

INDEXABLE MILLING
SOLID END MILLING
HOLEMAKING
TAPPING
TOOLING SYSTEMS



2017 Advances Catalogue
METRIC

WIDIA 



For more than 90 years, WIDIA™ brand products and services have defined excellence in innovation, technology, and customer service.

From turning, indexable milling, solid end milling, holmaking, tapping, and tooling systems — WIDIA offers a broad range of solutions, all delivered from a single source. Match the most expansive portfolio of precision-engineered products and engineered solution services available today with a global, specialised network of Authorised Distributor partners, and you have the tools you need — and the power that only comes from WIDIA.

WIDIA ™

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1926

Tungsten carbide production begins

1937

WIDIA™ wins the Grand Prix at the world exposition in Paris

1962

First patent granted for coated carbide inserts

1967

WIDIA (India) begins producing carbide and tools

1968

Launch of first global coated grade

A Powerful History of High Performance

For more than 90 years, WIDIA™ brand products and services have defined excellence in innovation, technology, and customer service. From the world's first patent for carbide indexable inserts to the development of the world's first coated grades, WIDIA delivers extreme results, no matter what the challenge.

From turning, indexable milling, solid end milling, holmaking, tapping, and tooling systems — WIDIA offers a broad range of solutions. Match the most expansive portfolio of precision-engineered products and engineered solution services available today with a global, specialised network of Authorised Distributor partners, and you have the tools you need — and the power that only comes from WIDIA.

WIDIA 

1982

Launch of first PVD TiN coated taps (VTD)

1987

Launch of the Widaflex™ tooling system for turning, holemaking, and milling

2000

QS 9000 TES and VDA 6.4 certification for the WIDIA™ operations in Germany

2009

The WIDIA, Hanita, Greenfield Tap & Die, Circle, ClappDiCo, Manchester, Metal Removal, Metcut, and Rübigen brands combine to create the WIDIA Products Group

2011

Launch KM™ and ERICKSON™ Portfolio

2013

Launch of new VariTap™ series

2016

WIDIA celebrates 90 years

CELEBRATING

90
YEARS

1926 - 2016



WIDIA™ Metalworking Services

WIDIA™ provides an array of products and support services from onsite tool management and engineering personnel, to inventory control systems, to tool manufacturing, reconditioning, and recycling to support tools and their processes throughout their entire lifecycle. Our metalworking services are designed to save your business time, money, and inventory, and protect your cutting tool investment for the long term.

Let WIDIA help you extend the life of your tools and maintain their performance in delivering productivity. Contact your local Authorised WIDIA distributor or visit widia.com/services to learn more.



NOVO™

NOVO™ possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

See page A17 to learn more.



Customer Application Support

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

See page F28 to learn more.



Carbide Recycling

The WIDIA™ Carbide Recycling Programme can turn accumulated scrap carbide tooling in your shop into cash.

See page B43 to learn more.



Tool Reconditioning

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

See page D7 to learn more.



ToolBOSS™ Vending Solution

ToolBOSS vending solutions help to reduce costs and improve efficiencies to give you a competitive edge.

KNOWLEDGE CENTER

Knowledge Center

The Knowledge Center offers several ways to get trained. In-person classes include lecture, lab, and machining demonstrations.



WIDIA and the Machine Tool Industry (MTI)

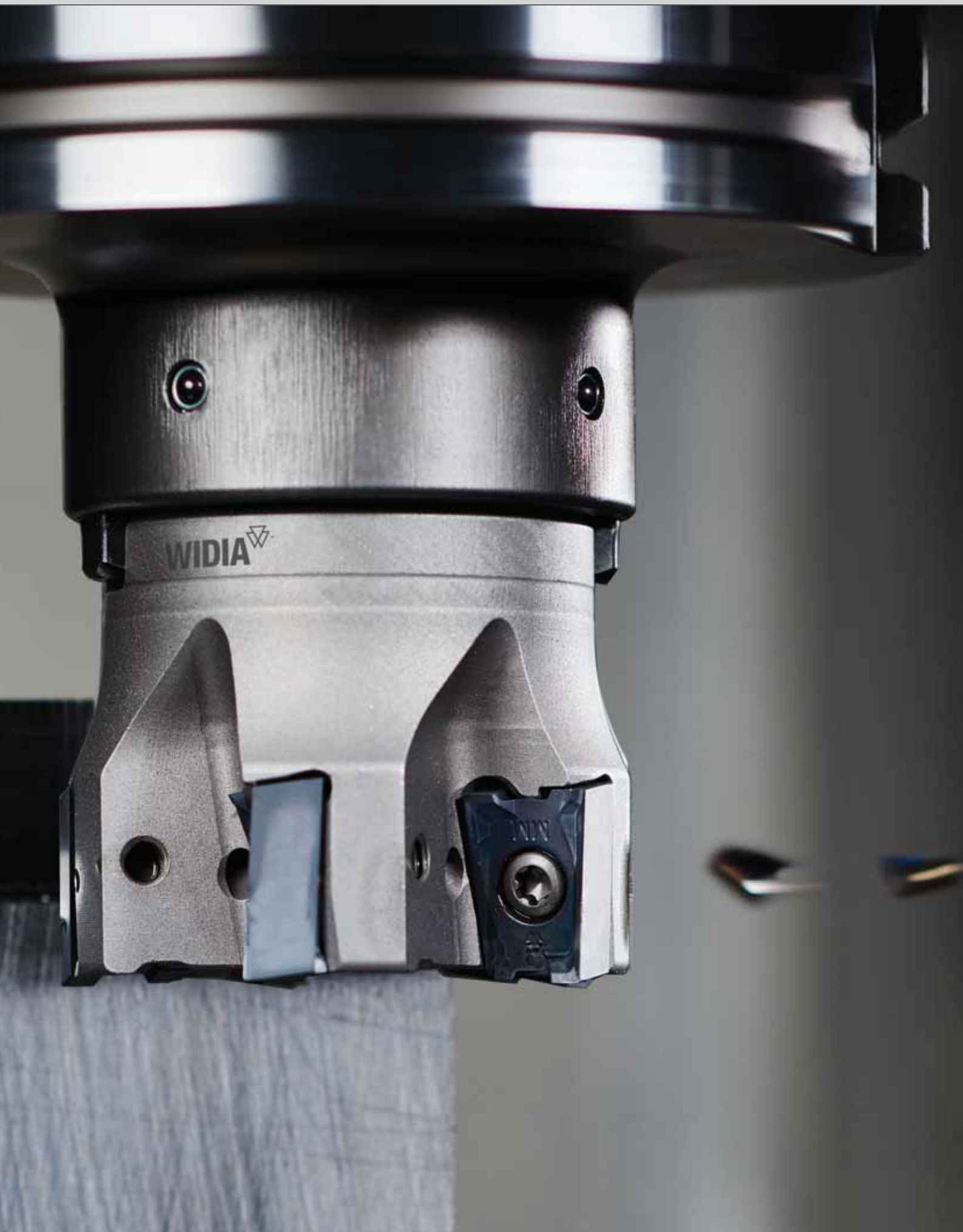
We have Machine Tool Industry (MTI) specialists in more than 60 countries around the world, so there's always someone near you: W-MTI.Solutions@WIDIA.com.



Toolholder Service and Repair

When your WIDIA™ advanced tooling products need to be serviced, the WIDIA Service and Repair Department has the highly trained staff to provide expert assistance.

For information on any of these services, go to widia.com/services.



Indexable Milling

WS40PM • New Titanium Milling GradeA2–A16

VSM490-15 Line ExpansionA15–A16, A18–A28

M200 Line ExpansionA30–A51



New Victory™ WS40PM

WS40PM

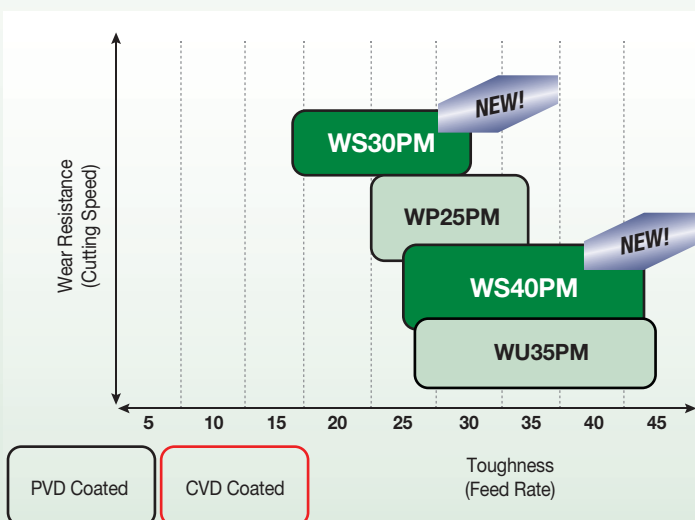


New substrate plus proven PVD coating technology increases performance in rough milling titanium and stainless steels. Excellent toughness and better wear resistance leads to higher efficiency in these demanding applications.

- Proven PVD coating for titanium and stainless to minimise microchipping and provide improved wear resistance.
- New advanced alloyed substrate achieves excellent cutting edge strength and avoids catastrophic insert breakage in severe cutting conditions.
- Resists thermal cracking:
 - Extremely important in machining titanium as coolant is used.
 - A common failure mode that leads to chipping.

Grade Positioning

- WS40PM completes the WIDIA™ indexable milling grade portfolio for titanium and stainless steel machining.
- WIDIA can now offer a grade as tough as WU35PM, with more wear resistance.



New WS40PM

- Expanded wear resistance range.
- Overlaps toughness range of WU35PM.
- New advanced substrate.

Application Recommendations

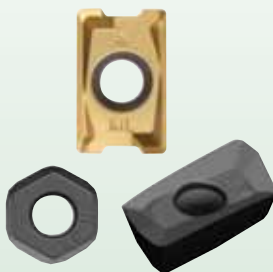
- The go-to grade for rough milling titanium and stainless steel.
- Up to 20% greater tool life at the same cutting conditions.
- Engineered to resist thermal cracking — a huge benefit in titanium milling (wet application).
 - The ideal speed range for the best tool life in titanium is 46–53 m/min.

Recommended Speeds

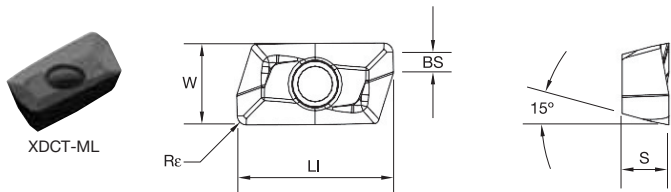
			WS40PM	Speed Vc (m/min)		
Material Group	ISO	Material	Description	max	(starting)	min
P5	P	Stainless Steel	Ferritic, Martensitic, and PH SS	135	100	70
P6			High-Strength Ferritic Austenitic and PH SS	115	80	50
M1	M	Stainless Steel	Austenitic SS	260	185	115
M2			High-Strength Austenitic S and Cast SS	230	170	105
M3			Duplex SS	190	135	85
S1	S	High-Temp Alloys	Iron Based	62	45	27
S2			Cobalt Based	55	40	26
S3			Nickel Based	64	46	29
S4			Titanium Based	90	66	42

WS40PM is available in these leading indexable milling platforms

- Face Milling: M1200, M1200 Mini, M640, M690
- Shoulder Milling: VSM11™, VSM17™
- Copy Milling: VSM490™



Indexable Milling



- -ML is a light- to medium-machining geometry and is the first choice for stainless steel and titanium materials.

- first choice
- alternate choice

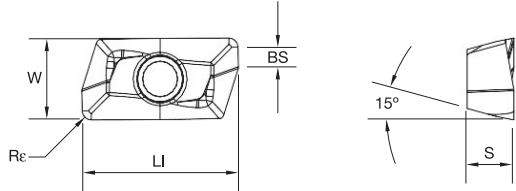
WIDIA
VICTORY

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

■ XDCT-ML

catalogue number	cutting edges	LI	BS	S	W	Rε	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM	WU35PM
XDCT110404PDERML	2	13,43	2,09	4,00	6,90	0,40	0,04	•	•	•	•	•	•	•	•	•
XDCT110408PDERML	2	13,44	1,69	4,00	6,90	0,80	0,04	•	•	•	•	•	•	•	•	•

NEW!



- -MM is a medium- to heavy-machining geometry and is the first choice for general purpose and universal applications.

- first choice
- alternate choice



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

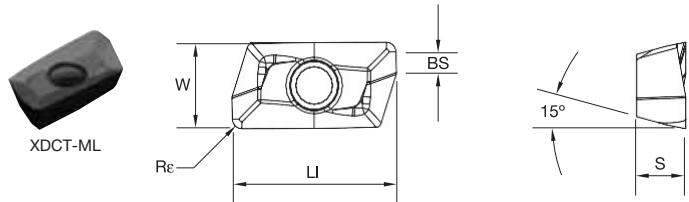
■ XDPT-MM

catalogue number	cutting edges	LI	BS	S	W	Rε	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM	WU35PM
XDPT110404PDSRMM	2	13,43	2,06	4,00	6,90	0,40	0,06	5415428	5415428	5642237	5642237	5415450	5642231	5642231	6180149	6180149
XDPT110408PDSRMM	2	13,44	1,68	4,00	6,90	0,79	0,06	5415315	5415315	5415319	5415319	5415450	5545063	5519921	6180148	5415317
XDPT110412PDSRMM	2	13,44	1,29	4,00	6,90	1,20	0,06	5415310	5415310	5415314	5415314	5415313	5642232	6180150	6180150	5415312
XDPT110416PDSRMM	2	13,51	0,85	4,13	6,95	1,60	0,06	5415250	5415250	5415254	5415254	5415313	5642233	6180172	6180172	5415254
XDPT110420PDSRMM	2	13,51	0,45	4,13	6,95	2,00	0,06	5901355	5901355	5980399	5980399	5980400	5980398	5980398	5980398	5980398
XDPT110424PDSRMM	2	13,37	—	4,01	6,94	2,40	0,06	5415425	5415425	5901354	5901354	5901354	5517827	5517827	5517827	5517827
XDPT110431PDSRMM	2	12,91	—	4,00	6,89	3,10	0,06	5415422	5415422	5415426	5415426	5415425	5642234	5517827	5517827	5517827

NEW!

Indexable Milling

Indexable Milling



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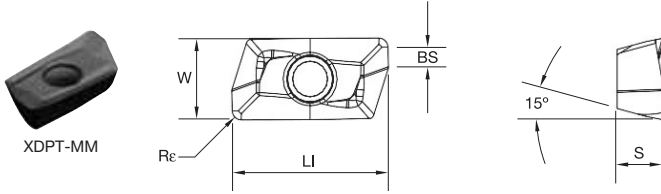
WIDIA
VICTORY

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

■ XDCT-ML

catalogue number	cutting edges	LI	BS	S	W	Rε	hm	W	K	N	S	H
XDCT170404PEERML	2	19,15	2,62	4,90	9,60	0,40	0,04	●	○	○	○	○
XDCT170408PEERML	2	19,15	2,22	4,90	9,60	0,80	0,04	●	○	○	○	○
XDCT170412PEERML	2	19,16	1,82	4,90	9,60	1,20	0,04	●	○	○	○	○
XDCT170416PEERML	2	19,17	1,42	4,90	9,60	1,60	0,04	●	○	○	○	○
XDCT170420PEERML	2	19,17	1,01	4,90	9,60	2,00	0,04	●	○	○	○	○
XDCT170424PEERML	2	19,17	0,63	4,90	9,60	2,40	0,04	●	○	○	○	○
XDCT170432PEERML	2	18,85	—	4,88	9,59	3,20	0,04	●	○	○	○	○
XDCT170440PEERML	2	18,33	—	4,87	9,59	4,00	0,04	●	○	○	○	○
XDCT170460PEERML	2	17,02	—	4,80	9,56	6,00	0,04	●	○	○	○	○

NEW!



- -MM is a medium- to heavy-machining geometry and is the first choice for general purpose and universal applications.

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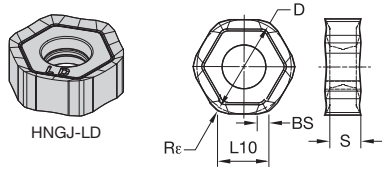
P	●	○	○	○	○	○	○	○
M	●	○	○	○	○	○	○	○
K	●	○	○	○	○	○	○	○
N	●	○	○	○	○	○	○	○
S	●	○	○	○	○	○	○	○
H	●	○	○	○	○	○	○	○

Indexable Milling

■ XDPT-MM

catalogue number	cutting edges	LI	BS	S	W	Rε	hm	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS40PM	WU35PM
XDPT170404PESRMM	2	19,15	2,52	4,90	9,60	0,40	0,10	●	○	○	○	○	○	○
XDPT170408PESRMM	2	19,15	2,15	4,90	9,60	0,80	0,10	●	○	○	○	○	○	○
XDPT170412PESRMM	2	19,16	1,77	4,90	9,60	1,20	0,10	●	○	○	○	○	○	○
XDPT170416PESRMM	2	19,17	1,38	4,90	9,60	1,60	0,10	●	○	○	○	○	○	○
XDPT170420PESRMM	2	19,17	0,99	4,90	9,60	2,00	0,10	●	○	○	○	○	○	○
XDPT170424PESRMM	2	19,17	0,62	4,90	9,60	2,40	0,10	●	○	○	○	○	○	○
XDPT170432PESRMM	2	18,85	—	4,89	9,59	3,20	0,10	●	○	○	○	○	○	○
XDPT170440PESRMM	2	18,33	—	4,87	9,59	4,00	0,10	●	○	○	○	○	○	○

NEW!

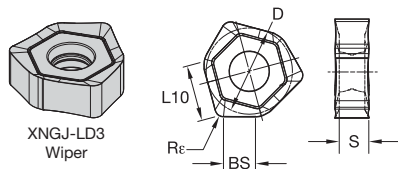


HNGJ-LD

● first choice
○ alternate choice

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

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM
HNGJ0704ANENLD	12	12,70	6,80	4,48	1,60	1,20	0,08	3954419	3954420	3954421	3954422	3954430	5895291	5895292	5550905	5528975	6180300	6180295
HNGJ070432ANENLD	12	12,70	6,80	4,48	—	3,21	0,08	3954428	3954429	3954429	3954430	5427373	5895298	5895299	5528975	6180300	6180300	6180300



XNGJ-LD3 Wiper

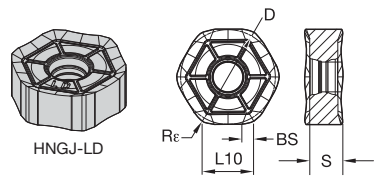
● first choice
○ alternate choice

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

catalogue number	cutting edges	D	L10	S	BS	Re	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM
XNGJ0704ANENLD3W	3	12,70	6,78	4,47	6,78	1,30	0,08	3954424	3954425	3954426	3954427	5427373	5895298	5895299	5528975	6180300	6180300	6180300

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.

Indexable Milling



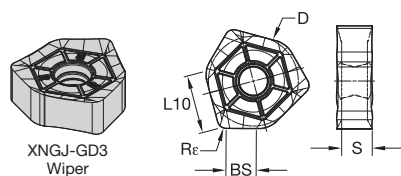
HNGJ-LD

● first choice
○ alternate choice

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

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM
HNGJ0905ANENLD	12	15,88	8,58	5,56	1,80	1,20	0,05	3093559	3330950	3030034	3030017	—	5895346	5895347	5895348	5528973	6180276

NEW!



XNGJ-GD3 Wiper

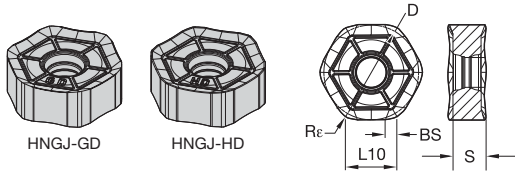
● first choice
○ alternate choice

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

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM
XNGJ0905ANSNGD3W	3	15,88	9,60	5,51	6,00	1,60	0,09	3524707	3523620	3066479	—	5622622	5895381	—	5895382	—	6180277

NEW!

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.



● first choice
○ alternate choice

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

■ HNGJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM
HNGJ0905ANSNGD	12	15,88	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	5427370	5400965	5895349	5895350	5528974	6180280

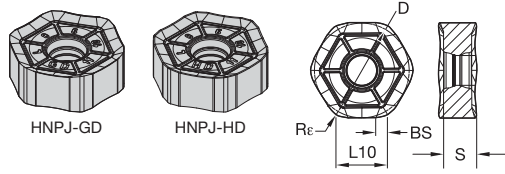
■ HNGJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM
HNGJ0905ANSNHD	12	15,88	8,59	5,46	1,66	1,20	0,17	3564083	3563901	3563902	-	-	5895371	5895372	5895373	-	6180291
HNGJ090543ANSNHD	12	15,88	8,50	5,44	-	4,35	0,20	3564084	-	-	-	-	-	-	-	-	-

NEW!

Indexable Milling

Indexable Milling



● first choice
○ alternate choice

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

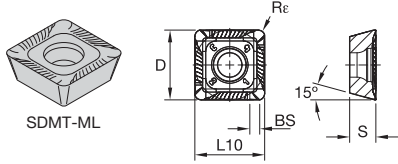
■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM
HNPJ0905ANSNGD	12	15,88	8,58	5,56	1,80	1,20	0,10	3761185	—	3761187	3761188	5427372	5895374	5895375	5550908	—	6180278

NEW!

■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	WS30PM	WS40PM
HNPJ0905ANSNHD	12	15,88	8,59	5,46	1,66	1,20	0,18	3670864	—	3670842	—	5427371	5895376	5895377	5550909	—	6180279
HNPJ090543ANSNHD	12	15,88	8,50	5,44	—	4,34	0,13	3670866	—	3670865	—	—	5895378	5895379	5895380	—	6180294



SDMT-ML

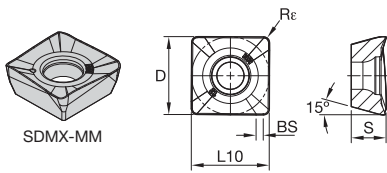
● first choice
○ alternate choice

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

■ SDMT-ML

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM	WS40PM
SDMT1204PDRML	4	12,70	12,70	4,77	1,10	1,20	0,08	○	○	○	○	○	○	○	○	○

NEW!



SDMX-MM

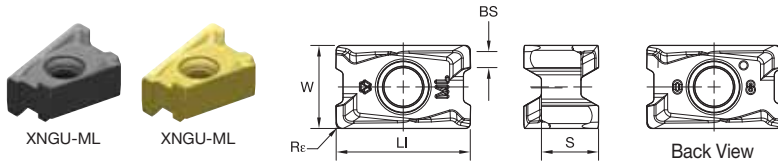
● first choice
○ alternate choice

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

■ SDMX-MM

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM	WS40PM
SDMX120408RMM	4	12,70	12,70	4,76	1,93	0,80	0,10	○	○	○	○	○	○	○	○
SDMX120412RMM	4	12,70	12,70	4,76	1,50	1,20	0,10	○	○	○	○	○	○	○	○
SDMX120416RMM	4	12,70	12,70	4,76	1,50	1,60	0,10	○	○	○	○	○	○	○	○
SDMX120424RMM	4	12,70	12,70	4,76	0,60	2,40	0,10	○	○	○	○	○	○	○	○
SDMX120432RMM	4	12,70	12,70	4,76	—	3,20	0,10	○	○	○	○	○	○	○	○

NEW!



- -ML geometry is the first choice for machining stainless steel. With reduced cutting forces, this is recommended for improved wall finishing capabilities in steels.

- first choice
- alternate choice

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

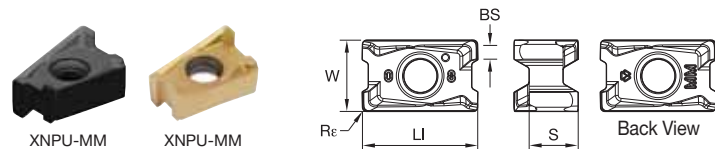
■ XNGU-ML • Precision Finishing

catalogue number	cutting edges	LI	S	W	BS	Re	hm	WK15CM	WK15PM	WN25PM	WP25PM	WP35CM	WP40PM	WS40PM	WU35PM
XNGU15T604ERML	4	16,20	6,88	10,00	2,20	0,40	0,08	●	●	●	○	○	○	○	○
XNGU15T608ERML	4	16,20	6,88	10,00	1,80	0,80	0,08	●	●	●	○	○	○	○	○

NEW!

Indexable Milling

Indexable Milling



- -MM is the universal geometry for VSM490-15. First choice when machining steel, as well as stainless steel and high-temp alloys in heavy applications.

- first choice
- alternate choice

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

■ XNPU-MM • Utility Roughing

catalogue number	cutting edges	LI	S	W	BS	Re	hm	WK15CM	WK15PM	WN25PM	WP25PM	WP35CM	WP40PM	WS40PM	WU35PM
XNPU15T608SRMM	4	16,10	6,88	10,00	1,90	0,80	0,10	5873420	5873419	-	5873415	5873418	5873416	6180320	5873417
XNPU15T612SRMM	4	16,10	6,88	10,00	1,50	1,20	0,10	5890763	5890762	-	5890728	5890761	5890729	6180321	5890730
XNPU15T616SRMM	4	16,10	6,88	10,00	1,10	1,60	0,10	5883522	5883521	-	5883447	5883450	5883448	6180322	5883449
XNPU15T620SRMM	4	16,10	6,88	10,00	0,70	2,00	0,10	6030375	-	-	6030372	6030374	6030373	-	-

NEW!

NOVO KNOWS SEARCH

Searching for a tool by using the outdated method of a catalogue has been replaced with the Advise and Select functions from NOVO™ — saving you time and money.

ADVISE

Uses a rules-based approach to provide cutting tool recommendations:

- Define Machining Feature (face milling, slotting, blind hole, etc.)
- Apply Constraint Requirements (geometric, material, tolerance, etc.)
- Set Machining Sequence (single or multi-step operations, rough then finish, etc.)
- Receive Ranked Results

SELECT

A method of selecting cutting tools from a tree structure via a hierarchy or parametric search:

- If you know which product you are looking for, a quick search can be performed by just the catalogue number or product description.
- Smart filters significantly reduce the amount of potential tooling solutions.
- After the tool is selected, NOVO also provides cutting and adaptive item options that fit with your solution.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. widia.com/novo

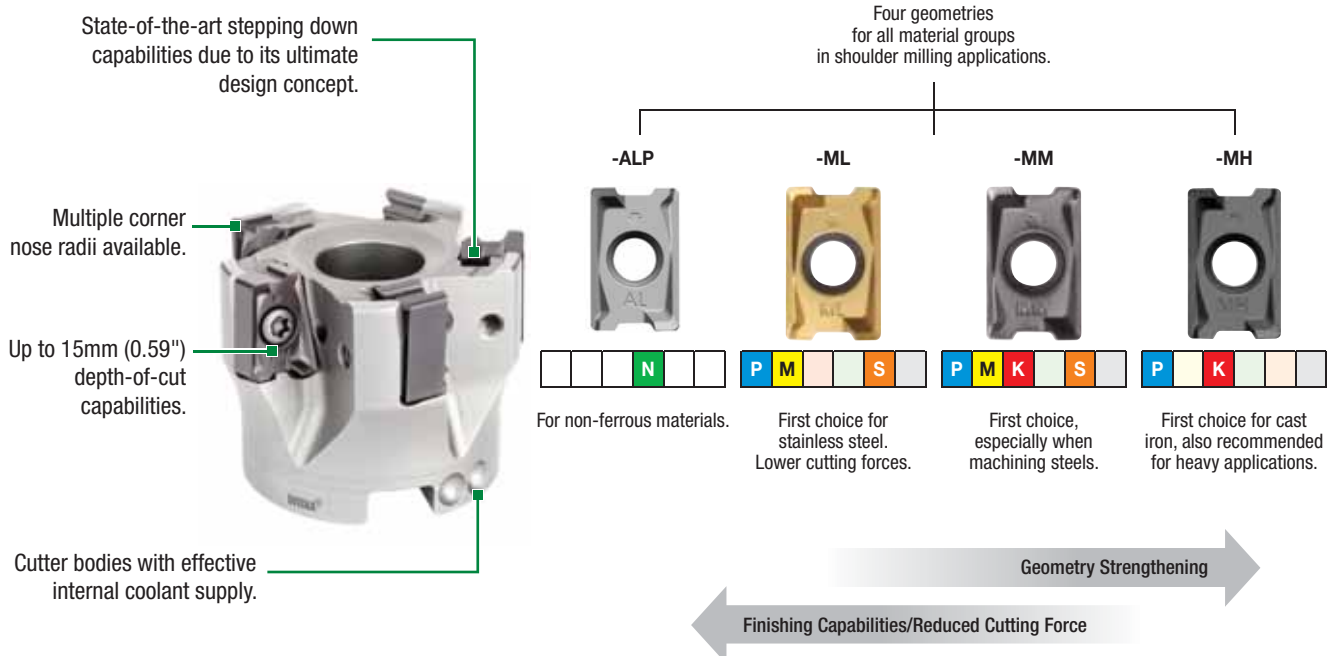
Double-Sided Shoulder Mill •
VSM490™ -15

VSM490-15



WIDIA™ Victory™ Shoulder Milling Series (VSM series) is specially engineered to achieve excellent surface quality as well as higher material removal rates in shoulder milling applications. The VSM490 series, with its unique design, enables the tool to be applied in multiple passes (stepping down) with outstanding results. VSM490-15 is applicable in a wide range of workpiece materials: steel, cast iron, stainless steel, and titanium, from roughing to finishing applications.

- Double-sided strong insert with 4 cutting edges.
- High positive geometry for lower cutting forces.
- Superior wall and surface finish capabilities.



90° Shoulder Mills



VSM490™-15

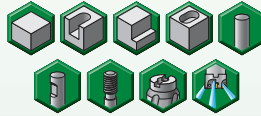
Max depth of cut: 15mm

Lead angle: 90°

Indexes per insert: 4

Diameter: 25–160mm

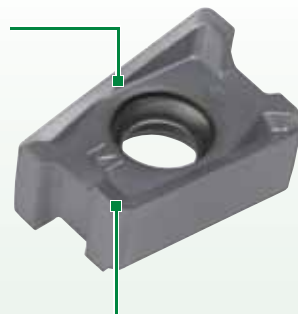
Pages: A15–A16,
A20–A28



VSM490-15 • Unbeatable Performance in Shoulder Milling

- “Stepless” solution.
- No mismatch when machining walls in different steps.

Innovative cutting geometry provides superior wall and surface finish.



Integrated wiper facet for excellent floor finishing.

Competitor Tool • Wall Quality



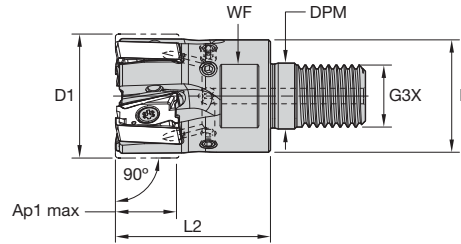
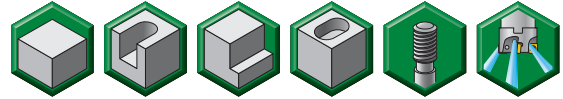
Traditional tools are designed to achieve a 90° wall, but exhibit poor performance when machining walls in multiple passes.

VSM490-15 • Wall Quality



VSM490-15 minimises the marks left. By increasing wall quality and avoiding a second tool, productivity increases significantly.

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.



■ Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	kg	max RPM
5873211	VSM490D025Z02M12XN15	25	21	13	M12	32	17	15,0	2	0,18	26700
5873212	VSM490D032Z03M16XN15	32	29	17	M16	40	24	15,0	3	0,18	22000
5873213	VSM490D032Z04M16XN15	32	29	17	M16	40	24	15,0	4	0,18	22000
5873214	VSM490D035Z04M16XN15	35	29	17	M16	40	24	15,0	4	0,19	20600

■ Spare Parts



insert screw

MS-2071



Nm

3,5

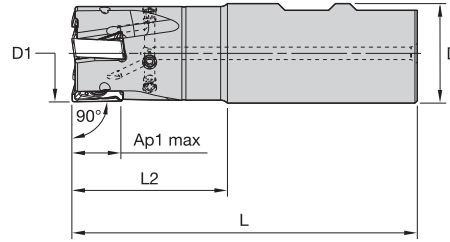
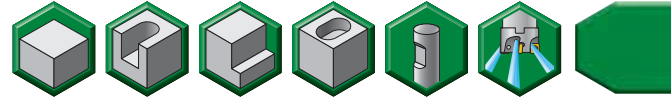


Torx Plus driver

DT15IP

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- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.



Indexable Milling

■ **Weldon Shanks**

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	kg	max RPM
5710285	VSM490D025Z02B25XN15	25	25	89	32	15,0	2	0,28	26700
5710286	VSM490D032Z03B32XN15	32	32	111	50	15,0	3	0,58	22000
5873215	VSM490D040Z03B32XN15	40	32	111	50	15,0	3	0,65	18800

NOTE: Weldon type not recommended for finishing operations.

■ **Spare Parts**



insert screw

MS-2071



Nm

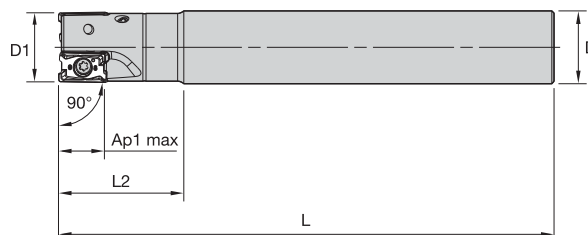
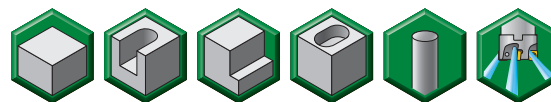
3,5



Torx Plus driver

DT151P

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.



■ Cylindrical End Mills

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	kg	max RPM
5873216	VSM490D025Z02A25XN15L100	25	25	100	43	15,0	2	0,32	26700
5710287	VSM490D025Z02A25XN15L170	25	25	170	43	15,0	2	0,59	26700
5873217	VSM490D032Z03A32XN15L110	32	32	110	49	15,0	3	0,59	22000
5710288	VSM490D032Z03A32XN15L200	32	32	200	50	15,0	3	1,14	22000
5873218	VSM490D032Z04A32XN15L110	32	32	110	49	15,0	4	0,58	22000
5873219	VSM490D032Z04A32XN15L200	32	32	200	50	15,0	4	1,14	22000

■ Spare Parts



insert screw

MS-2071



Nm

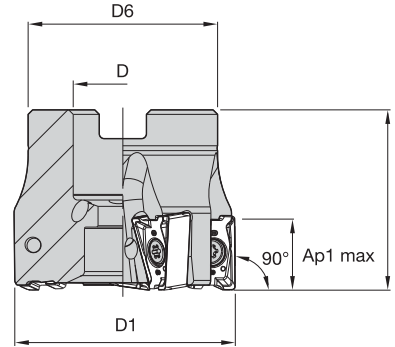
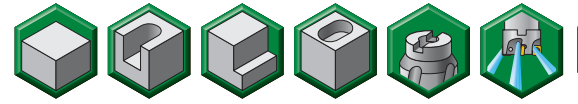
3,5



Torx Plus driver

DT15IP

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.



Indexable Milling

■ Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	kg	max RPM
5710289	VSM490D040Z04S16XN15	40	16	37	40	15,0	4	0,20	18800
5710520	VSM490D040Z05S16XN15	40	16	37	40	15,0	5	0,19	18800
5873221	VSM490D050Z04S22XN15	50	22	42	40	15,0	4	0,28	16300
5710521	VSM490D050Z05S22XN15	50	22	42	40	15,0	5	0,28	16300
5710522	VSM490D050Z06S22XN15	50	22	42	40	15,0	6	0,28	16300
5873222	VSM490D063Z05S22XN15	63	22	50	40	15,0	5	0,50	14200
5710523	VSM490D063Z06S22XN15	63	22	50	40	15,0	6	0,49	14200
5710524	VSM490D063Z07S22XN15	63	22	50	40	15,0	7	0,48	14200
5873223	VSM490D080Z05S27XN15	80	27	60	50	15,0	5	1,03	12300
5710525	VSM490D080Z07S27XN15	80	27	60	50	15,0	7	1,03	12300
5873224	VSM490D080Z09S27XN15	80	27	60	50	15,0	9	1,04	12300
5710526	VSM490D100Z08S32XN15	100	32	80	50	15,0	8	1,61	10900
5873225	VSM490D100Z11S32XN15	100	32	80	50	15,0	11	1,64	10900
5873226	VSM490D125Z09S40XN15	125	40	90	63	15,0	9	2,96	9600
5873227	VSM490D125Z12S40XN15	125	40	90	63	15,0	12	3,11	9600
5873228	VSM490D160Z12S40XN15	160	40	110	63	15,0	12	4,80	8400

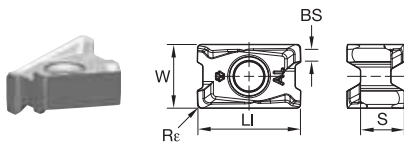
■ Spare Parts

D1	insert screw	Nm	Torx Plus driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly	coolant lock screw	coolant shower plate
40	MS-2071	3,5	DT15IP	125.825	MS1294CG	—	—	—
50	MS-2071	3,5	DT15IP	125.025	MS1234CG	—	—	—
63	MS-2071	3,5	DT15IP	125.025	MS1234CG	—	—	—
80	MS-2071	3,5	DT15IP	125.230	MS2038CG	—	—	—
100	MS-2071	3,5	DT15IP	—	—	MS2189C	—	—
125	MS-2071	3,5	DT15IP	—	—	MS2187C	—	—
160	MS-2071	3,5	DT15IP	—	—	—	420.200	470.233

NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1-P2	XNGU-ML	WP40PM	XNPU-ML	WP40PM	XNPU-MM	WP40PM
P3-P4	XNGU-ML	WP25PM	XNPU-MM	WP35CM	XNPU-MM	WP40PM
P5-P6	XNGU-MM	WP25PM	XNPU-MM	WP35CM	XNPU-MM	WP40PM
M1-M2	XNGU-ML	WU35PM	XNGU-ML	WU35PM	XNPU-MM	WU35PM
M3	XNGU-ML	WU35PM	XNGU-ML	WU35PM	XNPU-MM	WU35PM
K1-K2	XNPU-MM	WK15CM	XNGU-MH	WK15CM	XNGU-MH	WP35CM
K3	XNPU-MM	WK15PM	XNGU-MH	WK15PM	XNGU-MH	WP25PM
N1-N2	XNGU-ALP	WN25PM	XNGU-ALP	WN25PM	XNGU-ALP	WN25PM
N3	XNGU-ALP	WN25PM	XNGU-ALP	WN25PM	XNGU-ALP	WN25PM
S1-S2	XNGU-ML	WP25PM	XNGU-ML	WU35PM	XNPU-MM	WU35PM
S3	XNGU-ML	WP25PM	XNGU-ML	WU35PM	XNPU-MM	WU35PM
S4	XNGU-ML	WU35PM	XNGU-ML	WU35PM	XNPU-MM	WU35PM
H1	-	-	-	-	-	-



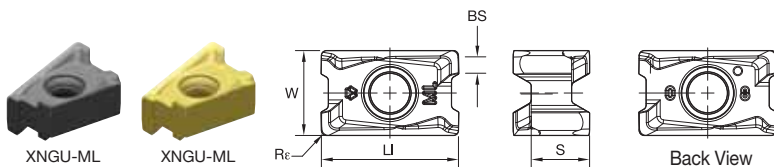
- -ALP is the first choice for milling aluminium and other non-ferrous alloys.

- first choice
- alternate choice

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

■ XNGU-ALP • For aluminium and other non-ferrous alloys

catalogue number	cutting edges	LI	S	W	BS	Re	hm	WK15CM	WK15PM	WN25PM	WP25PM	WP35CM	WP40PM	WS40PM	WU35PM
NEW! XNGU15T604ERALP	4	16,20	6,88	10,00	2,20	0,40	0,03	●	○	○	○	○	○	○	○
NEW! XNGU15T608ERALP	4	16,20	6,88	10,00	1,80	0,80	0,03	○	○	○	○	○	○	○	○



- -ML geometry is the first choice for machining stainless steel. With reduced cutting forces, this is recommended for improved wall finishing capabilities in steels.

- first choice
- alternate choice

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

■ XNGU-ML • Precision Finishing

catalogue number	cutting edges	LI	S	W	BS	Re	hm	WK15CM	WK15PM	WN25PM	WP25PM	WP35CM	WP40PM	WS40PM	WU35PM
XNGU15T604ERML	4	16,20	6,88	10,00	2,20	0,40	0,08	○	○	○	○	○	○	○	○
XNGU15T608ERML	4	16,20	6,88	10,00	1,80	0,80	0,08	○	○	○	○	○	○	○	○

Indexable Milling

■ Recommended Starting Speeds [m/min]

Material Group		WK15CM	WK15PM	WN25PM	WP25PM	WP35CM	WP40PM	WS40PM	WU35PM
P	1	- - -	- - -	- - -	330 285 270	455 395 370	295 260 245	- - -	260 230 215
	2	- - -	- - -	- - -	275 240 200	280 255 230	250 215 180	- - -	220 190 160
	3	- - -	- - -	- - -	255 215 175	255 230 205	230 195 160	- - -	200 170 140
	4	- - -	- - -	- - -	225 185 150	190 175 160	205 170 135	- - -	180 150 120
	5	- - -	- - -	- - -	185 170 150	260 230 210	170 155 135	135 100 70	150 135 120
	6	- - -	- - -	- - -	165 125 100	160 135 110	150 115 90	115 80 50	130 100 80
M	1	- - -	- - -	- - -	205 180 165	205 185 155	195 170 155	260 185 115	170 150 135
	2	- - -	- - -	- - -	185 160 130	185 160 140	175 150 125	230 170 105	155 130 110
	3	- - -	- - -	- - -	140 120 95	145 130 115	130 115 90	190 135 85	115 100 80
K	1	420 385 340	270 245 215	- - -	230 205 185	295 265 240	- - -	- - -	- - -
	2	335 295 275	210 190 175	- - -	180 160 150	235 210 190	- - -	- - -	- - -
	3	280 250 230	175 160 145	- - -	150 135 120	195 175 160	- - -	- - -	- - -
N	1	- - -	- - -	1075 945 875	- - -	- - -	- - -	- - -	- - -
	2	- - -	- - -	945 875 760	- - -	- - -	- - -	- - -	- - -
	3	- - -	- - -	945 875 760	- - -	- - -	- - -	- - -	- - -
S	1	- - -	- - -	- - -	40 35 25	- - -	40 35 30	62 45 27	35 30 25
	2	- - -	- - -	- - -	40 35 25	- - -	40 35 30	55 40 26	35 30 25
	3	- - -	- - -	- - -	50 40 25	- - -	50 40 30	64 46 29	45 35 25
	4	- - -	- - -	- - -	70 50 35	66 50 33	65 50 35	90 66 42	60 45 30
H	1	- - -	- - -	- - -	120 90 70	- - -	- - -	- - -	- - -

NOTE: FIRST choice starting speeds are in **bold** type.
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
-----------------	-----------------	-----------------

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	10%			20%			30%			40%			50-100%			
XNGU-ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	XNGU-ALP
XNGU-ML	0,17	0,33	0,46	0,13	0,24	0,33	0,09	0,18	0,25	0,08	0,16	0,22	0,08	0,14	0,20	XNGU-ML
XNPU-MM	0,23	0,40	0,64	0,17	0,29	0,46	0,13	0,22	0,35	0,11	0,19	0,30	0,10	0,18	0,28	XNPU-MM
XNGU-MH	0,23	0,46	0,70	0,17	0,33	0,50	0,13	0,25	0,38	0,11	0,22	0,33	0,10	0,20	0,30	XNGU-MH

NOTE: Use "Light Machining" values as starting feed rate.

Order a VSM490™ Kit and experience the next level of shoulder milling!

VSM490-15 Starter Kits

Order one of our starter kits and test the performance of our new VSM490-15 platform. The kits are set up to serve the majority of shoulder milling applications and workpiece materials, delivered with a cutter body as well as 20 inserts from a premium WIDIA™ grade. Detailed order information can be found in the table below.



■ VSM490-15 Starter Kits • Metric

order number	catalogue number	cutter diameter/ flutes	cutter body type	material group	application range	content				
						cutter	qty	inserts	grade	qty
5966234	VSM490KITC-D25Z02WP40PM	25z2	CYLINDRICAL	P	▽▽	VSM490D025Z02A25XN15L170	1	XNPU15T608SRMM	WP40PM	20
5966235	VSM490KITC-D32Z03WP40PM	32z3	CYLINDRICAL	P	▽▽	VSM490D032Z03A32XN15L200	1	XNPU15T608SRMM	WP40PM	20
5966236	VSM490KITS-D40Z04WP40PM	40z4	SHELL MILL	P	▽▽	VSM490D040Z04S16XN15	1	XNPU15T608SRMM	WP40PM	20
5966237	VSM490KITS-D50Z05WP40PM	50z5	SHELL MILL	P	▽▽	VSM490D050Z05S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966238	VSM490KITS-D50Z06WP40PM	50z6	SHELL MILL	P	▽▽	VSM490D050Z06S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966239	VSM490KITS-D63Z06WP40PM	63z6	SHELL MILL	P	▽▽	VSM490D063Z06S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966240	VSM490KITS-D80Z07WP40PM	80z7	SHELL MILL	P	▽▽	VSM490D080Z07S27XN15	1	XNPU15T608SRMM	WP40PM	20
5966251	VSM490KITS-D100Z08WP40PM	100z8	SHELL MILL	P	▽▽▽	VSM490D100Z08S32XN15	1	XNPU15T608SRMM	WP40PM	20

▽ Heavy/Roughing
 ▽▽ Medium
 ▽▽▽ Light Machining/Finishing

(continued)

(VSM490-15 Starter Kits • Metric — continued)

order number	catalogue number	cutter diameter/ flutes	cutter body type	material group	application range	content				
						cutter	qty	inserts	grade	qty
5966252	VSM490KITC-D25Z02WU35PM	25z2	CYLINDRICAL	M+S	▽▽▽	VSM490D025Z02A25XN15L170	1	XNGU15T608ERML	WU35PM	20
5966253	VSM490KITC-D32Z03WU35PM	32z3	CYLINDRICAL	M+S	▽▽▽	VSM490D032Z03A32XN15L200	1	XNGU15T608ERML	WU35PM	20
5966255	VSM490KITS-D40Z04WU35PM	40z4	SHELL MILL	M+S	▽▽▽	VSM490D040Z04S16XN15	1	XNGU15T608ERML	WU35PM	20
5966256	VSM490KITS-D50Z05WU35PM	50z5	SHELL MILL	M+S	▽▽▽	VSM490D050Z05S22XN15	1	XNGU15T608ERML	WU35PM	20
5966257	VSM490KITS-D50Z06WU35PM	50z6	SHELL MILL	M+S	▽▽▽	VSM490D050Z06S22XN15	1	XNGU15T608ERML	WU35PM	20
5966258	VSM490KITS-D63Z06WU35PM	63z6	SHELL MILL	M+S	▽▽▽	VSM490D063Z06S22XN15	1	XNGU15T608ERML	WU35PM	20
5966259	VSM490KITS-D80Z07WU35PM	80z7	SHELL MILL	M+S	▽▽▽	VSM490D080Z07S27XN15	1	XNGU15T608ERML	WU35PM	20
5966260	VSM490KITC-D25Z02WK15PM	25z2	CYLINDRICAL	K	▽	VSM490D025Z02A25XN15L170	1	XNPU15T608SRMM	WK15PM	20
5966261	VSM490KITC-D32Z03WK15PM	32z3	CYLINDRICAL	K	▽	VSM490D032Z03A32XN15L200	1	XNPU15T608SRMM	WK15PM	20
5966262	VSM490KITS-D40Z04WK15PM	40z4	SHELL MILL	K	▽	VSM490D040Z04S16XN15	1	XNPU15T608SRMM	WK15PM	20
5966263	VSM490KITS-D50Z05WK15PM	50z5	SHELL MILL	K	▽	VSM490D050Z05S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966264	VSM490KITS-D50Z06WK15PM	50z6	SHELL MILL	K	▽	VSM490D050Z06S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966265	VSM490KITS-D63Z07WK15PM	63z7	SHELL MILL	K	▽	VSM490D063Z07S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966266	VSM490KITS-D80Z09WK15PM	80z9	SHELL MILL	K	▽	VSM490D080Z09S27XN15	1	XNPU15T608SRMM	WK15PM	20
5966267	VSM490KITS-D100Z11WK15PM	100z11	SHELL MILL	K	▽	VSM490D100Z11S32XN15	1	XNPU15T608SRMM	WK15PM	20

▽ Heavy/Roughing
 ▽▽ Medium
 ▽▽▽ Light Machining/Finishing

Engineered to Achieve Superior Surface Quality



Victory™ Shoulder Mill Series

The Victory Shoulder Mill (VSM) family of tools provides a comprehensive solution for your most challenging shoulder milling applications. The unique design of the VSM11™, VSM17™, and VSM490™ is capable of producing a true 90° wall in multiple material types. When combined with the latest WIDIA™ Victory grades, VSM from WIDIA provides superior performance at high speeds.

- Innovative cutting geometry provides superior wall and surface finish.
- State-of-the-art step-down capability.
- Real soft cutting action results in lower cutting forces and low machine power consumption.
- VSM11 and VSM17 offer aggressive ramping capabilities.
- VSM490 provides outstanding step-down capabilities in applications that require multiple passes.

To learn more about the benefits of the WIDIA™ Victory Shoulder Mill Series, contact your local distributor.

WIDIA 

Double-Sided Round Insert •

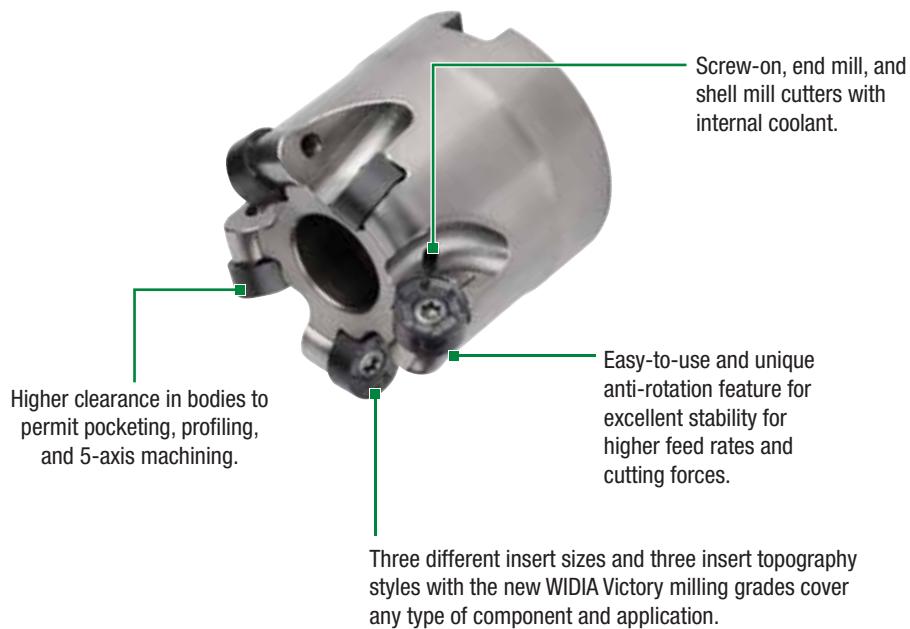
M200™ Series

Revolutionary double-sided round insert, capable of running in multiple types of milling operations and workpiece materials, increases customers' productivity with the most efficient cost per edge.

M200



- Up to 12 cutting edges per insert.
- Effective anti-rotation feature.
- Able to apply in all type of materials and milling applications.
- Latest WIDIA™ Victory™ grades offered.



