereupon, we shall be be entitled to charge the applicable default interest and charge € 10,00 for each payment reminder. We shall reserve the right to furnish proof of higher damage caused by default.
5. Any discounts or periods allowed for payment granted by us can be refused if the customer defaults on payment of previous invoices or following filings for insolvency. In these cases we shall be entitled to declare all due as well as any deferred invoice amounts immediately payable. In such cases, delivery of ordered goods will only be made on cash payment.
6. Set off rights can only be granted to the Buyer, if his counter claims have been stated legally binding, undisputed or recognized by our company. The customer's rights of retention only exist for counter claims resulting from the same contractual relationship.
7. In the case of the case of returned goods, we shall be entitled to retain a fee of 20% of the goods value as contribution to the coverage of costs. We can only take back tools in good order and condition and without any labels or with the TOOL FACTORY label only. Special tools and products with customized labelling are excluded from return. If the return shall be due to a fault of TOOL FACTORY, the take-back is free of charge to the customer. Only tools delivered within the last 6 months can be returned.

§ 4 Delivery terms – Receipt of the goods

1. Delivery times or dates shall only be binding upon agreement in writing.
2. Particularly in the case of larger deliveries, we shall be entitled for part-in deliveries to an extent that is reasonable for the customer.
3. As long as the customer is in delay with trade accounts payable, our obligation to deliver is in rest.
4. From our part, delivery term shall be deemed complied when the delivered goods have been sent to the customer prior to its expiry. The delivery period shall be reasonably extended against the background of measures taken within the scope of industrial action, particularly with regard to strikes and lockouts, as well as upon the occurrence of unforeseeable obstacles that are beyond our will, as far as such obstacles have a provable material influence on the delivery objects' completion or delivery. This shall also apply to circumstances which may occur at sub-suppliers. The aforementioned circumstances shall also be deemed to be beyond our control if they arise from a pre-existing delay. In important cases, we will inform the customer as soon as possible of the beginning and the end of such circumstances. If delivery or performance is rendered impossible or unreasonable by virtue of the indicated circumstances, we are relieved from the delivery obligation.
5. If we are in default towards companies due to reasons for which we bear responsibility, the client is entitled to a reimbursement for damages caused by arrears to the sum of 1% of the value of the declared value of goods for each full week of the delay, limited however to a maximum of 15% of the value of goods. Any additional claims due to delay of delivery are exclusively subject to § 8 of these Conditions.
6. If we are in default and if the customer – under the consideration of the statutory exceptions – grants to us a reasonable period of time for performance and if this period of time is not adhered to, the customer shall be entitled to withdrawal in accordance with statutory regulations. Any additional claims due to delay of delivery are exclusively subject to § 8 of these Conditions.
7. If the customer defaults in taking delivery or infringes other duties to cooperate, we shall be entitled to claim compensation for the damage suffered by us, including any additional expenses. In this case, the risk of accidental loss or of accidental degradation of the item purchased shall transfer to the customer at the time the customer falls into default of acceptance.
8. Where the customer does not accept the goods within the extension period, we are entitled, to request compensation for damages without any special proof due to non-fulfilment to an amount of 20% of the rejected goods value, as well as the incurred shipping cost plus applicable VAT. Both the customer and we reserve the right to provide evidence of higher or lower damages in the individual case.

§ 5 Transfer of risk – Dispatch

1. The goods shall be delivered or dispatched at the customer's risk in any case. Type and route of dispatch are left to us, unless otherwise agreed upon. As soon as the goods have been handed over to the forwarder/carrier, or, at the latest, when they have left our warehouse, the risk for the goods shall pass on to the customer.
2. If dispatch is delayed due to circumstances for which the customer bears responsibility, then the risk shall be transferred to the customer from the day on which the goods are ready for dispatch.
3. Delivered items shall be accepted by the customer even if there is evidence of minor faults, regardless of the rights arising from § 7.