Copy Mills

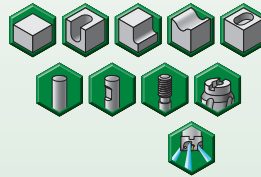


M200™

Max depth of cut: up to 5mm

Indexes per insert: up to 12
Diameter: 25–125mm

Pages: A32–A51



■ Insert Offering



M200 IC 10
10mm IC insert
8 cutting edges

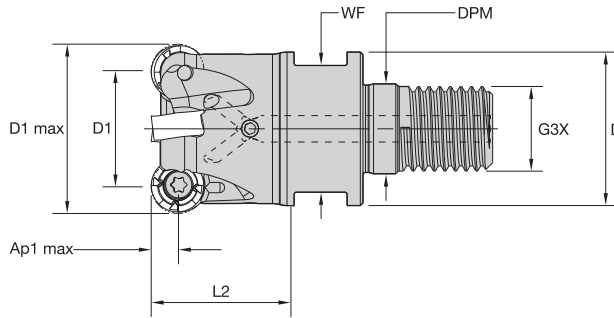


M200 IC 12
12mm IC insert
12 cutting edges



M200 IC 16
16mm IC insert
12 cutting edges

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



■ Screw-On End Mills

order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
5210273	M200D25Z03M12RN10	25	15	21	12,5	M12	32	17	5,0	3	0.6	54700	Yes	0,08
5210274	M200D32Z04M16RN10	32	22	29	17,0	M16	40	24	5,0	4	0.5	48300	Yes	0,18
5210275	M200D35Z05M16RN10	35	24	29	17,0	M16	40	24	5,0	5	0.5	46200	Yes	0,20
5210276	M200D42Z06M16RN10	42	32	29	17,0	M16	40	24	5,0	6	0.4	42200	Yes	0,24

■ Spare Parts



insert screw

191.848



Nm

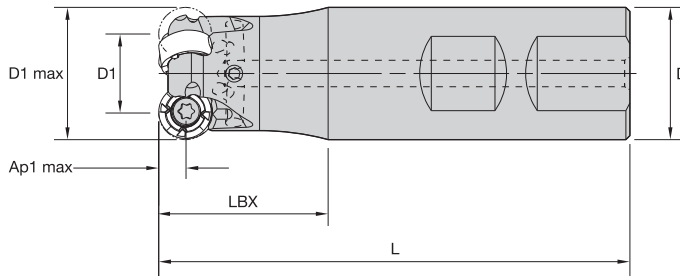
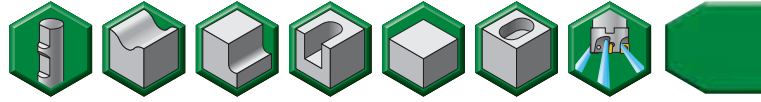
2,0



Torx driver

170.025

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



Indexable Milling

■ **Weldon Shanks**

order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
5210277	M200D25Z03B25RN10	25	15	25	89	40	5,0	3	0.6	54700	Yes	0,27
5210278	M200D32Z04B32RN10	32	22	32	101	40	5,0	4	0.5	48300	Yes	0,52

■ **Spare Parts**



insert screw

191.848



Nm

2,0

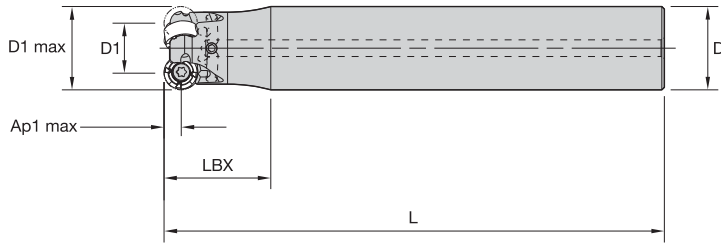


Torx driver

170.025

Indexable Milling

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



■ Cylindrical End Mills

order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
5210279	M200D25Z03A25RN10L150	25	15	25	150	32	5,0	3	0.6	54700	Yes	0,50
5210300	M200D25Z03A25RN10L200	25	15	25	200	32	5,0	3	0.6	54700	Yes	0,69
5210301	M200D25Z03A32RN10L250	25	15	32	250	32	5,0	3	0.6	54700	Yes	1,42
5210302	M200D28Z03A25RN10L200	28	18	25	200	40	5,0	3	0.6	51600	Yes	0,70
5210304	M200D32Z03A32RN10L200	32	22	32	200	40	5,0	3	0.5	48300	Yes	1,14
5210303	M200D32Z04A32RN10L150	32	22	32	150	40	5,0	4	0.5	48300	Yes	0,83

■ Spare Parts



insert screw

191.848



Nm

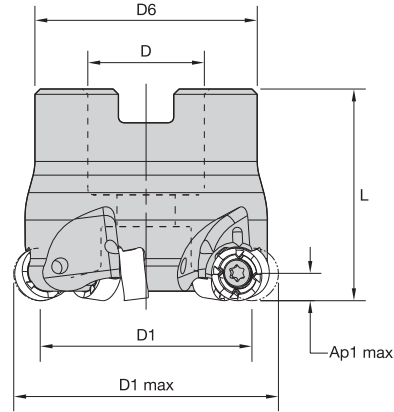
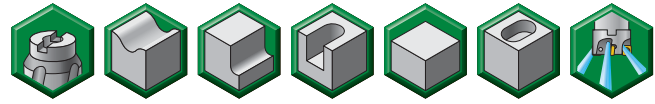
2,0



Torx driver

170.025

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.








Indexable Milling

■ **Shell Mills**

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
5210305	M200D40Z04RN10	40	30	16	38	40	5,0	4	0.4	43200	Yes	0,23
5210306	M200D40Z06RN10	40	30	16	38	40	5,0	6	0.4	43200	Yes	0,24
5210307	M200D50Z05RN10	50	40	22	42	40	5,0	5	0.3	38600	Yes	0,32
5210308	M200D50Z06RN10	50	40	22	42	40	5,0	6	0.3	38600	Yes	0,32
5210309	M200D52Z06RN10	52	42	22	49	50	5,0	6	0.3	37900	Yes	0,52

■ **Spare Parts**

D1 max	 insert screw	 Nm	 wrench	 socket-head cap screw	 socket-head cap screw with coolant groove
40	191.848	2,0	170.025	MS1294	MS1294CG
50	191.848	2,0	170.025	MS1234	MS1234CG
52	191.848	2,0	170.025	MS1242	MS1242CG

NOTE: Socket-head cap screw and socket-head cap screw with coolant groove must be ordered separately.

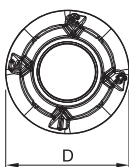
■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1-P2	ML	WP25PM	MM	WP40PM	MM	WP40PM
P3-P4	ML	WP25PM	MM	WP25PM	MH	WP40PM
P5-P6	ML	WP35CM	MM	WP35CM	MH	WP35CM
M1-M2	ML	WP25PM	ML	WU35PM	MM	WU35PM
M3	ML	WP25PM	MM	WU35PM	MM	WU35PM
K1-K2	MH	WK15CM	MH	WK15CM	MH	WP20CM
K3	MH	WK15CM	MH	WK15CM	MH	WP25PM
N1-N2	ALP	WN25PM	ALP	WN25PM	ALP	WN25PM
N3	ALP	WN25PM	ALP	WN25PM	ALP	WN25PM
S1-S2	ML	WS30PM	MM	WS30PM	MM	WU35PM
S3	ML	WS30PM	MM	WU35PM	MM	WU35PM
S4	ML	WS30PM	MM	WU35PM	MM	WU35PM
H1	MH	WP25PM	MH	WP20CM	-	-

IC10 • Inserts • RN.J10...



RNGJ-ALP



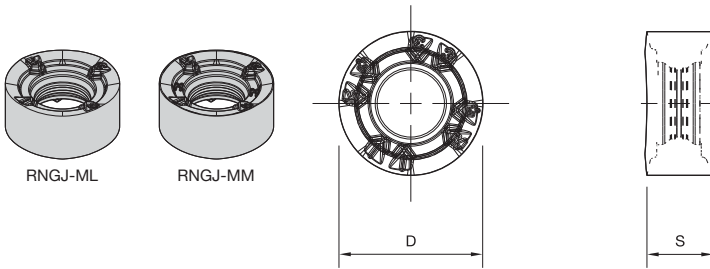
- ALP is the first choice for milling aluminium and other non-ferrous alloys.

- first choice
- alternate choice

■ RNGJ-ALP • For aluminium and other non-ferrous alloys

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

catalogue number	number of indexes	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
NEW! RNGJ10T3M0FALP	8	10,00	4,76	0,02	○	○	○	○	○	○	○	○



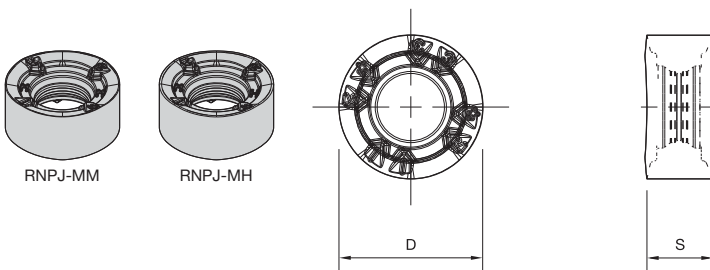
- -ML geometry is the first choice for stainless steel and high-temp alloys.
- -MM geometry is for general purpose, especially for steel.

RNGJ-ML

catalogue number	number of indexes	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNGJ10T3M0EML	8	10,00	4,76	0,04	•	•	•	•	•	•	•	•

RNGJ-MM

catalogue number	number of indexes	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNGJ10T3M0SMM	8	10,00	4,76	0,09	•	•	•	•	•	•	•	•



- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steel.

RNPJ-MM

catalogue number	number of indexes	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNPJ10T3M0SMM	8	10,00	4,76	0,09	•	•	•	•	•	•	•	•

RNPJ-MH

catalogue number	number of indexes	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNPJ10T3M0SMH	8	10,00	4,76	0,18	•	•	•	•	•	•	•	•

P	•	•	•	•	•	•	•	•	•	•	•	•
M	•	•	•	•	•	•	•	•	•	•	•	•
K	•	•	•	•	•	•	•	•	•	•	•	•
N	•	•	•	•	•	•	•	•	•	•	•	•
S	•	•	•	•	•	•	•	•	•	•	•	•
H	•	•	•	•	•	•	•	•	•	•	•	•

• first choice
○ alternate choice

WK15CM	•	•	•	•	•	•	•	•	•	•	•	•
WN25PM	•	•	•	•	•	•	•	•	•	•	•	•
WP20CM	•	•	•	•	•	•	•	•	•	•	•	•
WP25PM	•	•	•	•	•	•	•	•	•	•	•	•
WP35CM	•	•	•	•	•	•	•	•	•	•	•	•
WP40PM	•	•	•	•	•	•	•	•	•	•	•	•
WS30PM	•	•	•	•	•	•	•	•	•	•	•	•
WU35PM	•	•	•	•	•	•	•	•	•	•	•	•

P	•	•	•	•	•	•	•	•	•	•	•	•
M	•	•	•	•	•	•	•	•	•	•	•	•
K	•	•	•	•	•	•	•	•	•	•	•	•
N	•	•	•	•	•	•	•	•	•	•	•	•
S	•	•	•	•	•	•	•	•	•	•	•	•
H	•	•	•	•	•	•	•	•	•	•	•	•

• first choice
○ alternate choice

WK15CM	•	•	•	•	•	•	•	•	•	•	•	•
WN25PM	•	•	•	•	•	•	•	•	•	•	•	•
WP20CM	•	•	•	•	•	•	•	•	•	•	•	•
WP25PM	•	•	•	•	•	•	•	•	•	•	•	•
WP35CM	•	•	•	•	•	•	•	•	•	•	•	•
WP40PM	•	•	•	•	•	•	•	•	•	•	•	•
WS30PM	•	•	•	•	•	•	•	•	•	•	•	•
WU35PM	•	•	•	•	•	•	•	•	•	•	•	•

■ Recommended Starting Speeds [m/min]

Indexable Milling

Material Group		WK15CM			WN25PM			WP20CM			WP25PM		
P	1	-	-	-	-	-	-	660	580	540	395	340	325
	2	-	-	-	-	-	-	410	370	330	330	290	240
	3	-	-	-	-	-	-	370	330	305	305	260	210
	4	-	-	-	-	-	-	275	260	230	270	220	180
	5	-	-	-	-	-	-	330	300	275	220	205	180
	6	-	-	-	-	-	-	230	205	175	200	150	120
M	1	-	-	-	-	-	-	270	240	210	245	215	200
	2	-	-	-	-	-	-	245	210	190	220	190	155
	3	-	-	-	-	-	-	190	175	150	170	145	115
K	1	505	460	410	-	-	-	430	390	355	275	245	220
	2	400	355	330	-	-	-	340	305	280	215	190	180
	3	335	300	275	-	-	-	290	260	240	180	160	145
N	1	-	-	-	1290	1135	1050	-	-	-	-	-	-
	2	-	-	-	1135	1050	910	-	-	-	-	-	-
	3	-	-	-	1135	1050	910	-	-	-	-	-	-
S	1	-	-	-	-	-	-	-	-	-	50	40	30
	2	-	-	-	-	-	-	-	-	-	50	40	30
	3	-	-	-	-	-	-	-	-	-	60	50	30
	4	-	-	-	-	-	-	-	-	-	85	60	40
H	1	-	-	-	-	-	-	170	140	115	145	110	85
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-

Material Group		WP35CM			WP40PM			WS30PM			WU35PM		
P	1	545	475	445	355	310	295	445	385	360	310	275	260
	2	335	305	275	300	260	215	365	325	265	265	230	190
	3	305	275	245	275	235	190	340	290	235	240	205	170
	4	230	210	190	245	205	160	300	245	200	215	180	145
	5	310	275	250	205	185	160	245	230	200	180	160	145
	6	190	160	130	180	140	110	220	170	130	155	120	95
M	1	245	220	185	235	205	185	270	240	220	205	180	160
	2	220	190	170	210	180	150	245	215	175	185	155	130
	3	175	155	140	155	140	110	185	160	125	140	120	95
K	1	355	320	290	-	-	-	-	-	-	-	-	-
	2	280	250	230	-	-	-	-	-	-	-	-	-
	3	235	210	190	-	-	-	-	-	-	-	-	-
N	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-
S	1	-	-	-	50	40	35	55	50	35	40	35	30
	2	-	-	-	50	40	35	55	50	35	40	35	30
	3	-	-	-	60	50	35	65	55	35	55	40	30
	4	80	60	40	80	60	40	100	70	50	70	55	35
H	1	-	-	-	-	-	-	160	120	90	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-

NOTE: FIRST choice starting speeds are in **bold** type.
As the average chip thickness increases, the speed should be decreased.

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
-----------------	-----------------	-----------------

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,13	0,44	0,80	0,10	0,32	0,57	0,07	0,24	0,43	0,06	0,21	0,37	0,06	0,19	0,34	ML
MM	0,28	0,50	0,91	0,20	0,36	0,66	0,15	0,27	0,49	0,13	0,24	0,43	0,12	0,22	0,39	MM
MH	0,46	0,58	0,96	0,33	0,42	0,69	0,25	0,31	0,51	0,22	0,27	0,45	0,20	0,25	0,41	MH

At 2,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,15	0,51	0,92	0,11	0,37	0,66	0,08	0,27	0,49	0,07	0,24	0,43	0,07	0,22	0,39	ML
MM	0,32	0,58	1,06	0,23	0,42	0,76	0,18	0,31	0,57	0,15	0,27	0,49	0,14	0,25	0,45	MM
MH	0,54	0,67	1,11	0,39	0,48	0,80	0,29	0,36	0,59	0,25	0,32	0,52	0,23	0,29	0,47	MH

At 1,25 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,20	0,67	1,21	0,14	0,48	0,87	0,11	0,36	0,65	0,09	0,31	0,56	0,09	0,29	0,52	ML
MM	0,43	0,77	1,39	0,31	0,55	1,00	0,23	0,41	0,74	0,20	0,36	0,65	0,18	0,33	0,59	MM
MH	0,70	0,88	1,46	0,51	0,63	1,04	0,38	0,47	0,78	0,33	0,41	0,68	0,30	0,38	0,62	MH

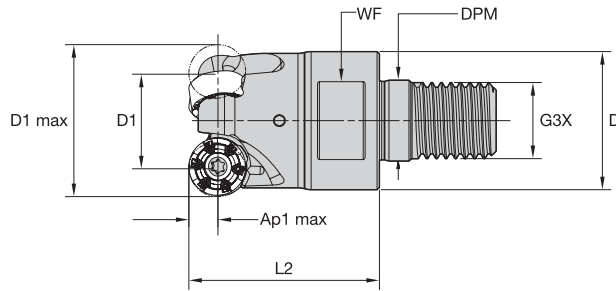
At 0,63 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,27	0,92	1,67	0,20	0,66	1,19	0,15	0,49	0,89	0,13	0,43	0,77	0,12	0,39	0,71	ML
MM	0,58	1,05	1,92	0,42	0,75	1,37	0,31	0,56	1,02	0,27	0,49	0,88	0,25	0,45	0,81	MM
MH	0,96	1,21	2,02	0,69	0,87	1,43	0,52	0,65	1,06	0,45	0,56	0,93	0,41	0,52	0,85	MH

NOTE: Use "Light Machining" value as starting feed rate.

Indexable Milling

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



■ Screw-On End Mills

order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
4147560	M200D32Z03M16RN12	32	20	29	17,0	M16	40	24	3,0	3	0.5	39160	Yes	0,18
4147561	M200D35Z03M16RN12	35	23	29	17,0	M16	40	24	3,0	3	0.4	37440	Yes	0,19
4147562	M200D42Z04M16RN12	42	30	29	17,0	M16	40	24	3,0	4	0.4	34180	Yes	0,23

■ Spare Parts



insert screw

193.492



Nm

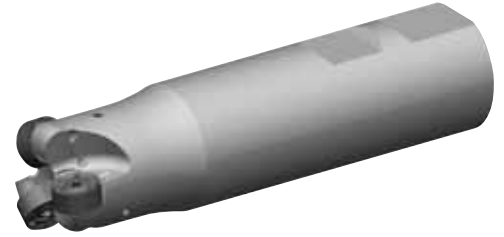
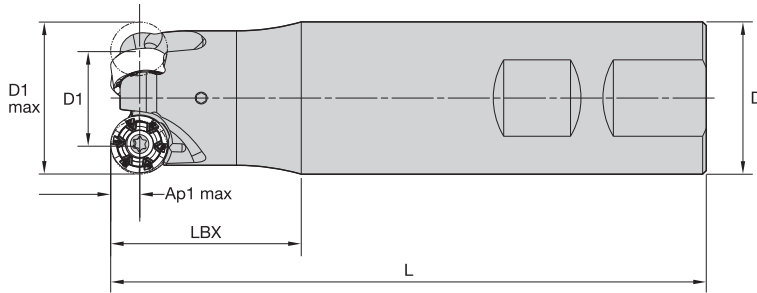
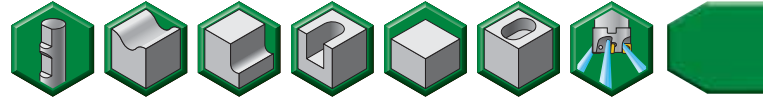
4,0



Torx driver

170.025

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



Indexable Milling

■ **Weldon Shanks**

order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
4147564	M200D32Z03B32RN12	32	20	32	125	40	3,0	3	0.5	39160	Yes	0,65

■ **Spare Parts**



insert screw

193.492



Nm

4,0

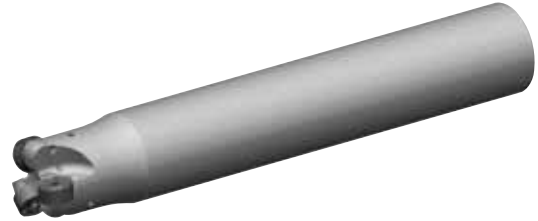
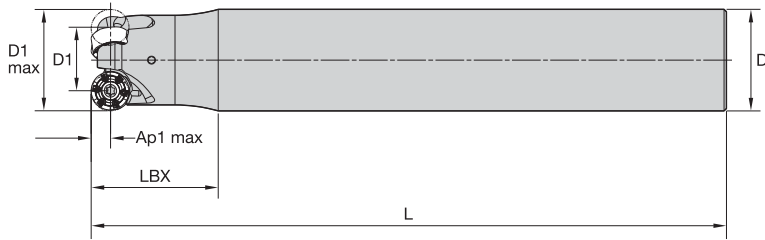


Torx driver

170.025

Indexable Milling

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



■ Cylindrical End Mills

order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
4147567	M200D32Z02A32RN12L250	32	20	32	250	40	3,0	2	0.4	39160	Yes	1,41
4147566	M200D32Z03A32RN12L200	32	20	32	200	40	3,0	3	0.5	39160	Yes	1,10

■ Spare Parts



insert screw

193.492



Nm

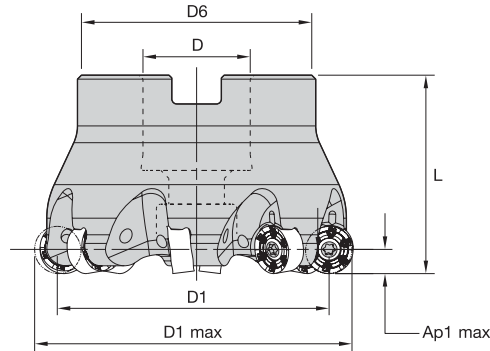
4,0



Torx driver

170.025

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



Indexable Milling

■ **Shell Mills**

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
4147568	M200D40Z04RN12	40	28	16	38	40	3,0	4	0.4	35020	Yes	0,22
4147569	M200D50Z04RN12	50	38	22	42	40	3,0	4	0.5	31330	Yes	0,29
4147570	M200D50Z05RN12	50	38	22	42	40	3,0	5	0.3	31330	Yes	0,29
4147571	M200D52Z05RN12	52	40	22	49	50	3,0	5	0.5	30720	Yes	0,50
4147572	M200D63Z05RN12	63	51	22	49	50	3,0	5	0.5	27910	Yes	0,63
4147573	M200D63Z07RN12	63	51	22	49	50	3,0	7	0.3	27910	Yes	0,63
4147574	M200D66Z07RN12	66	54	27	60	50	3,0	7	0.3	27260	Yes	0,82
4147575	M200D80Z06RN12	80	68	27	60	50	3,0	6	0.5	24760	Yes	1,02
4147576	M200D80Z08RN12	80	68	27	60	50	3,0	8	0.2	24760	Yes	1,02
4147577	M200D100Z07RN12	100	88	32	78	50	3,0	7	0.2	22150	Yes	1,45
4147578	M200D100Z09RN12	100	88	32	78	50	3,0	9	0.2	22150	Yes	1,41

■ **Spare Parts**



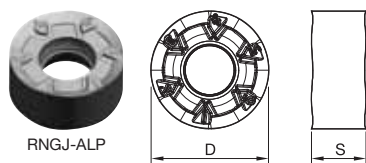
D1 max	insert screw	Nm	wrench	low-head cap screw	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant lock screw assembly
40	193.492	4,0	170.025	—	MS1294	MS1294CG	—	—
50	193.492	4,0	170.025	MS1336	—	MS2072CG	—	—
52	193.492	4,0	170.025	—	MS1242	MS1242CG	—	—
63	193.492	4,0	170.025	—	MS1242	MS1242CG	—	—
66	193.492	4,0	170.025	—	MS2038	MS2038CG	—	—
80	193.492	4,0	170.025	—	MS2038	MS2038CG	—	—
100	193.492	4,0	170.025	—	—	—	KLS32M	MS2195C

NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1-P2	ML	WP25PM	MM	WP40PM	MM	WP40PM
P3-P4	ML	WP25PM	MM	WP25PM	MH	WP40PM
P5-P6	ML	WP35CM	MM	WP35CM	MH	WP35CM
M1-M2	ML	WP25PM	ML	WU35PM	MM	WU35PM
M3	ML	WP25PM	MM	WU35PM	MM	WU35PM
K1-K2	MH	WK15CM	MH	WK15CM	MH	WP20CM
K3	MH	WK15PM	MH	WK15PM	MH	WP25PM
N1-N2	ALP	WN25PM	ALP	WN25PM	ALP	WN25PM
N3	ALP	WN25PM	ALP	WN25PM	ALP	WN25PM
S1-S2	ML	WS30PM	MM	WS30PM	MM	WU35PM
S3	ML	WS30PM	MM	WU35PM	MM	WU35PM
S4	ML	WS30PM	MM	WU35PM	MM	WU35PM
H1	MH	WP25PM	MH	WP20CM	-	-

IC12 • Inserts • RN.J12..



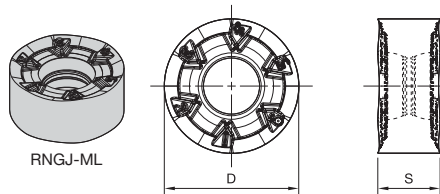
- ALP is the first choice for milling aluminium and other non-ferrous alloys.

■ RINGJ-ALP • For aluminium and other non-ferrous alloys

- first choice
- alternate choice

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

catalogue number	cutting edges	D	S	hm	WK15CM	WK15PM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
NEW! RINGJ1204M0FALP	12	12,00	4,75	0,02	●	●	○	○	○	○	○	○	○



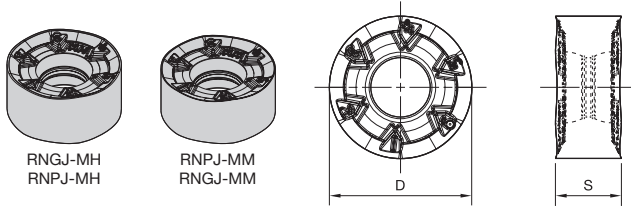
- ML geometry is the first choice for stainless steel and high-temp alloys.

■ RINGJ-ML

- first choice
- alternate choice

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

catalogue number	cutting edges	D	S	hm	WK15CM	WK15PM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RINGJ1204M0EML	12	12,00	4,75	0,04	●	●	●	●	○	○	○	○	○



- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steel.

- first choice
- alternate choice

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

■ RRGJ-MM

catalogue number	cutting edges	D	S	hm	WK15CM	WK15PM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RRGJ1204M0SMM	12	12,00	4,75	0,09	●	○	○	○	○	○	○	○	○

■ RRGJ-MH

catalogue number	cutting edges	D	S	hm	WK15CM	WK15PM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RRGJ1204M0SMH	12	12,00	4,75	0,19	○	●	○	○	○	○	○	○	○

■ RNPJ-MM

catalogue number	cutting edges	D	S	hm	WK15CM	WK15PM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNPJ1204M0SMM	12	12,00	4,75	0,09	○	○	○	○	○	○	○	○	○

■ RNPJ-MH

catalogue number	cutting edges	D	S	hm	WK15CM	WK15PM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNPJ1204M0SMH	12	12,00	4,75	0,18	○	○	○	○	○	○	○	○	○

■ Recommended Starting Speeds [m/min]

Indexable Milling

Material Group		WK15CM			WK15PM			WN25PM			WP20CM			WP25PM		
P	1	-	-	-	-	-	-	-	-	-	660	580	540	395	340	325
	2	-	-	-	-	-	-	-	-	-	410	370	330	330	290	240
	3	-	-	-	-	-	-	-	-	-	370	330	305	305	260	210
	4	-	-	-	-	-	-	-	-	-	275	260	230	270	220	180
	5	-	-	-	-	-	-	-	-	-	330	300	275	220	205	180
	6	-	-	-	-	-	-	-	-	-	230	205	175	200	150	120
M	1	-	-	-	-	-	-	-	-	-	270	240	210	245	215	200
	2	-	-	-	-	-	-	-	-	-	245	210	190	220	190	155
	3	-	-	-	-	-	-	-	-	-	190	175	150	170	145	115
K	1	505	460	410	325	295	260	-	-	-	430	390	355	275	245	220
	2	400	355	330	250	230	210	-	-	-	340	305	280	215	190	180
	3	335	300	275	210	190	175	-	-	-	290	260	240	180	160	145
N	1	-	-	-	-	-	-	1290	1135	1050	-	-	-	-	-	-
	2	-	-	-	-	-	-	1135	1050	910	-	-	-	-	-	-
	3	-	-	-	-	-	-	1135	1050	910	-	-	-	-	-	-
S	1	-	-	-	-	-	-	-	-	-	-	-	-	50	40	30
	2	-	-	-	-	-	-	-	-	-	-	-	-	50	40	30
	3	-	-	-	-	-	-	-	-	-	-	-	-	60	50	30
	4	-	-	-	-	-	-	-	-	-	-	-	-	85	60	40
H	1	-	-	-	-	-	-	-	-	-	170	140	115	145	110	85
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Material Group		WP35CM			WP40PM			WS30PM			WS40PM			WU35PM		
P	1	545	475	445	355	310	295	445	385	360	-	-	-	310	275	260
	2	335	305	275	300	260	215	365	325	265	-	-	-	265	230	190
	3	305	275	245	275	235	190	340	290	235	-	-	-	240	205	170
	4	230	210	190	245	205	160	300	245	200	-	-	-	215	180	145
	5	310	275	250	205	185	160	245	230	200	165	120	85	180	160	145
	6	190	160	130	180	140	110	220	170	130	140	100	60	155	120	95
M	1	245	220	185	235	205	185	270	240	220	315	225	140	205	180	160
	2	220	190	170	210	180	150	245	215	175	280	205	130	185	155	130
	3	175	155	140	155	140	110	185	160	125	230	165	105	140	120	95
K	1	355	320	290	-	-	-	-	-	-	-	-	-	-	-	-
	2	280	250	230	-	-	-	-	-	-	-	-	-	-	-	-
	3	235	210	190	-	-	-	-	-	-	-	-	-	-	-	-
N	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S	1	-	-	-	50	40	35	55	50	35	75	55	35	40	35	30
	2	-	-	-	50	40	35	55	50	35	70	50	35	40	35	30
	3	-	-	-	60	50	35	65	55	35	80	55	35	55	40	30
	4	80	60	40	80	60	40	100	70	50	110	80	50	70	55	35
H	1	-	-	-	-	-	-	160	120	90	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTE: FIRST choice starting speeds are in **bold** type.
As the average chip thickness increases, the speed should be decreased.

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
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At 6,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,12	0,18	0,32	0,09	0,13	0,23	0,07	0,10	0,18	0,06	0,08	0,15	0,05	0,08	0,14	ML
MM	0,28	0,51	0,84	0,21	0,37	0,61	0,15	0,28	0,45	0,13	0,24	0,39	0,12	0,22	0,36	MM
MH	0,46	0,70	1,02	0,33	0,50	0,73	0,25	0,38	0,55	0,22	0,33	0,48	0,20	0,30	0,44	MH

At 3,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,14	0,20	0,37	0,10	0,15	0,27	0,08	0,11	0,20	0,07	0,10	0,18	0,06	0,09	0,16	ML
MM	0,33	0,59	0,97	0,24	0,43	0,70	0,18	0,32	0,52	0,16	0,28	0,45	0,14	0,25	0,42	MM
MH	0,54	0,81	1,18	0,39	0,58	0,85	0,29	0,43	0,63	0,25	0,38	0,55	0,23	0,35	0,51	MH

At 1,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,18	0,27	0,49	0,13	0,19	0,35	0,10	0,15	0,26	0,09	0,13	0,23	0,08	0,12	0,21	ML
MM	0,43	0,77	1,28	0,31	0,56	0,92	0,23	0,42	0,68	0,20	0,36	0,60	0,19	0,33	0,55	MM
MH	0,70	1,06	1,56	0,51	0,76	1,12	0,38	0,57	0,83	0,33	0,50	0,72	0,30	0,45	0,66	MH

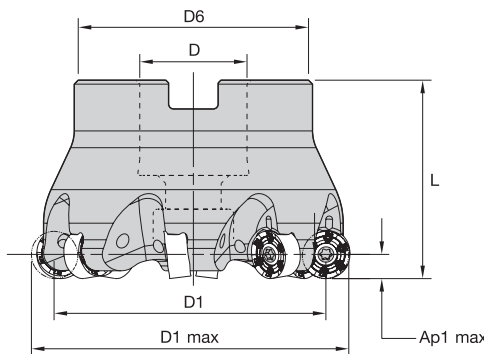
At 0,75 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,25	0,37	0,67	0,18	0,27	0,48	0,14	0,20	0,36	0,12	0,17	0,32	0,11	0,16	0,29	ML
MM	0,59	1,06	1,77	0,43	0,76	1,26	0,32	0,57	0,94	0,28	0,50	0,81	0,25	0,45	0,75	MM
MH	0,96	1,46	2,16	0,69	1,04	1,53	0,52	0,78	1,14	0,45	0,68	0,99	0,41	0,62	0,90	MH

NOTE: Use "Light Machining" value as starting feed rate.

Indexable Milling

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.



■ Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
5209989	M200D50Z04RN16	50	34	22	42	50	4,0	4	0.5	26700	Yes	0,36
5210210	M200D52Z04RN16	52	36	22	42	50	4,0	4	0.4	26000	Yes	0,39
5210211	M200D63Z04RN16	63	47	22	49	50	4,0	4	0.4	22700	Yes	0,58
5210212	M200D63Z06RN16	63	47	22	49	50	4,0	6	0.4	22700	Yes	0,56
5210213	M200D66Z05RN16	66	50	27	60	50	4,0	5	0.4	22000	Yes	0,69
5210214	M200D80Z05RN16	80	64	27	60	50	4,0	5	0.3	19500	Yes	0,88
5210215	M200D80Z07RN16	80	64	27	60	50	4,0	7	0.3	19500	Yes	0,89
5210216	M200D100Z06RN16	100	84	32	78	50	4,0	6	0.3	17000	Yes	1,36
5210217	M200D100Z08RN16	100	84	32	78	50	4,0	8	0.3	17000	Yes	1,37
5210218	M200D125Z08RN16	125	109	40	90	63	4,0	8	0.2	14900	Yes	2,50

■ Spare Parts



D1 max	insert screw	Nm	wrench	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant lock screw assembly
50	192.932	4,0	170.026	MS1242	MS1242CG	—	—
52	MS2260	4,0	170.026	MS1242	MS1242CG	—	—
63	MS2260	4,0	170.026	MS1242	MS1242CG	—	—
63	193.343	4,0	170.026	MS1242	MS1242CG	—	—
66	MS2260	4,0	170.026	MS2038	MS2038CG	—	—
80	MS2260	4,0	170.026	MS2038	MS2038CG	—	—
100	MS2260	4,0	170.026	—	—	KLS32M	MS2195C
125	MS2260	4,0	170.026	—	—	KLS40M	MS2187C

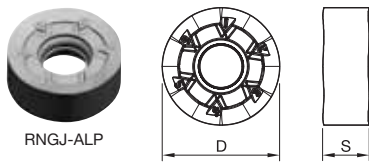
NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

■ **Insert Selection Guide**

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1-P2	ML	WP25PM	MM	WP40PM	MM	WP40PM
P3-P4	ML	WP25PM	MM	WP25PM	MH	WP40PM
P5-P6	ML	WP35CM	MM	WP35CM	MH	WP35CM
M1-M2	ML	WP25PM	ML	WU35PM	MM	WU35PM
M3	ML	WP25PM	MM	WU35PM	MM	WU35PM
K1-K2	MH	WK15CM	MH	WK15CM	MH	WP20CM
K3	MH	WK15CM	MH	WP20CM	MH	WP35CM
N1-N2	ALP	WN25PM	ALP	WN25PM	ALP	WN25PM
N3	ALP	WN25PM	ALP	WN25PM	ALP	WN25PM
S1-S2	ML	WS30PM	ML	WS30PM	ML	WU35PM
S3	ML	WS30PM	ML	WU35PM	ML	WU35PM
S4	ML	WS30PM	ML	WU35PM	ML	WU35PM
H1	MH	WP25PM	MH	WP20CM	-	-

Indexable Milling

IC16 • Inserts • RN.J16...



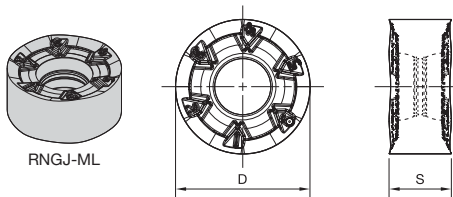
- -ALP is the first choice for milling aluminium and other non-ferrous alloys.

- first choice
- alternate choice

■ **RNGJ-ALP • For aluminium and other non-ferrous alloys**

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

catalogue number	cutting edges	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
NEW! RNGJ1605M0FALP	12	16,00	6,35	0,02	○	○	○	○	○	○	○	○



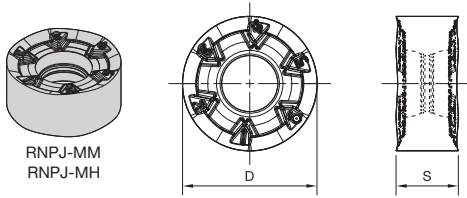
- -ML geometry is the first choice for stainless steel and high-temp alloys.

- first choice
- alternate choice

■ **RNGJ-ML**

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

catalogue number	cutting edges	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNGJ1605M0EML	12	16,00	6,35	0,04	○	○	○	○	○	○	○	○



- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steels.

● first choice
○ alternate choice

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

■ RNPJ-MM

catalogue number	cutting edges	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNPJ1605M0SMM	12	16,00	6,35	0,09	○	○	5276472	5276471	5276470	5542341	○	5476637

■ RNPJ-MH

catalogue number	cutting edges	D	S	hm	WK15CM	WN25PM	WP20CM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
RNPJ1605M0SMH	12	16,00	6,35	0,23	5276476	○	5276475	5276474	5276473	5542342	○	5476636

Recommended Starting Speeds

■ Recommended Starting Speeds [m/min]

Material Group		WK15CM			WN25PM			WP20CM			WP25PM		
P	1	-	-	-	-	-	-	660	580	540	395	340	325
	2	-	-	-	-	-	-	410	370	330	330	290	240
	3	-	-	-	-	-	-	370	330	305	305	260	210
	4	-	-	-	-	-	-	275	260	230	270	220	180
	5	-	-	-	-	-	-	330	300	275	220	205	180
	6	-	-	-	-	-	-	230	205	175	200	150	120
M	1	-	-	-	-	-	-	270	240	210	245	215	200
	2	-	-	-	-	-	-	245	210	190	220	190	155
	3	-	-	-	-	-	-	190	175	150	170	145	115
K	1	505	460	410	-	-	-	430	390	355	275	245	220
	2	400	355	330	-	-	-	340	305	280	215	190	180
	3	335	300	275	-	-	-	290	260	240	180	160	145
N	1	-	-	-	1290	1135	1050	-	-	-	-	-	-
	2	-	-	-	1135	1050	910	-	-	-	-	-	-
	3	-	-	-	1135	1050	910	-	-	-	-	-	-
S	1	-	-	-	-	-	-	-	-	-	50	40	30
	2	-	-	-	-	-	-	-	-	-	50	40	30
	3	-	-	-	-	-	-	-	-	-	60	50	30
	4	-	-	-	-	-	-	-	-	-	85	60	40
H	1	-	-	-	-	-	-	170	140	115	145	110	85
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

(Recommended Starting Speeds [m/min] – continued)

Material Group		WP35CM			WP40PM			WS30PM			WU35PM		
P	1	545	475	445	355	310	295	445	385	360	310	275	260
	2	335	305	275	300	260	215	365	325	265	265	230	190
	3	305	275	245	275	235	190	340	290	235	240	205	170
	4	230	210	190	245	205	160	300	245	200	215	180	145
	5	310	275	250	205	185	160	245	230	200	180	160	145
	6	190	160	130	180	140	110	220	170	130	155	120	95
M	1	245	220	185	235	205	185	270	240	220	205	180	160
	2	220	190	170	210	180	150	245	215	175	185	155	130
	3	175	155	140	155	140	110	185	160	125	140	120	95
K	1	355	320	290	-	-	-	-	-	-	-	-	-
	2	280	250	230	-	-	-	-	-	-	-	-	-
	3	235	210	190	-	-	-	-	-	-	-	-	-
N	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-
S	1	-	-	-	50	40	35	55	50	35	40	35	30
	2	-	-	-	50	40	35	55	50	35	40	35	30
	3	-	-	-	60	50	35	65	55	35	55	40	30
	4	80	60	40	80	60	40	100	70	50	70	55	35
H	1	-	-	-	-	-	-	160	120	90	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-

NOTE: FIRST choice starting speeds are in **bold** type.
As the average chip thickness increases, the speed should be decreased.

Indexable Milling

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining
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At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,12	0,37	0,48	0,09	0,27	0,35	0,07	0,20	0,26	0,06	0,17	0,23	0,05	0,16	0,21	ML
MM	0,28	0,70	0,81	0,21	0,50	0,58	0,15	0,38	0,44	0,13	0,33	0,38	0,12	0,30	0,35	MM
MH	0,53	0,70	1,17	0,38	0,50	0,84	0,29	0,38	0,63	0,25	0,33	0,55	0,23	0,30	0,50	MH

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,14	0,43	0,56	0,10	0,31	0,40	0,08	0,23	0,30	0,07	0,20	0,26	0,06	0,18	0,24	ML
MM	0,33	0,81	0,94	0,24	0,58	0,67	0,18	0,43	0,50	0,16	0,38	0,44	0,14	0,35	0,40	MM
MH	0,62	0,81	1,36	0,44	0,58	0,97	0,33	0,43	0,72	0,29	0,38	0,63	0,27	0,35	0,58	MH

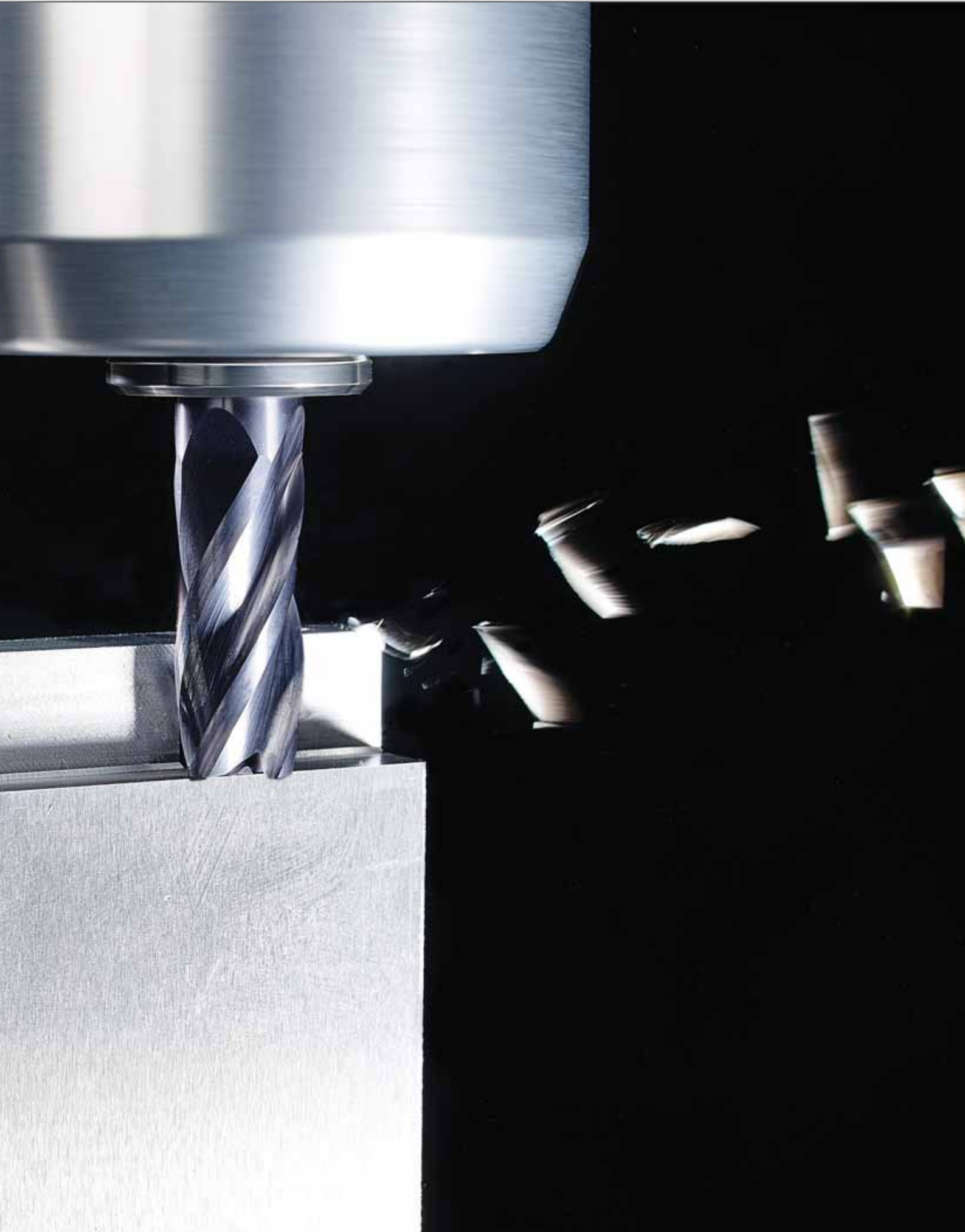
At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,19	0,56	0,73	0,14	0,40	0,53	0,10	0,30	0,40	0,09	0,26	0,34	0,08	0,24	0,32	ML
MM	0,43	1,06	1,24	0,31	0,76	0,89	0,23	0,57	0,66	0,20	0,50	0,57	0,19	0,45	0,53	MM
MH	0,81	1,06	1,79	0,58	0,76	1,28	0,44	0,57	0,95	0,38	0,50	0,83	0,35	0,45	0,76	MH

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40-100%			
ALP	0,12	0,20	0,28	0,08	0,15	0,20	0,06	0,11	0,15	0,06	0,09	0,13	0,05	0,09	0,12	ALP
ML	0,26	0,77	1,01	0,19	0,55	0,73	0,14	0,41	0,54	0,12	0,36	0,47	0,11	0,33	0,43	ML
MM	0,59	1,46	1,70	0,43	1,04	1,21	0,32	0,78	0,90	0,28	0,68	0,79	0,25	0,62	0,72	MM
MH	1,11	1,46	2,48	0,80	1,04	1,75	0,60	0,78	1,30	0,52	0,68	1,13	0,48	0,62	1,03	MH

NOTE: Use "Light Machining" value as starting feed rate.



Solid End Milling

VariMill GP	B2-B42
2-Flute End Mills	B2-B17
3-Flute End Mills	B18-B27
4-Flute End Mills	B28-B42
Duo-Lock Modular Milling	B44-B63
VariMill Modular End Mills.....	B44-B57
Adaptors.....	B58-B62
Assembly Information	B63



General Purpose 2-Flute End Mills •
VariMill™ GP

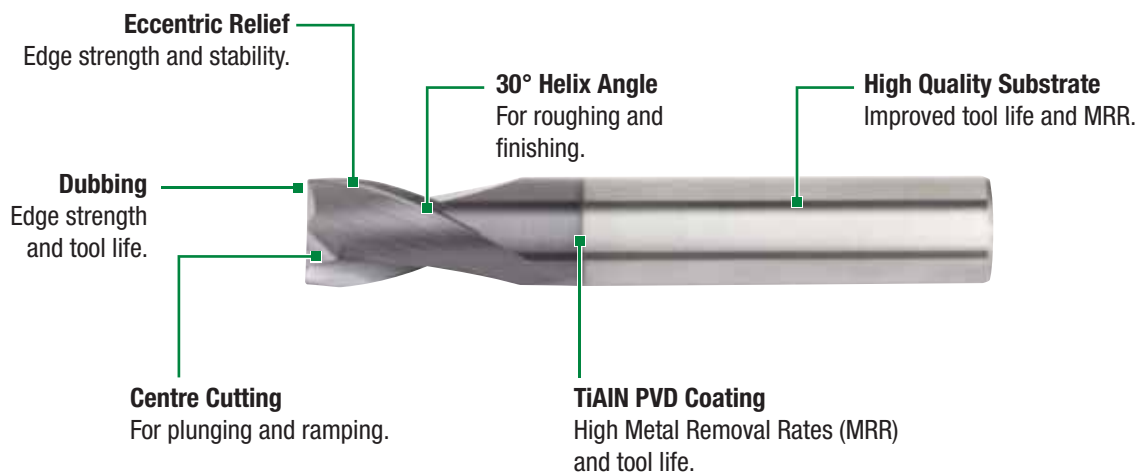
VariMill GP



VariMill GP offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high metal removal rates and excellent surface conditions at a value price. A wide range of diameters, lengths, and corner styles (such as sharp edge, chamfered edge, and ball nose) are available from stock.

VariMill GP • 2-Flute

- General purpose tools for a wide range of workpiece materials.
- Roughing and finishing with one tool.
- Various lengths-of-cut and overall lengths with different front-end designs available.
- Two flutes for high flexibility in unstable conditions.

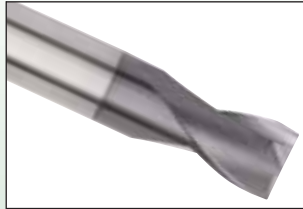


VariMill™ GP

- Increased manufacturing flexibility and reduced tooling cost.
- Fewer tool changes and high Metal Removal Rates (MRR).
- Eccentric relief for improved edge stability and high tool life.
- Easy and cost-efficient regrinding due to eccentric relief.

Series D002/D012

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.
- Sharp edge.



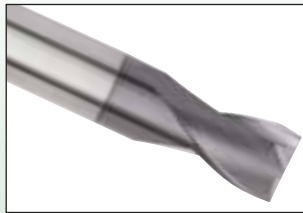
Series 2819

- Centre cutting.
- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.
- Sharp edge.



Series 4002/4012

- Centre cutting.
- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.
- Sharp edge.



Series D001/D011

- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



Series 2838

- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



Series 4001/4011/4021

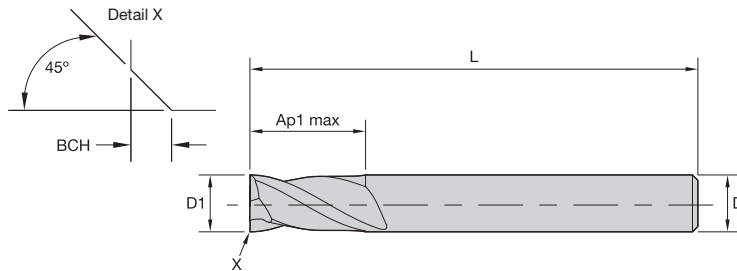
- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



- Centre cutting.
- Chamfered and sharp corners.
- Standard items listed. Additional styles and coatings made-to-order.



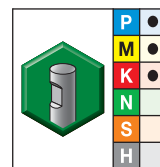
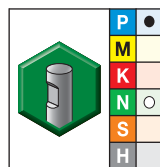
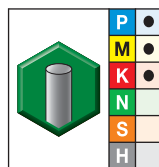
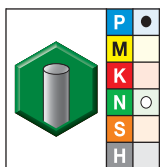
Solid End Milling



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series D002 D012 • VariMill GP

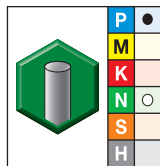
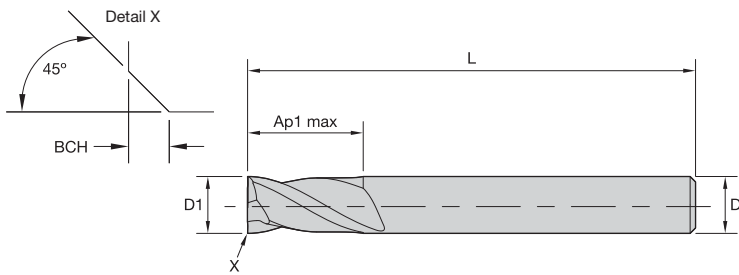


- first choice
- alternate choice

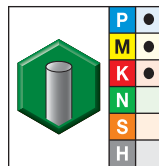
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
5877567	D0020200T003	5877330	D0020200T003	—	—	—	—	2,0	6	3,00	50	—
5877568	D0020250T003	5877501	D0020250T003	—	—	—	—	2,5	6	3,00	50	—
5877569	D0120250T007	5877502	D0120250T007	—	—	—	—	2,5	6	7,00	57	—
5877571	D0020300T004	5877503	D0020300T004	—	—	—	—	3,0	6	4,00	50	—
5877572	D0120300T007	5877504	D0120300T007	—	—	—	—	3,0	6	7,00	57	—
5877573	D0020350T004	5877505	D0020350T004	—	—	—	—	3,5	6	4,00	50	—
5877574	D0020400T005	5877506	D0020400T005	—	—	—	—	4,0	6	5,00	54	0,10
6092391	D0020400T005S	6092298	D0020400T005S	—	—	—	—	4,0	6	5,00	54	—
6092392	D0120400T008S	6092299	D0120400T008S	—	—	—	—	4,0	6	8,00	57	—
5877575	D0120400T008	5877507	D0120400T008	—	—	—	—	4,0	6	8,00	57	0,10
6092394	D0020450T005S	6092300	D0020450T005S	—	—	—	—	4,5	6	5,00	54	—
5877576	D0020450T005	5877509	D0020450T005	—	—	—	—	4,5	6	5,00	54	0,10
6092395	D0120450T008S	6092301	D0120450T008S	—	—	—	—	4,5	6	8,00	57	—
5877577	D0120450T008	5877510	D0120450T008	—	—	—	—	4,5	6	8,00	57	0,10
6092397	D0020500T006S	6092302	D0020500T006S	—	—	—	—	5,0	6	6,00	54	—
5877578	D0020500T006	5877511	D0020500T006	—	—	—	—	5,0	6	6,00	54	0,10
6092398	D0120500T010S	6092303	D0120500T010S	—	—	—	—	5,0	6	10,00	57	—
5877579	D0120500T010	5877512	D0120500T010	—	—	—	—	5,0	6	10,00	57	0,10
6092399	D0020600T007S	6092304	D0020600T007S	—	—	—	—	6,0	6	7,00	54	—
5877581	D0020600T007	5877513	D0020600T007	—	—	—	—	6,0	6	7,00	54	0,10
6092411	D0120600T010S	6092305	D0120600T010S	—	—	—	—	6,0	6	10,00	57	—
5877582	D0120600T010	5877514	D0120600T010	—	—	—	—	6,0	6	10,00	57	0,10
6092412	D0020700T008S	6092306	D0020700T008S	—	—	—	—	7,0	8	8,00	58	—
5877583	D0020700T008	5877515	D0020700T008	—	—	—	—	7,0	8	8,00	58	0,10
6092414	D0120700T013S	6092307	D0120700T013S	—	—	—	—	7,0	8	13,00	63	—
5877584	D0120700T013	5877516	D0120700T013	—	—	—	—	7,0	8	13,00	63	0,10
6092415	D0020800T009S	6092308	D0020800T009S	—	—	—	—	8,0	8	9,00	58	—
5877585	D0020800T009	5877517	D0020800T009	—	—	—	—	8,0	8	9,00	58	0,20

(continued)

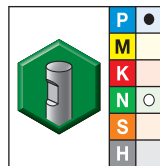
(Series D002 D012 • VariMill GP — continued)



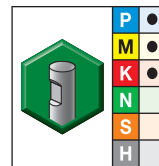
grade UNCOATED



grade TiAlN
TiAlN



grade UNCOATED



grade TiAlN
TiAlN

- first choice
- alternate choice

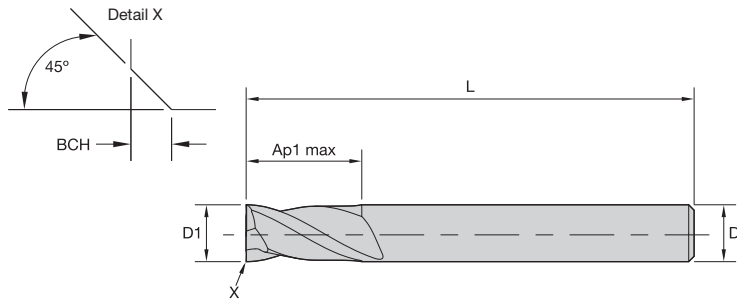
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
6092416	D0120800T016S	6092309	D0120800T016S	—	—	—	—	8,0	8	16,00	63	—
5877586	D0120800T016	5877518	D0120800T016	—	—	—	—	8,0	8	16,00	63	0,20
6092418	D0020900T010S	6092310	D0020900T010S	—	—	—	—	9,0	10	10,00	66	—
5877588	D0020900T010	5877520	D0020900T010	—	—	—	—	9,0	10	10,00	66	0,20
6092419	D0120900T016S	6092321	D0120900T016S	—	—	—	—	9,0	10	16,00	72	—
5877589	D0120900T016	5877521	D0120900T016	—	—	—	—	9,0	10	16,00	72	0,20
6092421	D0021000T011S	6092322	D0021000T011S	—	—	—	—	10,0	10	11,00	66	—
5877590	D0021000T011	5877522	D0021000T011	—	—	—	—	10,0	10	11,00	66	0,20
6092422	D0121000T019S	6092323	D0121000T019S	—	—	—	—	10,0	10	19,00	72	—
5877591	D0121000T019	5877523	D0121000T019	—	—	—	—	10,0	10	19,00	72	0,20
6092423	D0021200T012S	6092324	D0021200T012S	6092345	D0021200W012S	6092334	D0021200W012S	12,0	12	12,00	73	—
5877592	D0021200T012	5877524	D0021200T012	5877556	D0021200W012	5877535	D0021200W012	12,0	12	12,00	73	0,30
6092424	D0121200T022S	6092325	D0121200T022S	6092346	D0121200W022S	6092335	D0121200W022S	12,0	12	22,00	83	—
5877593	D0121200T022	5877525	D0121200T022	5877557	D0121200W022	5877537	D0121200W022	12,0	12	22,00	83	0,30
6092426	D0021400T014S	6092326	D0021400T014S	6092347	D0021400W014S	6092336	D0021400W014S	14,0	14	14,00	75	—
5877594	D0021400T014	5877526	D0021400T014	5877558	D0021400W014	5877538	D0021400W014	14,0	14	14,00	75	0,30
6092427	D0121400T022S	6092327	D0121400T022S	6092348	D0121400W022S	6092337	D0121400W022S	14,0	14	22,00	83	—
5877595	D0121400T022	5877527	D0121400T022	5877559	D0121400W022	5877539	D0121400W022	14,0	14	22,00	83	0,30
6092429	D0021600T016S	6092328	D0021600T016S	6092349	D0021600W016S	6092338	D0021600W016S	16,0	16	16,00	82	—
5877596	D0021600T016	5877529	D0021600T016	5877560	D0021600W016	5877540	D0021600W016	16,0	16	16,00	82	0,30
6092431	D0121600T026S	6092329	D0121600T026S	6092350	D0121600W026S	6092339	D0121600W026S	16,0	16	26,00	92	—
5877597	D0121600T026	5877530	D0121600T026	5877561	D0121600W026	5877551	D0121600W026	16,0	16	26,00	92	0,30
6092432	D0021800T018S	6092330	D0021800T018S	6092381	D0021800W018S	6092340	D0021800W018S	18,0	18	18,00	84	—
5877598	D0021800T018	5877531	D0021800T018	5877563	D0021800W018	5877552	D0021800W018	18,0	18	18,00	84	0,30
6092435	D0121800T026S	6092331	D0121800T026S	6092382	D0121800W026S	6092341	D0121800W026S	18,0	18	26,00	92	—
5877599	D0121800T026	5877532	D0121800T026	5877564	D0121800W026	5877553	D0121800W026	18,0	18	26,00	92	0,30
6092436	D0022000T020S	6092332	D0022000T020S	6092383	D0022000W020S	6092342	D0022000W020S	20,0	20	20,00	92	—
5877601	D0022000T020	5877533	D0022000T020	5877565	D0022000W020	5877554	D0022000W020	20,0	20	20,00	92	0,30
6092438	D0122000T032S	6092333	D0122000T032S	6092384	D0122000W032S	6092344	D0122000W032S	20,0	20	32,00	104	—
5877602	D0122000T032	5877534	D0122000T032	5877566	D0122000W032	5877555	D0122000W032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page B13.

- Centre cutting.
- Chamfered and sharp corners.
- Standard items listed. Additional styles and coatings made-to-order.



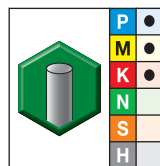
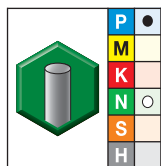
Solid End Milling



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series 2819 • VariMill GP

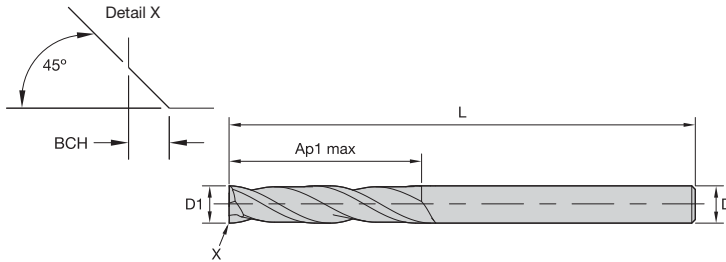


- first choice
- alternate choice

grade UNCOATED		grade TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #					
5877617	28190300T007	5877603	28190300T007	3,0	3	8,00	50	—
6092573	28190400T008S	6092528	28190400T008S	4,0	4	8,00	50	—
5877618	28190400T008	5877604	28190400T008	4,0	4	8,00	50	0,10
6092574	28190500T010S	6092529	28190500T010S	5,0	5	10,00	50	—
5877619	28190500T010	5877605	28190500T010	5,0	5	10,00	50	0,10
6092576	28190600T010S	6092530	28190600T010S	6,0	6	10,00	57	—
5877620	28190600T010	5877606	28190600T010	6,0	6	10,00	57	0,10
6092577	28190700T013S	6092561	28190700T013S	7,0	7	13,00	60	—
5877621	28190700T013	5877607	28190700T013	7,0	7	13,00	60	0,10
6092578	28190800T016S	6092562	28190800T016S	8,0	8	16,00	63	—
5877622	28190800T016	5877608	28190800T016	8,0	8	16,00	63	0,20
6092579	28190900T016S	6092563	28190900T016S	9,0	9	16,00	67	—
5877623	28190900T016	5877609	28190900T016	9,0	9	16,00	67	0,20
6092580	28191000T019S	6092565	28191000T019S	10,0	10	19,00	72	—
5877624	28191000T019	5877610	28191000T019	10,0	10	19,00	72	0,20
6092581	28191200T022S	6092566	28191200T022S	12,0	12	22,00	83	—
5877625	28191200T022	5877611	28191200T022	12,0	12	22,00	83	0,30
6092582	28191400T022S	6092567	28191400T022S	14,0	14	22,00	83	—
5877626	28191400T022	5877612	28191400T022	14,0	14	22,00	83	0,30
6092583	28191500T026S	6092568	28191500T026S	15,0	15	26,00	92	—
5877627	28191500T026	5877613	28191500T026	15,0	15	26,00	92	0,30
6092584	28191600T026S	6092569	28191600T026S	16,0	16	26,00	92	—
5877628	28191600T026	5877614	28191600T026	16,0	16	26,00	92	0,30
6092585	28191800T026S	6092570	28191800T026S	18,0	18	26,00	92	—
5877629	28191800T026	5877615	28191800T026	18,0	18	26,00	92	0,30
6092586	28192000T032S	6092571	28192000T032S	20,0	20	32,00	104	—
5877630	28192000T032	5877616	28192000T032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page B13.

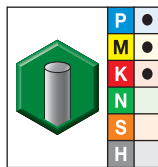
- Centre cutting.
- Chamfered and sharp corners.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 +/-
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series 4002 4012 • VariMill GP

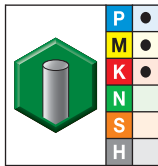
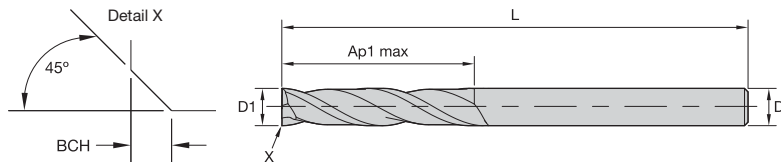


- first choice
- alternate choice

order #	catalogue #	grade TiAlN TiAlN	D1	D	length of cut Ap1 max	length L	BCH
5873484	40020100T004		1,0	3	4,00	38	—
5873485	40020150T004		1,5	3	4,00	38	—
5873486	40020180T004		1,8	3	4,00	38	—
5873487	40020200T006		2,0	3	6,30	38	—
5873488	40020250T006		2,5	3	6,30	38	—
5873489	40020300T009		3,0	3	9,50	38	—
5873490	40020300T019		3,0	3	19,00	63	—
5873491	40120300T025		3,0	3	25,00	75	—
5873492	40020350T012		3,5	4	12,00	50	—
5873493	40020400T012		4,0	4	12,00	50	0,10
6092621	40020400T012S		4,0	4	12,00	50	—
5873494	40020400T019		4,0	4	19,00	63	0,10
6092622	40020400T019S		4,0	4	19,00	63	—
6092623	40120400T031S		4,0	4	31,00	75	—
5873495	40120400T031		4,0	4	31,00	75	0,10
6092624	40020450T014S		4,5	6	14,00	50	—
5873496	40020450T014		4,5	6	14,00	50	0,10
5873497	40020480T014		4,8	6	14,00	50	0,10
6092626	40020480T014S		4,8	6	14,00	50	—
5873498	40020500T014		5,0	5	14,00	50	0,10
6092627	40020500T014S		5,0	5	14,00	50	—
5873499	40020500T020		5,0	5	20,00	63	0,10
6092628	40020500T020S		5,0	5	20,00	63	—
6092631	40120500T031S		5,0	5	31,00	100	—
5873500	40120500T031		5,0	5	31,00	100	0,10
5873501	40020550T014		5,5	6	14,00	50	0,10
6092632	40020550T014S		5,5	6	14,00	50	—
6092633	40020600T016S		6,0	6	16,00	50	—
5873502	40020600T016		6,0	6	16,00	50	0,10
5873503	40020600T028		6,0	6	28,00	76	0,10
6092634	40020600T028S		6,0	6	28,00	76	—
6092636	40120600T038S		6,0	6	38,00	100	—
5873504	40120600T038		6,0	6	38,00	100	0,10
6092637	40020700T020S		7,0	7	20,00	63	—
5873505	40020700T020		7,0	7	20,00	63	0,10
5873506	40020800T020		8,0	8	20,00	63	0,20

(continued)

(Series 4002 4012 • VariMill GP — continued)



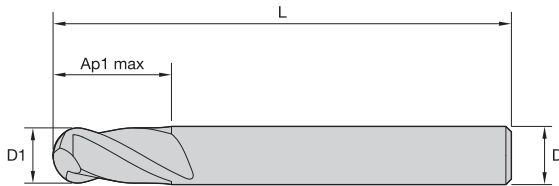
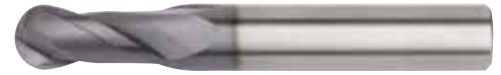
● first choice
○ alternate choice

grade TiAlN
TiAlN

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
6092638	40020800T020S	8,0	8	20,00	63	—
6092639	40020800T028S	8,0	8	28,00	76	—
5873507	40020800T028	8,0	8	28,00	76	0,20
6092640	40120800T041S	8,0	8	41,00	100	—
5873508	40120800T041	8,0	8	41,00	100	0,20
5873509	40020900T020	9,0	9	20,00	63	0,20
6092641	40020900T020S	9,0	9	20,00	63	—
5873510	40021000T022	10,0	10	22,00	72	0,20
6092643	40021000T022S	10,0	10	22,00	72	—
6092644	40021000T032S	10,0	10	32,00	89	—
5873511	40021000T032	10,0	10	32,00	89	0,20
6092645	40121000T045S	10,0	10	45,00	100	—
5873512	40121000T045	10,0	10	45,00	100	0,20
6092646	40021100T025S	11,0	11	25,00	76	—
5873513	40021100T025	11,0	11	25,00	76	0,30
5873514	40021200T025	12,0	12	25,00	76	0,30
6092647	40021200T025S	12,0	12	25,00	76	—
5873515	40021200T045	12,0	12	45,00	100	0,30
6092648	40021200T045S	12,0	12	45,00	100	—
6092650	40121200T075S	12,0	12	75,00	150	—
5873516	40121200T075	12,0	12	75,00	150	0,30
6092651	40021400T032S	14,0	14	32,00	83	—
5873517	40021400T032	14,0	14	32,00	83	0,30
6092653	40021400T050S	14,0	14	50,00	100	—
5873518	40021400T050	14,0	14	50,00	100	0,30
6092654	40121400T075S	14,0	14	75,00	150	—
5873519	40121400T075	14,0	14	75,00	150	0,30
5873520	40021600T032	16,0	16	32,00	89	0,30
6092657	40021600T032S	16,0	16	32,00	89	—
6092658	40021600T056S	16,0	16	56,00	110	—
5873531	40021600T056	16,0	16	56,00	110	0,30
6092659	40121600T075S	16,0	16	75,00	150	—
5873532	40121600T075	16,0	16	75,00	150	0,30
5873533	40021800T038	18,0	18	38,00	100	0,30
6092660	40021800T038S	18,0	18	38,00	100	—
5873534	40021800T060	18,0	18	60,00	125	0,30
6092681	40021800T060S	18,0	18	60,00	125	—
6092682	40121800T075S	18,0	18	75,00	150	—
5873535	40121800T075	18,0	18	75,00	150	0,30
6092683	40022000T038S	20,0	20	38,00	104	—
5873536	40022000T038	20,0	20	38,00	104	0,30
6092684	40022000T056S	20,0	20	56,00	125	—
5873537	40022000T056	20,0	20	56,00	125	0,30
6092685	40122000T075S	20,0	20	75,00	150	—
5873538	40122000T075	20,0	20	75,00	150	0,30

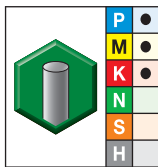
NOTE: For application data, please see pages B13–B14.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series D001 D011 • VariMill GP

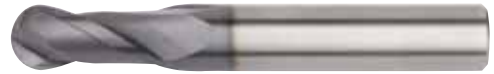


- first choice
- alternate choice

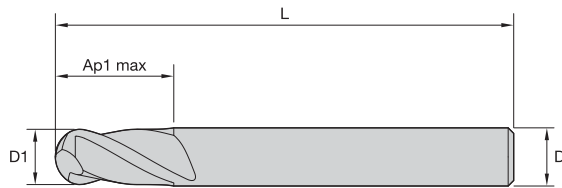
order #	catalogue #	grade TiAlN TiAlN	D1	D	length of cut Ap1 max	length L
5880362	D0110200T006	P ●	2,0	6	6,00	57
5880363	D0010300T004	M ●	3,0	6	4,00	50
5880364	D0110300T007	K ●	3,0	6	7,00	57
5880365	D0010400T005	N ○	4,0	6	5,00	54
5880366	D0110400T008	S ●	4,0	6	8,00	57
5880367	D0110500T010	H ○	5,0	6	10,00	57
5880368	D0110600T010		6,0	6	10,00	57
5880369	D0110700T013		7,0	8	13,00	63
5880370	D0110800T016		8,0	8	16,00	63
5880381	D0111000T019		10,0	10	19,00	72
5880382	D0111200T022		12,0	12	22,00	83
5880383	D0111400T022		14,0	14	22,00	83
5880384	D0111600T026		16,0	16	26,00	92
5880385	D0012000T020		20,0	20	20,00	92
5880386	D0112000T032		20,0	20	32,00	104

NOTE: For application data, please see page B15.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



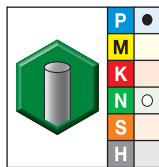
Solid End Milling



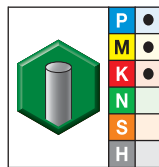
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series 2838 • VariMill GP



grade UNCOATED



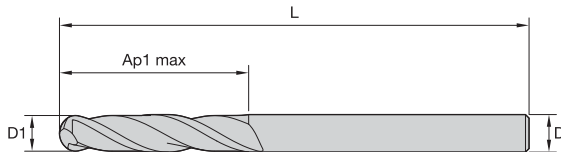
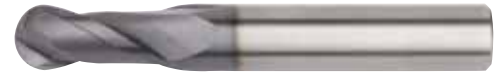
grade TiAlN
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
	—	5880451	28380200T007	2,0	2	7,00	50
5880462	28380300T007	5880452	28380300T007	3,0	3	7,00	50
5880463	28380400T008	5880453	28380400T008	4,0	4	8,00	50
5880464	28380500T010	5880454	28380500T010	5,0	5	10,00	50
5880465	28380600T010	5880455	28380600T010	6,0	6	10,00	57
5880466	28380800T016	5880456	28380800T016	8,0	8	16,00	63
5880467	28381000T019	5880457	28381000T019	10,0	10	19,00	72
5880468	28381200T022	5880458	28381200T022	12,0	12	22,00	83
5880469	28381400T022	5880459	28381400T022	14,0	14	22,00	83
5880470	28381600T026	5880460	28381600T026	16,0	16	26,00	92
5880471	28382000T032	5880461	28382000T032	20,0	20	32,00	104

NOTE: For application data, please see page B15.

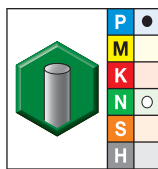
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



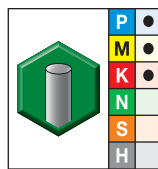
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series 4001 4011 4021 • VariMill GP



grade UNCOATED



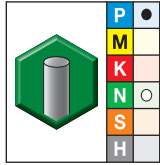
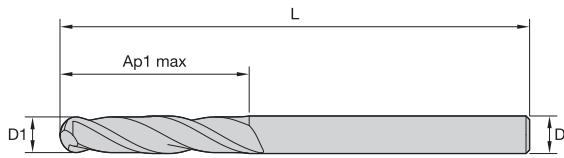
grade TiAlN
TiAlN

- first choice
- alternate choice

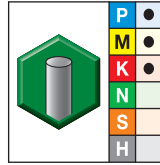
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5880425	40010100T004	5880387	40010100T004	1,0	3	4,00	38
5880426	40010150T005	5880388	40010150T005	1,5	3	5,00	38
5880427	40010200T006	5880389	40010200T006	2,0	3	6,30	38
5880428	40010250T007	5880390	40010250T007	2,5	3	7,00	38
5880429	40010300T009	5880391	40010300T009	3,0	3	9,50	38
—	—	5880392	40010350T012	3,5	4	12,00	50
5880430	40010400T012	5880393	40010400T012	4,0	4	12,00	50
5880431	40110400T019	5880395	40110400T019	4,0	4	19,00	63
5880432	40210400T031	5880396	40210400T031	4,0	4	31,00	75
5880433	40010500T014	—	—	5,0	5	14,00	50
—	—	5880397	40210500T014	5,0	6	14,00	50
5880435	40010600T020	5880398	40010600T020	6,0	6	20,00	63
5880436	40110600T028	5880399	40110600T028	6,0	6	28,00	76
5880437	40210600T038	5880400	40210600T038	6,0	6	38,00	100
5880438	40010800T020	5880401	40010800T020	8,0	8	20,00	63
5880439	40110800T028	5880402	40110800T028	8,0	8	28,00	76
5880440	40210800T040	5880403	40210800T040	8,0	8	40,00	100
5880441	40011000T022	5880404	40011000T022	10,0	10	22,00	76
5880442	40111000T032	5880405	40111000T032	10,0	10	32,00	89
5880443	40211000T045	5880406	40211000T045	10,0	10	45,00	100

(continued)

(Series 4001 4011 4021 • VariMill GP — continued)



grade UNCOATED



grade TiAlN
TiAlN

● first choice
○ alternate choice

order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5880444	40011200T025	5880407	40011200T025	12,0	12	25,00	75
5880445	40111200T045	5880408	40111200T045	12,0	12	45,00	100
5880446	40211200T075	5880409	40211200T075	12,0	12	75,00	150
5880447	40011400T032	5880410	40011400T032	14,0	14	32,00	89
5880448	40011600T032	5880411	40011600T032	16,0	16	32,00	89
5880449	40012000T038	5880412	40012000T038	20,0	20	38,00	100
5880450	40112000T075	5880413	40112000T075	20,0	20	75,00	150

NOTE: For application data, please see pages B15–B17.

Solid End Milling

■ Series D002 D012 2819 4002 • TiAlN • VariMill GP

Material Group	Side Milling (A) and Slotting (B)			TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.															
	A		B	Cutting Speed – vc m/min		D1 – Diameter															
	ap	ae	ap	min	max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0		
	P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108
1		Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
2		Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
3		Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
4		Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D002 D012 2819 4002 • Uncoated • VariMill GP

Material Group	Side Milling (A) and Slotting (B)			uncoated		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.														
	A		B	Cutting Speed – vc m/min		D1 – Diameter														
	ap	ae	ap	min	max	mm	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0					
	P	0	0,1 x D	0,1 x D	0,5 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114		
1		0,1 x D	0,1 x D	0,5 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114			
2		0,1 x D	0,1 x D	0,5 x D	112	–	152	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114			
N	1	Ap1 max	0,1 x D	0,5 x D	400	–	1600	fz	0,020	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200			
	2	Ap1 max	0,1 x D	0,5 x D	400	–	1200	fz	0,016	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160			
	4	Ap1 max	0,1 x D	0,5 x D	320	–	600	fz	0,014	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140			

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 4012 • TiAlN • VariMill GP

Solid End Milling

Material Group																			
	Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).													
	A		Cutting Speed – vc m/min			D1 – Diameter													
	ap	ae	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 4012 • Uncoated • VariMill GP

Material Group																
	Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).										
	A		Cutting Speed – vc m/min			D1 – Diameter										
	ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0		
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114	
	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114	
	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114	
N	1	Ap1 max	0,1 x D	400	–	1600	fz	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200	
	2	Ap1 max	0,1 x D	400	–	1200	fz	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160	
	4	Ap1 max	0,1 x D	320	–	600	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D001 D011 2838 4001 • TiAlN • VariMill GP

Material Group	Side Milling (A) and Slotting (B)		TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.																		
	A		B		Cutting Speed – vc m/min		D1 – Diameter																
	ap	ae	ap	min	max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0				
	ap1 max	0,1 x D	0,5 x D			fz																	
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114		
	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114		
	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114		
	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101		
	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088		
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101		
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081		
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114		
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101		

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D001 D011 2838 4001 • Uncoated • VariMill GP

Material Group	Side Milling (A) and Slotting (B)		uncoated		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.																		
	A		B		Cutting Speed – vc m/min		D1 – Diameter																
	ap	ae	ap	min	max	mm	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0							
	ap1 max	0,1 x D	0,5 x D			fz																	
P	0	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114					
	1	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114					
	2	Ap1 max	0,1 x D	0,5 x D	112	–	152	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114					
N	1	Ap1 max	0,1 x D	0,5 x D	400	–	1600	fz	0,010	0,020	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200					
	2	Ap1 max	0,1 x D	0,5 x D	400	–	1200	fz	0,008	0,016	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160					
	4	Ap1 max	0,1 x D	0,5 x D	320	–	600	fz	0,007	0,014	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140					

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.



■ Series 4011 4021 • TiAlN • VariMill GP

Solid End Milling

Material Group																				
	Side Milling (A)		TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A).															
	A		Cutting Speed – vc m/min			D1 – Diameter														
	ap	ae	min	max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0			
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	
	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 4011 4021 • Uncoated • VariMill GP

Material Group															
	Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).									
	A		Cutting Speed – vc m/min			D1 – Diameter									
	ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0	
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
N	1	Ap1 max	0,1 x D	400	–	1600	fz	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200
	2	Ap1 max	0,1 x D	400	–	1200	fz	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160
	4	Ap1 max	0,1 x D	320	–	600	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

General Purpose 3-Flute End Mills •
VariMill™ GP

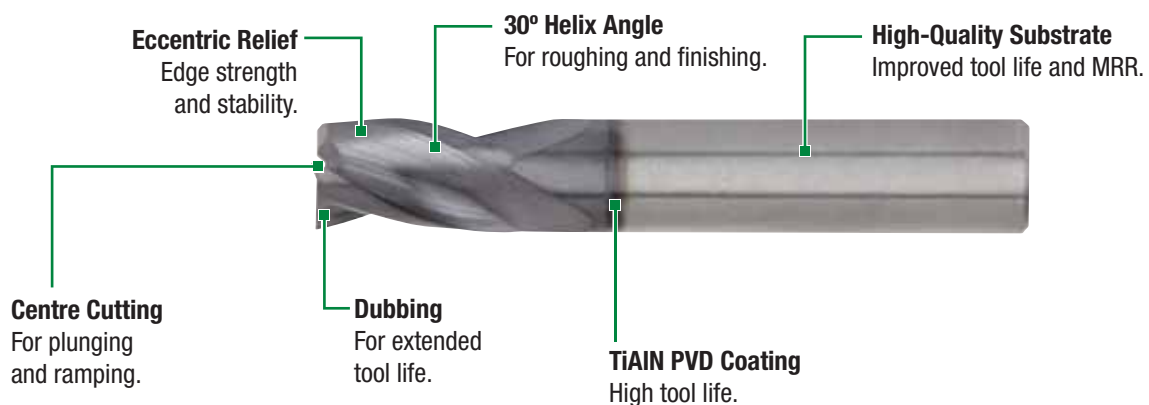
VariMill GP



VariMill GP offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high metal removal rates and excellent surface conditions at a value price. A wide range of diameters, lengths, and corner styles (such as chamfered and sharp edge) are available from stock.

VariMill GP • 3-Flute

- General purpose tools for a wide range of workpiece materials.
- Roughing and finishing with one tool.
- Various lengths-of-cut and overall lengths with different front end designs available.
- Three flutes for slotting in unstable conditions.



VariMill™ GP

- Increased manufacturing flexibility and reduced tool cost.
- Fewer tool changes and high Metal Removal Rates (MRR).
- Eccentric relief for improved edge stability and high tool life.
- Easy and cost-efficient regrinding due to eccentric relief.

Series D003..S/D013..S

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Sharp edge where required.



Series 4003..S/4013..S

- Centre cutting.
- Factory standard in short and long.
- Steel, stainless, and cast iron.
- Sharp edge where required.



Series D003/D013

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Chamfered edge for extended tool life.

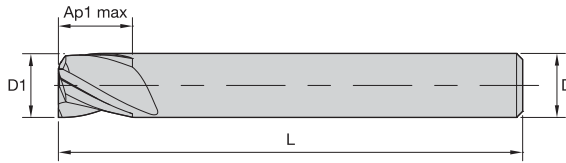


Series 4003/4013

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Chamfered edge for extended tool life.



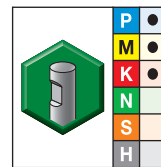
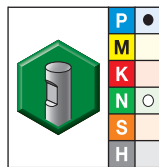
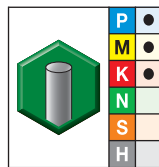
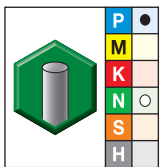
- Centre cutting.



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 +/-
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series D003..S D013..S • VariMill GP

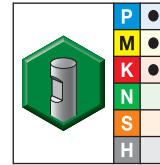
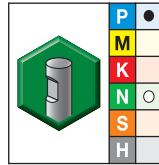
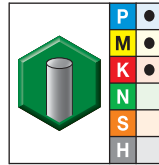
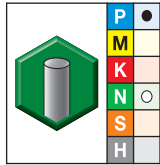
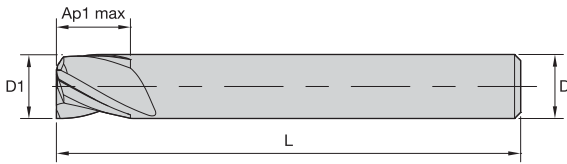


- first choice
- alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #				
6144450	D0030200T003S	6144351	D0030200T003S	6144484	D0030200W003S	6144388	D0030200W003S	2,0	6	3,00	50
6143764	D0130200T006S	6144441	D0130200T006S	6143831	D0130200W006S	6144467	D0130200W006S	2,0	6	6,00	57
6144452	D0030250T003S	6144352	D0030250T003S	6144486	D0030250W003S	6144390	D0030250W003S	2,5	6	3,00	50
6143765	D0130250T007S	6144442	D0130250T007S	6143832	D0130250W007S	6144469	D0130250W007S	2,5	6	7,00	57
6144454	D0030300T004S	6144353	D0030300T004S	6144488	D0030300W004S	6144392	D0030300W004S	3,0	6	4,00	50
6143766	D0130300T007S	6144443	D0130300T007S	6143833	D0130300W007S	6144471	D0130300W007S	3,0	6	7,00	57
6144456	D0030350T004S	6144354	D0030350T004S	6144490	D0030350W004S	6144394	D0030350W004S	3,5	6	4,00	50
6143767	D0130350T007S	6144444	D0130350T007S	6143834	D0130350W007S	6144473	D0130350W007S	3,5	6	7,00	57
6144458	D0030400T005S	6144355	D0030400T005S	6144492	D0030400W005S	6144396	D0030400W005S	4,0	6	5,00	54
6143768	D0130400T008S	6144445	D0130400T008S	6143835	D0130400W008S	6144475	D0130400W008S	4,0	6	8,00	57
6144460	D0030450T005S	—	—	6144494	D0030450W005S	6144398	D0030450W005S	4,5	6	5,00	54
6143769	D0130450T008S	6144446	D0130450T008S	6143836	D0130450W008S	6144477	D0130450W008S	4,5	6	8,00	57
6144462	D0030500T006S	6144357	D0030500T006S	6144496	D0030500W006S	6144400	D0030500W006S	5,0	6	6,00	54
6143770	D0130500T010S	6144447	D0130500T010S	6143837	D0130500W010S	6144479	D0130500W010S	5,0	6	10,00	57
6144464	D0030550T007S	6144358	D0030550T007S	6144498	D0030550W007S	6144402	D0030550W007S	5,5	6	7,00	54
6143821	D0130550T010S	6144448	D0130550T010S	6143838	D0130550W010S	6144481	D0130550W010S	5,5	6	10,00	57
6144466	D0030600T007S	6144360	D0030600T007S	6144500	D0030600W007S	6144404	D0030600W007S	6,0	6	7,00	54
6143822	D0130600T010S	6144449	D0130600T010S	6143839	D0130600W010S	6144483	D0130600W010S	6,0	6	10,00	57
6144468	D0030700T008S	6144372	D0030700T008S	6144501	D0030700W008S	6144406	D0030700W008S	7,0	8	8,00	58
6143823	D0130700T013S	6144451	D0130700T013S	6143840	D0130700W013S	6144485	D0130700W013S	7,0	8	13,00	63

(continued)

(Series D003..S D013..S • VariMill GP — continued)

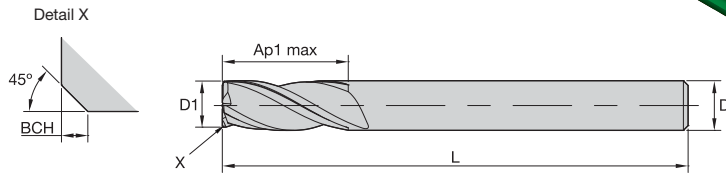


● first choice
○ alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #				
6144470	D0030800T009S	6144374	D0030800T009S	6144502	D0030800W009S	6144408	D0030800W009S	8,0	8	9,00	58
6143824	D0130800T016S	6144453	D0130800T016S	6143841	D0130800W016S	6144487	D0130800W016S	8,0	8	16,00	63
6144472	D0031000T011S	6144376	D0031000T011S	6144503	D0031000W011S	6144410	D0031000W011S	10,0	10	11,00	66
6143825	D0131000T019S	6144455	D0131000T019S	6143842	D0131000W019S	6144489	D0131000W019S	10,0	10	19,00	72
6144474	D0031200T012S	6144378	D0031200T012S	6144504	D0031200W012S	6144412	D0031200W012S	12,0	12	12,00	73
6143826	D0131200T022S	6144457	D0131200T022S	6143843	D0131200W022S	6144491	D0131200W022S	12,0	12	22,00	83
6144476	D0031400T014S	6144380	D0031400T014S	6144505	D0031400W014S	6144414	D0031400W014S	14,0	14	14,00	75
6143827	D0131400T022S	6144459	D0131400T022S	6143844	D0131400W022S	6144493	D0131400W022S	14,0	14	22,00	83
6144478	D0031600T016S	6144382	D0031600T016S	6144506	D0031600W016S	6144416	D0031600W016S	16,0	16	16,00	82
6143828	D0131600T026S	6144461	D0131600T026S	6143845	D0131600W026S	6144495	D0131600W026S	16,0	16	26,00	92
6144480	D0031800T018S	6144384	D0031800T018S	6144507	D0031800W018S	6144418	D0031800W018S	18,0	18	18,00	84
6143829	D0131800T026S	6144463	D0131800T026S	6143846	D0131800W026S	6144497	D0131800W026S	18,0	18	26,00	92
6144482	D0032000T020S	6144386	D0032000T020S	6144508	D0032000W020S	6144420	D0032000W020S	20,0	20	20,00	92
6143830	D0132000T032S	6144465	D0132000T032S	6143847	D0132000W032S	6144499	D0132000W032S	20,0	20	32,00	104

NOTE: For application data, please see page B26.

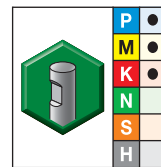
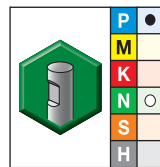
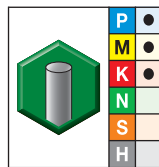
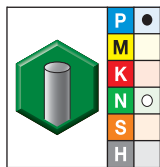
- Centre cutting.



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series D003 D013 • VariMill GP

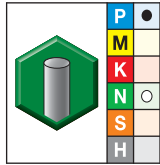
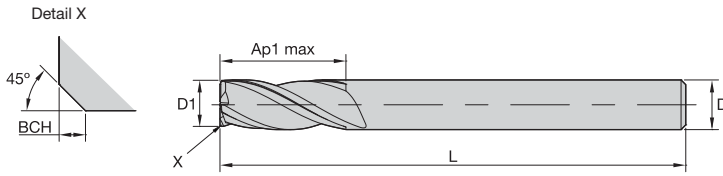


- first choice
- alternate choice

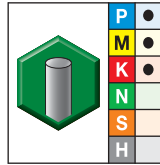
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
6145042	D0030400T005	6144295	D0030400T005	6145056	D0030400W005	6144318	D0030400W005	4,0	6	5,00	54	0,10
-		6144359	D0130400T008	6145094	D0130400W008	6144395	D0130400W008	4,0	6	8,00	57	0,10
6145043	D0030450T005	6144296	D0030450T005	6145057	D0030450W005	6144319	D0030450W005	4,5	6	5,00	54	0,10
-		6144371	D0130450T008	6145095	D0130450W008	6144397	D0130450W008	4,5	6	8,00	57	0,10
6145044	D0030500T006	6144297	D0030500T006	6145058	D0030500W006	6144320	D0030500W006	5,0	6	6,00	54	0,10
6145083	D0130500T010	6144373	D0130500T010	6145096	D0130500W010	6144399	D0130500W010	5,0	6	10,00	57	0,10
6145045	D0030550T007	6144298	D0030550T007	6145059	D0030550W007	6144331	D0030550W007	5,5	6	7,00	54	0,10
-		6144375	D0130550T010	6145097	D0130550W010	6144401	D0130550W010	5,5	6	10,00	57	0,10
6145046	D0030600T007	6144299	D0030600T007	6145060	D0030600W007	6144332	D0030600W007	6,0	6	7,00	54	0,10
6145085	D0130600T010	6144377	D0130600T010	6145098	D0130600W010	6144403	D0130600W010	6,0	6	10,00	57	0,10
6145047	D0030700T008	6144300	D0030700T008	6145061	D0030700W008	6144333	D0030700W008	7,0	8	8,00	58	0,10
-		6144379	D0130700T013	6145099	D0130700W013	6144405	D0130700W013	7,0	8	13,00	63	0,10
6145048	D0030800T009	6144311	D0030800T009	6145062	D0030800W009	6144334	D0030800W009	8,0	8	9,00	58	0,20
6145087	D0130800T016	6144381	D0130800T016	6145100	D0130800W016	6144407	D0130800W016	8,0	8	16,00	63	0,20
6145049	D0031000T011	6144312	D0031000T011	6145063	D0031000W011	6144335	D0031000W011	10,0	10	11,00	66	0,20
6145088	D0131000T019	6144383	D0131000T019	6145101	D0131000W019	6144409	D0131000W019	10,0	10	19,00	72	0,20
6145050	D0031200T012	6144313	D0031200T012	6145064	D0031200W012	6144336	D0031200W012	12,0	12	12,00	73	0,30
6145089	D0131200T022	6144385	D0131200T022	6145102	D0131200W022	6144411	D0131200W022	12,0	12	22,00	83	0,30
6145051	D0031400T014	6144314	D0031400T014	6145065	D0031400W014	6144337	D0031400W014	14,0	14	14,00	75	0,30
6145090	D0131400T022	6144387	D0131400T022	6145103	D0131400W022	6144413	D0131400W022	14,0	14	22,00	83	0,30

(continued)

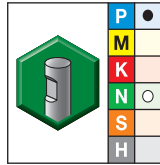
(Series D003 D013 • VariMill GP – continued)



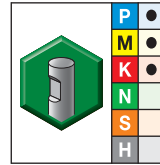
grade UNCOATED



grade TiAlN
TiAlN



grade UNCOATED



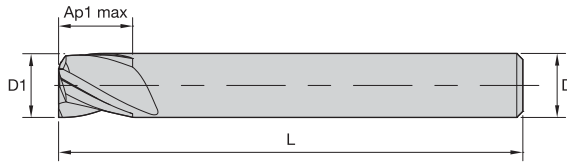
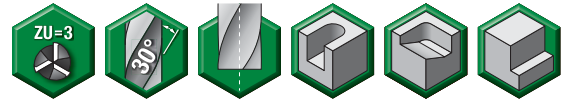
grade TiAlN
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
6145052	D0031600T016	6144315	D0031600T016	6145066	D0031600W016	6144338	D0031600W016	16,0	16	16,00	82	0,30
6145091	D0131600T026	6144389	D0131600T026	6145104	D0131600W026	6144415	D0131600W026	16,0	16	26,00	92	0,30
6145053	D0031800T018	6144316	D0031800T018	6145067	D0031800W018	6144339	D0031800W018	18,0	18	18,00	84	0,30
6145092	D0131800T026	6144391	D0131800T026	6145105	D0131800W026	6144417	D0131800W026	18,0	18	26,00	92	0,30
6145054	D0032000T020	6144317	D0032000T020	6145068	D0032000W020	6144340	D0032000W020	20,0	20	20,00	92	0,30
6145093	D0132000T032	6144393	D0132000T032	6145106	D0132000W032	6144419	D0132000W032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page B26.

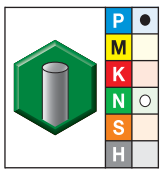
- Centre cutting.



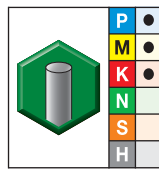
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

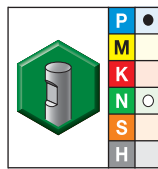
■ Series 4003..S 4013..S • VariMill GP



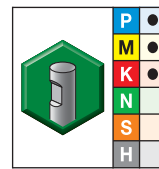
grade UNCOATED



grade TiAlN
TiAlN



grade UNCOATED



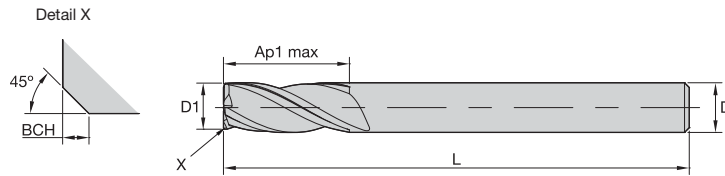
grade TiAlN
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
6144570	40030100T004S	6144056	40030100T004S	—	—	—	—	1,0	3	4,00	38
6144651	40030150T004S	6144057	40030150T004S	—	—	—	—	1,5	3	4,00	38
6144652	40030200T006S	6144058	40030200T006S	—	—	—	—	2,0	3	6,30	38
6144653	40030250T006S	6144059	40030250T006S	—	—	—	—	2,5	3	6,30	38
6144654	40030300T009S	6144060	40030300T009S	—	—	—	—	3,0	3	9,50	38
6145303	40130300T019S	6145199	40130300T019S	6145319	40130300W019S	6145243	40130300W019S	3,0	6	19,00	63
6144655	40030400T012S	6144551	40030400T012S	—	—	—	—	4,0	4	12,00	50
6145305	40130400T019S	6145200	40130400T019S	—	—	—	—	4,0	4	19,00	63
6144656	40030500T014S	6144552	40030500T014S	—	—	—	—	5,0	6	14,00	50
6145307	40130500T020S	6145231	40130500T020S	6145321	40130500W020S	6145247	40130500W020S	5,0	6	20,00	63
6144657	40030600T016S	6144553	40030600T016S	6144669	40030600W016S	6144565	40030600W016S	6,0	6	16,00	50
6145309	40130600T028S	6145232	40130600T028S	6145322	40130600W028S	6145249	40130600W028S	6,0	6	28,00	75
6144658	40030800T019S	6144554	40030800T019S	6144670	40030800W019S	6144566	40030800W019S	8,0	8	19,00	63
6145311	40130800T028S	6145233	40130800T028S	6145323	40130800W028S	6145251	40130800W028S	8,0	8	28,00	75
6144659	40031000T022S	6144555	40031000T022S	6144671	40031000W022S	6144567	40031000W022S	10,0	10	22,00	76
6145313	40131000T032S	6145234	40131000T032S	6145324	40131000W032S	6145253	40131000W032S	10,0	10	32,00	89
6144660	40031200T025S	6144556	40031200T025S	6144672	40031200W025S	6144568	40031200W025S	12,0	12	25,00	75
6145315	40131200T045S	6145235	40131200T045S	6145325	40131200W045S	6145255	40131200W045S	12,0	12	45,00	100
6144661	40031600T032S	6144557	40031600T032S	6144673	40031600W032S	6144569	40031600W032S	16,0	16	32,00	89
6145317	40131600T056S	6145238	40131600T056S	6145326	40131600W056S	6145257	40131600W056S	16,0	16	56,00	110
6145318	40132000T064S	6145241	40132000T064S	6145327	40132000W064S	6145259	40132000W064S	20,0	20	64,00	125

NOTE: For application data, please see pages B26–B27.

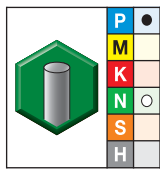
- Centre cutting.



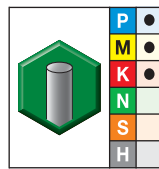
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

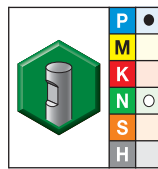
■ Series 4003 4013 • VariMill GP



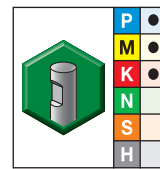
grade UNCOATED



grade TiAlN
TiAlN



grade UNCOATED



grade TiAlN
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
6145236	40030400T012	6145107	40030400T012	—	—	—	—	4,0	4	12,00	50	0,10
6145274	40130400T019	6145181	40130400T019	—	—	—	—	4,0	4	19,00	63	0,10
6145275	40130500T020	6145182	40130500T020	6145304	40130500W020	6145190	40130500W020	5,0	6	20,00	63	0,10
6145242	40030600T016	6145109	40030600T016	6145256	40030600W016	6145176	40030600W016	6,0	6	16,00	50	0,10
6145276	40130600T028	6145183	40130600T028	6145306	40130600W028	6145191	40130600W028	6,0	6	28,00	75	0,10
6145244	40030800T019	6145110	40030800T019	—	—	—	—	8,0	8	19,00	63	0,20
6145277	40130800T028	6145184	40130800T028	6145308	40130800W028	6145192	40130800W028	8,0	8	28,00	75	0,20
6145246	40031000T022	6145171	40031000T022	6145260	40031000W022	6145178	40031000W022	10,0	10	22,00	76	0,20
6145278	40131000T032	6145185	40131000T032	6145310	40131000W032	6145193	40131000W032	10,0	10	32,00	89	0,20
6145248	40031200T025	6145172	40031200T025	6145271	40031200W025	6145179	40031200W025	12,0	12	25,00	75	0,30
6145279	40131200T045	6145186	40131200T045	6145312	40131200W045	6145194	40131200W045	12,0	12	45,00	100	0,30
6145250	40031600T032	6145173	40031600T032	6145272	40031600W032	6145180	40031600W032	16,0	16	32,00	89	0,30
6145280	40131600T056	6145187	40131600T056	6145314	40131600W056	6145195	40131600W056	16,0	16	56,00	110	0,30
6145301	40132000T064	6145188	40132000T064	6145316	40132000W064	6145196	40132000W064	20,0	20	64,00	125	0,30

NOTE: For application data, please see pages B26–B27.

■ Series D003..S D013..S D003 D013 4003..S 4003 • VariMill GP TiAlN

Solid End Milling

Material Group	Side Milling (A) and Slotting (B)		TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.																
	A		B	Cutting Speed – vc m/min		D1 – Diameter															
	ap	ae	ap	min	max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0		
	P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108
1		Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
2		Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
3		Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
4		Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

■ Series D003..S D003 4003..S 4003 • VariMill GP Uncoated

Material Group	Side Milling (A)		uncoated		Recommended feed per tooth (fz = mm/th) for side milling (A).										
	A		Cutting Speed – vc m/min		D1 – Diameter										
	ap	ae	min	max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0		
	P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101
1		Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
2		Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
N	1	Ap1 max	0,1 x D	400	–	1600	fz	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200
	2	Ap1 max	0,1 x D	400	–	1200	fz	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160
	4	Ap1 max	0,1 x D	320	–	600	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

■ Series 4013..S 4013 • VariMill GP TiAlN

Material Group	Side Milling (A)		TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A).																
	A		Cutting Speed – vc m/min			D1 – Diameter															
	ap	ae	min		max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0		
		0	Ap1 max, 0,1 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
P	1	Ap1 max, 0,1 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114		
	2	Ap1 max, 0,1 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114		
	3	Ap1 max, 0,1 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101		
	4	Ap1 max, 0,1 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088		
M	1	Ap1 max, 0,1 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101		
	2	Ap1 max, 0,1 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081		
K	1	Ap1 max, 0,1 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114		
	2	Ap1 max, 0,1 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101		

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

■ Series 4013..S 4013 • VariMill GP Uncoated

Material Group	Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).									
	A		Cutting Speed – vc m/min			D1 – Diameter									
	ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0	
	P	0	Ap1 max, 0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
1		Ap1 max, 0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114	
2		Ap1 max, 0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114	
N	1	Ap1 max, 0,1 x D	400	–	1600	fz	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200	
	2	Ap1 max, 0,1 x D	400	–	1200	fz	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160	
	4	Ap1 max, 0,1 x D	320	–	600	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

General Purpose 4-Flute End Mills •
VariMill™ GP

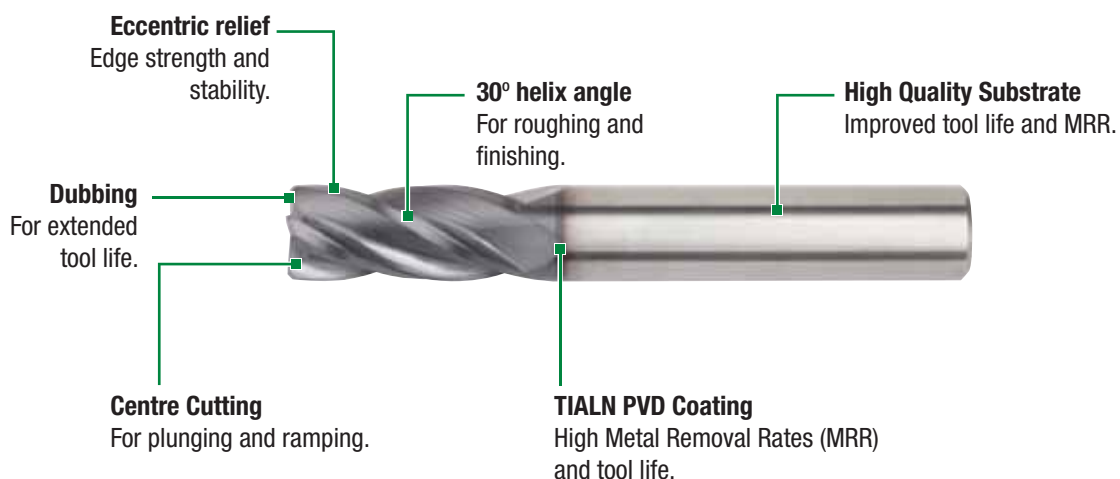
VariMill GP



VariMill GP offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high metal removal rates and excellent surface conditions at a value price. A wide range of diameters, lengths, and corner styles (such as chamfered, sharp edge, and ball nose) are available from stock.

VariMill GP • 4-Flute

- General purpose tools for wide a range of workpiece materials.
- Roughing and finishing with one tool.
- Various lengths-of-cut and overall lengths with different front end designs available.
- Four flutes for high Metal Removal Rates (MRR) and tool life.



VariMill™ GP

- Increased manufacturing flexibility and reduced tooling cost.
- Less tool changes and high Metal Removal Rates (MRR).
- One tool required for roughing and finishing.
- Eccentric relief for improved edge stability and high tool life.
- Easy and cost-efficient regrinding due to eccentric relief.

Series D004/D014

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.
- Sharp corner.



Series 2528

- Centre cutting.
- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.
- Sharp corner.



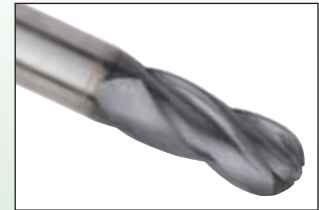
Series 4004/4014/4024

- Centre cutting.
- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.
- Sharp corner.



Series D010

- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



Series 2848

- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



Series 4000/4010

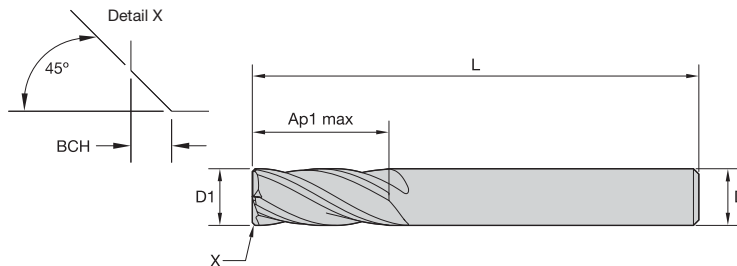
- Wide range of lengths-of-cut — regular and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



- Centre cutting.
- Chamfered and sharp corners.
- Standard items listed. Additional styles and coatings made-to-order.