§ 6 Retention of title

1. We shall retain full title of the goods that have been delivered in accordance with the delivery contract until the receipt of the full payment.
2. If the realisable value of the securities held by us exceeds the total value of our claims by more than 20%, we shall be obliged by request of the customer to the release of securities of our own choice.
3. The customer must inform us immediately in writing in relation to any attachments asserted by third parties, or any other such interventions, and it is also required to inform the attaching creditor of the existence of the retention of title.
4. In case of breach of contract by the client, in particular in case of default of payment, we shall be entitled to take back the object of sale. Our repossession of the object of sale shall not constitute a withdrawal from the contract, unless we make explicit written declaration thereof or imperative provisions of the consumer credit act shall apply to the contract. If we obtain the attachment of the object of sale this shall always be construed as a cancellation of the contract. We shall be entitled to re-market goods taken back from the company by implementing a resale at our sole discretion, provided that we have given advance reasonable notice of the threat of resale. After taking back the purchased goods, we shall be entitled to dispose of them. We shall offset the proceeds from such a sale against the client's liabilities, less appropriate administrative cost, in general 10% of the goods value.
5. If we are entitled to take back the goods, the customer is obliged to enable one of our employees to perform a stock check of the reserved goods.

§ 7 Defects of quality

1. We bear liability for defects as to quality as follows: All those parts which within the limitation period prove to have a defect, shall at our choice and at no expense to us be either repaired, delivered anew or performed again, insofar as the cause for the defect existed at the time of the transfer of risk.
2. The customer shall notify us in writing of any defects of quality immediately after their discovery.
3. If notice is given of defects, payments by the customer shall only be retained to such extent as is justified in proportion to the defects that have occurred. The customer may withhold payments only if the complaint as to defects is justified and incontestable. If the complaint is unjustified, we shall be entitled to demand from the customer reimbursement of the incurred expenses.
4. First, we must get the opportunity to provide subsequent fulfilment within a reasonable period.
5. If the subsequent fulfilment fails, the customer may withdraw from the contract or reduce the remuneration irrespective of any eventual indemnification claims pursuant to § 8.
6. There shall be no claims for defects where the discrepancy from the agreed condition is insignificant, where the impairment of use is insignificant, where there is normal wear and tear or where damages arise after the passing of risk as a consequence of incorrect or careless handling, excessive operational demands, unsuitable equipment or as a consequence of special exterior influences which in the agreement were not assumed. If improper modifications are made by the customer or third parties, they are not entitled to assert claims for damages on these goods and the consequences resulting thereof.
7. Claims by the customer concerning the expenses necessary for the purpose of supplementary performance, in particular costs of transport, travel, labour and material are precluded insofar as the expenses have risen because the delivery item has been moved to a different location subsequently, unless the move conforms to its intended use.

§ 8 Other claims for damages

1. Claims to damages and reimbursement of expenditure of the customer (hereinafter claims to damages), shall be excluded irrespective of their legal basis, including, but not limited to, the breach of duties under the law of obligations and under tort.
2. Claims for damages due to the infringement of material contractual duties, however, shall be limited to contract-Typeical, predictable damages, provided there is no intent or gross negligence, or that liability is assumed on account of damage to life, physical injury or damage to health. A change of the burden of proof to the disadvantage of the client is not associated with the aforementioned conditions.
3. Insofar as the customer is entitled to claims for damages in accordance with this section, they become statute-barred according to § 7 art. 2 of these conditions after the expiration of the limitation period applicable for claims for defects of quality. The legal provisions for limitation periods shall apply to claims for damage in accordance with the German product liability law.

§ 9 Place of fulfilment and court of jurisdiction

1. Though we ship the goods to the customer, our registered office shall remain the place of fulfilment.
2. Provided the customer is a company (entrepreneur), the court of jurisdiction shall be our registered office, however, upon our choice, also the company's registered office.

Notes

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