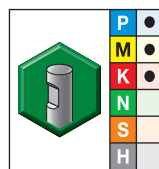
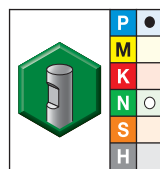
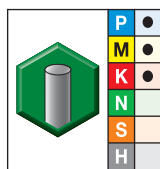
Solid End Milling



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series D004 D014 • VariMill GP

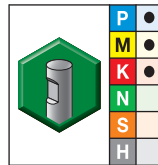
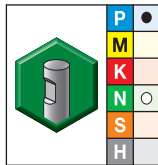
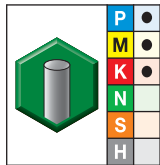
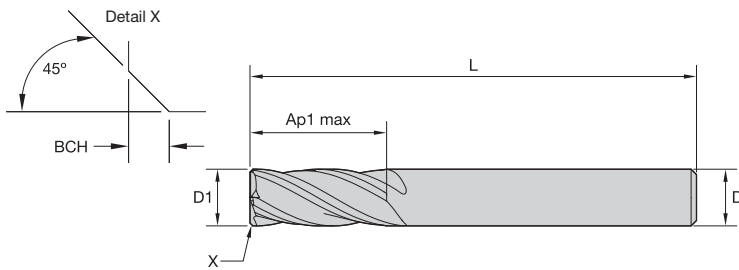


- first choice
- alternate choice

grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #					
5825894	D0040200T004	—	—	—	—	2,0	6	4,00	50	—
5825895	D0140200T007	—	—	—	—	2,0	6	7,00	57	—
5825896	D0140250T008	—	—	—	—	2,5	6	8,00	57	—
5825897	D0040300T005	—	—	—	—	3,0	6	5,00	50	—
5825898	D0140300T008	—	—	—	—	3,0	6	8,00	57	—
5825899	D0140350T010	—	—	—	—	3,5	6	10,00	57	—
5825900	D0040400T008	—	—	—	—	4,0	6	8,00	54	0,10
6085348	D0040400T008S	—	—	—	—	4,0	6	8,00	54	—
6085349	D0140400T011S	—	—	—	—	4,0	6	11,00	57	—
5825931	D0140400T011	—	—	—	—	4,0	6	11,00	57	0,10
6085350	D0140450T011S	—	—	—	—	4,5	6	11,00	57	—
5825932	D0140450T011	—	—	—	—	4,5	6	11,00	57	0,10
6085361	D0040500T009S	—	—	—	—	5,0	6	9,00	54	—
5825933	D0040500T009	—	—	—	—	5,0	6	9,00	54	0,10
6085362	D0140500T013S	—	—	—	—	5,0	6	13,00	57	—
5825934	D0140500T013	—	—	—	—	5,0	6	13,00	57	0,10
6085363	D0140550T013S	—	—	—	—	5,5	6	13,00	57	—
5825935	D0140550T013	—	—	—	—	5,5	6	13,00	57	0,10
6085364	D0040600T010S	—	—	—	—	6,0	6	10,00	54	—
5825936	D0040600T010	—	—	—	—	6,0	6	10,00	54	0,10
6085365	D0140600T013S	—	—	—	—	6,0	6	13,00	57	—
5825937	D0140600T013	—	—	—	—	6,0	6	13,00	57	0,10
6085366	D0140650T016S	—	—	—	—	6,5	8	16,00	63	—
5825938	D0140650T016	—	—	—	—	6,5	8	16,00	63	0,10
6085367	D0040700T011S	—	—	—	—	7,0	8	11,00	58	—
5825939	D0040700T011	—	—	—	—	7,0	8	11,00	58	0,10
6085368	D0140700T016S	—	—	—	—	7,0	8	16,00	63	—
5825940	D0140700T016	—	—	—	—	7,0	8	16,00	63	0,10

(continued)

(Series D004 D014 • VariMill GP — continued)



● first choice
○ alternate choice

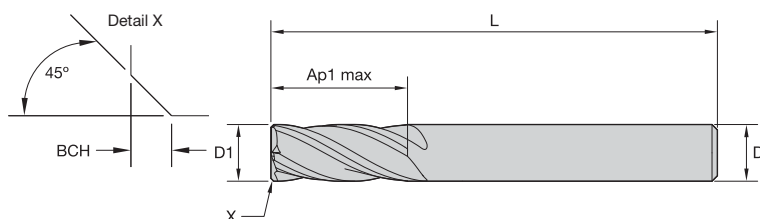
grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #					
6085369	D0140750T019S	—	—	—	—	7,5	8	19,00	63	—
5825941	D0140750T019	—	—	—	—	7,5	8	19,00	63	0,10
6085370	D0040800T012S	—	—	—	—	8,0	8	12,00	58	—
5825942	D0040800T012	—	—	—	—	8,0	8	12,00	58	0,20
6085371	D0140800T019S	—	—	—	—	8,0	8	19,00	63	—
5825943	D0140800T019	—	—	—	—	8,0	8	19,00	63	0,20
6085372	D0040900T013S	—	—	—	—	9,0	10	13,00	66	—
5825944	D0040900T013	—	—	—	—	9,0	10	13,00	66	0,20
6085373	D0140900T019S	—	—	—	—	9,0	10	19,00	72	—
5825945	D0140900T019	—	—	—	—	9,0	10	19,00	72	0,20
6085374	D0041000T014S	—	—	—	—	10,0	10	14,00	66	—
5825946	D0041000T014	—	—	—	—	10,0	10	14,00	66	0,20
6085375	D0141000T022S	—	—	—	—	10,0	10	22,00	72	—
5825947	D0141000T022	—	—	—	—	10,0	10	22,00	72	0,20
6085376	D0041200T016S	6085406	D0041200W016S	6085396	D0041200W016S	12,0	12	16,00	73	—
5825948	D0041200T016	5825968	D0041200W016	5825958	D0041200W016	12,0	12	16,00	73	0,30
6085377	D0141200T026S	—	—	6085397	D0141200W026S	12,0	12	26,00	83	—
5825949	D0141200T026	5825969	D0141200W026	5825959	D0141200W026	12,0	12	26,00	83	0,30
—	—	—	—	6085407	D0141200W026S	12,0	12	26,00	83	—
6085378	D0041400T018S	6085408	D0041400W018S	6085398	D0041400W018S	14,0	14	18,00	75	—
5825950	D0041400T018	5825970	D0041400W018	5825960	D0041400W018	14,0	14	18,00	75	0,30
6085379	D0141400T026S	—	—	6085399	D0141400W026S	14,0	14	26,00	83	—
5825951	D0141400T026	5825971	D0141400W026	5825961	D0141400W026	14,0	14	26,00	83	0,30
—	—	—	—	6085409	D0141400W026S	14,0	14	26,00	83	—
6085380	D0041600T022S	6085410	D0041600W022S	6085400	D0041600W022S	16,0	16	22,00	82	—
5825952	D0041600T022	5825972	D0041600W022	5825962	D0041600W022	16,0	16	22,00	82	0,30
6085391	D0141600T032S	6085421	D0141600W032S	6085401	D0141600W032S	16,0	16	32,00	92	—
5825953	D0141600T032	5825973	D0141600W032	5825963	D0141600W032	16,0	16	32,00	92	0,30
6085392	D0041800T024S	6086478	D0041800W024S	6085402	D0041800W024S	18,0	18	24,00	84	—
5825954	D0041800T024	5825974	D0041800W024	5825964	D0041800W024	18,0	18	24,00	84	0,30
6085393	D0141800T032S	6086479	D0141800W032S	6085403	D0141800W032S	18,0	18	32,00	92	—
5825955	D0141800T032	5825975	D0141800W032	5825965	D0141800W032	18,0	18	32,00	92	0,30
6085394	D0042000T026S	6086480	D0042000W026S	6085404	D0042000W026S	20,0	20	26,00	92	—
5825956	D0042000T026	5825976	D0042000W026	5825966	D0042000W026	20,0	20	26,00	92	0,30
6085395	D0142000T038S	6086491	D0142000W038S	6085405	D0142000W038S	20,0	20	38,00	104	—
5825957	D0142000T038	5825977	D0142000W038	5825967	D0142000W038	20,0	20	38,00	104	0,30

NOTE: For application data, please see pages B38–B39.

- Centre cutting.
- Chamfered and sharp corners.
- Standard items listed. Additional styles and coatings made-to-order.



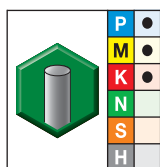
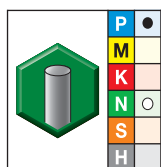
Solid End Milling



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series 2528 • VariMill GP

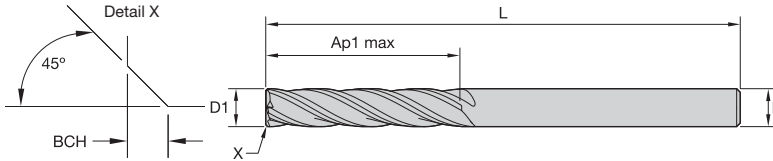


- first choice
- alternate choice

grade UNCOATED		grade TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #					
6086507	25280400T011S	6086492	25280400T011S	4,0	4	11,00	50	—
5825993	25280400T011	5825978	25280400T011	4,0	4	11,00	50	0,10
6086508	25280500T013S	6086493	25280500T013S	5,0	5	13,00	50	—
5825994	25280500T013	5825979	25280500T013	5,0	5	13,00	50	0,10
6086509	25280600T013S	6086494	25280600T013S	6,0	6	13,00	57	—
5825995	25280600T013	5825980	25280600T013	6,0	6	13,00	57	0,10
6086510	25280800T019S	6086495	25280800T019S	8,0	8	19,00	63	—
5825996	25280800T019	5825981	25280800T019	8,0	8	19,00	63	0,20
6086531	25281000T022S	6086496	25281000T022S	10,0	10	22,00	72	—
5825997	25281000T022	5825982	25281000T022	10,0	10	22,00	72	0,20
6086502	25281200T026S	6086497	25281200T026S	12,0	12	26,00	83	—
5825988	25281200T026	5825983	25281200T026	12,0	12	26,00	83	0,30
6086503	25281400T026S	6086498	25281400T026S	14,0	14	26,00	83	—
5825989	25281400T026	5825984	25281400T026	14,0	14	26,00	83	0,30
6086504	25281600T032S	6086499	25281600T032S	16,0	16	32,00	92	—
5825990	25281600T032	5825985	25281600T032	16,0	16	32,00	92	0,30
6086505	25281800T032S	6086500	25281800T032S	18,0	18	32,00	92	—
5825991	25281800T032	5825986	25281800T032	18,0	18	32,00	92	0,30
6086506	25282000T038S	6086501	25282000T038S	20,0	20	38,00	104	—
5825992	25282000T038	5825987	25282000T038	20,0	20	38,00	104	0,30

NOTE: For application data, please see page B39.

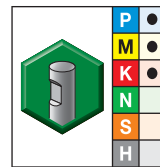
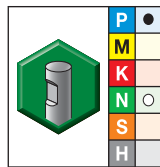
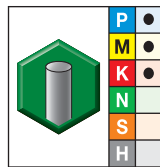
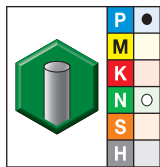
- Centre cutting.
- Chamfered and sharp corners.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series 4004 4014 4024 • VariMill GP

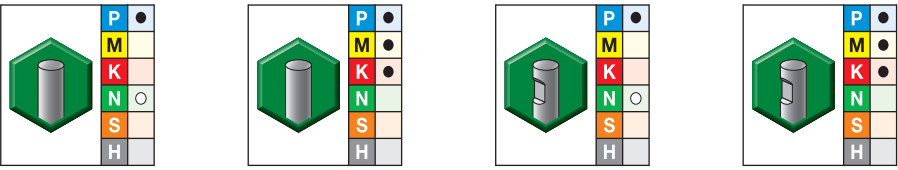
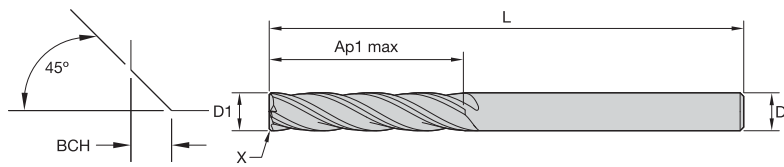


- first choice
- alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
5826085	40040100T004	5826016	40040100T004	—	—	—	—	1,0	3	4,00	38	—
5826086	40040150T004	5826017	40040150T004	—	—	—	—	1,5	3	4,00	38	—
5826087	40040200T006	5826018	40040200T006	—	—	—	—	2,0	3	6,30	38	—
5826088	40040250T006	5826019	40040250T006	—	—	—	—	2,5	3	6,30	38	—
5826089	40040300T009	5826020	40040300T009	—	—	—	—	3,0	3	9,50	38	—
5826090	40140300T019	5826021	40140300T019	—	—	—	—	3,0	3	19,00	63	—
5826101	40240300T025	5826022	40240300T025	—	—	—	—	3,0	3	25,00	75	—
5826102	40040350T012	5826023	40040350T012	—	—	—	—	3,5	4	12,00	50	—
5826103	40040400T011	5826024	40040400T011	—	—	—	—	4,0	4	11,00	50	0,10
6085522	40040400T011S	6085576	40040400T011S	—	—	—	—	4,0	4	11,00	50	—
—	—	6085577	40140400T019S	—	—	—	—	4,0	4	19,00	63	—
—	—	5826025	40140400T019	—	—	—	—	4,0	4	19,00	63	0,10
—	—	6085578	40240400T031S	—	—	—	—	4,0	4	31,00	75	—
—	—	5826026	40240400T031	—	—	—	—	4,0	4	31,00	75	0,10
6085523	40040450T014S	6085579	40040450T014S	—	—	—	—	4,5	5	14,00	50	—
5826104	40040450T014	5826027	40040450T014	—	—	—	—	4,5	5	14,00	50	0,10
—	—	6085580	40040500T013S	—	—	—	—	5,0	5	13,00	50	—
—	—	5826028	40040500T013	—	—	—	—	5,0	5	13,00	50	0,10
6085524	40040500T020S	6085581	40040500T020S	—	—	—	—	5,0	5	20,00	63	—
5826105	40040500T020	5826029	40040500T020	—	—	—	—	5,0	5	20,00	63	0,10
—	—	6085582	40140500T030S	—	—	—	—	5,0	5	30,00	75	—
—	—	5826030	40140500T030	—	—	—	—	5,0	5	30,00	75	0,10
—	—	6085583	40240500T031S	—	—	—	—	5,0	5	31,00	100	—
—	—	5826031	40240500T031	—	—	—	—	5,0	5	31,00	100	0,10
6085525	40040600T016S	6085584	40040600T016S	—	—	—	—	6,0	6	16,00	50	—
5826106	40040600T016	5826032	40040600T016	—	—	—	—	6,0	6	16,00	50	0,10
6085526	40140600T028S	6085585	40140600T028S	—	—	—	—	6,0	6	28,00	75	—
5826107	40140600T028	5826033	40140600T028	—	—	—	—	6,0	6	28,00	75	0,10
6085527	40240600T038S	6085586	40240600T038S	—	—	—	—	6,0	6	38,00	100	—
5826108	40240600T038	5826034	40240600T038	—	—	—	—	6,0	6	38,00	100	0,10
—	—	6085587	40040700T020S	—	—	—	—	7,0	8	20,00	63	—
—	—	5826035	40040700T020	—	—	—	—	7,0	8	20,00	63	0,10

(continued)

(Series 4004 4014 4024 • VariMill GP — continued)

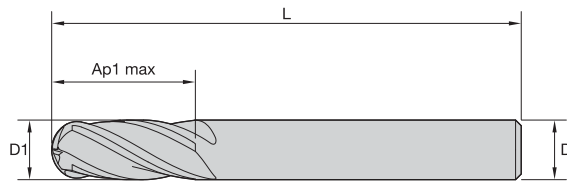


● first choice
○ alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN		D1	D	length of cut Ap1 max	length L	BCH
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #					
6085528	40040800T020S	6085588	40040800T020S	—	—	—	—	8,0	8	20,00	50	—
5826109	40040800T020	5826036	40040800T020	—	—	—	—	8,0	8	20,00	50	0,20
6085529	40140800T028S	6085589	40140800T028S	—	—	—	—	8,0	8	28,00	75	—
5826110	40140800T028	5826037	40140800T028	—	—	—	—	8,0	8	28,00	75	0,20
6085530	40240800T041S	6085590	40240800T041S	—	—	—	—	8,0	8	41,00	100	—
5826111	40240800T041	5826038	40240800T041	—	—	—	—	8,0	8	41,00	100	0,20
—	—	6085591	40040900T020S	—	—	—	—	9,0	9	20,00	63	—
—	—	5826039	40040900T020	—	—	—	—	9,0	9	20,00	63	0,20
6085531	40041000T022S	6085592	40041000T022S	—	—	—	—	10,0	10	22,00	72	—
5826113	40041000T022	5826040	40041000T022	—	—	—	—	10,0	10	22,00	72	0,20
6085532	40141000T032S	6085593	40141000T032S	—	—	—	—	10,0	10	32,00	89	—
5826114	40141000T032	5826041	40141000T032	—	—	—	—	10,0	10	32,00	89	0,20
6085533	40241000T045S	6085594	40241000T045S	—	—	—	—	10,0	10	45,00	100	—
5826115	40241000T045	5826042	40241000T045	—	—	—	—	10,0	10	45,00	100	0,20
6085534	40041200T025S	—	—	6085549	40041200W025S	6085610	40041200W025S	12,0	12	25,00	75	—
—	—	5826043	40041200T025	—	—	—	—	12,0	12	25,00	89	0,30
—	—	6085595	40041200T025S	—	—	—	—	12,0	12	25,00	89	—
5826116	40041200T025	—	—	5826141	40041200W025	5826070	40041200W025	12,0	12	25,00	75	0,30
6085535	40141200T045S	6085596	40141200T045S	6085550	40141200W045S	6085611	40141200W045S	12,0	12	45,00	100	—
5826117	40141200T045	5826044	40141200T045	5826142	40141200W045	5826071	40141200W045	12,0	12	45,00	100	0,30
6085536	40241200T075S	6085597	40241200T075S	6085551	40241200W075S	6085612	40241200W075S	12,0	12	75,00	150	—
5826118	40241200T075	5826045	40241200T075	5826143	40241200W075	5826072	40241200W075	12,0	12	75,00	150	0,30
6085537	40041400T032S	6085598	40041400T032S	6085552	40041400W032S	6085613	40041400W032S	14,0	14	32,00	83	—
5826119	40041400T032	5826046	40041400T032	5826144	40041400W032	5826073	40041400W032	14,0	14	32,00	83	0,30
5826120	40141400T050	5826047	40141400T050	5826146	40141400W050	5826074	40141400W050	14,0	14	50,00	100	0,30
6085538	40141400T050S	6085599	40141400T050S	6085553	40141400W050S	6085614	40141400W050S	14,0	14	50,00	100	—
6085539	40241400T075S	6085600	40241400T075S	6085554	40241400W075S	6085615	40241400W075S	14,0	14	75,00	150	—
5826121	40241400T075	5826049	40241400T075	5826147	40241400W075	5826075	40241400W075	14,0	14	75,00	150	0,30
5826122	40041600T032	5826061	40041600T032	5826148	40041600W032	5826076	40041600W032	16,0	16	32,00	92	0,30
6085540	40041600T032S	6085601	40041600T032S	6085555	40041600W032S	6085616	40041600W032S	16,0	16	32,00	92	—
6085541	40141600T056S	6085602	40141600T056S	6085556	40141600W056S	6102465	40141600W056S	16,0	16	56,00	110	—
5826123	40141600T056	5826062	40141600T056	5826149	40141600W056	5826077	40141600W056	16,0	16	56,00	110	0,30
6085542	40241600T075S	6085603	40241600T075S	6086532	40241600W075S	6085427	40241600W075S	16,0	16	75,00	150	—
5826124	40241600T075	5826063	40241600T075	5826150	40241600W075	5826078	40241600W075	16,0	16	75,00	150	0,30
6085543	40041800T038S	6085604	40041800T038S	6086533	40041800W038S	6085428	40041800W038S	18,0	18	38,00	100	—
5826125	40041800T038	5826064	40041800T038	5826151	40041800W038	5826079	40041800W038	18,0	18	38,00	100	0,30
6085544	40141800T060S	6085605	40141800T060S	6086534	40141800W060S	6085429	40141800W060S	18,0	18	60,00	125	—
5826126	40141800T060	5826065	40141800T060	5826152	40141800W060	5826080	40141800W060	18,0	18	60,00	125	0,30
6085545	40241800T075S	6085606	40241800T075S	6086535	40241800W075S	6085430	40241800W075S	18,0	18	75,00	150	—
5826127	40241800T075	5826066	40241800T075	5826153	40241800W075	5826081	40241800W075	18,0	18	75,00	150	0,30
5826128	40042000T038	5826067	40042000T038	5826154	40042000W038	5826082	40042000W038	20,0	20	38,00	104	0,30
6085546	40042000T038S	6085607	40042000T038S	6086536	40042000W038S	6085511	40042000W038S	20,0	20	38,00	104	—
6085547	40142000T056S	6085608	40142000T056S	6086537	40142000W056S	6085512	40142000W056S	20,0	20	56,00	125	—
5826129	40142000T056	5826068	40142000T056	5826155	40142000W056	5826083	40142000W056	20,0	20	56,00	125	0,30
6085548	40242000T075S	6085609	40242000T075S	6086538	40242000W075S	6085513	40242000W075S	20,0	20	75,00	150	—
5826130	40242000T075	5826069	40242000T075	5826156	40242000W075	5826084	40242000W075	20,0	20	75,00	150	0,30

NOTE: For application data, please see pages B38–B39.

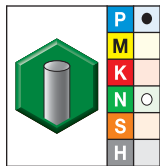
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



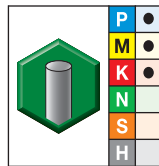
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

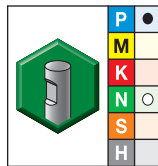
■ Series D010 • VariMill GP



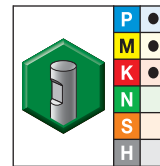
grade UNCOATED



grade TiAlN
TiAlN



grade UNCOATED



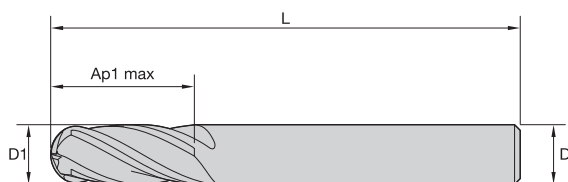
grade TiAlN
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5825604	D0100300T008	5825527	D0100300T008	—	—	—	—	3,0	6	8,00	57
5825605	D0100400T011	5825528	D0100400T011	—	—	—	—	4,0	6	11,00	57
5825606	D0100500T013	5825529	D0100500T013	—	—	—	—	5,0	6	13,00	57
5825607	D0100600T013	5825530	D0100600T013	—	—	—	—	6,0	6	13,00	57
5825608	D0100800T019	5825531	D0100800T019	—	—	—	—	8,0	8	19,00	63
5825609	D0101000T022	5825532	D0101000T022	—	—	—	—	10,0	10	22,00	72
5825610	D0101200T026	5825533	D0101200T026	5825589	D0101200W026	5825540	D0101200W026	12,0	12	26,00	83
5825611	D0101400T026	5825534	D0101400T026	5825590	D0101400W026	5825541	D0101400W026	14,0	14	26,00	83
5825612	D0101600T032	5825536	D0101600T032	5825591	D0101600W032	5825542	D0101600W032	16,0	16	32,00	92
5825613	D0101800T032	5825538	D0101800T032	5825592	D0101800W032	5825543	D0101800W032	18,0	18	32,00	92
5825614	D0102000T038	5825539	D0102000T038	5825593	D0102000W038	5825544	D0102000W038	20,0	20	38,00	104

NOTE: For application data, please see pages B40–B41.

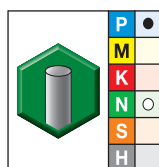
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



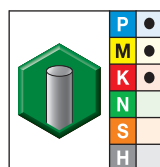
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series 2848 • VariMill GP



grade UNCOATED



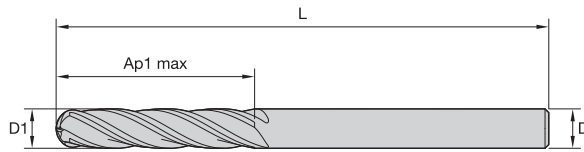
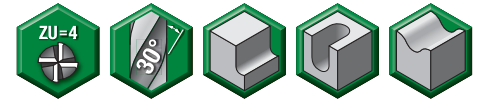
grade TiAlN
TiAlN

- first choice
- alternate choice

order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5825594	28480400T011	5825545	28480400T011	4,0	4	11,00	50
5825595	28480500T013	5825546	28480500T013	5,0	5	13,00	50
5825596	28480600T013	5825547	28480600T013	6,0	6	13,00	57
5825597	28480800T019	5825548	28480800T019	8,0	8	19,00	63
5825598	28481000T022	5825549	28481000T022	10,0	10	22,00	72
5825599	28481200T026	5825550	28481200T026	12,0	12	26,00	83
5825600	28481400T026	5825551	28481400T026	14,0	14	26,00	83
5825601	28481600T032	5825552	28481600T032	16,0	16	32,00	92
5825602	28481800T032	5825553	28481800T032	18,0	18	32,00	92
5825603	28482000T038	5825554	28482000T038	20,0	20	38,00	104

NOTE: For application data, please see pages B40-B41.

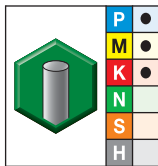
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3-6	-0,020/-0,038	> 3-6	0/0,008
> 6-10	-0,025/-0,047	> 6-10	0/0,009
> 10-18	-0,032/-0,059	> 10-18	0/0,011
> 18-30	-0,040/-0,073	> 18-30	0/0,013

■ Series 4000 4010 • VariMill GP



- first choice
- alternate choice

order #	catalogue #	grade TiAlN TiAlN	D1	D	length of cut Ap1 max	length L
5825555	40000200T006	●	2,0	3	6,30	38
5825556	40000300T020	●	3,0	3	20,00	75
5825557	40000400T014	●	4,0	4	14,00	50
5825558	40100400T025	○	4,0	4	25,00	75
5825559	40000500T016	●	5,0	5	16,00	50
5825560	40100500T030	○	5,0	5	30,00	75
5825573	40000600T016	●	6,0	6	16,00	50
5825574	40100600T019	○	6,0	6	19,00	63
5825575	40100600T030	○	6,0	6	30,00	75
5825576	40000800T019	●	8,0	8	19,00	63
5825577	40100800T040	○	8,0	8	40,00	100
5825578	40001000T022	●	10,0	10	22,00	72
5825579	40101000T040	○	10,0	10	40,00	100
5825580	40001200T025	●	12,0	12	25,00	75
5825581	40101200T045	○	12,0	12	45,00	150
5825583	40001400T032	●	14,0	14	32,00	83
5825584	40101400T050	○	14,0	14	50,00	100
5825585	40001600T032	●	16,0	16	32,00	89
5825586	40101600T065	○	16,0	16	65,00	150
5825587	40001800T038	●	18,0	18	38,00	100
5825588	40102000T056	○	20,0	20	56,00	125

NOTE: For application data, please see page B40.

■ Series D004 4004 • TiAlN • VariMill GP

Solid End Milling

Material Group	Side Milling (A) and Slotting (B)		TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.																	
	A		B	Cutting Speed – vc m/min		D1 – Diameter																
	ap	ae	ap	min	max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0			
	P	0	Ap1 max, 0,1 x D	0,5 x D	150	– 200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114		
	1	Ap1 max, 0,1 x D	0,5 x D	150	– 200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114			
	2	Ap1 max, 0,1 x D	0,5 x D	140	– 190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114			
	3	Ap1 max, 0,1 x D	0,5 x D	120	– 160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101			
	4	Ap1 max, 0,1 x D	0,5 x D	90	– 150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088			
M	1	Ap1 max, 0,1 x D	0,5 x D	90	– 115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101			
	2	Ap1 max, 0,1 x D	0,5 x D	60	– 80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081			
K	1	Ap1 max, 0,1 x D	0,5 x D	120	– 150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114			
	2	Ap1 max, 0,1 x D	0,5 x D	110	– 140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101			

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D004 4004 • Uncoated • VariMill GP

Material Group	Side Milling (A) and Slotting (B)		uncoated		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.																	
	A		B	Cutting Speed – vc m/min		D1 – Diameter																
	ap	ae	ap	min	max	mm	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0						
	P	0	Ap1 max, 0,1 x D	0,5 x D	120	– 160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114					
	1	Ap1 max, 0,1 x D	0,5 x D	120	– 160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114						
	2	Ap1 max, 0,1 x D	0,5 x D	112	– 152	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114						
N	1	Ap1 max, 0,1 x D	0,5 x D	400	– 1600	fz	0,010	0,020	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200						
	2	Ap1 max, 0,1 x D	0,5 x D	400	– 1200	fz	0,008	0,016	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160						
	4	Ap1 max, 0,1 x D	0,5 x D	320	– 600	fz	0,007	0,014	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140						

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D014 2528 4014 4024 • TiAlN • VariMill GP

Material Group																			
	Side Milling (A)		TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A).														
	A		Cutting Speed – vc m/min			D1 – Diameter													
	ap	ae	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D014 2528 4014 4024 • Uncoated • VariMill GP

Material Group																
	Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).										
	A		Cutting Speed – vc m/min			D1 – Diameter										
	ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0		
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114	
	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114	
	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114	
N	1	Ap1 max	0,1 x D	400	–	1600	fz	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200	
	2	Ap1 max	0,1 x D	400	–	1200	fz	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160	
	4	Ap1 max	0,1 x D	320	–	600	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D010 2848 4000 • TiAlN • VariMill GP

Solid End Milling

Material Group	Side Milling (A) and Slotting (B)		TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.															
	A		B	Cutting Speed – vc m/min			D1 – Diameter													
	ap	ae	ap	min	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0			
	ap1	ae1	ap	min	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0			
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	
	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

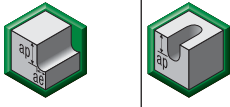

Application Data • Series 4010 • VariMill GP

■ Series 4010 • TiAlN • VariMill GP

Material Group	Side Milling (A)		TiAlN		Recommended feed per tooth (fz = mm/th) for side milling (A).														
	A		Cutting Speed – vc m/min			D1 – Diameter													
	ap	ae	min	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0			
	ap1	ae1	min	max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0			
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	1	Ap1 max	0,1 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	2	Ap1 max	0,1 x D	140	–	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	3	Ap1 max	0,1 x D	120	–	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	
	4	Ap1 max	0,1 x D	90	–	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	
	2	Ap1 max	0,1 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	
	2	Ap1 max	0,1 x D	110	–	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

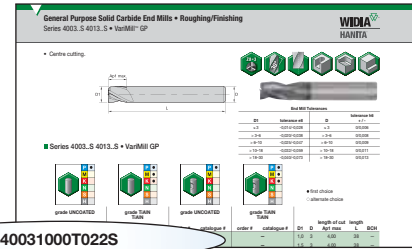
■ Series D010 2848 • Uncoated • VariMill GP

Material Group																		
	Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
	A		B	Cutting Speed – vc m/min			D1 – Diameter											
	ap	ae	ap	min	max	mm	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0		
P	0	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	0,5 x D	112	–	152	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
N	1	Ap1 max	0,1 x D	0,5 x D	400	–	1600	fz	0,010	0,020	0,030	0,040	0,060	0,080	0,100	0,120	0,160	0,200
	2	Ap1 max	0,1 x D	0,5 x D	400	–	1200	fz	0,008	0,016	0,024	0,032	0,048	0,064	0,080	0,096	0,128	0,160
	4	Ap1 max	0,1 x D	0,5 x D	320	–	600	fz	0,007	0,014	0,021	0,028	0,042	0,056	0,070	0,084	0,112	0,140

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

How Do Catalogue Numbers Work?

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



40031000T022S

4003

Series

- D002 = 2FL Square DIN6527 Short
- D012 = 2FL Square DIN6527 Long
- 2819 = 2FL Square DIN6528
- 4002 = 2FL Square Factory Standard Short/Regular
- 4012 = 2FL Square Factory Standard Long
- 4022 = 2FL Square Factory Standard Extra Long
- D001 = 2FL Ball Nose DIN6527 Short
- D011 = 2FL Ball Nose DIN6527 Long
- 2838 = 2FL Ball Nose DIN6528
- 4001 = 2FL Ball Nose Factory Standard Short/Regular
- 4011 = 2FL Ball Nose Factory Standard Long
- 4021 = 2FL Ball Nose Factory Standard Extra Long
- D003 = 3FL Square DIN6527 Short
- D013 = 3FL Square DIN6527 Long
- 4003 = 3FL Square Factory Standard Short/Regular
- 4013 = 3 FL Square Factory Standard Long
- D004 = 4FL Square DIN6527 Short
- D014 = 4FL Square DIN6527 Long
- 2528 = 4FL Square DIN6528
- 4004 = 4FL Square Factory Standard Short/Regular
- 4014 = 4FL Square Factory Standard Long
- 4024 = 4FL Square Factory Standard Extra Long
- D000 = 4FL Ball Nose DIN6527 Short
- D010 = 4FL Ball Nose DIN6527 Long
- 2848 = 4FL Ball Nose DIN6528
- 4000 = 4FL Ball Nose Factory Standard Short/Regular
- 4010 = 2FL Ball Nose Factory Standard Long/Extra Long

1000

Diameter
mm

T

Shank
Style

- T = Plain Shank
- W = Weldon® Shank

022

Ap1 max
mm

S

Corner
Style

- S = Sharp Corner

Good for You, Better for the Environment!

The WIDIA™ Carbide Recycling Programme can turn accumulated scrap carbide tooling in your shop into cash.

Carbide Recycling

We pay cash for used carbide tooling, including coated or non-coated carbide inserts, drills, end mills, reamers, and taps, regardless of brand.

It's good for the environment and a responsible way to dispose of scrap carbide.

Our carbide recycling programme features:

- Easy-to-use web portal that shows what your scrap carbide is worth before sending it to us.
- Online forms that make it easy to ship scrap carbide to WIDIA.
- Green Box™ containers for safe, convenient shipping of scrap carbide to WIDIA.
- Cash payment for used carbide tooling.



For more information, contact your local WIDIA
Authorised Distributor or visit widia.com/services.

WIDIA 

High-Performance Modular Solid Carbide End Mills •
Duo-Lock™

DUO-LOCK®



Duo-Lock™ combines highest runout accuracy and length repeatability with maximum coupling stability. This allows the Duo-Lock™ system to fully utilise the full potential of WIDIA™ VariMill™ cutting geometries and WIDIA Victory™ grades. The flexible modular system, Duo-Lock™, targets applications like solid carbide end mills. A wide range of diameters between 16–32mm and multiple corner configurations, such as chamfer, and radii, are available from stock.

- Cutting data and tool life comparable to high-performance solid carbide.
- Proprietary VariMill geometries allow roughing and finishing with one tool.
- 1,5 x D standard cutting edge length allows for less passes.
- Up to 1 x D full slotting increases Metal Removal Rates (MRR) and productivity significantly.
- Extensive straight and conical shank, as well as integral adaptor offering including CV, DV, BT, and HSK.

High-performance geometries provide highest Metal Removal Rates (MMR).

Intelligent thread that ensures stress levels remain below critical values.

Unequal flute spacing reduces vibrations and improves surface finish.

Third contact surface delivers high stiffness and highest accuracy below 5µm runout.

DUO-LOCK®
by HAIMER®



VariMill™ Duo-Lock™ Series

- Less cutting forces and pressure on cutting edge through tailored axial and radial rake angles.
- Proprietary tapered core provides highest tool stability at roughing and finishing operations.
- Eccentric relief design increases tool life through higher edge stability.

4X47 VariMill Series

- 4 flute.
- New asymmetrical fluting geometry.
- High metal removal rates and tool life in:
 - Stainless steels, steels, and alloyed steels.
 - High-temperature alloys and titanium.



4X48 VariMill Series

- 4 flute.
- New asymmetrical fluting geometry.
- Titanium geometry design.
- Extensive radii corner offering.



5747 VariMill II™ Series

- 5 flute.
- High metal removal rates and tool life in:
 - Stainless steels, steels, and alloyed steels.
 - Cast iron.
 - High-temperature alloys and titanium.



5748 VariMill II ER Series

- 5 flute.
- Titanium geometry design.
- Eccentric relief for edge stability and strength.
- Extensive radii corner offering.



4XN0 VariMill Series

- 4 flute.
- Stainless steel and steel geometry design.
- Centre cutting ball nose.

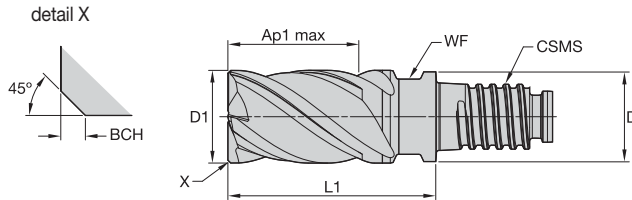
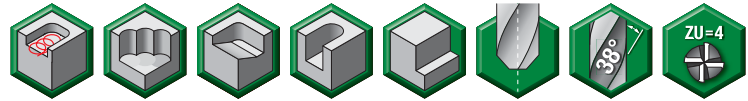


774E VariMill III™ ER Series

- 7 flute.
- Titanium geometry design.
- Eccentric relief for edge stability and strength.
- Extensive radii corner offering.



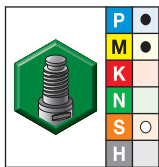
- Asymmetrical flute spacing configuration minimises chatter and harmonics for smoother machining.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8
> 10-18	-0,032/-0,059
> 18-30	-0,040/-0,073
> 30	-0,050/-0,089

4X47 • 4 Flute • Metric



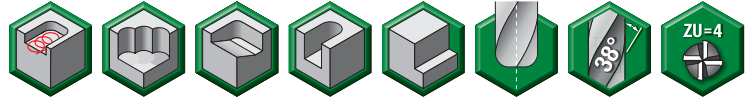
- first choice
- alternate choice

grade WP15PE
AlTiN

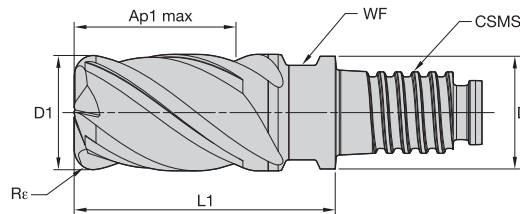
order #	catalogue #	D1	D	length of cut Ap1 max	L1	CSMS system size	WF	BCH
6071091	4X47160NDL16	16,0	15,50	24,00	36	DL16	13,00	0,50
6071092	4X47200NDL20	20,0	19,30	30,00	45	DL20	16,00	0,50
6071093	4X47250NDL25	25,0	24,00	37,50	57	DL25	21,00	0,50
6071094	4X47320NDL32	32,0	31,00	48,00	72	DL32	28,00	0,50

NOTE: For application data, please see page B48.

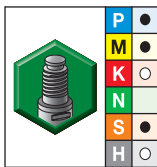
- Asymmetrical flute spacing configuration minimises chatter and harmonics for smoother machining.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



Solid End Milling


End Mill Tolerances

D1	tolerance e8
> 10-18	-0,032/-0,059
> 18-30	-0,040/-0,073
> 30	-0,050/-0,089

■ 4X48 • 4 Flute • Metric


- first choice
- alternate choice

**WS15PE
AITiN**

order #	catalogue #	D1	D	length of cut Ap1 max	L1	CSMS system size	WF	Re
6071111	4X481603DL16	16,0	15,50	24,00	36	DL16	13,00	1,00
6071112	4X481605DL16	16,0	15,50	24,00	36	DL16	13,00	2,00
6071113	4X481607DL16	16,0	15,50	24,00	36	DL16	13,00	3,00
6071114	4X482003DL20	20,0	19,30	30,00	45	DL20	16,00	1,00
6071115	4X482005DL20	20,0	19,30	30,00	45	DL20	16,00	2,00
6071116	4X482007DL20	20,0	19,30	30,00	45	DL20	16,00	3,00
6071117	4X482008DL20	20,0	19,30	30,00	45	DL20	16,00	4,00
6071118	4X482503DL25	25,0	24,00	37,50	57	DL25	21,00	1,00
6071119	4X482505DL25	25,0	24,00	37,50	57	DL25	21,00	2,00
6071120	4X482507DL25	25,0	24,00	37,50	57	DL25	21,00	3,00
6071121	4X482508DL25	25,0	24,00	37,50	57	DL25	21,00	4,00
6071122	4X483205DL32	32,0	31,00	48,00	72	DL32	28,00	2,00
6071123	4X483207DL32	32,0	31,00	48,00	72	DL32	28,00	3,00

NOTE: For application data, please see page B49.

■ VariMill • 4X47 • Asymmetrical Flute Spacing

Solid End Milling

Material Group		Side Milling (A) and Slotting (B)			adaptor reach									Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		A		B	short			medium			long			D1 – Diameter				
		ap		ae	WP15PE			WP15PE			WP15PE							
		min		max	Cutting Speed – vc m/min			Cutting Speed – vc m/min			Cutting Speed – vc m/min							
		ap	ae	ap	min	max	min	max	min	max	min	max	mm	16,0	20,0	25,0	32,0	
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	135	–	180	135	–	180	fz	0,101	0,114	0,124	0,125
	1	1,5 x D	0,5 x D	1 x D	150	–	200	135	–	180	135	–	180	fz	0,101	0,114	0,124	0,125
	2	1,5 x D	0,5 x D	1 x D	140	–	190	126	–	171	126	–	171	fz	0,101	0,114	0,124	0,125
	3	1,5 x D	0,5 x D	1 x D	120	–	160	108	–	144	108	–	144	fz	0,087	0,101	0,114	0,123
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	81	–	135	81	–	135	fz	0,077	0,088	0,098	0,102
	5	1,5 x D	0,5 x D	1 x D	60	–	100	51	–	85	48	–	80	fz	0,070	0,081	0,091	0,099
M	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	42	–	64	40	–	60	fz	0,057	0,065	0,071	0,073
	1	1,5 x D	0,5 x D	1 x D	90	–	115	72	–	92	63	–	80	fz	0,087	0,101	0,114	0,123
	2	1,5 x D	0,5 x D	1 x D	60	–	80	48	–	64	42	–	56	fz	0,070	0,081	0,091	0,099
S	3	1,5 x D	0,5 x D	1 x D	60	–	70	48	–	56	42	–	49	fz	0,057	0,065	0,071	0,073
	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	40	–	72	30	–	54	fz	0,087	0,101	0,114	0,123
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	20	–	32	15	–	24	fz	0,046	0,054	0,061	0,067
	3	1,5 x D	0,5 x D	1 x D	60	–	80	48	–	64	36	–	48	fz	0,070	0,081	0,091	0,099
	4	1,5 x D	0,5 x D	1 x D	50	–	60	40	–	48	30	–	36	fz	0,064	0,074	0,084	0,090

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.
 For side milling with ap larger than 1 x D, reduce fz by 20%!

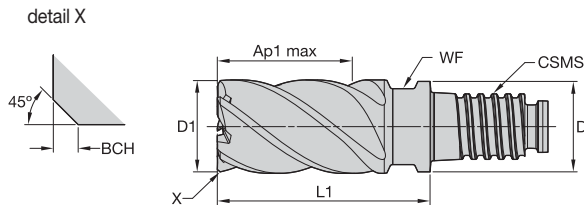
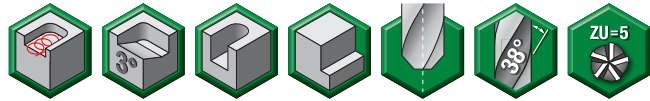
VariMill • 4X48 • Asymmetrical Flute Spacing

Material Group														Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		Side Milling (A) and Slotting (B)			short			medium			long							
		A		B		adaptor reach									D1 – Diameter			
		ap		ae		WS15PE			WS15PE			WS15PE						
		min		max		Cutting Speed – vc m/min			Cutting Speed – vc m/min			Cutting Speed – vc m/min						
				mm			16,0			20,0			25,0			32,0		
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	135	–	180	135	–	180	fz	0,101	0,114	0,124	0,125
	1	1,5 x D	0,5 x D	1 x D	150	–	200	135	–	180	135	–	180	fz	0,101	0,114	0,124	0,125
	2	1,5 x D	0,5 x D	1 x D	140	–	190	126	–	171	126	–	171	fz	0,101	0,114	0,124	0,125
	3	1,5 x D	0,5 x D	1 x D	120	–	160	108	–	144	108	–	144	fz	0,087	0,101	0,114	0,123
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	81	–	135	81	–	135	fz	0,077	0,088	0,098	0,102
	5	1,5 x D	0,5 x D	1 x D	60	–	100	51	–	85	48	–	80	fz	0,070	0,081	0,091	0,099
M	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	42	–	64	40	–	60	fz	0,057	0,065	0,071	0,073
	1	1,5 x D	0,5 x D	1 x D	90	–	115	72	–	92	63	–	80	fz	0,087	0,101	0,114	0,123
	2	1,5 x D	0,5 x D	1 x D	60	–	80	48	–	64	42	–	56	fz	0,070	0,081	0,091	0,099
K	3	1,5 x D	0,5 x D	1 x D	60	–	70	48	–	56	42	–	49	fz	0,057	0,065	0,071	0,073
	1	1,5 x D	0,5 x D	1 x D	120	–	150	108	–	135	108	–	135	fz	0,101	0,114	0,124	0,125
	2	1,5 x D	0,5 x D	1 x D	110	–	140	99	–	126	99	–	126	fz	0,087	0,101	0,114	0,123
S	3	1,5 x D	0,5 x D	1 x D	110	–	130	99	–	117	99	–	117	fz	0,070	0,081	0,091	0,099
	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	40	–	72	30	–	54	fz	0,087	0,101	0,114	0,123
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	20	–	32	15	–	24	fz	0,046	0,054	0,061	0,067
	3	1,5 x D	0,5 x D	1 x D	60	–	80	48	–	64	36	–	48	fz	0,070	0,081	0,091	0,099
H	4	1,5 x D	0,5 x D	1 x D	50	–	60	40	–	48	30	–	36	fz	0,064	0,074	0,084	0,090
	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	64	–	112	48	–	84	fz	0,077	0,088	0,098	0,102
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	56	–	96	42	–	72	fz	0,057	0,065	0,071	0,073

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.
 For side milling with ap larger than 1 x D, reduce fz by 20%!

Solid End Milling

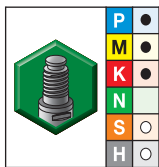
- Unequal flute spacing configuration minimises chatter and harmonics for smoother machining.
- Non-centre cutting.
- Ramping up to 3°.
- Five-flute geometry able to slot up to 1 x D.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8
> 10-18	-0,032/-0,059
> 18-30	-0,040/-0,073
> 30	-0,050/-0,089

■ 5747 • 5 Flute • Metric



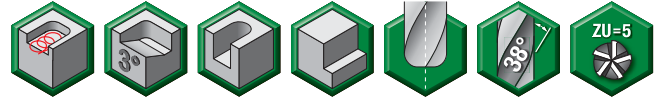
- first choice
- alternate choice

grade WP15PE
AlTiN

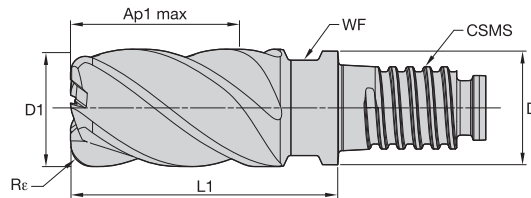
order #	catalogue #	D1	D	length of cut Ap1 max	L1	CSMS system size	WF	BCH
6071362	5747160NDL16	16,0	15,50	24,00	36	DL16	13,00	0,50
6071363	5747200NDL20	20,0	19,30	30,00	45	DL20	16,00	0,50
6071364	5747250NDL25	25,0	24,00	37,50	57	DL25	21,00	0,50
6071365	5747320NDL32	32,0	31,00	48,00	72	DL32	28,00	0,50

NOTE: For application data, please see page B52.

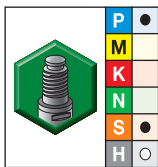
- Unequal flute spacing configuration minimises chatter and harmonics for smoother machining.
- Non-centre cutting.
- Ramping up to 3°.
- Five-flute geometry able to slot up to 1 x D.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



Solid End Milling


End Mill Tolerances

D1	tolerance e8
> 10-18	-0,032/-0,059
> 18-30	-0,040/-0,073
> 30	-0,050/-0,089

5748 • 5 Flute • Metric

**WS15PE
AITiN**

- first choice
- alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	L1	CSMS system size	WF	Re
6071372	57481603DL16	16,0	15,50	24,00	36	DL16	13,00	1,00
6071373	57481605DL16	16,0	15,50	24,00	36	DL16	13,00	2,00
6071374	57481607DL16	16,0	15,50	24,00	36	DL16	13,00	3,00
6071375	57482003DL20	20,0	19,30	30,00	45	DL20	16,00	1,00
6071376	57482005DL20	20,0	19,30	30,00	45	DL20	16,00	2,00
6071377	57482007DL20	20,0	19,30	30,00	45	DL20	16,00	3,00
6071378	57482008DL20	20,0	19,30	30,00	45	DL20	16,00	4,00
6071379	57482503DL25	25,0	24,00	37,50	56	DL25	21,00	1,00
6071380	57482505DL25	25,0	24,00	37,50	56	DL25	21,00	2,00
6071391	57482507DL25	25,0	24,00	37,50	56	DL25	21,00	3,00
6071392	57482508DL25	25,0	24,00	37,50	56	DL25	21,00	4,00
6071393	57483205DL32	32,0	31,00	48,00	72	DL32	28,00	2,00
6071394	57483207DL32	32,0	31,00	48,00	72	DL32	28,00	3,00

NOTE: For application data, please see page B53.

■ VariMill II™ • 5747 • Unequal Flute Spacing

Solid End Milling

		Side Milling (A) and Slotting (B)			short			medium			long				Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.					
Material Group		A		B	adaptor reach												D1 – Diameter			
		ap	ae		WP15PE			WP15PE			WP15PE									
				min		max	min		max	min		max	mm	16,0	20,0	25,0	32,0			
		Cutting Speed – vc m/min			Cutting Speed – vc m/min			Cutting Speed – vc m/min												
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	135	–	180	135	–	180	fz	0,101	0,114	0,124	0,125		
	1	1,5 x D	0,5 x D	1 x D	150	–	200	135	–	180	135	–	180	fz	0,101	0,114	0,124	0,125		
	2	1,5 x D	0,5 x D	1 x D	140	–	190	126	–	171	126	–	171	fz	0,101	0,114	0,124	0,125		
	3	1,5 x D	0,5 x D	1 x D	120	–	160	108	–	144	108	–	144	fz	0,087	0,101	0,114	0,123		
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	81	–	135	81	–	135	fz	0,077	0,088	0,098	0,102		
	5	1,5 x D	0,5 x D	1 x D	60	–	100	51	–	85	48	–	80	fz	0,070	0,081	0,091	0,099		
M	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	42	–	64	40	–	60	fz	0,057	0,065	0,071	0,073		
	1	1,5 x D	0,5 x D	1 x D	90	–	115	72	–	92	63	–	80	fz	0,087	0,101	0,114	0,123		
	2	1,5 x D	0,5 x D	1 x D	60	–	80	48	–	64	42	–	56	fz	0,070	0,081	0,091	0,099		
K	3	1,5 x D	0,5 x D	1 x D	60	–	70	48	–	56	42	–	49	fz	0,057	0,065	0,071	0,073		
	1	1,5 x D	0,5 x D	1 x D	120	–	150	108	–	135	108	–	135	fz	0,101	0,114	0,124	0,125		
	2	1,5 x D	0,5 x D	1 x D	110	–	140	99	–	126	99	–	126	fz	0,087	0,101	0,114	0,123		
S	3	1,5 x D	0,5 x D	1 x D	110	–	130	99	–	117	99	–	117	fz	0,070	0,081	0,091	0,099		
	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	40	–	72	30	–	54	fz	0,087	0,101	0,114	0,123		
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	20	–	32	15	–	24	fz	0,046	0,054	0,061	0,067		
	3	1,5 x D	0,5 x D	1 x D	60	–	80	48	–	64	36	–	48	fz	0,070	0,081	0,091	0,099		
H	4	1,5 x D	0,5 x D	1 x D	50	–	60	40	–	48	30	–	36	fz	0,064	0,074	0,084	0,090		
	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	64	–	112	48	–	84	fz	0,077	0,088	0,098	0,102		
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	56	–	96	42	–	72	fz	0,057	0,065	0,071	0,073		

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.
 For side milling with ap larger than 1 x D, reduce fz by 20%!

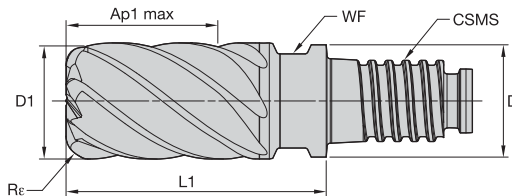
VariMill II™ • 5748 • Unequal Flute Spacing

Material Group														Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.					
		Side Milling (A) and Slotting (B)		short		medium			long			D1 – Diameter							
		A		B		adaptor reach										mm			
						WS15PE		WS15PE		WS15PE									
				Cutting Speed – vc m/min		Cutting Speed – vc m/min		Cutting Speed – vc m/min											
		ap	ae	ap	min		max	min		max	min		max	mm	16,0	20,0	25,0	32,0	
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	51	–	85	48	–	80	fz	0,070	0,081	0,091	0,099	
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	42	–	64	40	–	60	fz	0,057	0,065	0,071	0,073	
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	40	–	72	30	–	54	fz	0,087	0,101	0,114	0,123	
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	20	–	32	15	–	24	fz	0,046	0,054	0,061	0,067	
	3	1,5 x D	0,5 x D	1 x D	60	–	80	48	–	64	36	–	48	fz	0,070	0,081	0,091	0,099	
	4	1,5 x D	0,5 x D	1 x D	50	–	60	40	–	48	30	–	36	fz	0,064	0,074	0,084	0,090	
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	64	–	112	48	–	84	fz	0,077	0,088	0,098	0,102	
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	56	–	96	42	–	72	fz	0,057	0,065	0,071	0,073	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.
 For side milling with ap larger than 1 x D, reduce fz by 20%!

Solid End Milling

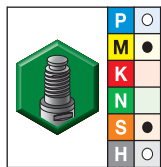
- Unequal flute spacing configuration minimises chatter and harmonics for smoother machining.
- Centre cutting.
- Optimised geometry for titanium machining.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8
> 10-18	-0,032/-0,059
> 18-30	-0,040/-0,073
> 30	-0,050/-0,089

■ 774E • 7 Flute with Eccentric Relief Grind • Metric



- first choice
- alternate choice

WS15PE
AITiN

order #	catalogue #	D1	D	length of cut Ap1 max	L1	CSMS system size	WF	Re
6071521	774E1603DL16	16,0	15,50	24,00	36	DL16	13,00	1,00
6071522	774E1605DL16	16,0	15,50	24,00	36	DL16	13,00	2,00
6071523	774E1607DL16	16,0	15,50	24,00	36	DL16	13,00	3,00
6071524	774E2003DL20	20,0	19,30	30,00	45	DL20	16,00	1,00
6071525	774E2005DL20	20,0	19,30	30,00	45	DL20	16,00	2,00
6071526	774E2007DL20	20,0	19,30	30,00	45	DL20	16,00	3,00
6071527	774E2008DL20	20,0	19,30	30,00	45	DL20	16,00	4,00
6071528	774E2503DL25	25,0	24,00	37,50	57	DL25	21,00	1,00
6071529	774E2505DL25	25,0	24,00	37,50	57	DL25	21,00	2,00
6071530	774E2507DL25	25,0	24,00	37,50	57	DL25	21,00	3,00
6071531	774E2508DL25	25,0	24,00	37,50	57	DL25	21,00	4,00
6071532	774E3205DL32	32,0	31,00	48,00	72	DL32	28,00	2,00
6071533	774E3207DL32	32,0	31,00	48,00	72	DL32	28,00	3,00

NOTE: For application data, please see page B55.

■ VariMill III™ • 774E • Unequal Flute Spacing • Roughing

Material Group													Recommended feed per tooth (fz = mm/th) for side milling (A).					
				Side Milling (A)			short			medium							long	
		A		adaptor reach											D1 – Diameter			
				WS15PE			WS15PE			WS15PE								
				Cutting Speed – vc m/min			Cutting Speed – vc m/min			Cutting Speed – vc m/min								
		ap	ae	min		max	min		max	min		max	mm	16,0	20,0	25,0	32,0	
P	5	Ap max	0,3 x D	90	–	150	81	–	135	81	–	135	fz	0,077	0,088	0,098	0,102	
	6	Ap max	0,3 x D	60	–	100	51	–	85	48	–	80	fz	0,070	0,081	0,091	0,099	
M	1	Ap max	0,3 x D	90	–	115	72	–	92	63	–	80	fz	0,087	0,101	0,114	0,123	
	2	Ap max	0,3 x D	60	–	80	48	–	64	42	–	56	fz	0,070	0,081	0,091	0,099	
	3	Ap max	0,3 x D	60	–	70	48	–	56	42	–	49	fz	0,057	0,065	0,071	0,073	
S	1	Ap max	0,3 x D	50	–	90	40	–	72	30	–	54	fz	0,087	0,101	0,114	0,123	
	2	Ap max	0,3 x D	25	–	40	20	–	32	15	–	24	fz	0,046	0,054	0,061	0,067	
	3	Ap max	0,3 x D	60	–	80	48	–	64	36	–	48	fz	0,070	0,081	0,091	0,099	
	4	Ap max	0,3 x D	50	–	60	40	–	48	30	–	36	fz	0,064	0,074	0,084	0,090	
H	1	Ap max	0,3 x D	80	–	140	64	–	112	48	–	84	fz	0,077	0,088	0,098	0,102	
	2	Ap max	0,3 x D	70	–	120	56	–	96	42	–	72	fz	0,057	0,065	0,071	0,073	

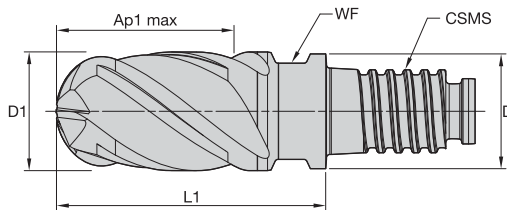
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.
 For side milling with ap larger than 1 x D, reduce fz by 20%!

■ VariMill III • 774E • Unequal Flute Spacing • Finishing

Material Group													Recommended feed per tooth (fz = mm/th) for side milling (A).					
				Side Milling (A)			short			medium							long	
		A		adaptor reach											D1 – Diameter			
				WS15PE			WS15PE			WS15PE								
				Cutting Speed – vc m/min			Cutting Speed – vc m/min			Cutting Speed – vc m/min								
		ap	ae	min		max	min		max	min		max	mm	16,0	20,0	25,0	32,0	
P	5	Ap max	0,06 x D	180	–	300	162	–	270	162	–	270	fz	0,092	0,106	0,117	0,123	
	6	Ap max	0,06 x D	120	–	200	102	–	170	96	–	160	fz	0,084	0,097	0,109	0,118	
M	1	Ap max	0,06 x D	180	–	230	144	–	184	126	–	161	fz	0,105	0,121	0,137	0,148	
	2	Ap max	0,06 x D	120	–	160	96	–	128	84	–	112	fz	0,084	0,097	0,109	0,118	
	3	Ap max	0,06 x D	120	–	140	96	–	112	84	–	98	fz	0,068	0,078	0,085	0,088	
S	1	Ap max	0,06 x D	100	–	180	80	–	144	60	–	108	fz	0,105	0,121	0,137	0,148	
	2	Ap max	0,06 x D	50	–	80	40	–	64	30	–	48	fz	0,056	0,065	0,074	0,081	
	3	Ap max	0,06 x D	120	–	160	96	–	128	72	–	96	fz	0,084	0,097	0,109	0,118	
	4	Ap max	0,06 x D	100	–	120	80	–	96	60	–	72	fz	0,077	0,089	0,100	0,108	
H	1	Ap max	0,06 x D	160	–	280	128	–	224	96	–	168	fz	0,092	0,106	0,117	0,123	
	2	Ap max	0,06 x D	140	–	240	112	–	192	84	–	144	fz	0,068	0,078	0,085	0,088	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.
 For side milling with ap larger than 1 x D, reduce fz by 20%!

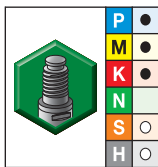
- Asymmetrical flute spacing configuration minimises chatter and harmonics for smoother machining.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8
> 10-18	-0,032/-0,059
> 18-30	-0,040/-0,073
> 30	-0,050/-0,089

■ 4XN0 • 4-Flute Ball Nose • Metric



grade WP15PE
AITIN

- first choice
- alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	L1	CSMS system size	WF
6071151	4XN01600DL16	16,0	15,50	24,00	36	DL16	13,00
6071152	4XN02000DL20	20,0	19,30	30,00	45	DL20	16,00
6071153	4XN02500DL25	25,0	24,00	37,50	56	DL25	21,00

NOTE: For application data, please see page B57.

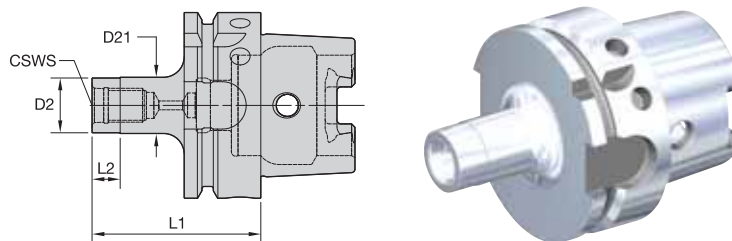
■ VariMill Ball Nose • 4XN0 • Asymmetrical Flute Spacing

Material Group														Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		Side Milling (A) and Slotting (B)			short			medium			long							
		A		B		adaptor reach												
						WP15PE			WP15PE			WP15PE						
		ap		ae		ap		Cutting Speed – vc m/min			Cutting Speed – vc m/min						Cutting Speed – vc m/min	
min		max		min		max		min		max		min		max		mm		
P	0	1,25 x D	0,5 x D	1 x D	150	–	200	135	–	180	135	–	180	fz	0,101	0,114	0,124	
	1	1,25 x D	0,5 x D	1 x D	150	–	200	135	–	180	135	–	180	fz	0,101	0,114	0,124	
	2	1,25 x D	0,5 x D	1 x D	140	–	190	126	–	171	126	–	171	fz	0,101	0,114	0,124	
	3	1,25 x D	0,5 x D	1 x D	120	–	160	108	–	144	108	–	144	fz	0,087	0,101	0,114	
	4	1,25 x D	0,5 x D	0,75 x D	90	–	150	81	–	135	81	–	135	fz	0,077	0,088	0,098	
	5	1,25 x D	0,5 x D	1 x D	60	–	100	51	–	85	48	–	80	fz	0,070	0,081	0,091	
	6	1,25 x D	0,5 x D	0,75 x D	50	–	75	42	–	64	40	–	60	fz	0,057	0,065	0,071	
M	1	1,25 x D	0,5 x D	1 x D	90	–	115	72	–	92	63	–	80	fz	0,087	0,101	0,114	
	2	1,25 x D	0,5 x D	1 x D	60	–	80	48	–	64	42	–	56	fz	0,070	0,081	0,091	
	3	1,25 x D	0,5 x D	1 x D	60	–	70	48	–	56	42	–	49	fz	0,057	0,065	0,071	
K	1	1,25 x D	0,5 x D	1 x D	120	–	150	108	–	135	108	–	135	fz	0,101	0,114	0,124	
	2	1,25 x D	0,5 x D	1 x D	110	–	140	99	–	126	99	–	126	fz	0,087	0,101	0,114	
	3	1,25 x D	0,5 x D	1 x D	110	–	130	99	–	117	99	–	117	fz	0,070	0,081	0,091	
S	1	1 x D	0,3 x D	0,3 x D	50	–	90	40	–	72	30	–	54	fz	0,087	0,101	0,114	
	2	1 x D	0,3 x D	0,3 x D	25	–	40	20	–	32	15	–	24	fz	0,046	0,054	0,061	
	3	1,25 x D	0,5 x D	1 x D	60	–	80	48	–	64	36	–	48	fz	0,070	0,081	0,091	
	4	1,25 x D	0,5 x D	1 x D	50	–	60	40	–	48	30	–	36	fz	0,064	0,074	0,084	
H	1	1,25 x D	0,5 x D	0,75 x D	80	–	140	64	–	112	48	–	84	fz	0,077	0,088	0,098	
	2	1,25 x D	0,2 x D	0,5 x D	70	–	120	56	–	96	42	–	72	fz	0,057	0,065	0,071	

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
 Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
 Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.
 For side milling with ap larger than 1 x D, reduce fz by 20%!



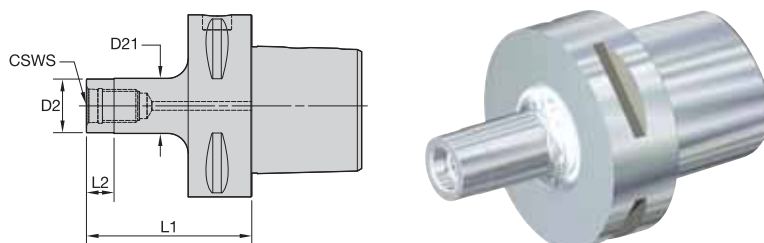
Solid End Milling



■ DL HSK Form A Metric

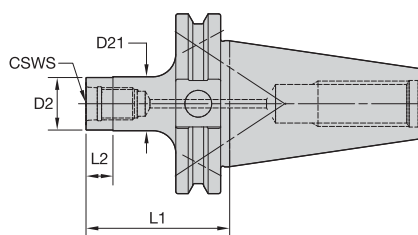
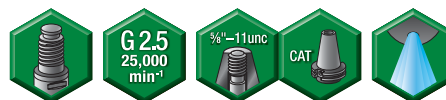
order number	catalogue number	CSWS system size	D2	D21	L1	L2	kg
6136951	HSK63ADL16057M	DL16	16	16	57	8	0,68
6136952	HSK63ADL20057M	DL20	19	20	57	10	0,70
6136953	HSK63ADL25061M	DL25	24	25	61	13	0,71
6136954	HSK63ADL32072M	DL32	31	32	72	16	0,80

PSC63 Duo-Lock™ Integrated



■ DL PSC63 Metric

order number	catalogue number	CSWS system size	D2	D21	L1	L2	kg
6136957	PSC63DL16055M	DL16	16	16	55	8	0,81
6136958	PSC63DL20055M	DL20	19	20	55	10	0,82
6136959	PSC63DL25060M	DL25	24	25	60	13	0,85
6136960	PSC63DL32068M	DL32	31	32	68	16	0,93

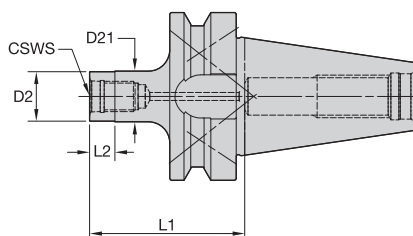


Solid End Milling

■ DL CV40 Metric

order number	catalogue number	CSWS system size	D2	D21	L1	L2	kg
6136973	CV40BDL16050M	DL16	16	16	50	8	0,87
6136974	CV40BDL20050M	DL20	19	20	50	10	0,90
6136975	CV40BDL25056M	DL25	24	25	56	13	0,91
6136976	CV40BDL32065M	DL32	31	32	65	16	0,99

BT40 Duo-Lock™ Integrated

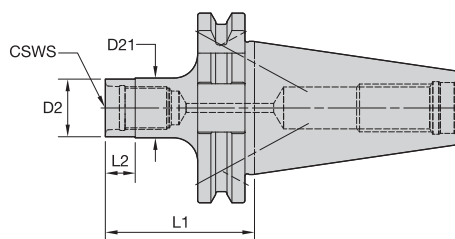


■ DL BT40 Metric

order number	catalogue number	CSWS system size	D2	D21	L1	L2	kg
6136979	BT40BDL16058M	DL16	16	16	58	8	1,02
6136980	BT40BDL20058M	DL20	19	20	58	10	1,03
6136991	BT40BDL25060M	DL25	24	25	60	13	1,05
6136992	BT40BDL32068M	DL32	31	32	68	16	1,11






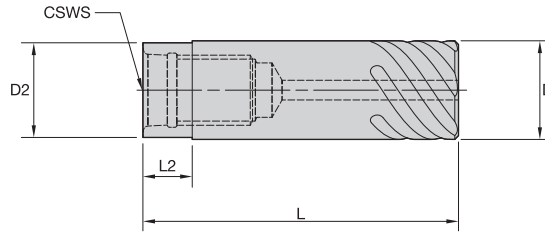
Solid End Milling



■ DL DV40 Metric

order number	catalogue number	CSWS system size	D2	D21	L1	L2	kg
6136995	DV40BDL16050M	DL16	16	16	50	8	0,87
6136996	DV40BDL20050M	DL20	19	20	50	10	0,89
6136997	DV40BDL25056M	DL25	24	25	56	13	0,91
6136998	DV40BDL32065M	DL32	31	32	65	16	0,99

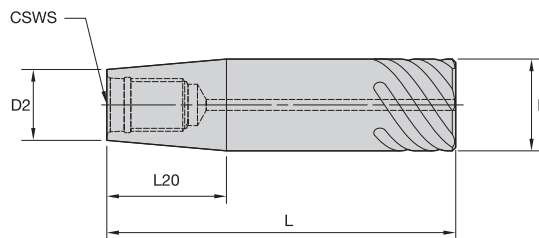
 Form B			40	(2x) MS2221S	2,5mm
			50	(2x) MS1296S	3mm



Solid End Milling

■ DL SS SL Cylindrical Metric

order number	catalogue number	CSWS system size	D	D2	L	L2	kg
6135049	SS16SLDL16065M	DL16	16	16	65	8	0,08
6135057	SS20SLDL20070M	DL20	20	19	70	10	0,14
6135063	SS25SLDL25080M	DL25	25	24	80	13	0,24
6135067	SS32SLDL32090M	DL32	32	31	90	16	0,43



■ DL SS SL Conical Metric

order number	catalogue number	CSWS system size	D	D2	L	L20	kg
6135055	SS20SLDL16080M	DL16	20	16	80	26	0,17
6135059	SS25SLDL16115M	DL16	25	16	115	54	0,35
6135061	SS25SLDL20095M	DL20	25	19	95	33	0,31
6135065	SS32SLDL25105M	DL25	32	24	105	46	0,53
6135069	SS40SLDL32140M	DL32	40	31	140	51	1,13
6135081	SS50SLDL32200M	DL32	50	31	200	109	2,37



Solid End Milling



■ Torque Wrench

order number	catalogue number	Description
6135412	TWDLTMSET	TORQUE WRENCH SET
6135413	TWDLTM	BASIC DUO LOCK WRENCH
6135414	TWTMINSERTDL10	TORQUE WRENCH INSERT DL10
6135415	TWTMINSERTDL12	TORQUE WRENCH INSERT DL12
6135416	TWTMINSERTDL16	TORQUE WRENCH INSERT DL16
6135417	TWTMINSERTDL20	TORQUE WRENCH INSERT DL20
6135418	TWTMINSERTDL25	TORQUE WRENCH INSERT DL25
6135419	TWTMINSERTDL32	TORQUE WRENCH INSERT DL32
6135420	TWTMINSERTDL10W	TORQUE WRENCH INSERT DL10 WEAR
6135421	TWTMINSERTDL12W	TORQUE WRENCH INSERT DL12 WEAR
6135422	TWTMEXT	TORQUE WRENCH EXTENSION HANDLE
6135423	TWTMBC	TORQUE WRENCH BOLT SET

Assembly

Please wear sufficient personal safety equipment such as gloves and eye protection during assembly.

- 1 Clean the Duo-Lock™ cutting insert and shank coupling.



- 2 Mount the Duo-Lock™ adaptor in a mounting block with a clamping chuck sufficient to enable torque transmission.



- 3 Screw the Duo-Lock™ cutting tip into adaptor by hand.
Attention: Use of protective gloves is mandatory!



- 4 A gap of approx. 0,15–0,3mm should be visible.



- 5 Apply the torque shown in the table. Use of a high quality common torque wrench is mandatory. The ERICKSON™ Torque Master wrench is recommended.



Duo-Lock™ Size	Torque Nm
DL 16	60
DL 20	80
DL 25	100
DL 32	130



Holemaking

Top Ream Systems • TRF and TRM	C2-C15
TRF and TRM Overview	C2-C3
TRF – Top Ream Feed	C4-C7
TRM – Top Ream Modular	C8-C15



TRF and TRM



Common reamers of this category have single tips, brazed onto a steel body. The new WIDIA™ TRF and TRM reamers have a solid carbide disc brazed onto the steel body instead. This allows for more regrinds than a regular tipped reamer, which brings down the cost-per-hole significantly. Additionally, the new coating WU05PR™ holds the surface finish more than twice as long as conventional coatings applied on reamers, depending on the workpiece material.

Disc Style Versus Regular Tipped Reamers

- Stronger brazing joint than conventional tipped reamers.
- Practically no influence of temperature on runout.
- More rigidity and less vibrations due to full carbide front-end.
- Minimum of four regrinds possible versus regularly tipped reamers with an average of three regrinds, depending on wear situation.
- No damage of flutes, compared to the steel portion of regularly tipped reamers when chips constantly rub across.

New Coating WU05PR™

The new disc style design combined with the new reaming coating WU05PR allows for significant cost-per-hole improvements.



- WU05PR was specifically developed for reaming applications and shows superior results versus usual market grades applied on reamers.
- Holds surface finish more than 3x as long in steel compared to regular TiAlN thin coatings.
- Holds surface finish more than 2x as long in cast iron compared to regular TiAlN thin coatings.

TRF

In comparison to solid carbide reamers or single-tipped reamers, TRF is the economic alternative without any disadvantages in regards to productivity or hole quality.

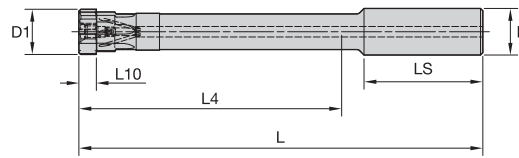
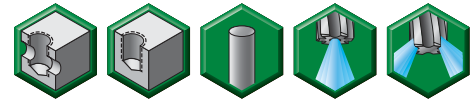


- Solid carbide disc at front instead of single-tipped carbide blanks.
- Unique coating, specially developed for reaming applications.
- High-speed and high-performance ready.
- Superior surface finish due to lapped ground leads.
- Improved hole straightness and roundness due to unequal flute spacing (less vibrations) and runout <3 microns.
- Helical and straight flutes for chip control in through and blind holes.
- Adjustment screw with straight-fluted RMR reamers to change internal coolant supply from axial to radial.

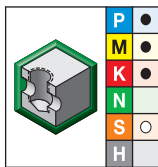
Customisation

- All diameters between 14–42,5mm.
- Variation of leads and cylindrical margin for application-specific optimisation.

- For hole tolerance H7.
- Intermediate sizes ground to achieve IT6 or IT7 hole tolerance class available.
- Adjustment screw to change internal coolant supply from axial to radial.



■ TRF • Disc Style Reamer • Straight Fluted for Blind Holes and Through Holes with Internal Coolant

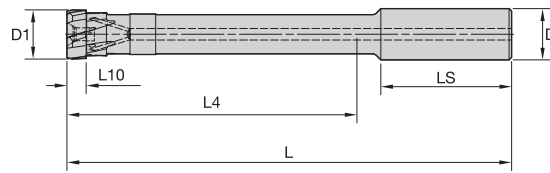
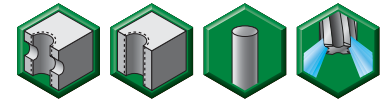


grade WU05PR
AlCrN

● first choice
○ alternate choice

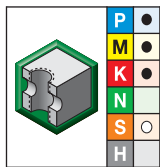
order #	catalogue #	D1	D	L	L4	L10	LS	Z
6055331	TRF14000H7SF	14,00	16,00	147,4	92,4	7,5	49,0	6
6055332	TRF15000H7SF	15,00	16,00	147,4	92,4	7,5	49,0	6
6055333	TRF16000H7SF	16,00	20,00	159,4	102,4	7,5	51,0	6
6055334	TRF17000H7SF	17,00	20,00	159,4	102,4	7,5	51,0	6
6055335	TRF18000H7SF	18,00	20,00	173,4	116,4	7,5	51,0	6
6055336	TRF19000H7SF	19,00	20,00	173,4	116,4	7,5	51,0	6
6055337	TRF20000H7SF	20,00	20,00	173,4	116,4	7,5	51,0	6
6135130	TRF21000H7SF	21,00	20,00	202,4	145,4	7,5	51,0	6
6135191	TRF22000H7SF	22,00	20,00	202,4	145,4	7,5	51,0	6
6135192	TRF23000H7SF	23,00	20,00	212,4	155,4	7,5	51,0	6
6135193	TRF24000H7SF	24,00	20,00	212,4	155,4	7,5	51,0	6
6135194	TRF25000H7SF	25,00	25,00	232,4	169,4	7,5	57,0	8
6135195	TRF26000H7SF	26,00	25,00	232,4	169,4	7,5	57,0	8
6135196	TRF27000H7SF	27,00	25,00	232,4	169,4	7,5	57,0	8
6135197	TRF28000H7SF	28,00	25,00	242,4	179,4	7,5	57,0	8
6135198	TRF29000H7SF	29,00	25,00	242,4	179,4	7,5	57,0	8
6135199	TRF30000H7SF	30,00	25,00	272,4	209,4	7,5	57,0	8
6135200	TRF31000H7SF	31,00	25,00	272,4	209,4	7,5	57,0	8
6135201	TRF32000H7SF	32,00	25,00	272,4	209,4	7,5	57,0	8
6135202	TRF33000H7SF	33,00	32,00	272,4	205,4	7,5	61,0	8
6135203	TRF34000H7SF	34,00	32,00	272,4	205,4	7,5	61,0	8
6135204	TRF35000H7SF	35,00	32,00	272,4	205,4	7,5	61,0	8
6135205	TRF36000H7SF	36,00	32,00	272,4	205,4	7,5	61,0	8
6135206	TRF37000H7SF	37,00	32,00	272,4	205,4	7,5	61,0	8
6135207	TRF38000H7SF	38,00	32,00	272,4	205,4	7,5	61,0	8
6135208	TRF39000H7SF	39,00	32,00	272,4	205,4	7,5	61,0	8
6135209	TRF40000H7SF	40,00	32,00	272,4	205,4	7,5	61,0	8
6135210	TRF41000H7SF	41,00	32,00	272,4	205,4	7,5	61,0	8
6135211	TRF42000H7SF	42,00	32,00	272,4	205,4	7,5	61,0	8

- For hole tolerance H7.
- Intermediate sizes ground to achieve IT6 or IT7 hole tolerance class available.



Holmaking

■ TRF • Disc Style Reamer • Helical Fluted for Through Holes with Internal Coolant



- first choice
- alternate choice

grade WU05PR
AlCrN

order #	catalogue #	D1	D	L	L4	L10	LS	Z
6055338	TRF14000H7HF	14,00	16,00	147,4	92,4	7,5	49,0	6
6055339	TRF15000H7HF	15,00	16,00	147,4	92,4	7,5	49,0	6
6055340	TRF16000H7HF	16,00	20,00	159,4	102,4	7,5	51,0	6
6055341	TRF17000H7HF	17,00	20,00	159,4	102,4	7,5	51,0	6
6055342	TRF18000H7HF	18,00	20,00	173,4	116,4	7,5	51,0	6
6055343	TRF19000H7HF	19,00	20,00	173,4	116,4	7,5	51,0	6
6055344	TRF20000H7HF	20,00	20,00	173,4	116,4	7,5	51,0	6
6135212	TRF21000H7HF	21,00	20,00	202,4	145,4	7,5	51,0	6
6135213	TRF22000H7HF	22,00	20,00	202,4	145,4	7,5	51,0	6
6135214	TRF23000H7HF	23,00	20,00	212,4	155,4	7,5	51,0	6
6135215	TRF24000H7HF	24,00	20,00	212,4	155,4	7,5	51,0	6
6135216	TRF25000H7HF	25,00	25,00	232,4	169,4	7,5	51,0	8
6135217	TRF26000H7HF	26,00	25,00	232,4	169,4	7,5	51,0	8
6135218	TRF27000H7HF	27,00	25,00	232,4	169,4	7,5	57,0	8
6135219	TRF28000H7HF	28,00	25,00	242,4	179,4	7,5	57,0	8
6135220	TRF29000H7HF	29,00	25,00	242,4	179,4	7,5	57,0	8
6135221	TRF30000H7HF	30,00	25,00	272,4	209,4	7,5	57,0	8
6135222	TRF31000H7HF	31,00	25,00	272,4	209,4	7,5	57,0	8
6135223	TRF32000H7HF	32,00	25,00	272,4	209,4	7,5	57,0	8
6135224	TRF33000H7HF	33,00	32,00	272,4	205,4	7,5	61,0	8
6135225	TRF34000H7HF	34,00	32,00	272,4	205,4	7,5	61,0	8
6135226	TRF35000H7HF	35,00	32,00	272,4	205,4	7,5	61,0	8
6135227	TRF36000H7HF	36,00	32,00	272,4	205,4	7,5	61,0	8
6135228	TRF37000H7HF	37,00	32,00	272,4	205,4	7,5	61,0	8
6135229	TRF38000H7HF	38,00	32,00	272,4	205,4	7,5	61,0	8
6135230	TRF39000H7HF	39,00	32,00	272,4	205,4	7,5	61,0	8
6135231	TRF40000H7HF	40,00	32,00	272,4	205,4	7,5	61,0	8
6135232	TRF41000H7HF	41,00	32,00	272,4	205,4	7,5	61,0	8
6135233	TRF42000H7HF	42,00	32,00	272,4	205,4	7,5	61,0	8

■ TRF • Metric

Material Group		WU05PR™			Metric						
		Cutting Speed – vc			Recommended Feed Rate per Tooth						
		Range – m/min			Tool Diameter (mm)	14,00–19,99		20,00–32,00		32,50–42,00	
		min	Starting Value	max		Feed/Tooth	min	max	min	max	min
P	1	90	120	155	mm/z	0,10	0,20	0,10	0,22	0,10	0,25
	2	90	120	155	mm/z	0,10	0,20	0,10	0,22	0,10	0,25
	3	75	100	130	mm/z	0,10	0,20	0,10	0,22	0,10	0,25
	4	50	80	105	mm/z	0,10	0,20	0,10	0,22	0,10	0,25
	5	30	40	60	mm/z	0,08	0,18	0,08	0,20	0,08	0,22
	6	30	40	60	mm/z	0,08	0,18	0,08	0,20	0,08	0,22
M	1	15	20	40	mm/z	0,08	0,15	0,08	0,18	0,08	0,20
	2	15	20	30	mm/z	0,08	0,15	0,08	0,18	0,08	0,20
	3	15	20	30	mm/z	0,08	0,15	0,08	0,18	0,08	0,20
K	1	80	110	130	mm/z	0,10	0,20	0,10	0,22	0,10	0,25
	2	65	90	110	mm/z	0,10	0,20	0,10	0,22	0,10	0,25
	3	50	70	90	mm/z	0,10	0,18	0,10	0,20	0,10	0,22
S	1	15	20	30	mm/z	0,06	0,15	0,10	0,18	0,10	0,20
	2	15	20	30	mm/z	0,06	0,15	0,10	0,18	0,10	0,20
	3	20	30	40	mm/z	0,08	0,18	0,10	0,20	0,10	0,20
	4	20	30	40	mm/z	0,08	0,18	0,10	0,20	0,10	0,20

Holemaking

WIDIA™ TRM •

Top Ream Modular (Available as Semi-Standards)



WIDIA TRM

Primary Application

- Achieve solid carbide metal removal rates.
- Five sizes of standard straight shank bodies available to couple reaming heads from 20–42mm.
- The TRM heads are stocked as semi-finished goods.
- Any diameter from 20–42mm is possible.

Features and Benefits

- High-speed and high-performance ready.
- Unique proprietary coupling system enables same runout accuracy as monoblock systems (<3 microns).
- Comfortable radial clamping for quick exchanging even in narrow situations in the machine.
- No fixture for clamping or dismounting necessary.

Customisation

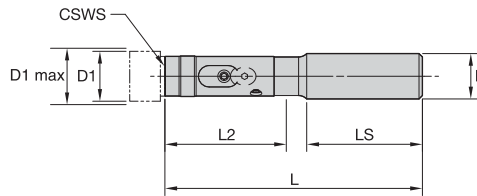
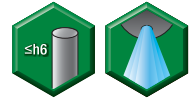
- Heads fully customisable as simple specials with different lead geometries, grades, coatings, and edge hones.
- Semi-finished heads on stock for shorter lead times.

Ordering Process

- Please contact your local Authorised Distributor for a quote.



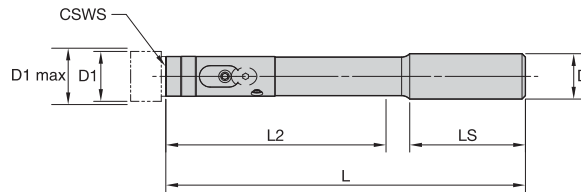
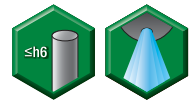
- Tool body shipped with retention knob, clamp set, and wrench.
- Order reamer head separately.



■ Straight Shank • Radial Clamping • 3 x D

order number	catalogue number	CSWS system size	D1	D1 max	D	L	L2	LS	retention knob
6055345	SS20WST175RR3M	KST175	20,00	22,499	20,00	113,50	51,50	51,00	KST175200RK
6055347	SS20WST200RR3M	KST200	22,50	27,499	20,00	130,50	65,50	51,00	KST175200RK
6055349	SS25WST250RR3M	KST250	27,50	32,499	25,00	152,50	80,50	56,00	KST250250RK
6055351	SS32WST300RR3M	KST300	32,50	37,499	32,00	174,00	94,00	61,00	KST300350RK
6055353	SS32WST350RR3M	KST350	37,50	42,000	32,00	190,00	108,00	61,00	KST300350RK

- Tool body shipped with retention knob, clamp set, and wrench.
- Order reamer head separately.

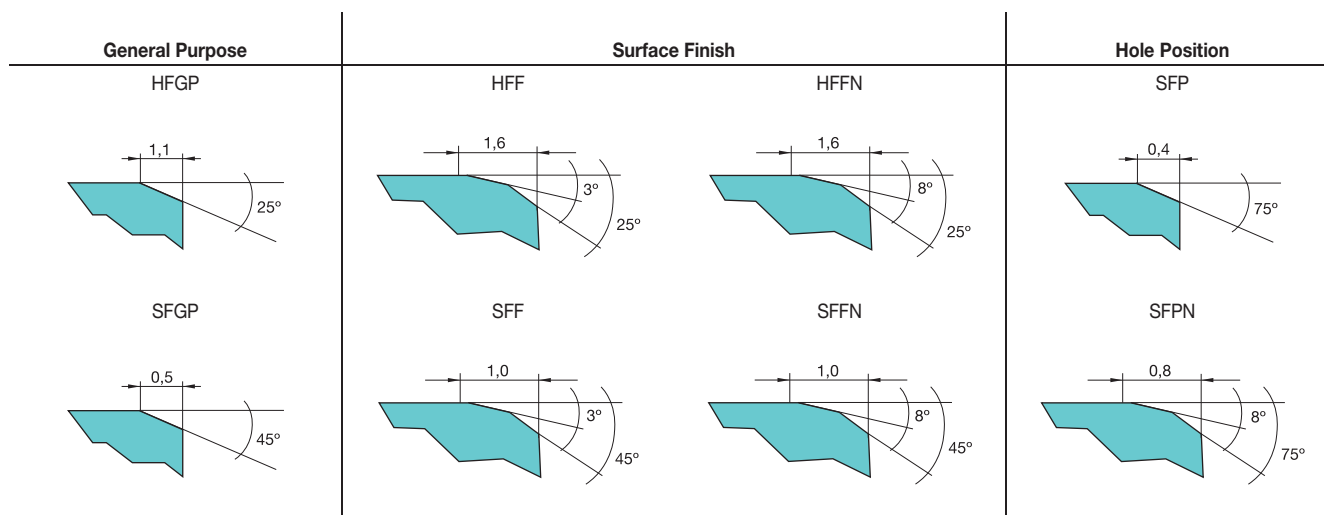


■ Straight Shank • Radial Clamping • 5 x D

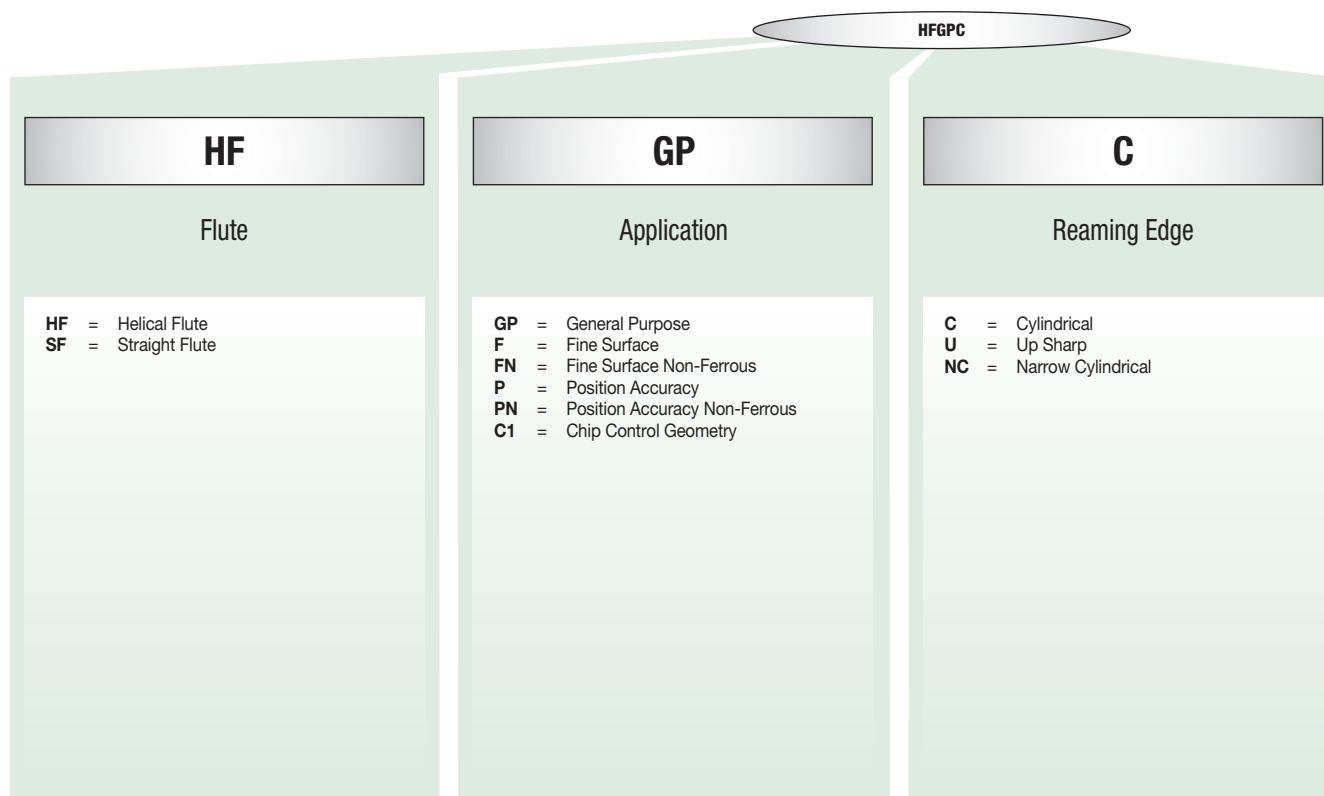
order number	catalogue number	CSWS system size	D1	D1 max	D	L	L2	LS	retention knob
6055346	SS20WST175RR5M	KST175	20,00	22,499	20,00	158,50	96,50	51,00	KST175200RK
6055348	SS20WST200RR5M	KST200	22,50	27,499	20,00	185,50	120,50	51,00	KST175200RK
6055350	SS25WST250RR5M	KST250	27,50	32,499	25,00	217,50	145,50	56,00	KST250250RK
6055352	SS32WST300RR5M	KST300	32,50	37,499	32,00	249,00	169,00	61,00	KST300350RK
6055354	SS32WST350RR5M	KST350	37,50	42,000	32,00	274,00	192,00	61,00	KST300350RK

Lead Design Overview

Holemaking



Lead Nomenclature



General Purpose

Material Group	Hole Type	Surface Requirement	Recommended Geometry	Design
P	through	IT 7, Ra <1.6	HFGP	C
	blind		SFGP	
M	through	IT 7, Ra <1.0	HFGP	C, NC
	blind		SFGP	
K	through	IT 7, Ra <1.6	HFGP	C
	blind		SFGP	
S	through	IT 7, Ra <0.6	HFGP	U, NC
	blind		SFGP	


Extra Surface Finish

Material Group	Hole Type	Surface Requirement	Recommended Geometry	Design
P	through	IT 7, Ra <0.8	HFFN	C
	blind		SFFN	
K	through	IT 7, Ra <0.8	HFFN	C
	blind		SFFN	

Additional Hole Position Accuracy

Material Group	Hole Type	Surface Requirement	Recommended Geometry	Design
P	through	IT 7, Ra <1.6	SFP	C
	blind			
M	through	IT 7, Ra <1.0	SFP	C, NC
	blind			
K	through	IT 7, Ra <1.6	SFP	C
	blind			
S	through	IT 7, Ra <0.6	SFP	U, NC
	blind			

Extra Chip Control

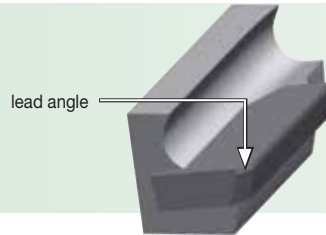
Material Group	Hole Type	Surface Requirement	Recommended Geometry	Design
P	blind	Ra 0.4–1.6	SFC1	C, U

Customisation Capabilities

Diameter

- 14mm up to 42,5mm in diameter.
- Depending on the application, up to tolerance IT6.
- Diameter steps.

Leads

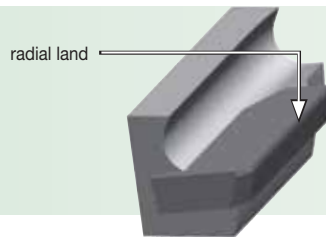


- 25–90° leads for smoother cutting or better positioning.
- Double leads for better surface quality.
- Radius leads for optimal CI machining.

Grades

- Different coatings possible: TiAlN, AlCrN, TiN, TiCN, TiB₂.
- Cermet grades for steel cutting.

Radial Land



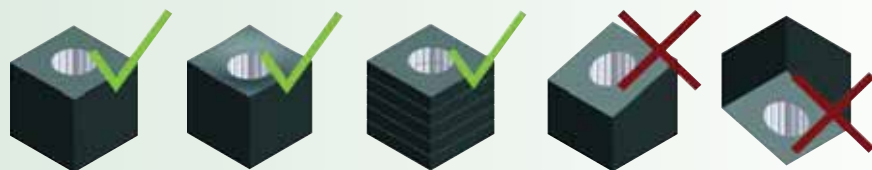
- Cylindrical for better guiding and form.
- Upsharp (no land) for best surface finishes and less passive forces.
- Narrow land to reduce forces.

Application Hints

Pre-Drill

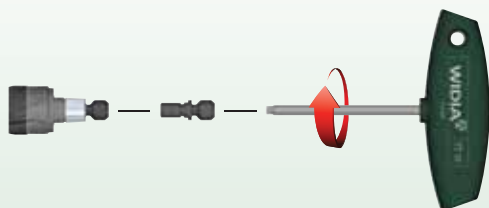
- Leave stock for reamer, depending on diameter.
- 0,2mm up to 0,4mm in diameter.
- If possible, a chamfer will ease the reaming operation.

Entries/Exits



Assembly

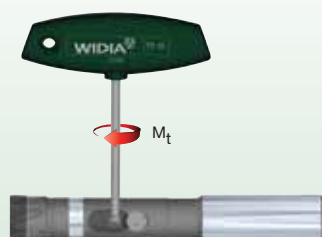
1 Assembling the Reamer Head



2 Place the Reamer Head in the Reamer Body



3 Clamp the Reamer Head in the Reamer Body



Disassembly

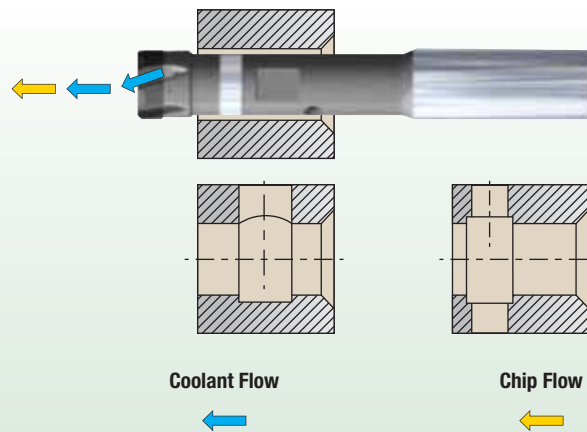
- 3 2 1

KST	Ø Range (mm)		M _t (Nm)	Torx size
175	20	22,499	4	TT-15
200	22,5	27,499	4	TT-15
250	27,5	32,499	5	TT-25
300	32,5	37,499	9	TT-30
350	37,5	42	9	TT-30

Through Hole



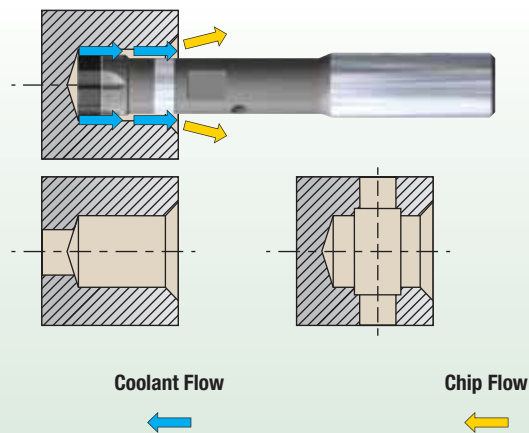
Helical fluted reamer pushes chips forward, supported by coolant.



Blind Hole



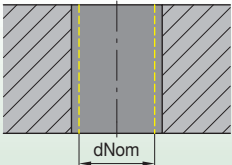
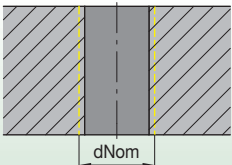
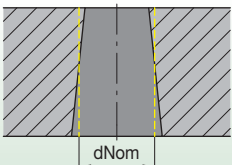
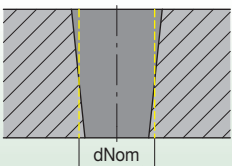
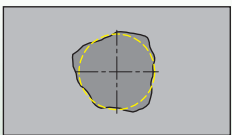
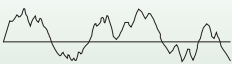
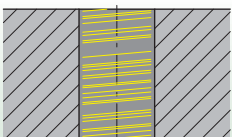
Straight fluted reamer and coolant force chips backwards.



Reaming Allowances for Multi-Blade Reaming

mm	reaming allowances in diameter		
	min	mm middle	max
1,40–4,80	0,08	0,12	0,20
4,81–9,59	0,10	0,15	0,25
9,60–15,00	0,15	0,20	0,30
15,00–20,00	0,15	0,25	0,35
20,00–50,00	0,20	0,30	0,40

Troubleshooting

Problem	Cause	Possible Remedy
<p>Hole diameter too large.</p> 	<ul style="list-style-type: none"> Reaming tool running out-of-centre. Concentricity of pilot hole and ream machining unsatisfactory. Built-up edge. Unsuitable cooling lubricant. Reaming tool diameter too large. 	<ul style="list-style-type: none"> Use equalising adaptor. Re-align, use floating head. Change cooling lubricant. Change cutting speed. Measure reamers and send for repairs.
<p>Hole diameter too small.</p> 	<ul style="list-style-type: none"> Reamer worn. Unsuitable cooling lubricant. Reaming allowance too small. 	<ul style="list-style-type: none"> Replace and refit tool. Change cooling lubricant. Increase reaming allowance.
<p>Conical hole profile wider towards drill runout.</p> 	<ul style="list-style-type: none"> Concentricity of pilot hole and reaming unsatisfactory. Positioning accuracy of pilot hole to reaming. 	<ul style="list-style-type: none"> Re-align, use equalising adaptor. Correct positioning accuracy.
<p>Conical hole profile wider at drill entry point.</p> 	<ul style="list-style-type: none"> Concentricity of pilot hole and reaming unsatisfactory. Reaming tool skim cutting with ledger. 	<ul style="list-style-type: none"> Re-align, use floating head. Securely clamp reaming tool axially.
<p>Hole out-of-centre and/or showing chatter marks.</p> 	<ul style="list-style-type: none"> Reaming tool running out-of-centre. Slanted cutting surface/asymmetrical cutting. Workpiece twisted. 	<ul style="list-style-type: none"> Use equalising adaptor. Spot face as drilling preparation. Take the direction of impact into account when clamping the workpiece.
<p>Surface quality does not meet specification.</p> 	<ul style="list-style-type: none"> Tool cutters worn. Reaming tool running out-of-centre. Incorrect technology data (cutting parameters). Inadequate chip evacuation. 	<ul style="list-style-type: none"> Use equalising adaptor. Re-align, use floating head. Change cooling lubricant. Change cutting speed. Measure reamers and send for repairs.
<p>Feed grooves</p> 	<ul style="list-style-type: none"> Built-up edge. 	<ul style="list-style-type: none"> Change cooling lubricant. Change cutting speed.



Tapping

VariTap Multipurpose Taps	D2-D33
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Spiral-Point HSS-E Taps.....	D8-D15
Spiral-Flute HSS-E Taps	D16-D29
Spiral-Point HSS-E ISO Pipe Taps	D30
Straight-Flute HSS-E ISO Pipe Taps	D31
Straight-Flute HSS-E American National Taper Pipe Taps.....	D32
High-Performance Taps Application Data	D33



High-Performance Solution for Multipurpose Tapping •
VariTap™ Line Expansion

VariTap



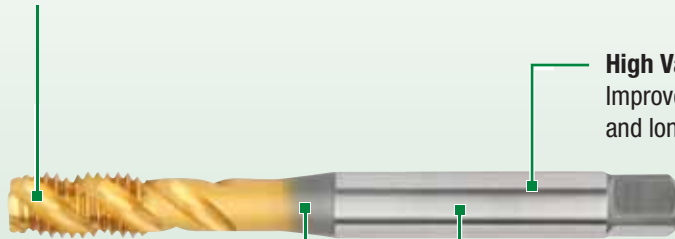
VariTap is the high-performance multipurpose tapping solution from WIDIA™. VariTap has an optimised geometry capable of working in a wide variety of ductile materials — including carbon and alloy steels, stainless steels, ductile iron, and cast aluminium. VariTap reduces inventory costs without losing the benefit of high-quality threads and consistent tool life.

With a wide range of inch and metric standard sizes, pitch diameter limits, classes of fit, chamfer styles, and coatings, VariTap offers the most expansive portfolio of multipurpose taps available on the market. VariTap now includes ISO pipe taps for through and blind hole applications.

Multipurpose HSS-E Spiral-Flute Taps For Use in Tension/Compression Tap Holders

Advanced spiral-flute design

Smooth ejection of chips to reduce and eliminate bird-nesting.



High Vanadium HSS-E

Improved wear characteristics and longer tool life.

Precision ground shanks

Low runout.

PVD Coating and surface treatment

For use in various workpiece materials:








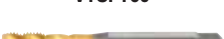






WU41EG

TiN

WP49EG

Oxide

- ★ Good
- ★★ Better
- ★★★ Best

series	hole		thread		coolant		size range	grade/ coating	material				chamfer		helix angle	dimension
	through	blind	cutting	forming	flood	through			carbide	HSS-E-PM	HSS-E	HSS	type	form		
VariTap™ High-Performance Multipurpose Spiral-Point Taps																
 VTSP065	X		X		X		M2-M36	WP42EG WU41EG WP49EG WU40EG			X		Plug	B	0°	DIN 371, 374, 376
 VTSP060	X		X		X		#4-1"	WU41EG WP49EG			X		Plug	B	0°	DIN 371, 376
 VTSP075	X		X		X		M3-M20	WU41EG WU40EG			X		Plug	B	0°	JIS
VariTap High-Performance Multipurpose Spiral-Flute Taps																
 VTSFT65		X	X		X		M2-M36	WP42EG WU41EG WP49EG WU40EG			X		semi-bottom	C	45°	DIN 371, 374, 376
 VTSFT65		X	X		X		M3-M20	WP42EG WP49EG			X		bottoming	E	45°	DIN 371, 374, 376
 VTSFT-TC65		X	X		X		M2-M52	WU41EG WP49EG			X		semi-bottom	C	45°	DIN 371, 374, 376
 VTSFT-TC67		X	X		X		M3-M20	WU41EG WP49EG			X		bottoming	E	45°	DIN 371, 376
 VTSFT60		X	X		X		#4-1"	WU41EG WP49EG			X		semi-bottom	C	45°	DIN 371, 376
 VTSFT-TC60		X	X		X		#6-2"	WU41EG WP49EG			X		semi-bottom	C	45°	DIN 371, 374, 376
 VTSFT75		X	X		X		M3-M20	WU41EG WU40EG			X		semi-bottom	C	45°	JIS
VariTap High-Performance Multipurpose Pipe Taps																
 VTSP086	X		X		X		1/8-1"	WP49EG WU41EG			X		Plug	B	0°	DIN 5156
 VTSFT86		X	X		X		1/8-1"	WP49EG WU41EG			X		semi-bottom	C	42°	DIN 5156
 VTSTR83	X	X	X		X		1/16-1"	WU40EG			X		semi-bottom	C	0°	DIN 5156
 VTSTR88	X	X	X		X		1/16-1"	WU40EG			X		semi-bottom	C	0°	DIN 5156

		P				M	K		N			S				H		page(s)	recommended cutting parameters
		1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16	17, 18, 19, 20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1, 40.2, 41.1	39.1, 41.2		
		Steel <35 HRC	Steel >36-48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Grey Cast Iron	Ductile Cast Iron	Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49-55 HRC	Hardened Steels 56-68 HRC		
VariTap™ High-Performance Multipurpose Spiral-Point Taps (continued)																			
	★★	★	★		★★	★	★★	★	★★	★★	★						D9	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D12	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D15	D33	
VariTap High-Performance Multipurpose Spiral-Flute Taps (continued)																			
	★★	★	★		★★	★	★★	★	★★	★★	★						D17	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D20	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D21	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D23	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D24	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D26	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D29	D33	
VariTap High-Performance Multipurpose Pipe Taps (continued)																			
	★★	★	★		★★	★	★★	★	★★	★★	★						D30	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D31	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D32	D33	
	★★	★	★		★★	★	★★	★	★★	★★	★						D32	D33	

Reconditioning Services

Anyone can regrind our tools — but only we can recondition them

WIDIA™ Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

To use WIDIA tool reconditioning services, contact your authorised WIDIA distributor to get started.

Global Reconditioning Network



To locate a Reconditioning Center near you, visit widia.com/services.



Multipurpose Taps for Steel, Stainless Steel, Cast Aluminium, and Ductile Iron

Unique spiral-point design
Cutting edge angles and positive rake face straight-flutes are optimised for tapping multiple materials.

Multiple tap dimension options
ANSI, DIN, JIS, and DIN/ANSI.

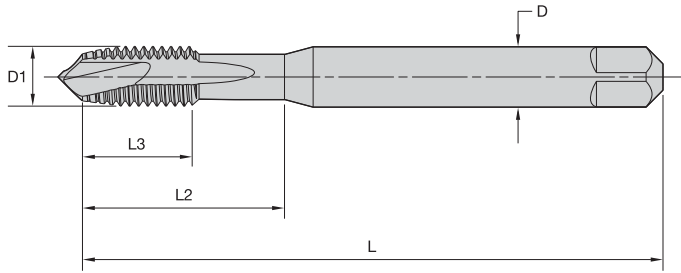
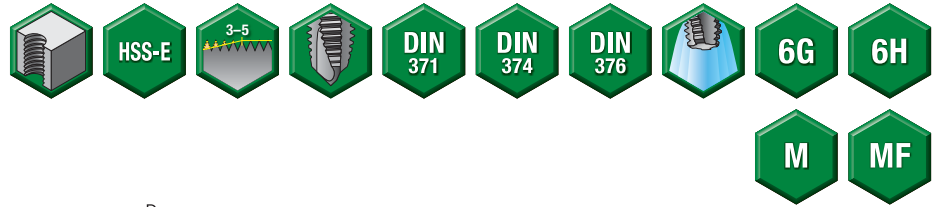
Precision ground shanks
Low runout.

High-vanadium HSS-E
Improved wear characteristics and longer tool life.

PVD coatings and surface treatments
For use with various workpiece materials:

WP42EG TiCN	WU41EG TiN	WP49EG Oxide	WU40EG Bright
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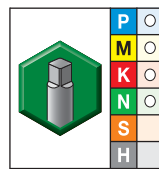
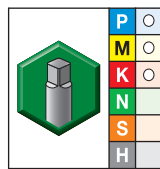
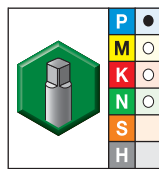
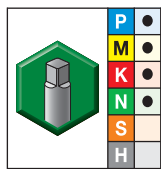
- WP42EG TiCN
- WU41EG TiN
- WP49EG oxide
- WU40EG bright



Shank Tolerance

D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

■ VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376



- first choice
- alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions				number dimension class			
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	of flutes	standard	of fit
5366647	VTSP06505	5366646	VTSP06505	5366648	VTSP06505	5366649	VTSP06505	M2 X 0,4	45	7	13	2,8	2	DIN 371	6H
-	-	-	-	5366660	VTSP06506	-	-	M2 X 0,4	45	7	13	2,8	2	DIN 371	6G
-	-	-	-	5366661	VTSP06507	-	-	M2,2 X 0,45	45	7	13	2,8	2	DIN 371	6H
-	-	5366662	VTSP06508	5366663	VTSP06508	5366664	VTSP06508	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6H
-	-	-	-	5366665	VTSP06509	-	-	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6G
-	-	-	-	5368602	VTSP06545	5368603	VTSP06545	M3 X 0,35	56	8	-	2,2	2	DIN 374	6H
-	-	5368514	VTSP06525	5368515	VTSP06525	5368516	VTSP06525	M3 X 0,5	56	8	-	2,2	2	DIN 376	6H
-	-	-	-	5366670	VTSP06511	-	-	M3 X 0,5	56	8	18	3,5	2	DIN 371	6G
5366667	VTSP06510	5366666	VTSP06510	5366668	VTSP06510	5366669	VTSP06510	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
-	-	5366671	VTSP06512	5366673	VTSP06512	5366674	VTSP06512	M3,5 X 0,6	56	9	20	4,0	2	DIN 371	6H
-	-	-	-	5368604	VTSP06546	5368605	VTSP06546	M4 X 0,5	63	10	21	2,8	2	DIN 374	6H
-	-	5368517	VTSP06526	5368518	VTSP06526	5368519	VTSP06526	M4 X 0,7	63	10	21	2,8	2	DIN 376	6H
-	-	-	-	5366679	VTSP06514	-	-	M4 X 0,7	63	11	21	4,5	2	DIN 371	6G
5366676	VTSP06513	5366675	VTSP06513	5366677	VTSP06513	5366678	VTSP06513	M4 X 0,7	63	11	21	4,5	2	DIN 371	6H
-	-	-	-	5368606	VTSP06547	5368607	VTSP06547	M5 X 0,5	70	12	25	3,5	2	DIN 374	6H
-	-	5368540	VTSP06527	5368541	VTSP06527	5368542	VTSP06527	M5 X 0,8	70	12	25	3,5	2	DIN 376	6H
-	-	-	-	5366685	VTSP06516	-	-	M5 X 0,8	70	12	25	6,0	2	DIN 371	6G
5366681	VTSP06515	5366680	VTSP06515	5366682	VTSP06515	5366684	VTSP06515	M5 X 0,8	70	12	25	6,0	2	DIN 371	6H
-	-	-	-	5368608	VTSP06548	5368609	VTSP06548	M6 X 0,5	80	12	30	4,5	3	DIN 374	6H
-	-	-	-	5368610	VTSP06549	5368611	VTSP06549	M6 X 0,75	80	12	30	4,5	3	DIN 374	6H
-	-	5368543	VTSP06528	5368544	VTSP06528	5368545	VTSP06528	M6 X 1	80	12	30	4,5	3	DIN 376	6H
5366687	VTSP06517	5366686	VTSP06517	5366688	VTSP06517	5366689	VTSP06517	M6 X 1	80	12	30	6,0	3	DIN 371	6H
-	-	-	-	5366690	VTSP06518	-	-	M6 X 1	80	12	30	6,0	3	DIN 371	6G
-	-	-	-	5368612	VTSP06550	5368613	VTSP06550	M7 X 0,75	80	12	30	5,5	3	DIN 374	6H

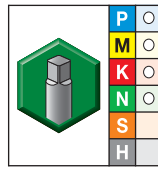
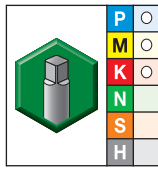
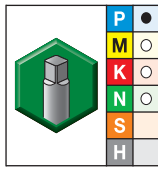
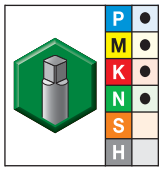
(continued)

Multipurpose Taps

VariTap™ Spiral-Point HSS-E Taps • Through Holes



(VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376 – continued)



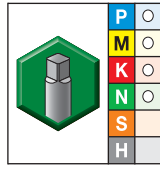
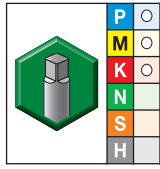
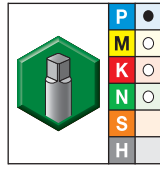
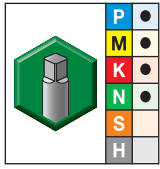
- first choice
- alternate choice

Tapping

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5366693	VTSP06519	5366692	VTSP06519	5366695	VTSP06519	5366696	VTSP06519	M7 X 1	80	12	30	7,0	3	DIN 371	6H
-	-	-	-	5366697	VTSP06520	-	-	M7 X 1	80	12	30	7,0	3	DIN 371	6G
-	-	-	-	5368614	VTSP06551	5368615	VTSP06551	M8 X 0,75	80	12	30	6,0	3	DIN 374	6H
-	-	-	-	5368616	VTSP06552	5368617	VTSP06552	M8 X 1	90	15	35	6,0	3	DIN 374	6H
-	-	5368546	VTSP06529	5368547	VTSP06529	5368548	VTSP06529	M8 X 1,25	90	15	35	6,0	3	DIN 376	6H
5366700	VTSP06521	5366698	VTSP06521	5366701	VTSP06521	5366703	VTSP06521	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
-	-	-	-	5366704	VTSP06522	-	-	M8 X 1,25	90	15	35	8,0	3	DIN 371	6G
-	-	-	-	5368618	VTSP06553	5368619	VTSP06553	M10 X 0,75	90	15	35	7,0	3	DIN 374	6H
-	-	-	-	5368620	VTSP06554	5368621	VTSP06554	M10 X 1	90	15	35	7,0	3	DIN 374	6H
-	-	-	-	5368622	VTSP06555	5368623	VTSP06555	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
-	-	-	-	5366709	VTSP06524	-	-	M10 X 1,5	100	18	39	10,0	3	DIN 371	6G
5366706	VTSP06523	5366705	VTSP06523	5366707	VTSP06523	5366708	VTSP06523	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
-	-	5368549	VTSP06530	5368550	VTSP06530	5368551	VTSP06530	M10 X 1,5	100	18	39	7,0	3	DIN 376	6H
-	-	-	-	5368624	VTSP06556	5368625	VTSP06556	M11 X 1	90	15	36	8,0	3	DIN 374	6H
-	-	-	-	5368626	VTSP06557	5368627	VTSP06557	M12 X 1	100	21	39	9,0	3	DIN 374	6H
-	-	-	-	5368628	VTSP06558	5368629	VTSP06558	M12 X 1,25	100	21	39	9,0	3	DIN 374	6H
-	-	-	-	5368630	VTSP06559	5368631	VTSP06559	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
-	-	-	-	5368556	VTSP06532	-	-	M12 X 1,75	110	21	44	9,0	3	DIN 376	6G
5368553	VTSP06531	5368552	VTSP06531	5368554	VTSP06531	5368555	VTSP06531	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
-	-	-	-	5368632	VTSP06560	5368633	VTSP06560	M14 X 1	100	21	47	11,0	3	DIN 374	6H
-	-	-	-	5368634	VTSP06561	5368635	VTSP06561	M14 X 1,25	100	21	47	11,0	3	DIN 374	6H
-	-	-	-	5368636	VTSP06562	5368637	VTSP06562	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
5368558	VTSP06533	5368557	VTSP06533	5368559	VTSP06533	5368560	VTSP06533	M14 X 2	110	24	52	11,0	3	DIN 376	6H
-	-	-	-	5368561	VTSP06534	-	-	M14 X 2	110	24	52	11,0	3	DIN 376	6G
-	-	-	-	5368638	VTSP06563	5368639	VTSP06563	M16 X 1	100	21	46	12,0	3	DIN 374	6H
-	-	-	-	5368640	VTSP06564	5368641	VTSP06564	M16 X 1,5	100	21	46	12,0	3	DIN 374	6H
5368563	VTSP06535	5368562	VTSP06535	5368565	VTSP06535	5368566	VTSP06535	M16 X 2	110	24	51	12,0	3	DIN 376	6H
-	-	-	-	5368567	VTSP06536	-	-	M16 X 2	110	24	51	12,0	3	DIN 376	6G
-	-	-	-	5368642	VTSP06565	5368643	VTSP06565	M18 X 1	110	21	50	14,0	3	DIN 374	6H
-	-	-	-	5368683	VTSP06566	5368684	VTSP06566	M18 X 1,5	110	21	50	14,0	3	DIN 374	6H
-	-	-	-	5368685	VTSP06567	5368686	VTSP06567	M18 X 2	125	30	58	14,0	3	DIN 374	6H
5368569	VTSP06537	5368568	VTSP06537	5368570	VTSP06537	5368571	VTSP06537	M18 X 2,5	125	30	58	14,0	3	DIN 376	6H
-	-	-	-	5368687	VTSP06568	5368688	VTSP06568	M20 X 1	125	24	56	16,0	3	DIN 374	6H
-	-	-	-	5368689	VTSP06569	5368690	VTSP06569	M20 X 1,5	125	24	56	16,0	3	DIN 374	6H
-	-	-	-	5368691	VTSP06570	5368692	VTSP06570	M20 X 2	140	30	64	16,0	3	DIN 374	6H
5368573	VTSP06538	5368572	VTSP06538	5368574	VTSP06538	5368575	VTSP06538	M20 X 2,5	140	30	64	16,0	3	DIN 376	6H

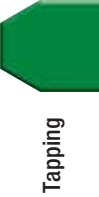
(continued)

(VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376 – continued)

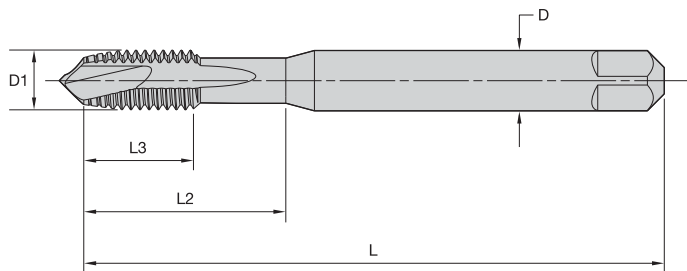


● first choice
○ alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
-	-	-	-	5368693	VTSP06571	5368694	VTSP06571	M22 X 1,5	125	24	62	18,0	3	DIN 374	6H
-	-	-	-	-	-	5368695	VTSP06572	M22 X 2	140	30	70	18,0	3	DIN 374	6H
5368577	VTSP06539	5368576	VTSP06539	5368578	VTSP06539	5368579	VTSP06539	M22 X 2,5	140	30	70	18,0	3	DIN 376	6H
-	-	-	-	5368696	VTSP06573	5368697	VTSP06573	M24 X 1,5	140	28	67	18,0	3	DIN 374	6H
-	-	-	-	-	-	5368698	VTSP06574	M24 X 2	140	30	67	18,0	3	DIN 374	6H
5368581	VTSP06540	5368580	VTSP06540	5368582	VTSP06540	5368583	VTSP06540	M24 X 3	160	36	77	18,0	3	DIN 376	6H
-	-	5368584	VTSP06541	5368585	VTSP06541	5368586	VTSP06541	M27 X 3	160	36	82	20,0	4	DIN 376	6H
-	-	-	-	-	-	5368699	VTSP06575	M30 X 2	150	28	80	22,0	4	DIN 374	6H
-	-	5368587	VTSP06542	5368588	VTSP06542	5368589	VTSP06542	M30 X 3,5	180	42	91	22,0	4	DIN 376	6H
-	-	-	-	5368600	VTSP06543	-	-	M33 X 3,5	180	42	100	25,0	4	DIN 376	6H
-	-	-	-	5368601	VTSP06544	-	-	M36 X 4	200	48	110	28,0	4	DIN 376	6H



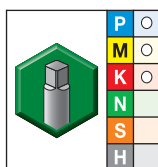
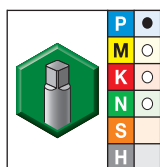
- WU41EG TiN
- WP49EG oxide



Shank Tolerance

D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

■ VT-SPO • Form B Plug Chamfer • Machine Screw and Fractional • DIN 371 and 376

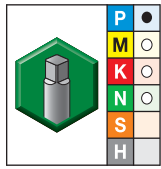


- first choice
- alternate choice

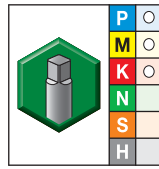
grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5472633	VTSP06005	5387704	VTSP06005	4 - 40	56	8	18	3,5	2	DIN 371	2B
5472635	VTSP06007	5387707	VTSP06007	5 - 40	56	9	20	4,0	2	DIN 371	2B
5472636	VTSP06008	5387708	VTSP06008	6 - 32	56	9	20	4,0	2	DIN 371	2B
5472638	VTSP06010	5387760	VTSP06010	6 - 40	56	9	20	4,0	2	DIN 371	2B
5472639	VTSP06011	5387761	VTSP06011	8 - 32	63	11	21	4,5	2	DIN 371	2B
5472641	VTSP06013	5387763	VTSP06013	10 - 24	70	12	25	6,0	2	DIN 371	2B
5472644	VTSP06014	5387764	VTSP06014	10 - 32	70	12	25	6,0	2	DIN 371	2B
5472646	VTSP06016	5387766	VTSP06016	1/4 - 20	80	15	30	7,0	3	DIN 371	2B
5472647	VTSP06017	5387767	VTSP06017	1/4 - 28	80	15	30	7,0	3	DIN 371	2B
5472649	VTSP06019	5387769	VTSP06019	5/16 - 18	90	15	35	8,0	3	DIN 371	2B
5472650	VTSP06020	5387770	VTSP06020	5/16 - 24	90	15	35	8,0	3	DIN 371	2B
5472652	VTSP06022	5387772	VTSP06022	3/8 - 16	100	19	39	10,0	3	DIN 371	2B
5472653	VTSP06023	5387773	VTSP06023	3/8 - 24	100	19	39	10,0	3	DIN 371	2B
5472655	VTSP06025	5387776	VTSP06025	7/16 - 14	100	18	41	8,0	3	DIN 376	2B
5472656	VTSP06026	5387777	VTSP06026	7/16 - 20	100	18	41	8,0	3	DIN 376	2B
5472658	VTSP06028	5387779	VTSP06028	1/2 - 13	110	23	47	9,0	3	DIN 376	2B
5472659	VTSP06029	5387780	VTSP06029	1/2 - 20	110	23	47	9,0	3	DIN 376	2B
5472661	VTSP06031	5387782	VTSP06031	9/16 - 12	110	25	53	11,0	3	DIN 376	2B
5472662	VTSP06032	5387783	VTSP06032	9/16 - 18	110	25	53	11,0	3	DIN 376	2B
5472663	VTSP06033	5387784	VTSP06033	5/8 - 11	110	24	51	12,0	3	DIN 376	2B

(continued)

(VT-SPO • Form B Plug Chamfer • Machine Screw and Fractional • DIN 371 and 376 – continued)



grade WU41EG
TiN



grade WP49EG
Oxide

● first choice
○ alternate choice

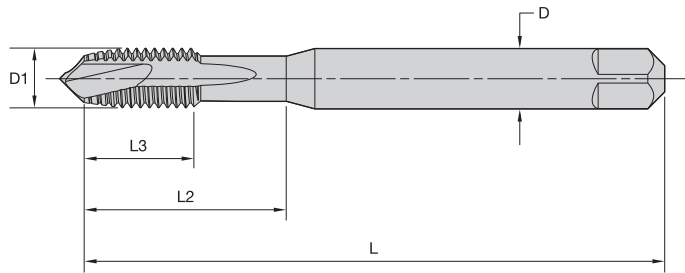
grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5472664	VTSP06034	5387785	VTSP06034	5/8 - 18	110	24	51	12,0	3	DIN 376	2B
5472665	VTSP06035	5387786	VTSP06035	3/4 - 10	140	30	64	16,0	3	DIN 376	2B
5472666	VTSP06036	5387787	VTSP06036	3/4 - 16	140	30	64	16,0	3	DIN 376	2B
5472667	VTSP06037	5387788	VTSP06037	7/8 - 9	140	34	71	18,0	3	DIN 376	2B
5472668	VTSP06038	5387789	VTSP06038	7/8 - 14	140	34	71	18,0	3	DIN 376	2B
5472669	VTSP06039	5387790	VTSP06039	1 - 8	160	38	81	18,0	3	DIN 376	2B
5472670	VTSP06040	5387791	VTSP06040	1 - 12	160	38	81	18,0	3	DIN 376	2B



Multipurpose Taps

VariTap™ Spiral-Point HSS-E Taps • Through Holes

- WU41EG TiN
- WP49EG oxide

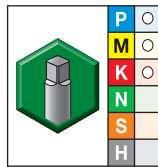
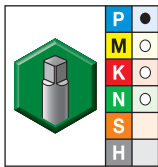


Shank Tolerance

D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

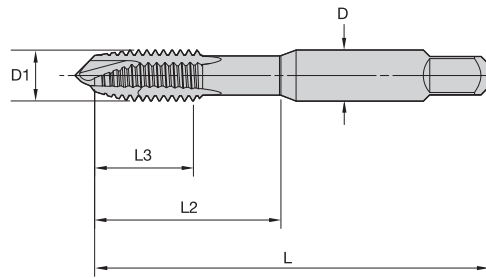
■ VT-SPO • Form B Plug Chamfer • UNJC/UNJF • Inch DIN 371 and 376



- first choice
- alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5472634	VTSP06006	5387705	VTSP06006	4 - 40	56	8	18	3,5	2	DIN 371	3B
5472637	VTSP06009	5387709	VTSP06009	6 - 32	56	9	20	4,0	2	DIN 371	3B
5472640	VTSP06012	5387762	VTSP06012	8 - 32	63	11	21	4,5	2	DIN 371	3B
5472645	VTSP06015	5387765	VTSP06015	10 - 32	70	12	25	6,0	2	DIN 371	3B
5472648	VTSP06018	5387768	VTSP06018	1/4 - 28	80	15	30	7,0	3	DIN 371	3B
5472651	VTSP06021	5387771	VTSP06021	5/16 - 24	90	15	35	8,0	3	DIN 371	3B
5472654	VTSP06024	5387774	VTSP06024	3/8 - 24	100	19	39	10,0	3	DIN 371	3B
5472657	VTSP06027	5387778	VTSP06027	7/16 - 20	100	18	41	8,0	3	DIN 376	3B
5472660	VTSP06030	5387781	VTSP06030	1/2 - 20	110	23	47	9,0	3	DIN 376	3B

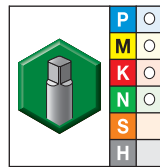
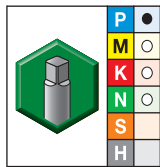
- WU41EG TiN
- WU40EG bright



Shank Tolerance	
D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

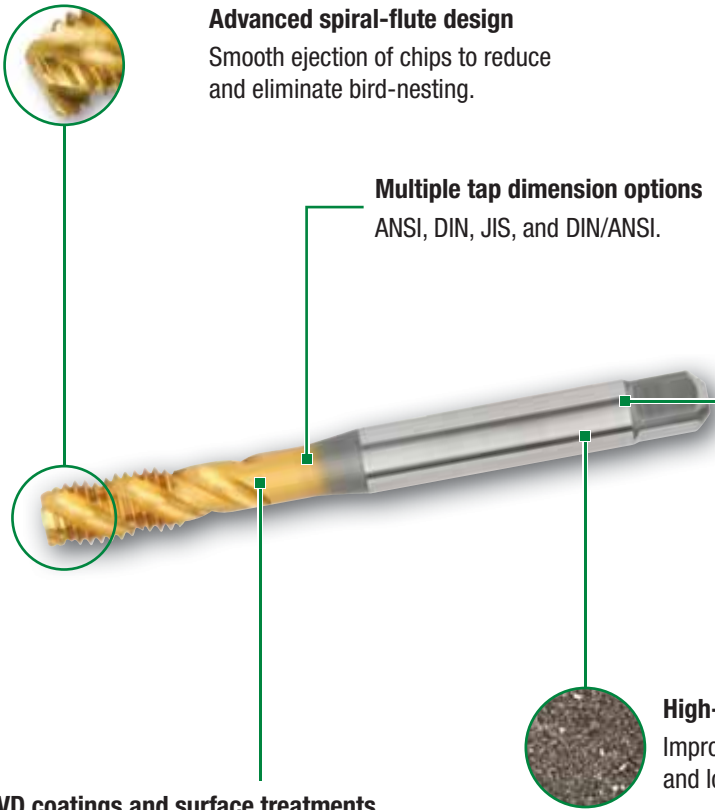
■ VT-SPO • Form B Plug Chamfer • Metric • JIS



- first choice
- alternate choice

grade WU41EG TiN		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	tap class
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5387861	VTSP07505	5387859	VTSP07505	M3 X 0,5	46	11	19	4,0	2	JIS	ISO 2
5387865	VTSP07506	5387863	VTSP07506	M4 X 0,7	52	13	21	5,0	2	JIS	ISO 2
5387869	VTSP07507	5387867	VTSP07507	M5 X 0,8	60	16	24	5,5	2	JIS	ISO 2
5387873	VTSP07508	5387871	VTSP07508	M6 X 1	62	19	29	6,0	3	JIS	ISO 2
5387877	VTSP07509	5387875	VTSP07509	M8 X 1,25	70	22	37	6,2	3	JIS	ISO 2
5387881	VTSP07510	5387879	VTSP07510	M10 X 1,5	75	24	41	7,0	3	JIS	ISO 2
-		5387883	VTSP07511	M12 X 1,25	82	29	48	8,5	3	JIS	ISO 2
-		5387887	VTSP07513	M12 X 1,5	82	29	48	8,5	3	JIS	ISO 2
-		5387885	VTSP07512	M12 X 1,75	82	29	48	8,5	3	JIS	ISO 2
-		5387891	VTSP07515	M14 X 1,5	88	30	48	10,5	3	JIS	ISO 2
-		5387889	VTSP07514	M14 X 2	88	30	48	10,5	3	JIS	ISO 2
-		5387895	VTSP07517	M16 X 1,5	95	32	52	12,5	3	JIS	ISO 2
-		5387893	VTSP07516	M16 X 2	95	32	52	12,5	3	JIS	ISO 2
-		5387898	VTSP07518	M18 X 2,5	100	37	55	14,0	3	JIS	ISO 2
-		5387900	VTSP07519	M20 X 2,5	105	37	60	15,0	3	JIS	ISO 2

Multipurpose Taps for Steel, Stainless Steel, Cast Aluminium, and Ductile Iron



Advanced spiral-flute design
Smooth ejection of chips to reduce and eliminate bird-nesting.

Multiple tap dimension options
ANSI, DIN, JIS, and DIN/ANSI.

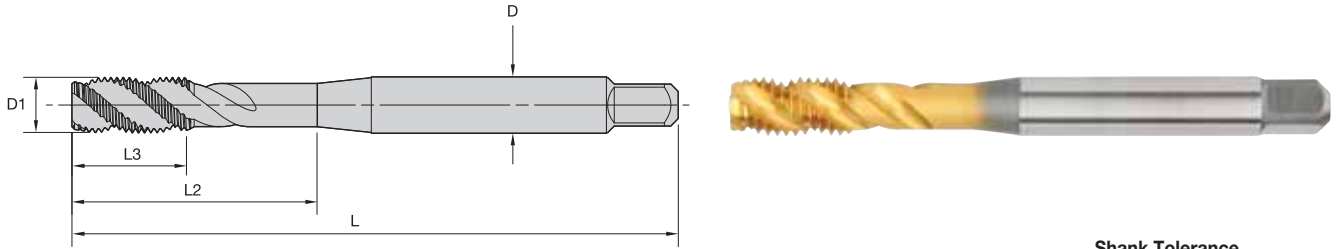
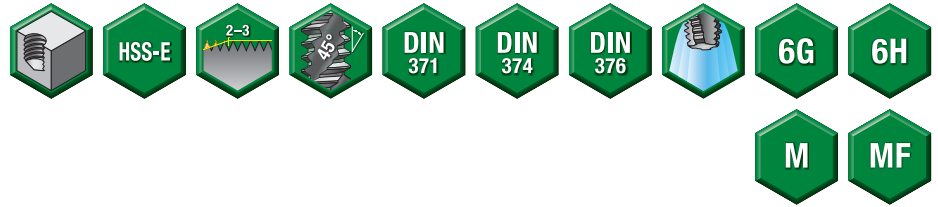
Precision ground shanks
Low runout.

High-vanadium HSS-E
Improved wear resistance and longer life.

PVD coatings and surface treatments
For use with various workpiece materials:

WP42EG TiCN	WU41EG TiN	WP49EG Oxide	WU40EG Bright
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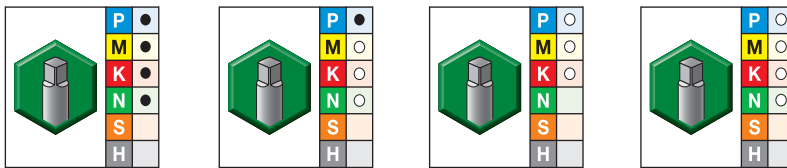
- WP42EG TiCN
- WU41EG TiN
- WP49EG oxide
- WU40EG bright



Shank Tolerance	
D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

■ **VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • Rigid and Synchronous Holders**



- first choice
- alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions				number of flutes	dimension standard	class of fit	
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2				D
5368703	VTSFT6506	5368702	VTSFT6506	5368704	VTSFT6506	5368705	VTSFT6506	M2 X 0,4	45	7	13	2,8	2	DIN 371	6H
-	-	-	-	5368706	VTSFT6507	-	-	M2 X 0,4	45	7	13	2,8	2	DIN 371	6G
-	-	-	-	5368707	VTSFT6508	-	-	M2,2 X 0,45	45	7	13	2,8	2	DIN 371	6H
-	-	5368708	VTSFT6509	5368709	VTSFT6509	5368720	VTSFT6509	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6H
-	-	-	-	5368721	VTSFT6510	-	-	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6G
-	-	-	-	5402138	VTSFT6545	-	-	M3 X 0,35	56	8	-	2,2	2	DIN 374	6H
-	-	-	-	5368726	VTSFT6512	-	-	M3 X 0,5	56	8	18	3,5	2	DIN 371	6G
-	-	-	-	5402227	VTSFT6525	5402228	VTSFT6525	M3 X 0,5	56	8	-	2,2	2	DIN 376	6H
5368723	VTSFT6511	5368722	VTSFT6511	5368724	VTSFT6511	5368725	VTSFT6511	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
-	-	5368727	VTSFT6513	5368728	VTSFT6513	5368729	VTSFT6513	M3,5 X 0,6	56	9	20	4,0	2	DIN 371	6H
-	-	-	-	5402139	VTSFT6546	5402180	VTSFT6546	M4 X 0,5	63	10	21	2,8	3	DIN 374	6H
-	-	-	-	5368734	VTSFT6515	-	-	M4 X 0,7	63	11	21	4,5	3	DIN 371	6G
-	-	-	-	5402229	VTSFT6526	5402250	VTSFT6526	M4 X 0,7	63	10	21	2,8	3	DIN 376	6H
5368731	VTSFT6514	5368730	VTSFT6514	5368732	VTSFT6514	5368733	VTSFT6514	M4 X 0,7	63	11	21	4,5	3	DIN 371	6H
-	-	-	-	5402181	VTSFT6547	5402182	VTSFT6547	M5 X 0,5	70	12	25	3,5	3	DIN 374	6H
-	-	-	-	5368739	VTSFT6517	-	-	M5 X 0,8	70	12	25	6,0	3	DIN 371	6G
-	-	-	-	5402251	VTSFT6527	5402252	VTSFT6527	M5 X 0,8	70	12	25	3,5	3	DIN 376	6H
5368736	VTSFT6516	5368735	VTSFT6516	5368737	VTSFT6516	5368738	VTSFT6516	M5 X 0,8	70	12	25	6,0	3	DIN 371	6H
-	-	-	-	5402183	VTSFT6548	-	-	M6 X 0,5	80	12	30	4,5	3	DIN 374	6H
-	-	-	-	5402185	VTSFT6549	5402184	VTSFT6549	M6 X 0,75	80	12	30	4,5	3	DIN 374	6H

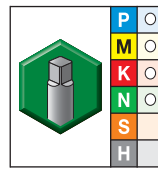
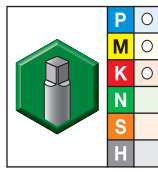
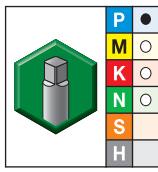
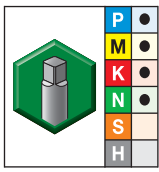
(continued)

Multipurpose Taps

VariTap™ Spiral-Flute HSS-E Taps • Blind Holes



(VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • Rigid and Synchronous Holders — continued)



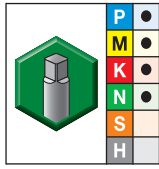
- first choice
- alternate choice

Tapping

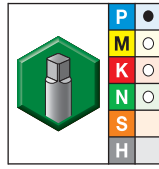
grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5368741	VTSFT6518	5368740	VTSFT6518	5368742	VTSFT6518	5368743	VTSFT6518	M6 X 1	80	12	30	6,0	3	DIN 371	6H
-	-	-	-	5402253	VTSFT6528	5402254	VTSFT6528	M6 X 1	80	12	30	4,5	3	DIN 376	6H
-	-	-	-	5368744	VTSFT6519	-	-	M6 X 1	80	12	30	6,0	3	DIN 371	6G
-	-	-	-	5368745	VTSFT6520	5368746	VTSFT6520	M7 X 1	80	12	30	7,0	3	DIN 371	6H
-	-	-	-	5402186	VTSFT6550	5402187	VTSFT6550	M8 X 0,75	80	12	30	6,0	3	DIN 374	6H
5402188	VTSFT6551	-	-	5402189	VTSFT6551	5402190	VTSFT6551	M8 X 1	90	15	35	6,0	3	DIN 374	6H
-	-	-	-	5368752	VTSFT6522	-	-	M8 X 1,25	90	15	35	8,0	3	DIN 371	6G
-	-	-	-	5402255	VTSFT6529	5402256	VTSFT6529	M8 X 1,25	90	15	35	6,0	3	DIN 376	6H
5368749	VTSFT6521	5368748	VTSFT6521	5368750	VTSFT6521	5368751	VTSFT6521	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
-	-	-	-	-	-	5402191	VTSFT6552	M10 X 0,75	90	15	35	7,0	3	DIN 374	6H
-	-	-	-	5402192	VTSFT6553	5402193	VTSFT6553	M10 X 1	90	15	35	7,0	3	DIN 374	6H
5402194	VTSFT6554	-	-	5402195	VTSFT6554	5402196	VTSFT6554	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
5368754	VTSFT6523	5368753	VTSFT6523	5368755	VTSFT6523	5368756	VTSFT6523	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
-	-	-	-	5368757	VTSFT6524	-	-	M10 X 1,5	100	18	39	10,0	3	DIN 371	6G
-	-	-	-	5402257	VTSFT6530	5402258	VTSFT6530	M10 X 1,5	100	18	39	7,0	3	DIN 376	6H
-	-	-	-	5402197	VTSFT6555	5402198	VTSFT6555	M12 X 1	100	21	39	9,0	3	DIN 374	6H
-	-	-	-	5402199	VTSFT6556	5402200	VTSFT6556	M12 X 1,25	100	21	39	9,0	3	DIN 374	6H
5402201	VTSFT6557	-	-	5402202	VTSFT6557	5402203	VTSFT6557	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
-	-	-	-	5402263	VTSFT6532	-	-	M12 X 1,75	110	21	44	9,0	3	DIN 376	6G
5402260	VTSFT6531	5402259	VTSFT6531	5402261	VTSFT6531	5402262	VTSFT6531	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
-	-	-	-	-	-	5402204	VTSFT6558	M14 X 1	100	21	47	11,0	3	DIN 374	6H
-	-	-	-	-	-	5402205	VTSFT6559	M14 X 1,25	100	21	47	11,0	3	DIN 374	6H
5402206	VTSFT6560	-	-	5402207	VTSFT6560	5402208	VTSFT6560	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
-	-	-	-	5402268	VTSFT6534	-	-	M14 X 2	110	24	52	11,0	3	DIN 376	6G
5402265	VTSFT6533	5402264	VTSFT6533	5402266	VTSFT6533	5402267	VTSFT6533	M14 X 2	110	24	52	11,0	3	DIN 376	6H
-	-	-	-	-	-	5402209	VTSFT6561	M16 X 1	100	21	46	12,0	3	DIN 374	6H
-	-	-	-	5402210	VTSFT6562	5402211	VTSFT6562	M16 X 1,5	100	21	46	12,0	3	DIN 374	6H
-	-	-	-	5402272	VTSFT6536	-	-	M16 X 2	110	24	51	12,0	3	DIN 376	6G
-	-	5402269	VTSFT6535	5402270	VTSFT6535	5402271	VTSFT6535	M16 X 2	110	24	51	12,0	3	DIN 376	6H
-	-	-	-	-	-	5402212	VTSFT6563	M18 X 1	110	21	50	14,0	4	DIN 374	6H
-	-	-	-	5402214	VTSFT6564	5402213	VTSFT6564	M18 X 1,5	110	21	50	14,0	4	DIN 374	6H
-	-	-	-	-	-	5402215	VTSFT6565	M18 X 2	125	30	58	14,0	4	DIN 374	6H
-	-	5402273	VTSFT6537	5402274	VTSFT6537	5402275	VTSFT6537	M18 X 2,5	125	30	58	14,0	4	DIN 376	6H
-	-	-	-	-	-	5402216	VTSFT6566	M20 X 1	125	24	56	16,0	4	DIN 374	6H
-	-	-	-	5402217	VTSFT6567	5402218	VTSFT6567	M20 X 1,5	125	24	56	16,0	4	DIN 374	6H
-	-	-	-	-	-	5402219	VTSFT6568	M20 X 2	140	30	64	16,0	4	DIN 374	6H
-	-	5402276	VTSFT6538	5402277	VTSFT6538	5402278	VTSFT6538	M20 X 2,5	140	30	64	16,0	4	DIN 376	6H
-	-	-	-	5402220	VTSFT6569	5402221	VTSFT6569	M22 X 1,5	125	24	62	18,0	4	DIN 374	6H
-	-	-	-	-	-	5402222	VTSFT6570	M22 X 2	140	30	70	18,0	4	DIN 374	6H
-	-	5402279	VTSFT6539	5402280	VTSFT6539	5402281	VTSFT6539	M22 X 2,5	140	30	70	18,0	4	DIN 376	6H

(continued)

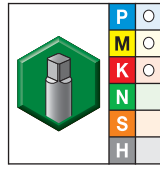
(VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • Rigid and Synchronous Holders — continued)



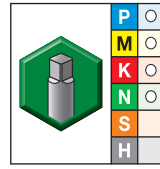
grade WP42EG
TiCN



grade WU41EG
TiN



grade WP49EG
Oxide



grade WU40EG
Bright

- first choice
- alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions				number of flutes	dimension standard	class of fit	
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2				D
-	-	-	-	5402223	VTSFT6571	5402224	VTSFT6571	M24 X 1,5	140	28	67	18,0	4	DIN 374	6H
-	-	-	-	-	-	5402225	VTSFT6572	M24 X 2	140	28	67	18,0	4	DIN 374	6H
-	5402282	VTSFT6540	5402283	VTSFT6540	5402284	VTSFT6540	M24 X 3	160	36	77	18,0	4	DIN 376	6H	
-	5402285	VTSFT6541	5402286	VTSFT6541	5402287	VTSFT6541	M27 X 3	160	36	82	20,0	4	DIN 376	6H	
-	-	-	-	-	5402226	VTSFT6573	M30 X 2	150	28	80	22,0	2	DIN 374	6H	
-	5402288	VTSFT6542	5402289	VTSFT6542	5402290	VTSFT6542	M30 X 3,5	180	42	91	22,0	4	DIN 376	6H	
-	-	-	5402291	VTSFT6543	5402292	VTSFT6543	M33 X 3,5	180	42	100	25,0	4	DIN 376	6H	
-	-	-	5402293	VTSFT6544	5402294	VTSFT6544	M36 X 4	200	48	110	28,0	5	DIN 376	6H	

NOTE: Suggested for use in rigid and synchronous holders.

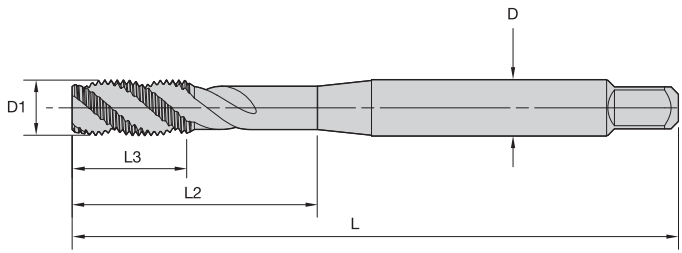
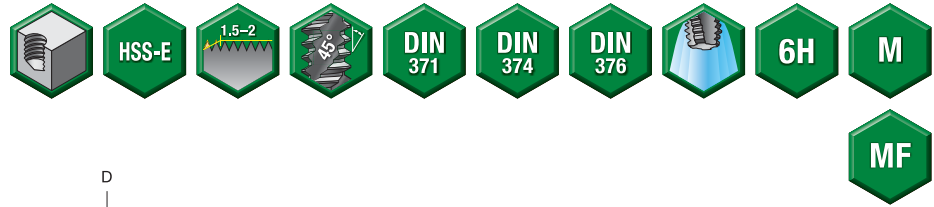
Tapping

Multipurpose Taps

VariTap™ Spiral-Flute HSS-E Taps • Blind Holes



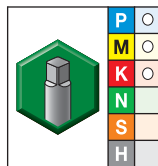
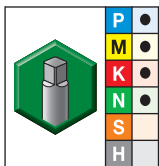
- WP42EG TiCN
- WP49EG oxide



Shank Tolerance	
D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

■ VT-SFT • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376 • Rigid and Synchronous Holders

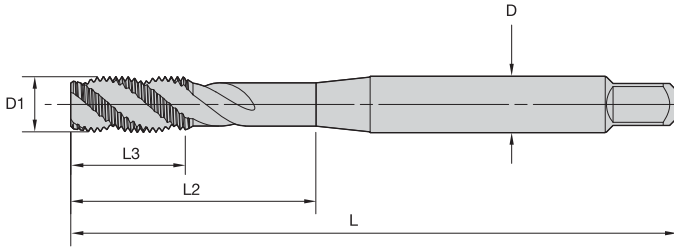
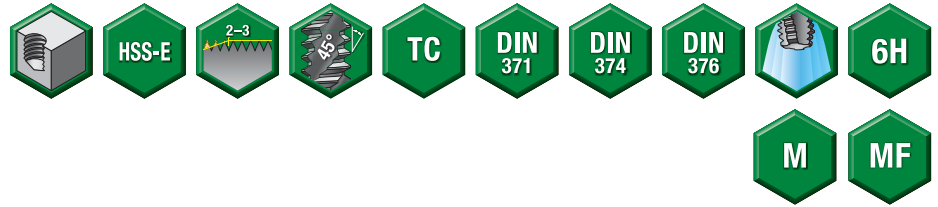


- first choice
- alternate choice

grade WP42EG TiCN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5387434	VTSFT6574	5387435	VTSFT6574	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
5387436	VTSFT6575	5387437	VTSFT6575	M4 X 0,7	63	11	21	4,5	3	DIN 371	6H
5387438	VTSFT6576	5387439	VTSFT6576	M5 X 0,8	70	12	25	6,0	3	DIN 371	6H
5387460	VTSFT6577	5387461	VTSFT6577	M6 X 1	80	12	30	6,0	3	DIN 371	6H
5387475	VTSFT6585	5387476	VTSFT6585	M8 X 1	90	15	35	6,0	3	DIN 374	6H
5387462	VTSFT6578	5387463	VTSFT6578	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
5387477	VTSFT6586	5387478	VTSFT6586	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
5387464	VTSFT6579	5387465	VTSFT6579	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
5387479	VTSFT6587	5387481	VTSFT6587	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
5387466	VTSFT6580	5387467	VTSFT6580	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
5387482	VTSFT6588	5387483	VTSFT6588	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
5387468	VTSFT6581	5387469	VTSFT6581	M14 X 2	110	24	52	11,0	3	DIN 376	6H
-		5387470	VTSFT6582	M16 X 2	110	24	51	12,0	3	DIN 376	6H
5387471	VTSFT6583	5387472	VTSFT6583	M18 X 2,5	125	30	58	14,0	4	DIN 376	6H
5387473	VTSFT6584	5387474	VTSFT6584	M20 X 2,5	140	30	64	16,0	4	DIN 376	6H

NOTE: Suggested for use in rigid and synchronous holders.

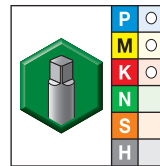
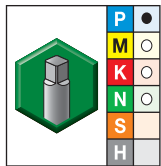
- WU41EG TiN
- WP49EG oxide



Shank Tolerance	
D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

■ VT-SFT TC • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • Tension/Compression Holders



- first choice
- alternate choice

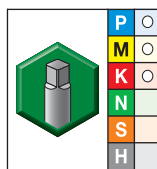
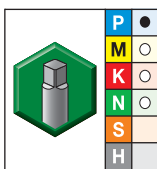
grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
6172434	VTSFT-TC6506	6172432	VTSFT-TC6506	M2 X 0,4	45	7	13	2,8	3	DIN 371	6H
6172438	VTSFT-TC6508	6172436	VTSFT-TC6508	M3 X 0,5	56	5	19	3,5	3	DIN 371	6H
6172442	VTSFT-TC6510	6172440	VTSFT-TC6510	M4 X 0,7	63	7	21	4,5	3	DIN 371	6H
6172446	VTSFT-TC6511	6172444	VTSFT-TC6511	M5 X 0,8	70	8	26	6,0	3	DIN 371	6H
6172450	VTSFT-TC6512	6172448	VTSFT-TC6512	M5 X 0,8	70	8	27	3,5	3	DIN 376	6H
6172464	VTSFT-TC6513	6172462	VTSFT-TC6513	M6 X 0,75	80	10	34	4,5	3	DIN 374	6H
6172468	VTSFT-TC6514	6172466	VTSFT-TC6514	M6 X 1	80	10	30	6,0	3	DIN 371	6H
6172470	VTSFT-TC6515	6172469	VTSFT-TC6515	M6 X 1	80	10	34	4,5	3	DIN 376	6H
6172482	VTSFT-TC6516	6172481	VTSFT-TC6516	M8 X 0,75	90	13	37	6,0	3	DIN 374	6H
6172484	VTSFT-TC6517	6172483	VTSFT-TC6517	M8 X 1	90	13	37	6,0	3	DIN 374	6H
6172486	VTSFT-TC6518	6172485	VTSFT-TC6518	M8 X 1,25	90	13	37	8,0	3	DIN 371	6H
6172488	VTSFT-TC6519	6172487	VTSFT-TC6519	M8 X 1,25	90	13	37	6,0	3	DIN 376	6H
6172490	VTSFT-TC6520	6172489	VTSFT-TC6520	M10 X 0,75	90	15	40	7,0	3	DIN 374	6H
6172492	VTSFT-TC6540	6172491	VTSFT-TC6540	M10 X 1	90	15	40	7,0	3	DIN 374	6H
6172494	VTSFT-TC6522	6172493	VTSFT-TC6522	M10 X 1,25	100	15	44	7,0	3	DIN 374	6H
6172496	VTSFT-TC6550	6172495	VTSFT-TC6550	M10 X 1,5	100	15	41	10,0	3	DIN 371	6H
6172498	VTSFT-TC6524	6172497	VTSFT-TC6524	M10 X 1,5	100	15	44	7,0	3	DIN 376	6H
6172500	VTSFT-TC6525	6172499	VTSFT-TC6525	M12 X 1	100	13	50	9,0	3	DIN 374	6H
6172502	VTSFT-TC6526	6172501	VTSFT-TC6526	M12 X 1,25	100	13	50	9,0	3	DIN 374	6H
6172504	VTSFT-TC6527	6172503	VTSFT-TC6527	M12 X 1,5	100	13	50	9,0	3	DIN 374	6H

(continued)

Multipurpose Taps

VariTap™ Spiral-Flute HSS-E Taps • Blind Holes

(VT-SFT TC • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • Tension/Compression Holders — continued)



● first choice
○ alternate choice

grade WU41EG
TiN

grade WP49EG
Oxide

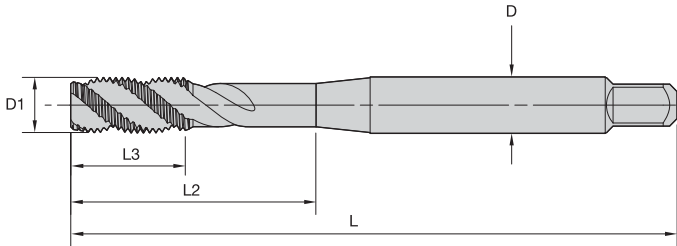
metric dimensions

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
6172506	VTSFT-TC6528	6172505	VTSFT-TC6528	M12 X 1,75	110	18	55	9,0	3	DIN 376	6H
6172508	VTSFT-TC6529	6172507	VTSFT-TC6529	M14 X 1	100	15	41	11,0	4	DIN 374	6H
6172510	VTSFT-TC6530	6172509	VTSFT-TC6530	M14 X 1,25	100	15	41	11,0	4	DIN 374	6H
6172512	VTSFT-TC6536	6172511	VTSFT-TC6536	M14 X 1,5	100	15	41	11,0	4	DIN 374	6H
6172672	VTSFT-TC6532	6172671	VTSFT-TC6532	M14 X 2	110	20	50	11,0	3	DIN 376	6H
6172674	VTSFT-TC6534	6172673	VTSFT-TC6534	M16 X 1,5	100	15	45	12,0	4	DIN 374	6H
6172676	VTSFT-TC6564	6172675	VTSFT-TC6564	M16 X 2	110	20	55	12,0	4	DIN 376	6H
6172678	VTSFT-TC6537	6172677	VTSFT-TC6537	M18 X 1,5	110	17	55	14,0	4	DIN 374	6H
6172680	VTSFT-TC6538	6172679	VTSFT-TC6538	M18 X 2	125	25	61	14,0	4	DIN 374	6H
6172692	VTSFT-TC6539	6172691	VTSFT-TC6539	M18 X 2,5	125	25	61	14,0	4	DIN 376	6H
6172694	VTSFT-TC6541	6172693	VTSFT-TC6541	M20 X 1,5	125	17	56	16,0	4	DIN 374	6H
6172696	VTSFT-TC6542	6172695	VTSFT-TC6542	M20 X 2	140	25	65	16,0	4	DIN 374	6H
6172698	VTSFT-TC6543	6172697	VTSFT-TC6543	M20 X 2,5	140	25	65	16,0	4	DIN 376	6H
6172700	VTSFT-TC6544	6172699	VTSFT-TC6544	M22 X 1,5	125	18	61	18,0	4	DIN 374	6H
6172712	VTSFT-TC6545	6172711	VTSFT-TC6545	M22 X 2	140	25	66	18,0	4	DIN 374	6H
6172714	VTSFT-TC6546	6172713	VTSFT-TC6546	M22 X 2,5	140	25	66	18,0	4	DIN 376	6H
6172716	VTSFT-TC6547	6172715	VTSFT-TC6547	M24 X 1,5	140	20	67	18,0	4	DIN 374	6H
6172718	VTSFT-TC6548	6172717	VTSFT-TC6548	M24 X 2	140	20	67	18,0	4	DIN 374	6H
6172720	VTSFT-TC6549	6172719	VTSFT-TC6549	M24 X 3	160	30	77	18,0	4	DIN 376	6H
6172722	VTSFT-TC6551	6172721	VTSFT-TC6551	M27 X 1,5	140	20	65	20,0	4	DIN 374	6H
6172724	VTSFT-TC6552	6172723	VTSFT-TC6552	M27 X 3	160	33	85	20,0	4	DIN 376	6H
6172726	VTSFT-TC6554	6172725	VTSFT-TC6554	M30 X 1,5	150	22	68	20,0	4	DIN 374	6H
6172728	VTSFT-TC6555	6172727	VTSFT-TC6555	M30 X 2	150	22	68	22,0	4	DIN 374	6H
6172730	VTSFT-TC6556	6172729	VTSFT-TC6556	M30 X 3,5	180	35	87	22,0	4	DIN 376	6H
6172732	VTSFT-TC6558	6172731	VTSFT-TC6558	M33 X 3,5	180	35	92	25,0	4	DIN 376	6H
6172734	VTSFT-TC6560	6172733	VTSFT-TC6560	M36 X 4	200	40	110	28,0	4	DIN 376	6H
6172736	VTSFT-TC6563	6172735	VTSFT-TC6563	M39 X 4	200	40	105	32,0	4	DIN 376	6H
6172738	VTSFT-TC6565	6172737	VTSFT-TC6565	M42 X 4,5	200	40	105	32,0	5	DIN 376	6H
6172740	VTSFT-TC6567	6172739	VTSFT-TC6567	M45 X 5	220	50	110	36,0	5	DIN 376	6H
6172742	VTSFT-TC6569	6172741	VTSFT-TC6569	M48 X 5	250	50	145	36,0	5	DIN 376	6H
6172744	VTSFT-TC6571	6172743	VTSFT-TC6571	M52 X 5	250	50	135	40,0	5	DIN 376	6H

NOTE: Suitable for tension/compression holders.

Tapping

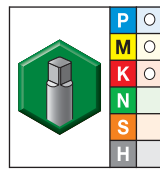
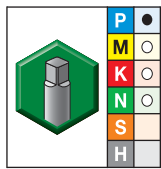
- WU41EG TiN
- WP49EG oxide



Shank Tolerance	
D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

■ VT-SFT TC • Form E Bottoming Chamfer • Metric DIN 371 and 376 • Tension/Compression Holders

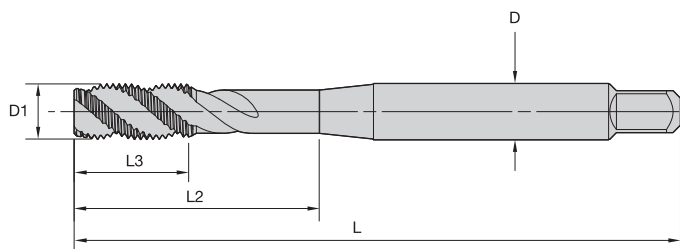


- first choice
- alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
6173197	VTSFT-TC6708	6173196	VTSFT-TC6708	M3 X 0,5	56	5	19	3,5	3	DIN 371	6H
6173199	VTSFT-TC6710	6173198	VTSFT-TC6710	M4 X 0,7	63	7	21	4,5	3	DIN 371	6H
6173211	VTSFT-TC6711	6173200	VTSFT-TC6711	M5 X 0,8	70	8	26	6,0	3	DIN 371	6H
6173213	VTSFT-TC6714	6173212	VTSFT-TC6714	M6 X 1	80	10	30	6,0	3	DIN 371	6H
6173215	VTSFT-TC6718	6173214	VTSFT-TC6718	M8 X 1,25	90	13	37	8,0	3	DIN 371	6H
6173217	VTSFT-TC6723	6173216	VTSFT-TC6723	M10 X 1,5	100	15	42	10,0	3	DIN 371	6H
6173219	VTSFT-TC6728	6173218	VTSFT-TC6728	M12 X 1,75	110	18	55	9,0	3	DIN 376	6H
6173231	VTSFT-TC6732	6173220	VTSFT-TC6732	M14 X 2	110	20	50	11,0	3	DIN 376	6H
6173233	VTSFT-TC6735	6173232	VTSFT-TC6735	M16 X 2	110	20	55	12,0	4	DIN 376	6H
6173235	VTSFT-TC6739	6173234	VTSFT-TC6739	M18 X 2,5	125	25	61	14,0	4	DIN 376	6H
6173237	VTSFT-TC6743	6173236	VTSFT-TC6743	M20 X 2,5	140	25	65	16,0	4	DIN 376	6H

NOTE: Suitable for tension/compression holders.

- WU41EG TiN
- WP49EG oxide

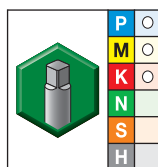
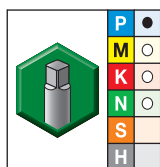


Shank Tolerance

D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

■ VT-SFT • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371 and 376 • Rigid and Synchronous Holders

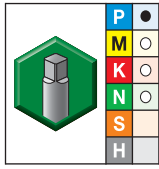


- first choice
- alternate choice

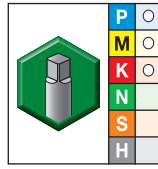
grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5472587	VTSFT6005	5387487	VTSFT6005	4 - 40	56	8	18	3,5	2	DIN 371	2B
5472589	VTSFT6007	5387489	VTSFT6007	5 - 40	56	9	20	4,0	2	DIN 371	2B
5472600	VTSFT6008	5387640	VTSFT6008	6 - 32	56	9	20	4,0	2	DIN 371	2B
5472602	VTSFT6010	5387642	VTSFT6010	6 - 40	56	9	20	4,0	2	DIN 371	2B
5472603	VTSFT6011	5387643	VTSFT6011	8 - 32	63	11	21	4,5	3	DIN 371	2B
5472605	VTSFT6013	5387645	VTSFT6013	10 - 24	70	12	25	6,0	3	DIN 371	2B
5472606	VTSFT6014	5387646	VTSFT6014	10 - 32	70	12	25	6,0	3	DIN 371	2B
5472608	VTSFT6016	5387648	VTSFT6016	1/4 - 20	80	15	30	7,0	3	DIN 371	2B
5472609	VTSFT6017	5387649	VTSFT6017	1/4 - 28	80	15	30	7,0	3	DIN 371	2B
5472611	VTSFT6019	5387651	VTSFT6019	5/16 - 18	90	15	35	8,0	3	DIN 371	2B
5472612	VTSFT6020	5387652	VTSFT6020	5/16 - 24	90	15	35	8,0	3	DIN 371	2B
5472614	VTSFT6022	5387654	VTSFT6022	3/8 - 16	100	19	39	10,0	3	DIN 371	2B
5472615	VTSFT6023	5387655	VTSFT6023	3/8 - 24	100	19	39	10,0	3	DIN 371	2B
5472617	VTSFT6025	5387657	VTSFT6025	7/16 - 14	100	18	41	8,0	3	DIN 376	2B
5472618	VTSFT6026	5387658	VTSFT6026	7/16 - 20	100	18	41	8,0	3	DIN 376	2B
5472620	VTSFT6028	5387670	VTSFT6028	1/2 - 13	110	23	40	9,0	3	DIN 376	2B
5472621	VTSFT6029	5387671	VTSFT6029	1/2 - 20	110	23	40	9,0	3	DIN 376	2B
5472623	VTSFT6031	5387673	VTSFT6031	9/16 - 12	110	25	32	11,0	3	DIN 376	2B
5472624	VTSFT6032	5387674	VTSFT6032	9/16 - 18	110	25	32	11,0	3	DIN 376	2B
5472625	VTSFT6033	5387675	VTSFT6033	5/8 - 11	110	24	35	12,0	3	DIN 376	2B

(continued)

(VT-SFT • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371 and 376 • Rigid and Synchronous Holders — continued)



grade WU41EG
TiN



grade WP49EG
Oxide

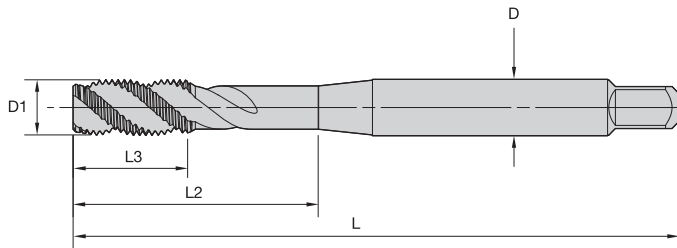
● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5472626	VTSFT6034	5387676	VTSFT6034	5/8 - 18	110	24	35	12,0	3	DIN 376	2B
5472627	VTSFT6035	5387677	VTSFT6035	3/4 - 10	140	30	46	16,0	4	DIN 376	2B
5472628	VTSFT6036	5387678	VTSFT6036	3/4 - 16	140	30	46	16,0	4	DIN 376	2B
5472629	VTSFT6037	5387679	VTSFT6037	7/8 - 9	140	34	35	18,0	4	DIN 376	2B
5472630	VTSFT6038	5387700	VTSFT6038	7/8 - 14	140	34	35	18,0	4	DIN 376	2B
5472631	VTSFT6039	5387701	VTSFT6039	1 - 8	160	38	41	18,0	4	DIN 376	2B
5472632	VTSFT6040	5387702	VTSFT6040	1 - 12	160	38	41	18,0	4	DIN 376	2B

NOTE: Suggested for use in rigid and synchronous holders.



- WU41EG TiN
- WP49EG oxide

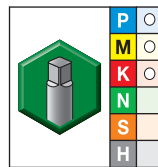
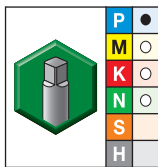


Shank Tolerance

D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

■ VT-SFT TC • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371, 374, and 376 • Tension/Compression Holders

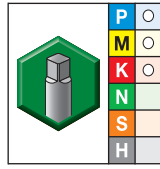
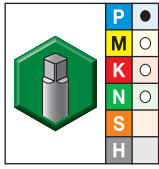


- first choice
- alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
6172748	VTSFT-TC6008	6172747	VTSFT-TC6008	6 - 32	56	7	21	4,0	3	DIN 371	2B
6172750	VTSFT-TC6009	6172749	VTSFT-TC6009	6 - 40	56	7	21	4,0	3	DIN 371	2B
6172782	VTSFT-TC6010	6172781	VTSFT-TC6010	8 - 32	63	7	21	4,5	3	DIN 371	2B
6172784	VTSFT-TC6011	6172783	VTSFT-TC6011	8 - 36	63	7	21	4,5	3	DIN 371	2B
6172786	VTSFT-TC6012	6172785	VTSFT-TC6012	10 - 24	70	8	25	6,0	3	DIN 371	2B
6172788	VTSFT-TC6013	6172787	VTSFT-TC6013	10 - 32	70	8	25	6,0	3	DIN 371	2B
6172790	VTSFT-TC6014	6172789	VTSFT-TC6014	12 - 24	80	10	30	6,0	3	DIN 371	2B
6172792	VTSFT-TC6015	6172791	VTSFT-TC6015	12 - 28	80	10	30	6,0	3	DIN 371	2B
6172794	VTSFT-TC6016	6172793	VTSFT-TC6016	1/4 - 20	80	10	29	7,0	3	DIN 371	2B
6172796	VTSFT-TC6017	6172795	VTSFT-TC6017	1/4 - 20	80	10	36	4,5	3	DIN 376	2B
6172798	VTSFT-TC6018	6172797	VTSFT-TC6018	1/4 - 28	80	10	29	7,0	3	DIN 371	2B
6172800	VTSFT-TC6050	6172799	VTSFT-TC6050	1/4 - 28	80	10	36	4,5	3	DIN 374	2B
6172802	VTSFT-TC6052	6172801	VTSFT-TC6052	5/16 - 18	90	13	37	8,0	3	DIN 371	2B
6172804	VTSFT-TC6021	6172803	VTSFT-TC6021	5/16 - 18	90	13	37	6,0	3	DIN 376	2B
6172806	VTSFT-TC6054	6172805	VTSFT-TC6054	5/16 - 24	90	13	37	6,0	3	DIN 374	2B
6172808	VTSFT-TC6056	6172807	VTSFT-TC6056	3/8 - 16	100	15	42	10,0	3	DIN 371	2B
6172810	VTSFT-TC6024	6172809	VTSFT-TC6024	3/8 - 16	100	15	45	7,0	3	DIN 376	2B
6172812	VTSFT-TC6058	6172811	VTSFT-TC6058	3/8 - 24	90	15	40	7,0	3	DIN 374	2B
6172814	VTSFT-TC6060	6172813	VTSFT-TC6060	7/16 - 14	100	15	47	8,0	3	DIN 376	2B
6172816	VTSFT-TC6027	6172815	VTSFT-TC6027	7/16 - 20	100	15	47	8,0	3	DIN 374	2B

(continued)

(VT-SFT TC • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371, 374, and 376 • Tension/Compression Holders — continued)



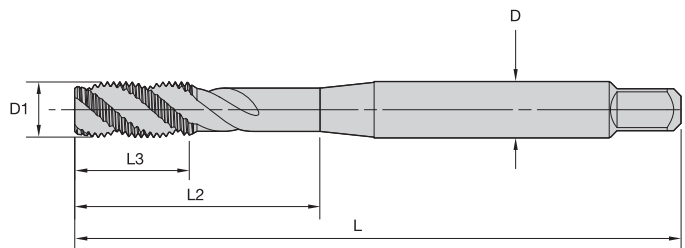
● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
6172818	VTSFT-TC6062	6172817	VTSFT-TC6062	1/2 - 13	110	18	50	9,0	3	DIN 376	2B
6172820	VTSFT-TC6029	6172819	VTSFT-TC6029	1/2 - 20	100	13	44	9,0	3	DIN 374	2B
6172837	VTSFT-TC6030	6172836	VTSFT-TC6030	9/16 - 12	110	20	55	11,0	4	DIN 376	2B
6172839	VTSFT-TC6031	6172838	VTSFT-TC6031	9/16 - 18	100	15	44	11,0	4	DIN 374	2B
6172911	VTSFT-TC6032	6172840	VTSFT-TC6032	5/8 - 11	110	20	55	12,0	4	DIN 376	2B
6172913	VTSFT-TC6033	6172912	VTSFT-TC6033	5/8 - 18	100	15	45	12,0	4	DIN 374	2B
6172915	VTSFT-TC6034	6172914	VTSFT-TC6034	3/4 - 10	125	25	65	14,0	4	DIN 376	2B
6172917	VTSFT-TC6035	6172916	VTSFT-TC6035	3/4 - 16	110	17	55	14,0	4	DIN 374	2B
6172919	VTSFT-TC6036	6172918	VTSFT-TC6036	7/8 - 9	140	25	68	18,0	4	DIN 376	2B
6172932	VTSFT-TC6037	6172920	VTSFT-TC6037	7/8 - 14	125	18	57	18,0	4	DIN 374	2B
6172934	VTSFT-TC6038	6172933	VTSFT-TC6038	1 - 8	160	30	89	18,0	4	DIN 376	2B
6172936	VTSFT-TC6039	6172935	VTSFT-TC6039	1 - 12	140	22	63	18,0	4	DIN 374	2B
6172938	VTSFT-TC6040	6172937	VTSFT-TC6040	1 1/8 - 7	180	35	90	22,0	4	DIN 376	2B
6172940	VTSFT-TC6041	6172939	VTSFT-TC6041	1 1/8 - 12	150	22	70	22,0	4	DIN 374	2B
6172952	VTSFT-TC6042	6172951	VTSFT-TC6042	1 1/4 - 7	180	35	95	22,0	4	DIN 376	2B
6172954	VTSFT-TC6043	6172953	VTSFT-TC6043	1 1/4 - 12	150	22	67	22,0	5	DIN 374	2B
6172956	VTSFT-TC6044	6172955	VTSFT-TC6044	1 3/8 - 6	200	40	100	28,0	4	DIN 376	2B
6172958	VTSFT-TC6045	6172957	VTSFT-TC6045	1 3/8 - 12	170	24	80	28,0	5	DIN 374	2B
6172960	VTSFT-TC6046	6172959	VTSFT-TC6046	1 1/2 - 6	200	40	100	28,0	4	DIN 376	2B
6172962	VTSFT-TC6047	6172961	VTSFT-TC6047	1 1/2 - 12	170	24	72	28,0	6	DIN 374	2B
6172964	VTSFT-TC6048	6172963	VTSFT-TC6048	1 3/4 - 5	220	50	108	36,0	5	DIN 376	2B
6172966	VTSFT-TC6049	6172965	VTSFT-TC6049	2 - 4 1/2	250	55	140	40,0	5	DIN 376	2B



NOTE: Suitable for tension/compression holders.

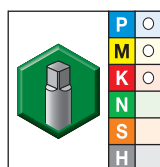
• WP49EG oxide



Shank Tolerance

D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

■ VT-SFT • Form C Semi-Bottoming Chamfer • UNJC/UNJF • Inch DIN 371 and 376 • Rigid and Synchronous Holders



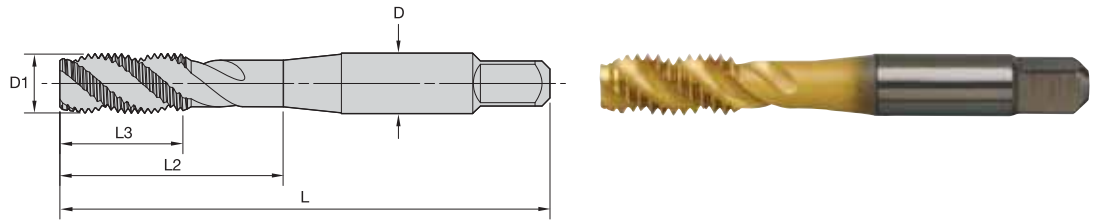
- first choice
- alternate choice

grade WP49EG Oxide		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
5387488	VTSFT6006	4 - 40	56	8	18	3,5	2	DIN 371	3B
5387641	VTSFT6009	6 - 32	56	9	20	4,0	2	DIN 371	3B
5387644	VTSFT6012	8 - 32	63	11	21	4,5	3	DIN 371	3B
5387647	VTSFT6015	10 - 32	70	12	25	6,0	3	DIN 371	3B
5387650	VTSFT6018	1/4 - 28	80	15	30	7,0	3	DIN 371	3B
5387653	VTSFT6021	5/16 - 24	90	15	35	8,0	3	DIN 371	3B
5387656	VTSFT6024	3/8 - 24	100	19	39	10,0	3	DIN 371	3B
5387659	VTSFT6027	7/16 - 20	100	18	41	8,0	3	DIN 376	3B
5387672	VTSFT6030	1/2 - 20	110	23	40	9,0	3	DIN 376	3B

NOTE: Suggested for use in rigid and synchronous holders.

Tapping

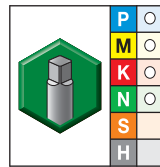
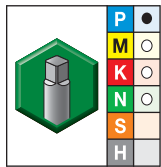
- WU41EG TiN
- WU40EG bright



Shank Tolerance	
D mm	tolerance h9
1-3	+0, -0,025
>3-6	+0, -0,030
>6-10	+0, -0,036
>10-18	+0, -0,043
>18-30	+0, -0,052

Tapping

■ VT-SFT • Form C Semi-Bottoming Chamfer • Metric • JIS • Rigid and Synchronous Holders



- first choice
- alternate choice

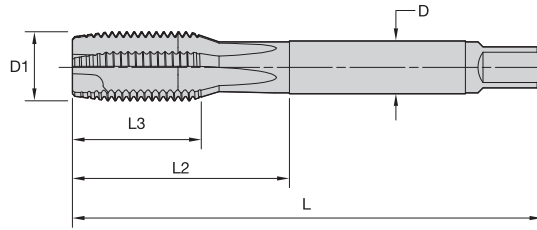
grade WU41EG TiN		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	tap class
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5398709	VTSFT7505	5398708	VTSFT7505	M3 X 0,5	46	11	19	4,0	2	JIS	ISO 2
5398791	VTSFT7506	5398790	VTSFT7506	M4 X 0,7	52	13	21	5,0	3	JIS	ISO 2
5398793	VTSFT7507	5398792	VTSFT7507	M5 X 0,8	60	16	24	5,5	3	JIS	ISO 2
5398795	VTSFT7508	5398794	VTSFT7508	M6 X 1	62	19	29	6,0	3	JIS	ISO 2
5398797	VTSFT7509	5398796	VTSFT7509	M8 X 1,25	70	22	37	6,2	3	JIS	ISO 2
5398799	VTSFT7510	5398798	VTSFT7510	M10 X 1,5	75	24	41	7,0	3	JIS	ISO 2
-		5398800	VTSFT7511	M12 X 1,25	82	29	48	8,5	3	JIS	ISO 2
-		5398802	VTSFT7513	M12 X 1,5	82	29	48	8,5	3	JIS	ISO 2
-		5398801	VTSFT7512	M12 X 1,75	82	29	48	8,5	3	JIS	ISO 2
-		5398804	VTSFT7515	M14 X 1,5	88	30	48	10,5	3	JIS	ISO 2
-		5398803	VTSFT7514	M14 X 2	88	30	48	10,5	3	JIS	ISO 2
-		5398806	VTSFT7517	M16 X 1,5	95	32	52	12,5	3	JIS	ISO 2
-		5398805	VTSFT7516	M16 X 2	95	32	52	12,5	3	JIS	ISO 2
-		5398807	VTSFT7518	M18 X 2,5	100	37	55	14,0	4	JIS	ISO 2
-		5398808	VTSFT7519	M20 X 2,5	105	37	60	15,0	4	JIS	ISO 2

NOTE: Suggested for use in rigid and synchronous holders.

Multipurpose Taps

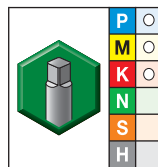
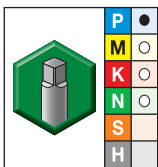
VariTap™ Spiral-Point HSS-E ISO Pipe Taps • Through Holes

- WU41EG TiN
- WP49EG oxide



Tapping

■ VTSP0 • (G) Whitworth Pipe Thread • DIN EN ISO 228 • Form B

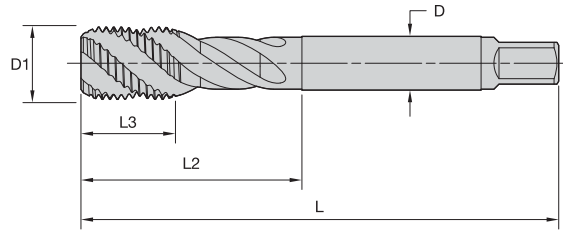


- first choice
- alternate choice

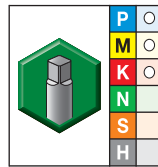
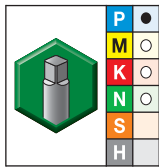
grade WU41EG TiN		grade WP49EG Oxide		D1 TPI	L	L2	L3	D	number of flutes	thread type
order #	catalogue #	order #	catalogue #							
6058785	VTSP08605	6058784	VTSP08605	1/8 - 28	90	35	15	7	3	G
6058787	VTSP08606	6058786	VTSP08606	1/4 - 19	100	44	22	11	3	G
6058790	VTSP08607	6058788	VTSP08607	3/8 - 19	100	47	22	12	4	G
6058792	VTSP08608	6058791	VTSP08608	1/2 - 14	125	55	25	16	4	G
6058794	VTSP08609	6058793	VTSP08609	5/8 - 14	125	61	25	18	4	G
6058797	VTSP08610	6058796	VTSP08610	3/4 - 14	140	60	25	20	4	G
6058799	VTSP08611	6058798	VTSP08611	7/8 - 14	150	68	28	22	4	G
6058811	VTSP08612	6058800	VTSP08612	1 - 11	160	68	30	25	5	G

NOTE: Suitable for tension/compression holders.

- WU41EG TiN
- WP49EG oxide



■ VTSFT • (G) Whitworth Pipe Thread • DIN EN ISO 228 • Form C



- first choice
- alternate choice

grade WU41EG TiN		grade WP49EG Oxide		D1	L	L2	L3	D	number of flutes	thread type
order #	catalogue #	order #	catalogue #	TPI						
6058815	VTSFT8605	6058814	VTSFT8605	1/8 - 28	90	35	15	7	3	G
6058817	VTSFT8606	6058816	VTSFT8606	1/4 - 19	100	44	15	11	3	G
6058819	VTSFT8607	6058818	VTSFT8607	3/8 - 19	100	47	15	12	4	G
6058871	VTSFT8608	6058820	VTSFT8608	1/2 - 14	125	55	18	16	4	G
6058873	VTSFT8609	6058872	VTSFT8609	5/8 - 14	125	61	18	18	4	G
6058875	VTSFT8610	6058874	VTSFT8610	3/4 - 14	140	65	20	20	4	G
6058877	VTSFT8611	6058876	VTSFT8611	7/8 - 14	150	68	22	22	4	G
6058879	VTSFT8612	6058878	VTSFT8612	1 - 11	160	74	24	25	5	G

NOTE: Suitable for tension/compression holders.

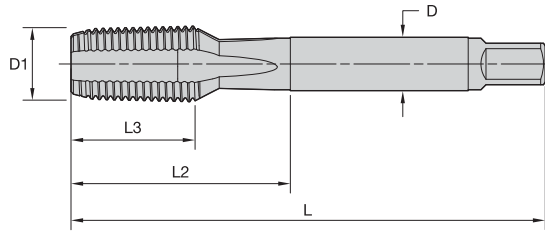
Tapping

Multipurpose Taps

VariTap™ Straight-Flute HSS-E American National Taper Pipe Taps • Through and Blind Holes

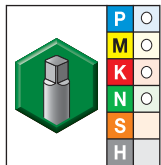


• WU40EG bright



Tapping

■ VTSTR • NPT and NPTF • Standard Projection • Form C





● first choice
○ alternate choice

grade WU40EG Bright							number of flutes	thread type
order #	catalogue #	D1 TPI	L	L2	L3	D		
6058953	VTSTR8301	1/16 - 27	90	35	13	6	3	NPT
6058960	VTSTR8801	1/16 - 27	90	35	13	6	3	NPTF
6058954	VTSTR8302	1/8 - 27	90	36	13	7	4	NPT
6059011	VTSTR8802	1/8 - 27	90	36	13	7	4	NPTF
6058955	VTSTR8303	1/4 - 18	100	39	20	11	4	NPT
6059012	VTSTR8803	1/4 - 18	100	39	20	11	4	NPTF
6058956	VTSTR8304	3/8 - 18	110	39	20	12	4	NPT
6059013	VTSTR8804	3/8 - 18	110	39	20	12	4	NPTF
6058957	VTSTR8305	1/2 - 14	125	56	26	16	4	NPT
6059014	VTSTR8805	1/2 - 14	125	56	26	16	4	NPTF
6058958	VTSTR8306	3/4 - 14	140	55	26	20	4	NPT
6059015	VTSTR8806	3/4 - 14	140	55	26	20	4	NPTF
6058959	VTSTR8307	1 - 11.5	160	71	32	25	5	NPT
6059016	VTSTR8807	1 - 11.5	160	71	32	25	5	NPTF

NOTE: Suitable for tension/compression holders.

■ VariTap™ • HSS-E • Metric

Material Group	 Through Holes					 Blind Holes					
	Tap Style	Grade	Range – m/min			Tap Style	Grade	Range – m/min			
			min	Starting Value	max			min	Starting Value	max	
P	P1	VT-SPO	WP42EG, WU41EG	21	27	34	VT-SFT (TC)	WP42EG, WU41EG	13	18	26
		VT-SPO	WP49EG, WU40EG	10	14	17	VT-SFT (TC)	WP49EG, WU40EG	6	9	13
	P2	VT-SPO	WP42EG, WU41EG	16	21	27	VT-SFT (TC)	WP42EG, WU41EG	11	15	22
		VT-SPO	WP49EG, WU40EG	8	11	13	VT-SFT (TC)	WP49EG, WU40EG	4	6	9
	P3	VT-SPO	WP42EG, WU41EG	9	12	15	VT-SFT (TC)	WP42EG, WU41EG	6	9	13
		VT-SPO	WP49EG, WU40EG	5	6	8	VT-SFT (TC)	WP49EG, WU40EG	2	3	4
		VT-STR NPT	WU41EG	5	6	8	VT-STR NPT	WU41EG	5	6	8
		VT-STR NPT	WU40EG	2	3	4	VT-STR NPT	WU40EG	2	3	4
M	M1	VT-SPO	WP42EG, WU41EG	9	12	15	VT-SFT (TC)	WP42EG, WU41EG	6	9	13
		VT-SPO	WP49EG, WU40EG	5	6	8	VT-SFT (TC)	WP49EG, WU40EG	2	3	4
		VT-SFT NPT	WU41EG	5	6	8	VT-SFT NPT	WU41EG	5	6	8
		VT-SFT NPT	WP49EG, WU40EG	2	3	4	VT-SFT NPT	WP49EG, WU40EG	2	3	4
	M3	VT-SPO	WP42EG, WU41EG	7	9	11	VT-SFT (TC)	WP42EG, WU41EG	4	6	9
		VT-SPO	WP49EG, WU40EG	3	5	6	VT-SFT (TC)	WP49EG, WU40EG	2	3	4
K	K1	VT-STR NPT	WU41EG	10	14	17	VT-STR NPT	WU41EG	10	14	17
		VT-STR NPT	WU40EG	6	8	10	VT-STR NPT	WU40EG	6	8	10
	K2	VT-SPO	WP42EG, WU41EG	21	27	34	VT-SFT (TC)	WP42EG, WU41EG	13	18	26
		VT-SPO	WP49EG, WU40EG	10	14	17	VT-SFT (TC)	WP49EG, WU40EG	6	9	13
N	N1	VT-SPO	WP42EG, WU41EG	34	46	57	VT-SFT (TC)	WP42EG, WU41EG	23	34	48
		VT-SPO	WU40EG	17	23	29	VT-SFT	WU40EG	11	15	22
	N2	VT-SPO	WP42EG, WU41EG	30	40	50	VT-SFT (TC)	WP42EG, WU41EG	19	27	39
		VT-SPO	WU40EG	15	20	25	VT-SFT	WU40EG	11	15	22
	N4	VT-SPO	WP42EG, WU41EG	7	9	11	VT-SFT (TC)	WP42EG, WU41EG	4	6	9
		VT-SPO	WU40EG	3	5	6	VT-SFT	WU40EG	2	3	4

* Grades: WP42EG = TiCN
WU41EG = TiN
WP49EG = oxide
WU40EG = bright



Tooling Systems

HydroForce E2-E23

Hydraulic Chuck Reducer Sleeves E24-E29

ERICKSON NG (New Generation) Shrink Fit Unit E30-E33



HydroForce™ HT Hydraulic Chuck High Torque

- First choice solution for rotating applications.
- HydroForce HT gives you an unparalleled combination of accuracy and clamping force.
- HydroForce HT requires only two clamping sizes for all of your tooling applications.



HydroForce

Compact and Stable Design

- Shorter projection length and thicker front wall cross section result in higher rigidity. This allows higher cutting parameters and better surface quality.

Advanced Hydraulic Clamping

- Three times better clamping force than regular hydraulic chucks, runout of 3 microns at 2.5 times diameter overhang vibration dampening. This results in up to 50% longer tool life and improved workpiece surface quality.

Balance Quality at G2.5 at 25.000 RPM

- Lower vibration, particularly at high speeds. This results in higher productivity.

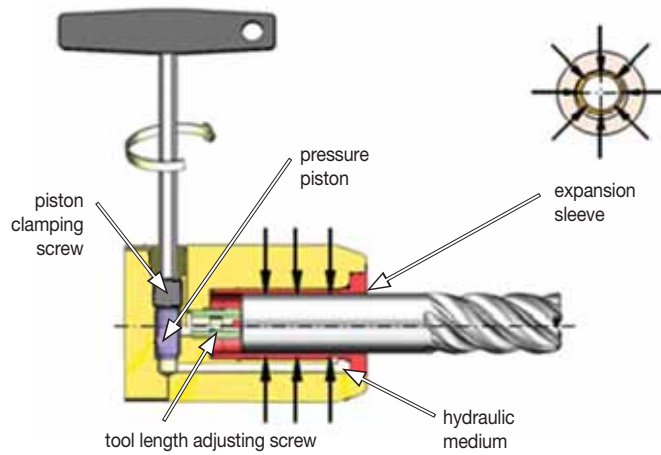
Easy Side Access for Clamping/Unclamping

- Mechanical stop for clamping and 10mm (3/8") length adjustment. This results in reliable, consistent clamping and no over torque. No torque wrench required.

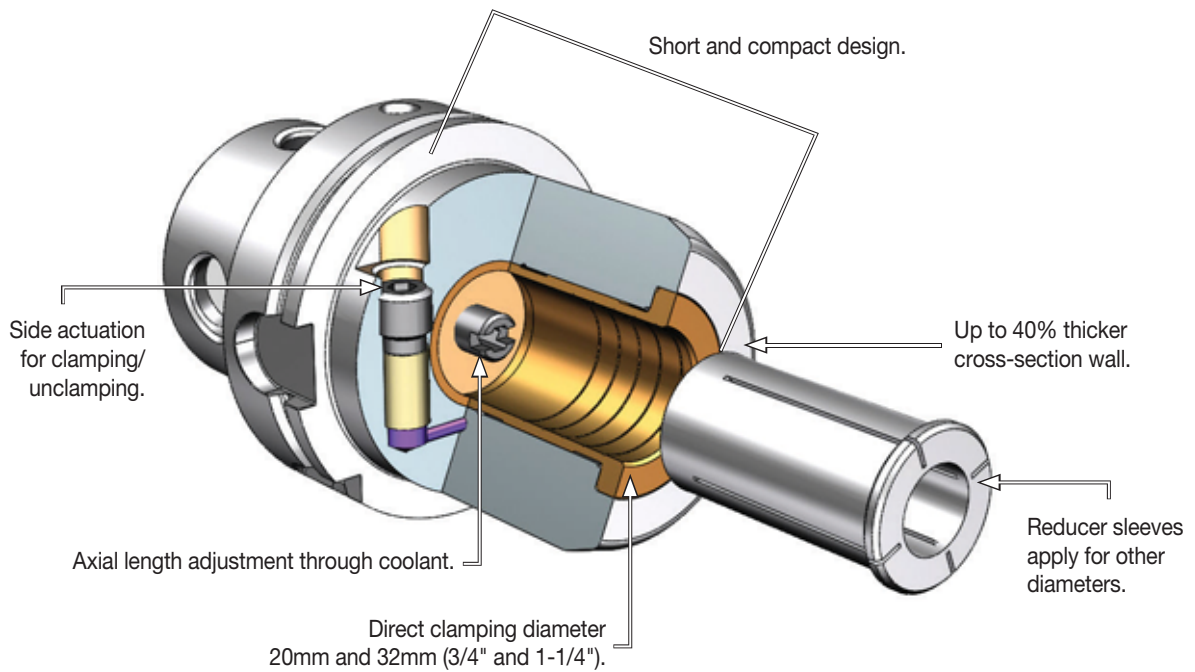
Focused and Flexible Product Offering

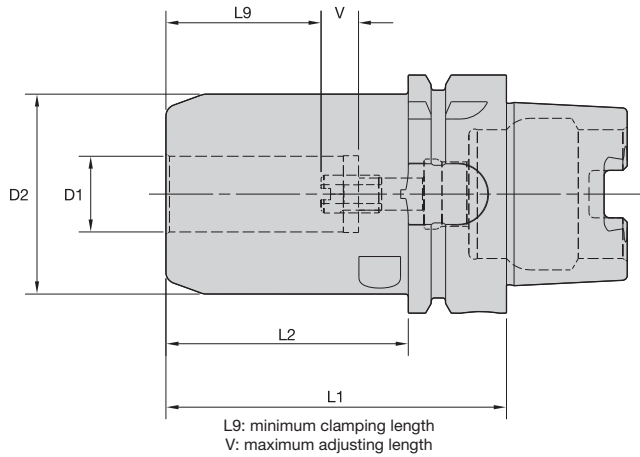
- Allows direct clamping for 20mm and 32mm (3/4" and 1-1/4"). Reducer sleeves available for all combinations metric/inch, which results in reduced toolholder inventory, maximum flexibility, and minimum cost.

Hydraulic Chuck (HC) Basic Working Principle



HydroForce™ Advanced Features





Tooling Systems

Cutting Tool Shank Requirements metric (ISO standard)

cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

Cutting Tool Shank Requirements inch (industry standard)

cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/-0.0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
3/4, 7/8, 1, & 1-1/4	.0000/-0.0005

ERICKSON™

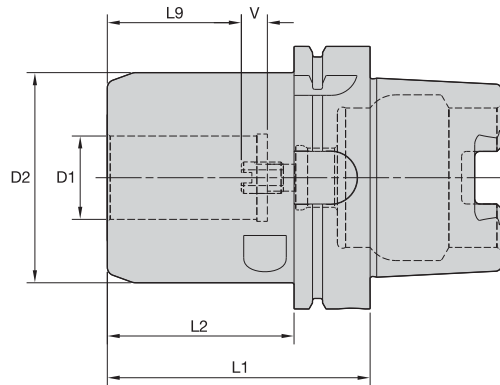
■ HCTHT • Metric • HSK Form A

order number	catalogue number	D1	D2	D21	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	kg
5520975	HSK63AHCTHT20090M	20	53	—	90	64	41	10	170.135	5 mm	5 mm	1,54
6048237	HSK63AHCTHT32100	32	65	80	100	32	51	10	170.136	6 mm	6 mm	2,25

■ HCTHT • Inch • HSK Form A

order number	catalogue number	D1	D2	D21	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	lbs
5520958	HSK63AHCTHT075350	.750	2.067	—	3.500	2.478	1.618	.394	170.135	5 mm	5 mm	3.39
6048238	HSK63AHCTHT125400	1.250	2.559	3.150	4.000	1.260	2.008	.394	170.136	6 mm	6 mm	5.11

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
 Hydraulic chuck technical section, see pages K60–K63 of the WIDIA Tooling Systems catalogue A-09-02122.
 Wrenches must be ordered separately.
 Supplied with stop screw.
 Actuation wrench must be ordered separately.
 Reduction sleeves are available and must be ordered separately; see pages E18–E19.
 HSK coolant unit and wrench are available and must be ordered separately;
 see page J32 of the WIDIA Tooling Systems catalogue A-09-02122.



Cutting Tool Shank Requirements metric (ISO standard)			Cutting Tool Shank Requirements inch (industry standard)	
cutting tool shank diameter	tolerance		cutting tool shank diameters	tolerance
6	h6	0,000/-0,008	1/4, 5/16 & 3/8	.0000/-0.0004
8 & 10	h6	0,000/-0,009	7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
12, 14, 16, & 18	h6	0,000/-0,011	3/4, 7/8, 1, & 1-1/4	.0000/-0.0005
20	h6	0,000/-0,013		

ERICKSON™

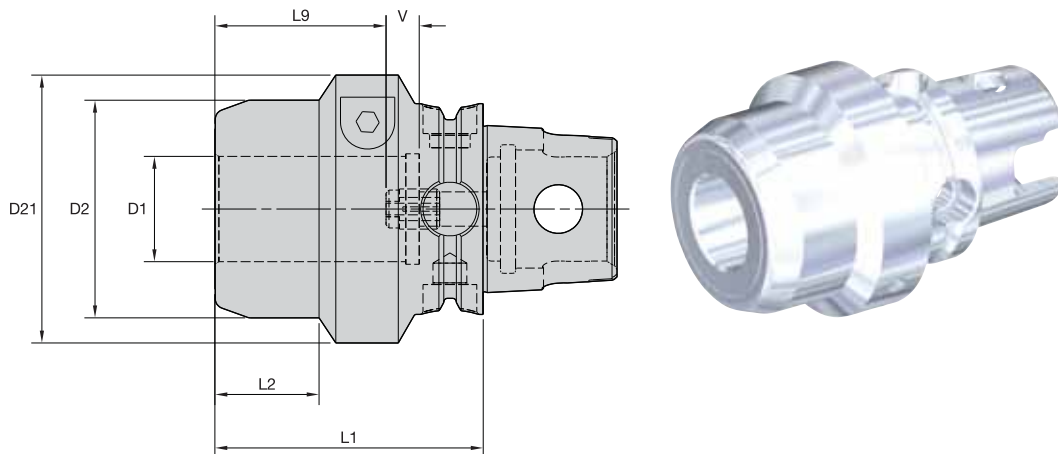
■ HCTHT • Metric • HSK Form A

order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	kg
5520976	HSK100AHCTHT20090M	20	65	90	61	41	10	170.135	5 mm	5 mm	3,38
5520977	HSK100AHCTHT32100M	32	80	100	71	51	10	170.136	6 mm	6 mm	4,29

■ HCTHT • Inch • HSK Form A

order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	lbs
5520959	HSK100AHCTHT125400	1.250	3.150	4.000	2.860	2.012	.394	170.136	6 mm	6 mm	9.61

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60-K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18-E19.
HSK coolant unit and wrench are available and must be ordered separately;
see page J32 of the WIDIA Tooling Systems catalogue A-09-02122.
For diameter D1 32mm (1-1/4"), use an L-shape Allen wrench with side length of approximately 200mm.



Tooling Systems

**Cutting Tool Shank Requirements
metric (ISO standard)**

cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

**Cutting Tool Shank Requirements
inch (industry standard)**

cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/-0.0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
3/4, 7/8, 1, & 1-1/4	.0000/-0.0005



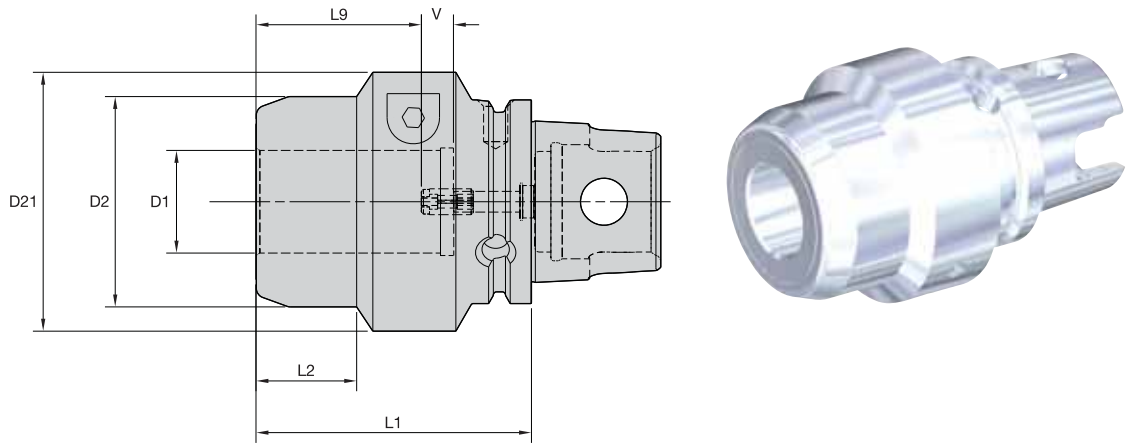
■ HCTHT • Metric • KM63TS

order number	catalogue number	D1	D2	D21	L1	L2	L9	V	wrench size actuation screw	wrench size stop screw	kg
5520979	KM63TSHCTHT32080M	32	65,0	80	80	31	51	10	6 mm	6 mm	2,00

■ HCTHT • Inch • KM63TS

order number	catalogue number	D1	D2	D21	L1	L2	L9	V	wrench size actuation screw	wrench size stop screw	lbs
5521070	KM63TSHCTHT125315	1.250	2.559	3.150	3.150	1.220	2.012	.394	6 mm	6 mm	4.42

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
 Hydraulic chuck technical section, see pages K60–K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
 Supplied with stop screw.
 Actuation wrench must be ordered separately.
 Reduction sleeves are available and must be ordered separately; see pages E18–E19.
 For diameter D1 32mm (1-1/4"), use an L-shape Allen wrench with side length of approximately 200mm.



Cutting Tool Shank Requirements metric (ISO standard)

cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

Cutting Tool Shank Requirements inch (industry standard)

cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/-0.0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
3/4, 7/8, 1, & 1-1/4	.0000/-0.0005



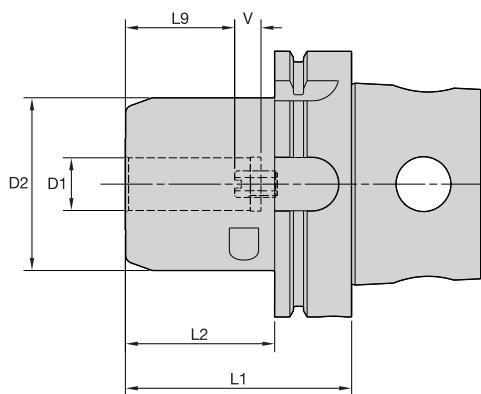
■ HCTHT • Metric • KM63XMZ

order number	catalogue number	D1	D2	D21	L1	L2	L9	V	wrench size actuation screw	wrench size stop screw	kg
5520978	KM63XMZHCTHT32085M	32	65,0	80	85	31	51	10	6 mm	4 mm	2,27

■ HCTHT • Inch • KM63XMZ

order number	catalogue number	D1	D2	D21	L1	L2	L9	V	wrench size actuation screw	wrench size stop screw	lbs
5521079	KM63XMZHCTHT125315	1.250	2.559	3.150	3.150	1.260	2.012	.394	6 mm	4 mm	4.59

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60–K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18–E19.
For diameter D1 32mm (1-1/4"), use an L-shape Allen wrench with side length of approximately 200mm.



L9: minimum clamping length
V: maximum adjusting length



Tooling Systems

**Cutting Tool Shank Requirements
metric (ISO standard)**

cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

**Cutting Tool Shank Requirements
inch (industry standard)**

cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/-0.0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
3/4, 7/8, 1, & 1-1/4	.0000/-0.0005



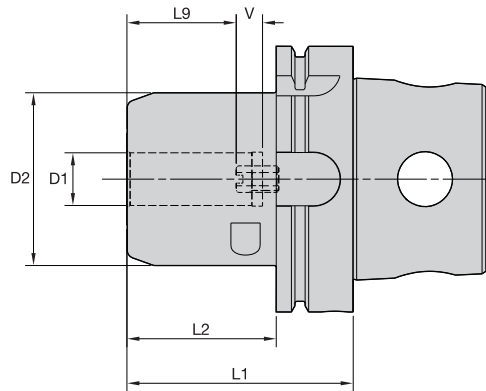
■ HCTHT • Metric • KM4X™

order number	catalogue number	D1	D2	L1	L2	L9	V	wrench size actuation screw	wrench size stop screw	kg
5520990	KM4X63HCTHT20090M	20	52,5	90	64	41	10	5 mm	5 mm	1,63

■ HCTHT • Inch • KM4X

order number	catalogue number	D1	D2	L1	L2	L9	V	wrench size actuation screw	wrench size stop screw	lbs
5521071	KM4X63HCTHT075350	.750	2.067	3.500	2.478	1.618	.394	5 mm	5 mm	3.57

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60–K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18–E19.
KM4X63 coolant unit and wrench are available and must be ordered separately; order number 5572428 and 1134161.



Cutting Tool Shank Requirements metric (ISO standard)

cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

Cutting Tool Shank Requirements inch (industry standard)

cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/-0.0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
3/4, 7/8, 1, & 1-1/4	.0000/-0.0005

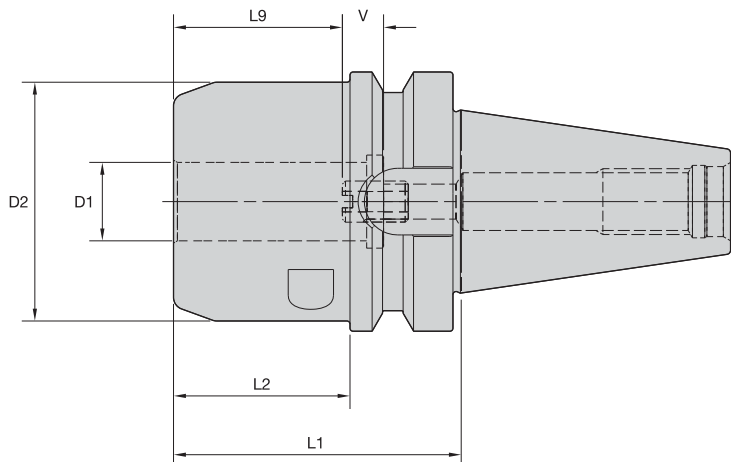
■ HCTHT • Metric • KM4X™

order number	catalogue number	D1	D2	L1	L2	L9	V	wrench size actuation screw	wrench size stop screw	kg
5520991	KM4X100HCTHT20085M	20	65,0	85	56	41	10	5 mm	5 mm	3,53
5520992	KM4X100HCTHT32095M	32	80,0	95	66	51	10	6 mm	6 mm	4,37

■ HCTHT • Inch • KM4X

order number	catalogue number	D1	D2	L1	L2	L9	V	wrench size actuation screw	wrench size stop screw	lbs
5521072	KM4X100HCTHT125375	1.250	3.150	3.750	2.630	2.012	.394	6 mm	6 mm	9.66

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60–K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18–E19.
KM4X100 coolant unit and wrench are available and must be ordered separately; order number 5572427 and 1132993.



L9: minimum clamping length
V: maximum adjusting length



Tooling Systems

**Cutting Tool Shank Requirements
metric (ISO standard)**

cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

**Cutting Tool Shank Requirements
inch (industry standard)**

cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/-0.0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
3/4, 7/8, 1, & 1-1/4	.0000/-0.0005

ERICKSON™

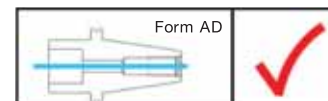
■ HCTHT • Metric • BT40

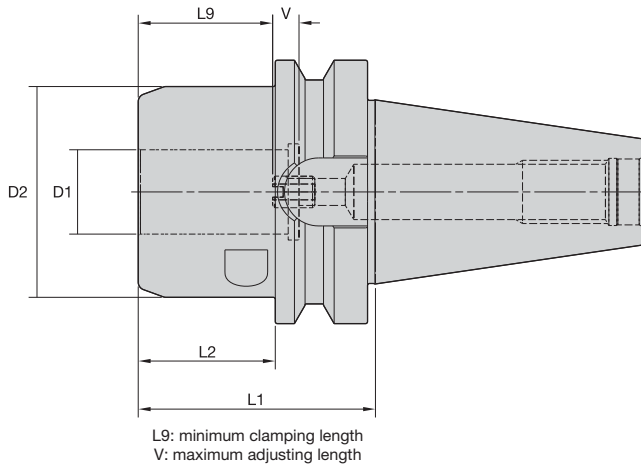
order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	kg
5520971	BT40HCTHT20070M	20	58	70	43	41	10	170.135	5 mm	5 mm	1,67
6048257	BT40HCTHT32080M	32	80	80	80	51	10	170.136	6 mm	6 mm	2,31

■ HCTHT • Inch • BT40

order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	lbs
5521073	BT40HCTHT075275	3/4	2.283	2.750	1.687	1.618	.394	170.135	5 mm	5 mm	3.70
6048258	BT40HCTHT125315	—	3.150	3.150	3.150	2.008	.394	170.136	6 mm	6 mm	5.03

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60–K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18–E19.
For retention knobs, see pages J33–J38 of the WIDIA Tooling Systems catalogue A-09-02122.





Cutting Tool Shank Requirements metric (ISO standard)


cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

Cutting Tool Shank Requirements inch (industry standard)


cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/-0.0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
3/4, 7/8, 1, & 1-1/4	.0000/-0.0005

ERICKSON™

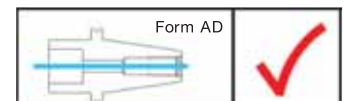
■ HCTHT • Metric • BT50

order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	kg	
5520972	BT50HCTHT32090M	32	80	90	52	51	10		170.136	6 mm	6 mm	5,09

■ HCTHT • Inch • BT50

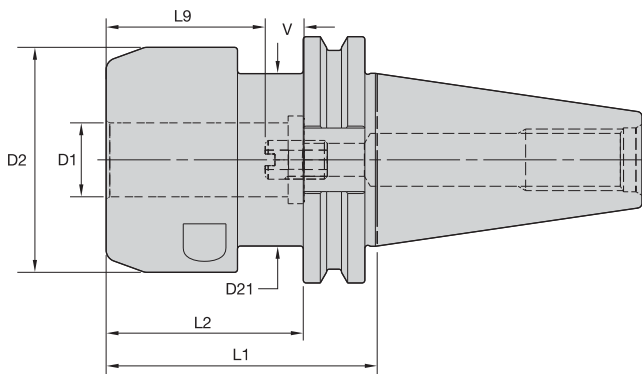
order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	lbs	
5521074	BT50HCTHT125350	1 1/4	3.150	3.500	2.004	2.012	.394		170.136	6 mm	6 mm	11.14

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60-K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18-E19.
For retention knobs, see pages J33-J38 of the WIDIA Tooling Systems catalogue A-09-02122.
For D1 of 32mm (1,25"), please use 6mm Allen wrench with minimum length of 180mm.



CV40 • CV50 Shank Tools

HydroForce™ Hydraulic Toolholders High Torque (HT)



L9: minimum clamping length
V: maximum adjusting length



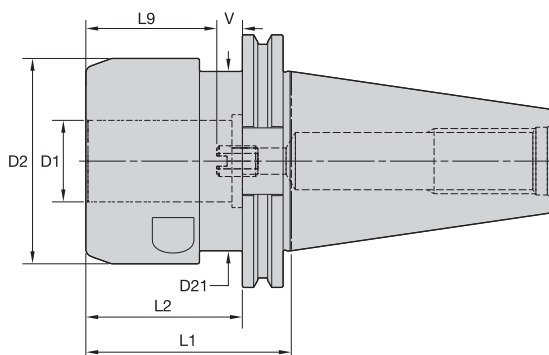
Cutting Tool Shank Requirements
inch (industry standard)

cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/-0.0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/-0.0004
3/4, 7/8, 1, & 1-1/4	.0000/-0.0005

ERICKSON™

■ HCTHT • Inch • CV40

order number	catalogue number	D1	D2	D21	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	lbs
5521075	CV40HCTHT075275	3/4	2.283	—	2.750	2.000	1.618	.394	170.135	5 mm	5 mm	3.41
5647194	CV40HCTHT125400	1 1/4	2.559	3.150	4.000	1.575	2.012	.394	170.136	6 mm	6 mm	5.59



L9: minimum clamping length
V: maximum adjusting length

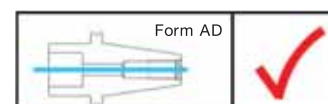


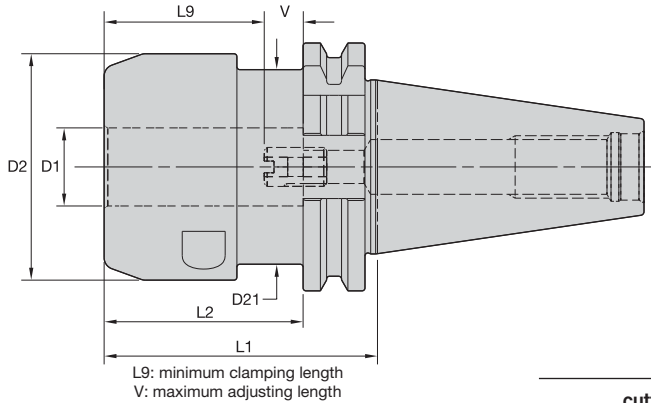
ERICKSON™

■ HCTHT • Inch • CV50

order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	lbs
5521076	CV50HCTHT125315	1 1/4	3.150	3.150	2.400	2.012	.394	170.136	6 mm	6 mm	9.48

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60–K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18–E19.
For retention knobs, see pages J33–J38 of the WIDIA Tooling Systems catalogue A-09-02122.
For diameter D1 32mm (1-1/4"), use an L-shape Allen wrench with side length of approximately 200mm.





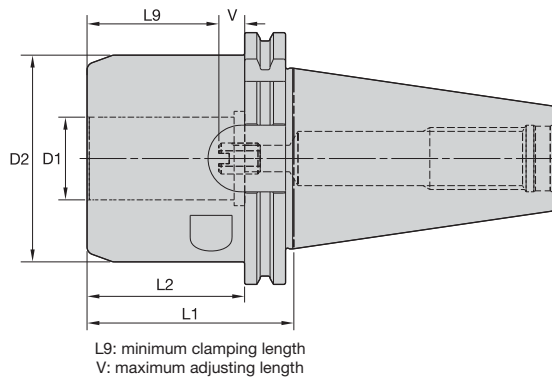
**Cutting Tool Shank Requirements
metric (ISO standard)**

cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

ERICKSON™

■ HCTHT • Metric • DV40

order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	kg
5520973	DV40HCTHT20070M	20	58	70	51	41	10	170.135	5 mm	5 mm	1,58
6048256	DV40HCTHT125315	32	80	80	80	51	10	170.136	6 mm	—	2,32
6048255	DV40HCTHT32080M	32	80	80	80	51	10	170.136	6 mm	6 mm	2,32

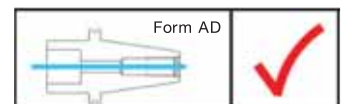


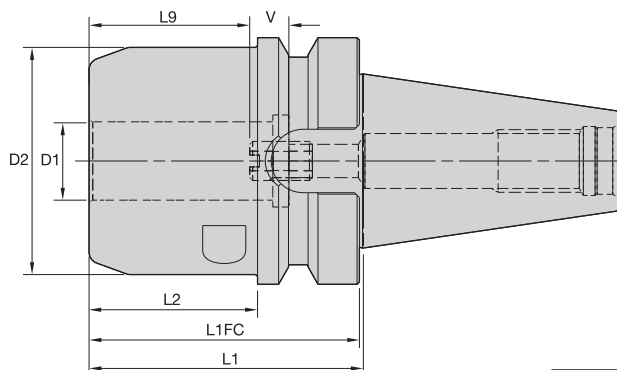
ERICKSON™

■ HCTHT • Metric • DV50

order number	catalogue number	D1	D2	L1	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	kg
5520974	DV50HCTHT32080M	32	80	80	61	51	10	170.136	6 mm	6 mm	4,45

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60–K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18–E19.
For retention knobs, see pages J33–J38 WIDIA Tooling Systems catalogue A-09-02122.
For diameter D1 32mm (1-1/4"), use an L-shape Allen wrench with side length of approximately 200mm.





L9: minimum clamping length
V: maximum adjusting length



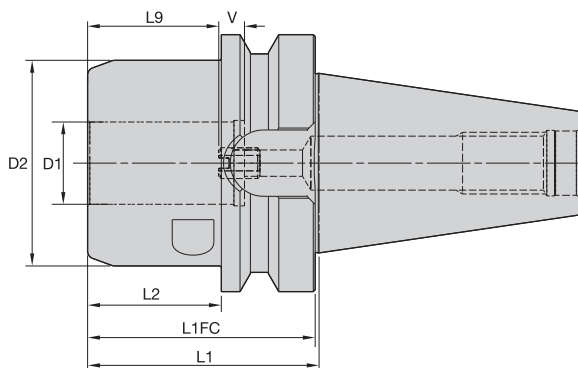
Cutting Tool Shank Requirements
metric (ISO standard)

cutting tool shank diameter	tolerance	
6	h6	0,000/-0,008
8 & 10	h6	0,000/-0,009
12, 14, 16, & 18	h6	0,000/-0,011
20	h6	0,000/-0,013

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■ HCTHT • Metric • BTKV40

order number	catalogue number	D1	D2	L1	L1FC	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	kg
5520993	BTKV40HCTHT20070M	20	58	70	69	43	41	10	170.135	5 mm	5 mm	1,62
6048260	BTKV40HCTHT125315	32	80	80	79	79	51	10	170.136	6 mm	—	2,28
6048259	BTKV40HCTHT32080M	32	80	80	79	79	51	10	170.136	6 mm	6 mm	2,29



L9: minimum clamping length
V: maximum adjusting length

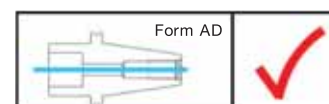


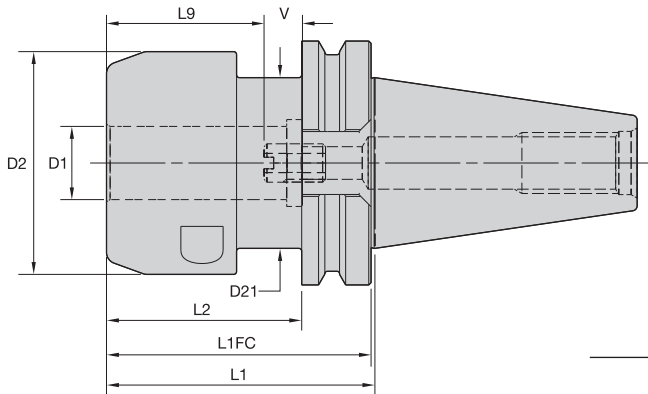
ERICKSON™

■ HCTHT • Metric • BTKV50

order number	catalogue number	D1	D2	L1	L1FC	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	kg
5520994	BTKV50HCTHT32090M	32	80	90	89	52	51	10	170.136	6 mm	6 mm	5,13

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60–K63 of the WIDIA™ Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see pages E18–E19.
For retention knobs, see pages J33–J38 WIDIA Tooling Systems catalogue A-09-02122.
For diameter D1 32mm (1-1/4"), use an L-shape Allen wrench with side length of approximately 200mm.





L9: minimum clamping length
V: maximum adjusting length



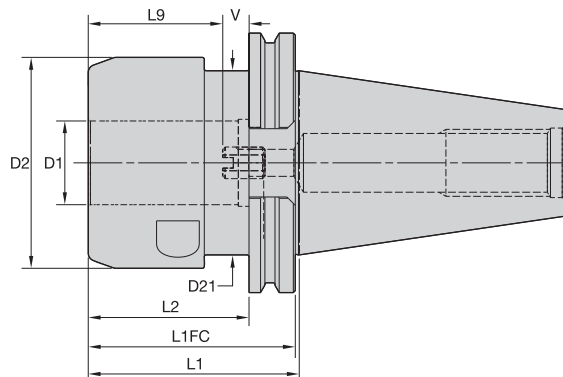
Cutting Tool Shank Requirements
inch (industry standard)

cutting tool shank diameters	tolerance
1/4, 5/16 & 3/8	.0000/- .0004
7/16, 1/2, 9/16, 5/8, & 11/16	.0000/- .0004
3/4, 7/8, 1, & 1-1/4	.0000/- .0005

ERICKSON™

■ HCTHT • Inch • CVKV40

order number	catalogue number	D1	D2	D21	L1	L1FC	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	lbs
5521077	CVKV40HCTHT075275	.750	2.283	1.750	2.750	2.711	2.000	1.618	.394	170.135	5 mm	5 mm	3.43
6048261	CVKV40HCTHT125315	1.250	2.559	3.150	3.150	3.110	.787	2.008	.394	170.136	6 mm	6 mm	4.39



L9: minimum clamping length
V: maximum adjusting length

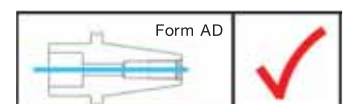


ERICKSON™

■ HCTHT • Inch • CVKV50

order number	catalogue number	D1	D2	D21	L1	L1FC	L2	L9	V	actuation wrench	wrench size actuation screw	wrench size stop screw	lbs
5521078	CVKV50HCTHT125315	1.250	3.150	2.750	3.150	3.091	2.400	2.012	.394	170.136	6 mm	6 mm	9.52

NOTE: Do not overtorque actuation screw. Tighten by hand until stop is felt.
Hydraulic chuck technical section, see pages K60–K63 of the WIDIA Tooling Systems catalogue A-09-02122.
Supplied with stop screw.
Actuation wrench must be ordered separately.
Reduction sleeves are available and must be ordered separately; see page E18–E19.
For retention knobs, see pages J33–J38 WIDIA Tooling Systems catalogue A-09-02122.
For diameter D1 32mm (1-1/4"), use an L-shape Allen wrench with side length of approximately 200mm.



ERICKSON™ HC Hydraulic Chuck Sleeves

ERICKSON™

HC

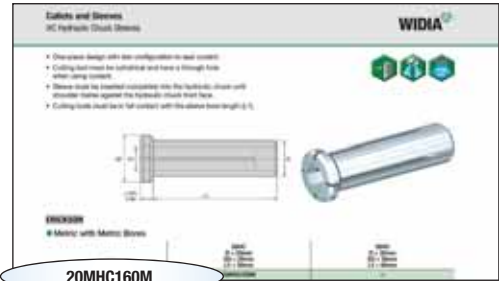


ERICKSON Hydraulic Reduction Sleeves are specially designed for high-precision clamping of straight cylindrical cutting tool shanks. The self-sealing design enables efficient use of through coolant cutting tools when the cutting tool shank completely engages the full gripping length of the sleeve.

- One-piece design with slot configuration to seal coolant.
- Cutting tool must be cylindrical and have a through hole when using coolant.
- Capable of up to 100 bar (1,500 psi) coolant pressure.
- Cutting tool shank requirement tolerance is h6 and Ra $\geq 0,3 \mu\text{m}$ (12 μin) surface finish.
- Maximum collapse is h6.

How Do Catalogue Numbers Work?

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


ERICKSON
20

System Size

12 = 12mm
20 = 20mm
32 = 32mm
50 = 1/2"
75 = 3/4"
12 = 1-1/4"

M

System Value

M = Previous two numbers built in metric values

HC

Sleeve Style

HC = Hydraulic Chuck

160

Sleeve Bore Size

metric (xx.x)
010 = 1mm
010 = 16mm
010 = 25mm
inch (x.xxx)
0125 = 1/8"
0500 = 1/2"
1000 = 1"

M

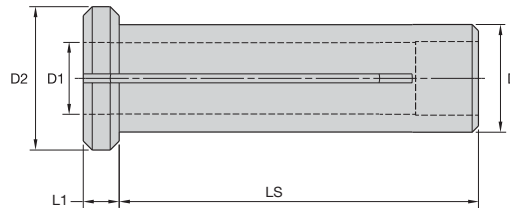
Identification Value

M = Sleeve bore size built to metric values

(blank) = Sleeve bore size built to inch values



- One-piece design with slot configuration to seal coolant.
- Cutting tool must be cylindrical and have a through hole when using coolant.
- Sleeve must be inserted completely into the hydraulic chuck until shoulder mates against the hydraulic chuck front face.
- Cutting tools must be in full contact with the sleeve bore length (L9).



ERICKSON

■ Metric with Metric Bores

Tooling Systems

D1	L9	12HC D = 12mm D2 = 16mm LS = 40mm	20HC D = 20mm D2 = 25mm LS = 50mm	25HC D = 25mm D2 = 30mm LS = 56mm	32HC D = 32mm D2 = 36mm LS = 60mm
3,0	29	12MHC030M	—	25MHC030M	—
3,0	28	—	20MHC030M	—	—
4,0	29	12MHC040M	—	25MHC040M	—
4,0	28	—	20MHC040M	—	—
5,0	29	12MHC050M	—	25MHC050M	—
5,0	28	—	20MHC050M	—	—
6,0	36	12MHC060M	20MHC060M	—	—
6,0	37	—	—	25MHC060M	32MHC060M
7,0	37	12MHC070M	20MHC070M	25MHC070M	32MHC070M
8,0	37	12MHC080M	20MHC080M	25MHC080M	32MHC080M
9,0	37	12MHC090M	—	—	32MHC090M
9,0	38	—	20MHC090M	25MHC090M	—
10,0	40	12MHC100M	20MHC100M	25MHC100M	32MHC100M
11,0	40	—	20MHC110M	—	—
11,0	41	—	—	—	32MHC110M
12,0	45	—	20MHC120M	—	32MHC120M
12,0	46	—	—	25MHC120M	—
13,0	45	—	20MHC130M	—	32MHC130M
14,0	45	—	20MHC140M	—	—
14,0	47	—	—	25MHC140M	—
14,0	46	—	—	—	32MHC140M
15,0	45	—	20MHC150M	—	—
15,0	46	—	—	—	32MHC150M
16,0	48	—	20MHC160M	25MHC160M	32MHC160M
17,0	48	—	—	—	32MHC170M
18,0	48	—	—	25MHC180M	—
18,0	49	—	—	—	32MHC180M
19,0	49	—	—	—	32MHC190M
20,0	49	—	—	25MHC200M	—
20,0	50	—	—	—	32MHC200M
22,0	51	—	—	—	32MHC220M
25,0	57	—	—	—	32MHC250M

(continued)

(HC Hydraulic Chuck Sleeves – continued)

■ **Metric with Inch Bores**

D1	L9	20HC	32HC
		D = 20mm D2 = 25mm LS = 50mm	D = 32mm D2 = 36mm LS = 60mm
3/16	28	20HCM0188	—
1/4	36	20HCM0250	—
5/16	37	20HCM0312	—
3/8	38	20HCM0375	—
7/16	40	20HCM0438	—
1/2	45	20HCM0500	32HCM0500
9/16	45	20HCM0562	—
5/8	48	20HCM0625	—
9/16	46	—	32HCM0562
5/8	46	—	32HCM0625
11/16	48	—	32HCM0688
3/4	50	—	32HCM0750
7/8	51	—	32HCM0875
1	56	—	32HCM1000

■ **Inch with Metric Bores**

D1	L9	50HC	75HC	12HC
		D = .500 D2 = .630 LS = 1.575	D = .750 D2 = .984	D = 1.250 D2 = 1.417
3,0	29	50HC030M	—	—
3,0	28	—	75HC030M	—
4,0	29	50HC040M	—	—
4,0	28	—	75HC040M	—
5,0	29	50HC050M	—	—
5,0	28	—	75HC050M	—
6,0	36	50HC060M	75HC060M	—
8,0	37	50HC080M	75HC080M	—
10,0	40	50HC100M	75HC100M	—
12,0	45	—	75HC120M	—
14,0	45	—	75HC140M	—
16,0	48	—	75HC160M	—
18,0	49	—	—	12HC180M
20,0	50	—	—	12HC200M
25,0	57	—	—	12HC250M

■ **Inch with Inch Bores**

D1	L9	50HC	75HC	12HC
		D = .500 D2 = .630 LS = 1.575	D = .750 D2 = .945 LS = 1.969	D = 1.250 D2 = 1.417 LS = 2.362
1/8	29	50HC0125	—	—
1/8	28	—	75HC0125	—
3/16	29	50HC0188	75HC0188	—
1/4	36	50HC0250	—	—
1/4	38	—	75HC0250	—
5/16	37	50HC0312	—	—
5/16	41	—	75HC0312	—
3/8	40	50HC0375	—	—
3/8	41	—	75HC0375	—
7/16	41	—	75HC0438	—
1/2	45	—	—	12HC0500
1/2	46	—	75HC0500	—
9/16	46	—	75HC0562	12HC0562
5/8	46	—	75HC0625	12HC0625
11/16	48	—	—	12HC0688
3/4	50	—	—	12HC0750
13/16	50	—	—	12HC0812
7/8	51	—	—	12HC0875
1	55	—	—	12HC1000

NOTE: Inserting the cutting tool less than the gripping length (L9) of the sleeve can permanently damage the sleeve and hydraulic chuck. Recommended to clean coolant holes periodically with air.

HydroForce HT Torque Comparison



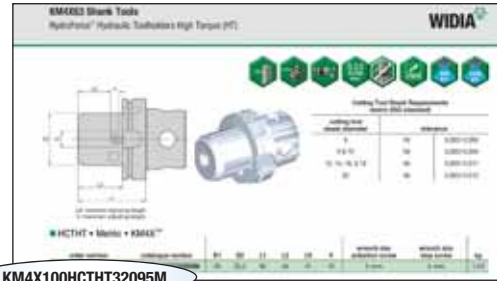
Torque Capacity of Toolholders, Nm

bore diameter (mm)	shank diameter (mm)	adaptor type				
		regular hydraulic chuck	Shrink Fit holder* GP	Shrink Fit holder* HT	HydroForce hydraulic chuck	milling chuck (bearing type)
20	20	220	410-1050	650-1290	800	1120
32	32	700	1030-2080	1340-2380	2000	2350
32 with sleeve	20	440	-	-	1500	1460

**Torque is highly influenced by shank diameter of cutting tool and bore size.
All above torque values are for solid carbide shanks in dry condition at minimum clamping length.*

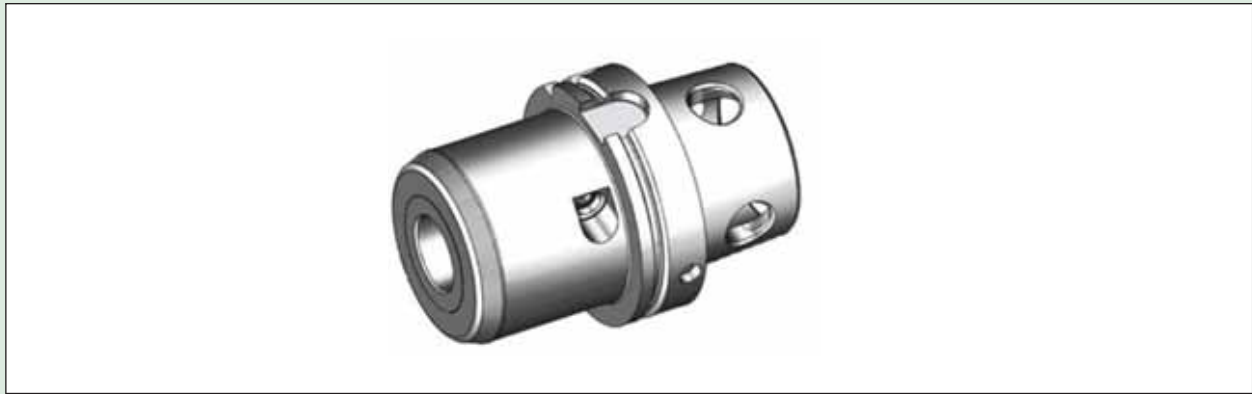
How Do Catalogue Numbers Work?

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



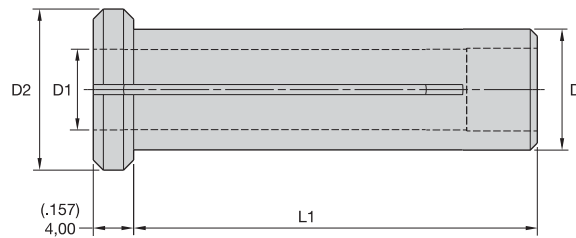
KM4X100HCTHT32095M

KM4X	100	HCTHT	32	095	M
Shank Style	System Size	Toolholder Style (Hydraulic Chuck Trend Line High Torque)	Toolholder Size (Bore Size)	Tool Length	Metric
		<p>HC = Hydraulic Chuck – Standard Line</p> <p>HCB = Hydraulic Chuck – Basic Line</p> <p>HCSLT = Hydraulic Chuck – Slim Line – Trend</p> <p>HCT = Hydraulic Chuck – Trend Line</p>			



Reducer Sleeve Product Portfolio

Reducer Sleeves		
d	D (metric)	D (inch)
12mm	3-10	-
20mm	3-16	3/16-5/8"
25mm	3-20	-
32mm	6-25	1/2-1"
1/2"	3-10	1/8-3/8"
3/4"	3-16	1/8-5/8"
1-1/4"	6-25	1/2-1"



Reduction sleeves available in metric and inch bores.

Applying the Product

High Torque Hydraulic Chuck is a new solution developed by WIDIA™ to address holding in all types of applications in all types of material.

These chucks have great gripping torque comparable to shrinkers and power grip chucks.

They can be used to hold shank diameters having h4 (3–4mm), h5 (5mm), h6 (>6mm) tolerance in rough milling, tapping, drilling, and reaming applications recommended to hold solid carbide shanks.

Parameters as recommended in solid carbide end milling catalogues can be used.

NOTE: Check if spindle connections can support the bending loads.

One Powerful Chuck — Best Suited for All Operations.

3D Profiling	Coolant — Through Coolant 100 bar (1500 psi) Maximum	Drilling into Solid	Drilling — Through Coolant
Plunge Milling	Ramping: Blank	Reaming: Through Hole	Shank — Cylindrical Plain
Side/Shoulder Milling: Square End with AE/AP Dimensions	Slotting: Square End	Tapping: Through Hole	

- Cutting tool must be cylindrical and have a through hole when using coolant.
- Sleeve must be inserted completely into the hydraulic chuck until shoulder mates against the hydraulic chuck front face.

Benchmark Toolholders

technical data/characteristics	toolholders				
	HydroForce high torque	Shrink Fit	milling chuck	ER collet chuck	Weldon® adaptor
torque transmission	★★★★★	★★★★	★★★★★	★★	★★★★★
radial runout (T.I.R.) ¹	★★★★★	★★★★★	★★★★	★★★	★
radial rigidity ²	★★★	★★★★★	★★★	★★★	★★★
tool length adjustment	★★★★★	★★★★	★	★★★★	★★
tool shank tolerance requirement	★★★	★★	★★★	★★★★★	★★★
through coolant	★★★★★	★★★★★	★★★	★★★	★★
minimum quantity lubrication (MQL)	★★★★★	★★★★★	★	★	★
dampening capability	★★★★★	★	★★★	★★★	★★★
shank diameter range ³	★★★★★	★	★★★★★	★★★★★	★
cost of toolholder	★★	★★★	★	★★★★	★★★★★
low requirement of external devices ⁴	★★★★★	★	★★★★	★★★★	★★★★★
ease of handling	★★★★★	★★★	★★	★★★★	★★★★
dust resistance	★★★★★	★★★★★	★★★	★★★	★★★★
high-speed capability	★★★★★	★★★★★	★★★	★★★	★
balancing accuracy	★★★★★	★★★★★	★★★	★★★	★

¹ Radial runout may affect tool life.

² Radial rigidity for Weldon holder is low at a direction perpendicular to the screw.

³ Accepts different shank diameters through the use of reduction sleeves or due to collapse range.

⁴ Collet chucks and milling chucks may require the use of a torque or special wrench; Shrink Fit adaptor requires a shrinking unit.



\$25,000 estimated savings per year	2.3x longer tool life	Exceptional surface quality
Field Test 1	Field Test 2	Field Test 3
S650 Cylinder Head	Mill Mounting & Pump Flange	Straightness Test with INCONEL® 718
<p>CHALLENGE</p> <ul style="list-style-type: none"> • Operation — End milling inside of rocker valley • Material — Varifer cast iron • Coolant type — External emulsion 	<p>CHALLENGE</p> <ul style="list-style-type: none"> • Operation — Side/face milling and slotting • Material — 80-55-06 (grey cast iron) • Coolant type — External emulsion 	<p>CHALLENGE</p> <ul style="list-style-type: none"> • Operation — Slotting • Material — INCONEL 718 • Coolant type — External emulsion
<p>SOLUTION</p> <ul style="list-style-type: none"> • Adapter — CV50BHCHTHT32080M; used 1" reduction sleeve • Base line — CV50BHPMC100650 • End mill — 4V6525028BW WP15PE 	<p>SOLUTION</p> <ul style="list-style-type: none"> • Adapter — CV50BHCHTHT32080M; used 3/4" reduction sleeve • Base line — CV50EM075575 • End mill — 5V0C19007BT WP15PE 	<p>SOLUTION</p> <ul style="list-style-type: none"> • Adapter — DV40BHCHTHT20090M; direct clamp • Base line — D = 20mm, GPL = 82mm
<p>CUTTING DATA</p> <ul style="list-style-type: none"> • vc — 116 m/min (380 SFM) • fz — 0,114 mm/U (.0045 IPT) • Ap — 5,08mm (.2") • Ae — 2,54mm (.1") • Spindle speed — 1451 rev/min 	<p>CUTTING DATA</p> <ul style="list-style-type: none"> • vc — 105,1 m/min (344 SFM) • F — 0,116 mm/U (.0046 IPT) • Ap — 17,526mm (.69") • Ae — 3,81mm (.15") • Spindle speed — 1750 rev/min 	<p>CUTTING DATA</p> <ul style="list-style-type: none"> • vc — 26 m/min (85.09 SFM) • F — 120 m/min • Ap — 20mm (.787") • Ae — 4mm (.15") • Ran for 20 minutes.
<p>RESULT</p> <ul style="list-style-type: none"> • Standard HPMC chuck — 63 minute tool life. • New HydroForce HT — 101 minute tool life. • 299 m (984 ft) increment in tool life distance. 	<p>RESULT</p> <ul style="list-style-type: none"> • Standard end mill adapter — 80.9 minute tool life. • New HydroForce HT — 213.1 minute tool life. • 1612 m (5290 ft) increment in tool life distance. 	<p>RESULT</p> <ul style="list-style-type: none"> • Straightness measured — 0,05mm. • No chip-off and no wear found on cutting edges.
<p>BENEFIT</p> <ul style="list-style-type: none"> • Up to 80% more tool life compared to competition. • Estimated savings of \$25,893 per year. • Exceptional surface finish. • Easy handling and tool presetting. 	<p>BENEFIT</p> <ul style="list-style-type: none"> • 2.3x more tool life compared to competition. • Estimated savings of \$14,840 per year. • Exceptional surface finish. • Easy handling and tool presetting. 	<p>BENEFIT</p> <ul style="list-style-type: none"> • Better quality of straightness. • No pullout. • Exceptional surface finish. • Easy handling and tool presetting.

Hydraulic Chuck Reducer Sleeves

with Safe-Lock™ Smart Coolant

Hydraulic Chuck Reducer Sleeves

Primary Application

Safe-Lock™ Smart Coolant reducer sleeves are specially designed for high precision and secure clamping of Safe-Lock™ tool shanks. The special drive feature in the reducer sleeve and grooves in the tool shank prevent the end mill from spinning and pullout during extreme machining conditions. The Smart Coolant feature enhances efficient cooling and easy chip evacuation, which leads to increased tool life. In addition, the real locking feature, which engages with a basic holder, provides bonus security for reducer sleeves against slippage and pullout.

Low vibration, in combination with pullout protection, excellent runout accuracy, and the hydraulic system's dampening property, results in very efficient machining with reduced and uniform tool wear. Due to the increased cutting depths and feeds, the metal removal rates can be increased up to the maximum limits of the tool and machine.

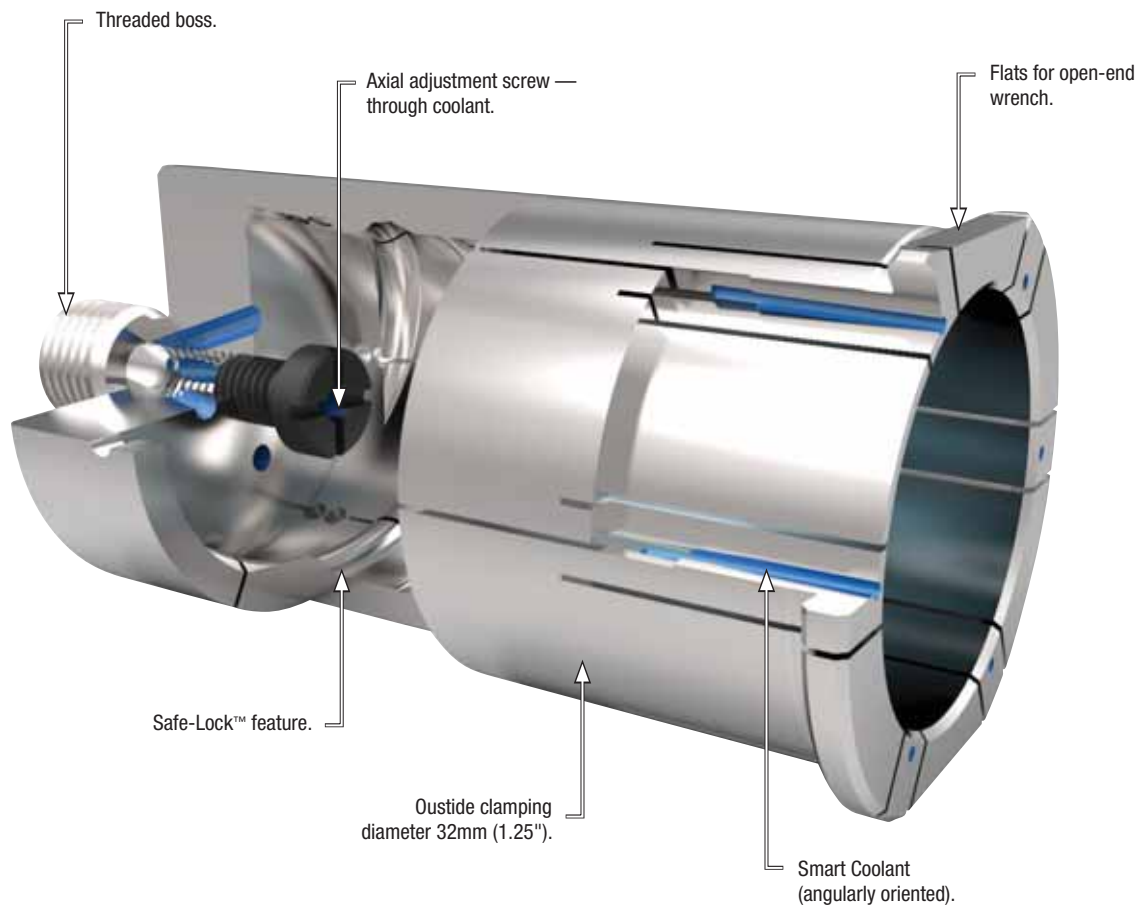
We are the first in the market to introduce the Safe-Lock™ with Smart Coolant feature in the high torque hydraulic chuck portfolio.

Features and Benefits

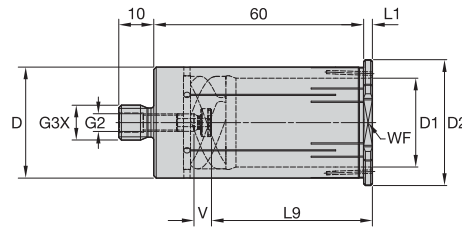
Stay Safe with Safe-Lock™ Smart Coolant

- For High-Performance Cutting (HPC).
- Highly accurate clamping due to hydraulic technology.
- High torque due to form-closed clamping.
- Highest stiffness by robust construction of HydroForce™.
- No loss of accuracy.
- No pullout of the tool.
- No spinning of the tool.
- No damage on workpiece or machine.
- Easy and quick clamping and unclamping cycles.
- Safe-Lock™ Smart Coolant reducer sleeves are available for shank diameters 12, 14, 16, 20, and 25mm (.5, .625, .75, and 1").





- One-piece design with slot configuration to seal coolant.
- Cutting tool must be cylindrical and have the Safe-Lock™ grooves on the shank.
- Sleeve must be screwed completely into the hydraulic chuck until shoulder mates against the hydraulic chuck front face.
- Cutting tool shank holding requirement at least to L9 dimension.

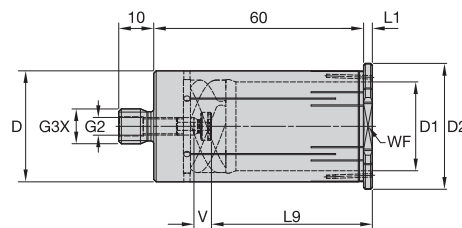


MHCSFC • Metric

order number	catalogue number	D1	D2	D	L1	L9	V	G3X	G2	WF
5998607	32MHCSFC120M	12	36	32	2,5	41	4	M12	M6	32
5998608	32MHCSFC140M	14	36	32	2,5	41	4	M12	M6	32
5998609	32MHCSFC160M	16	36	32	2,5	44	4	M12	M6	32
5998610	32MHCSFC200M	20	36	32	2,5	46	4	M12	M6	32
5998751	32MHCSFC250M	25	36	32	2,5	47	4	M12	M6	32

NOTE: Inserting the cutting tool less than the gripping length (L9) of the sleeve can permanently damage the sleeve and hydraulic chuck. Recommended to clean coolant holes periodically with air.

- One-piece design with slot configuration to seal coolant.
- Cutting tool must be cylindrical and have the Safe-Lock™ grooves on the shank.
- Sleeve must be screwed completely into the hydraulic chuck until shoulder mates against the hydraulic chuck front face.
- Cutting tool shank holding requirement at least to L9 dimension.



HCSFC • Inch

order number	catalogue number	D1	D2	D	L1	L9	V	G3X	G2	WF
5998754	12HCSFC0500	.500	1.417	1.250	.098	1.614	.154	M12	M6	1.260
5998755	12HCSFC0625	.625	1.417	1.250	.098	1.732	.154	M12	M6	1.260
5998756	12HCSFC0750	.750	1.417	1.250	.098	1.811	.154	M12	M6	1.260
5998757	12HCSFC1000	1.000	1.417	1.250	.098	1.850	.154	M12	M6	1.260

NOTE: Inserting the cutting tool less than the gripping length (L9) of the sleeve can permanently damage the sleeve and hydraulic chuck. Recommended to clean coolant holes periodically with air.

■ **Safe-Lock™ Smart Coolant**

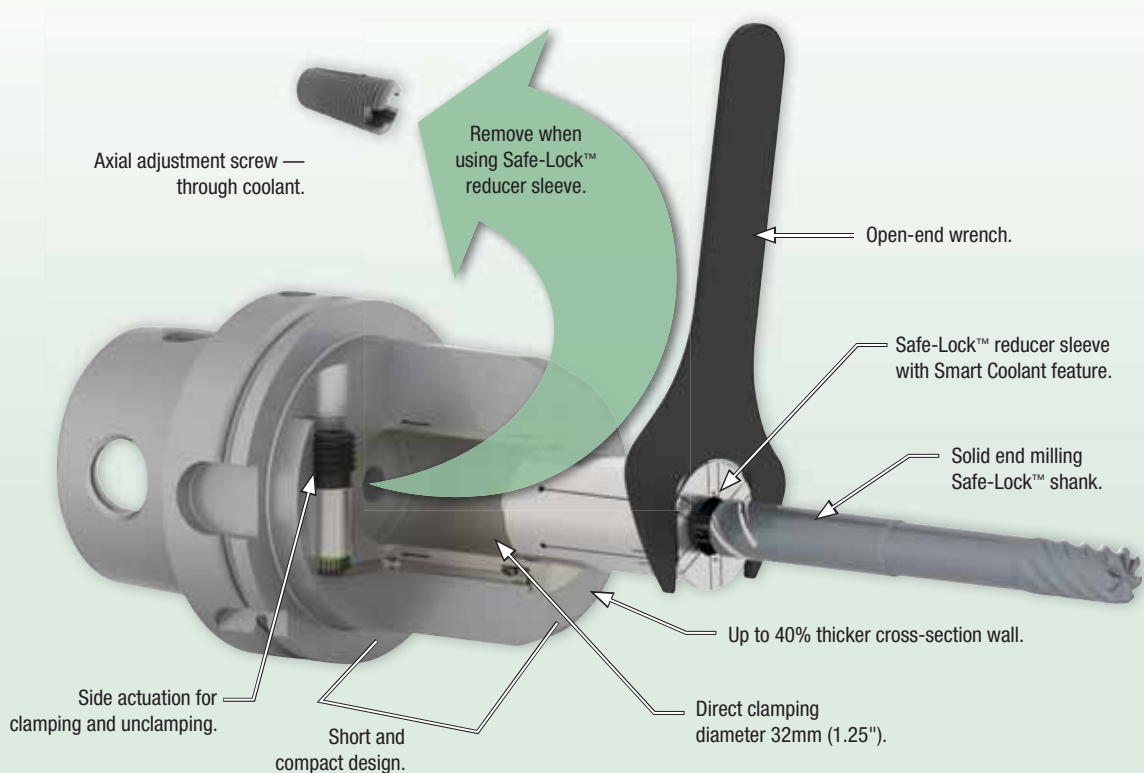
The Safe-Lock™ Smart Coolant feature is a pullout protection system with an effective cooling feature for high-performance machining, in particular for heavy-duty machining. This is achieved by helical grooves that are ground into the tool shank. These, in combination with the drive feature in a Safe-Lock™ Smart Coolant reducer sleeve, prevent the tool from being pulled out during extreme machining conditions.

In addition, the rear-locking feature, which engages with a basic holder, provides bonus security for reducer sleeves against slippage and pullout.

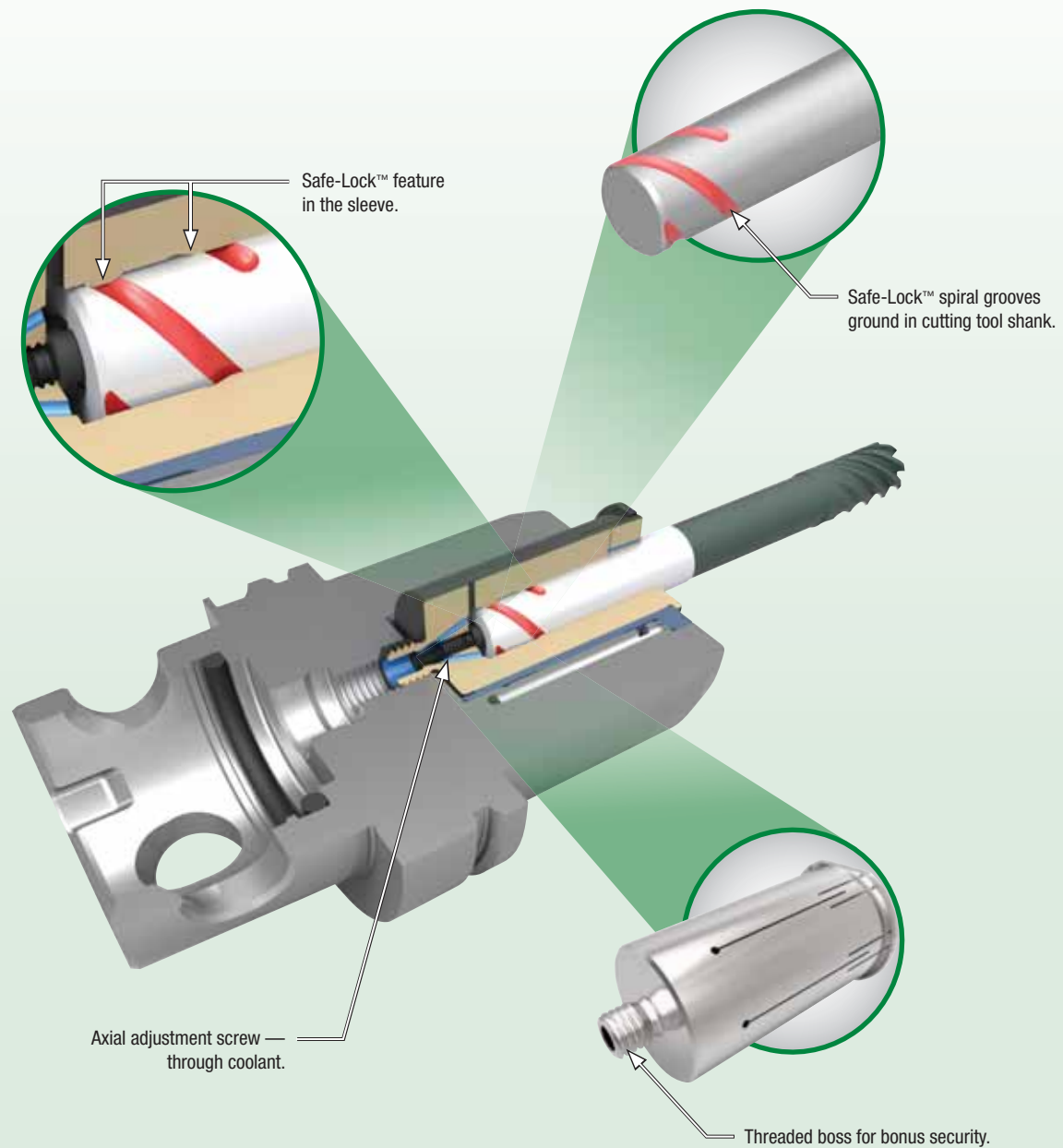
By locking the cutting tool in the Safe-Lock™ Smart Coolant reducer sleeve, the pullout security ensures optimum process reliability in conjunction with the HydroForce™ HT, which has benefits such as runout accuracy, excellent torque, and a unique dampening property. This makes for longer tool life, higher productivity, and excellent part accuracy for our customers.

- Optimum process reliability and security.
- Higher productivity.
- Greater cutting depths and higher feed rates.
- Time-saving and longer cutting tool life.
- Less vibration.
- Optimises the cutting edge technology.
- Able to fully utilise potential of machine tool.
- Minimises potential scrap.
- High accuracy clamping.
- Excellent runout.
- Helical grooves.
- Adjustable clamping length.
- No need to change NC programme after regrinding.

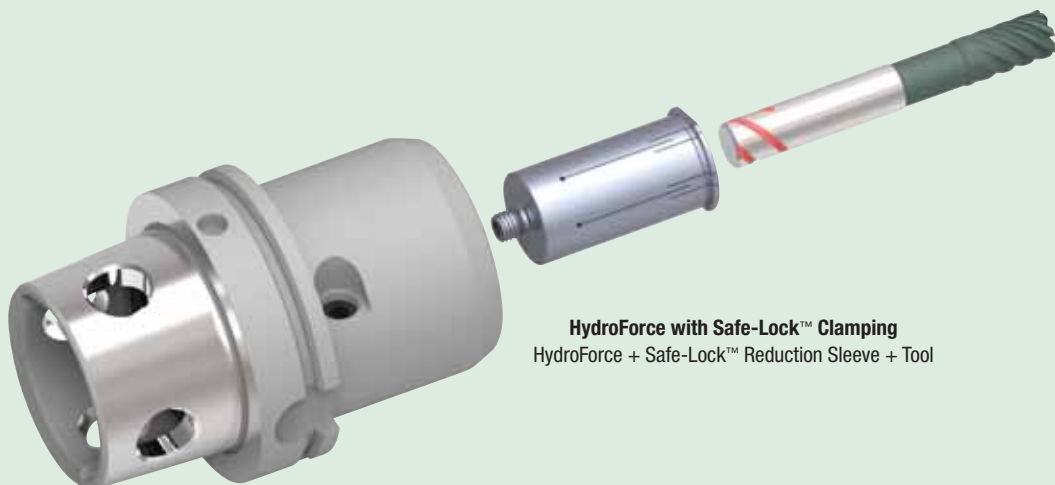
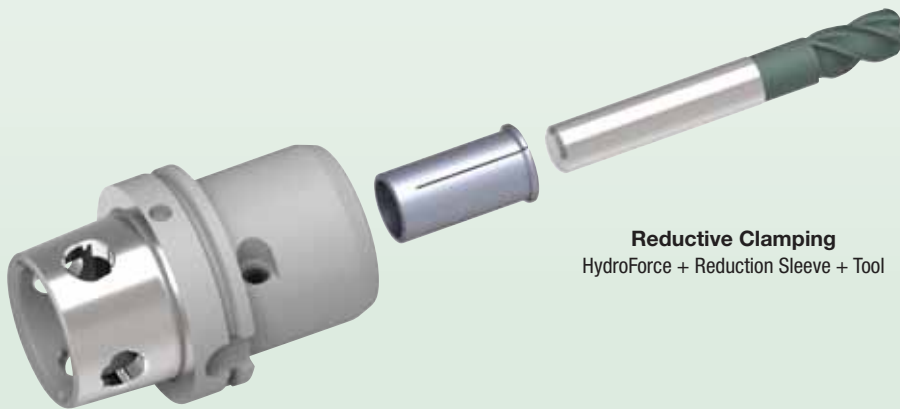
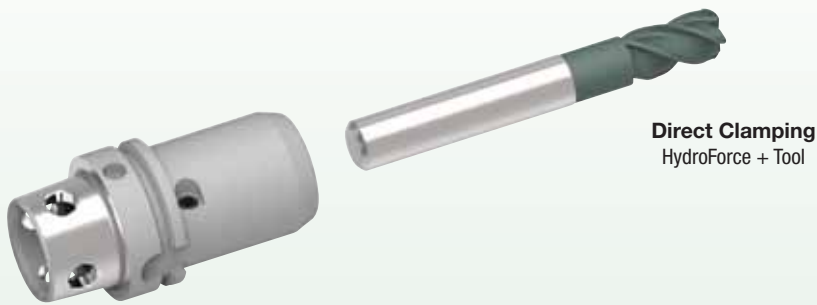
■ **HydroForce – Conversion from Standard to Safe-Lock™**



■ Product Construction and Assembly



■ Clamping Combinations with HydroForce™



ERICKSON™ NG Induction Shrink Fit Unit

A complete Shrink Fit unit to fully support your thermo-tool needs!

ERICKSON NG Induction Shrink Fit Unit

- High-performance Shrink Fit machine for all tools.
- With intelligent new generation coil.
- With integrated contact cooling system.

Features and Benefits

- Tool exchanges in 3–5 seconds.
- Complete tool cooling in 30 seconds.
- Simultaneous shrinking and cooling in record time (3 stations).
- Reduction of tool assembly cost.
- Adaptable to multi-clamping.

Delivery Includes:

- Intelligent NG coil VS32-h.
- Integrated contact cooling.
- Speed cooler.
- Cooling manager.
- Rotary table with 3 stations.
- 2 chuck supports for rotary table for your selection.
- Craning boxes.
- System cart.
- Inserts for system cart.
- TME Cooling System for safe handling.
 - 2 cooling adaptors for Shrink Fit extensions.
 - 1 cooling body for Shrink Fit chucks.
- Protection gloves.
- Safe packaging.



ERICKSON NG Induction Shrink Fit Unit comes complete, ready to work!



Enhanced Coil Technology

- Coil is flexible and adjustable by diameter.
- Coils can be set to the size of the diameter with one turn.
- Stop disks are no longer necessary.
- Chucks are only heated where it is intended.
- Intelligent coil to protect from overheating of the chuck.

Select the back ends of the holders you need to shrink and the pots you need will be included with your unit.

Technical Details

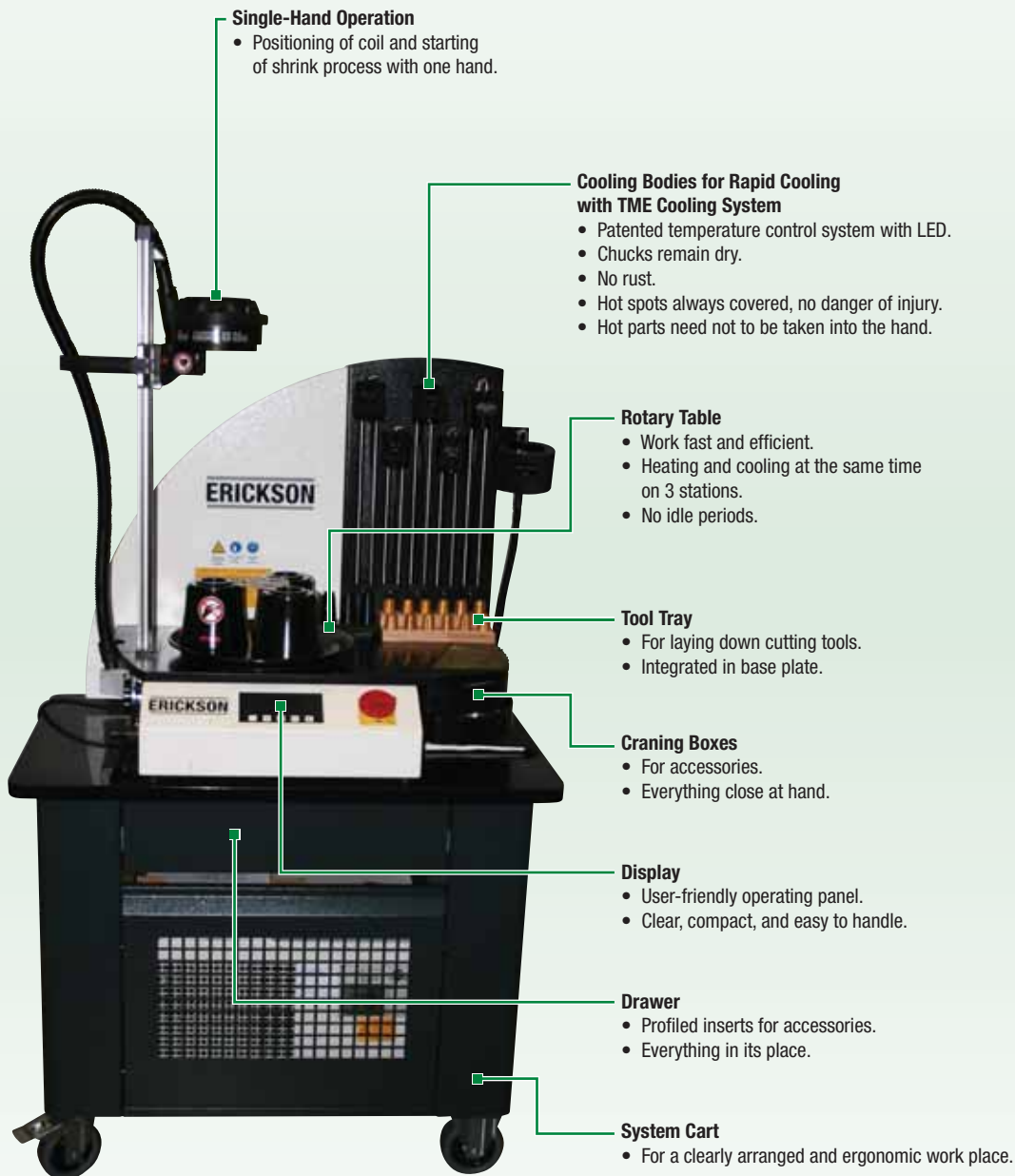
- Power: 13 kW
- Main voltage: 3 x 400–480 V, 16 A
- Tools: solid carbide and HSS from Ø 3–32mm
- Maximum length of shrink fit chuck = 570mm
- Dimensions W x D x H = 860 x 600 x 990mm
- Weight 70 kg
- HD kit for diameters up to 50 mm/2"

US Version

- Order No. **5905657**
- Cat No. **TTPWCNGNA**

EU Version

- Order No. **5906168**
- Cat No. **TTPWCNGEU**



Your first choice for fast, reliable heating and cooling of your Shrink Fit tools.



■ Shrink Fit Unit Complete

order number	catalogue number	description
5905657	TTPWCNGNA	POWER CLAMP NEW GEN SHRINK FIT (UL and CSA approved) for North America
5906168	TTPWCNGEU	POWER CLAMP NEXT GEN SHRINK FIT (CE and FC approved) for Europe/ROW

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1093268 75HC0500 E19	2248951 50HC0125 E19	3026679 32MHC100M E18	3954426 XNGJ0704ANENLD3W TN6525 A8
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5210300	M200D25Z03A25RN1 OL200	A34	5366688	VTSP06517 WP49EG	D9	5368586	VTSP06541 WU40EG	D11	5368706	VTSTF6507 WP49EG	D17
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5210303	M200D32Z04A32RN1 OL150	A34	5366692	VTSP06519 WU41EG	D10	5368589	VTSP06542 WU40EG	D11	5368709	VTSTF6509 WP49EG	D17
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5210306	M200D40Z06RN10	A35	5366696	VTSP06519 WU40EG	D10	5368602	VTSP06545 WP49EG	D9	5368722	VTSTF6511 WU41EG	D17
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5210308	M200D50Z06RN10	A35	5366698	VTSP06521 WU41EG	D10	5368604	VTSP06546 WP49EG	D9	5368724	VTSTF6511 WP49EG	D17
5210309	M200D52Z06RN10	A35	5366700	VTSP06521 WP42EG	D10	5368605	VTSP06546 WU40EG	D9	5368725	VTSTF6511 WU40EG	D17
5274455	RNGJ10T3MOEML WP35CM	A37	5366701	VTSP06521 WP49EG	D10	5368606	VTSP06547 WP49EG	D9	5368726	VTSTF6512 WP49EG	D17
5274456	RNGJ10T3MOEML WP25PM	A37	5366703	VTSP06521 WU40EG	D10	5368607	VTSP06547 WU40EG	D9	5368727	VTSTF6513 WU41EG	D17
5274457	RNGJ10T3MOEML WU35PM	A37	5366704	VTSP06522 WP49EG	D10	5368608	VTSP06548 WP49EG	D9	5368728	VTSTF6513 WP49EG	D17
5274511	RNGJ10T3MOSMM WP25PM	A37	5366705	VTSP06523 WU41EG	D10	5368609	VTSP06548 WU40EG	D9	5368729	VTSTF6513 WU40EG	D17
5274512	RNGJ10T3MOSMM WU35PM	A37	5366706	VTSP06523 WP42EG	D10	5368610	VTSP06549 WP49EG	D9	5368730	VTSTF6514 WU41EG	D17
5274560	RNGJ1605MOEML WP35CM	A49	5366707	VTSP06523 WP49EG	D10	5368611	VTSP06549 WU40EG	D9	5368731	VTSTF6514 WP42EG	D17
5274561	RNGJ1605MOEML WP25PM	A49	5366708	VTSP06523 WU40EG	D10	5368612	VTSP06550 WP49EG	D9	5368732	VTSTF6514 WP49EG	D17
5274562	RNGJ1605MOEML WU35PM	A49	5366709	VTSP06524 WP49EG	D10	5368613	VTSP06550 WU40EG	D9	5368733	VTSTF6514 WU40EG	D17
5276196	RNPJ10T3MOSMM WP35CM	A37	5368514	VTSP06525 WU41EG	D9	5368614	VTSP06551 WP49EG	D10	5368734	VTSTF6515 WP49EG	D17
5276197	RNPJ10T3MOSMM WP25PM	A37	5368515	VTSP06525 WP49EG	D9	5368615	VTSP06551 WU40EG	D10	5368735	VTSTF6516 WU41EG	D17
5276198	RNPJ10T3MOSMM WP20CM	A37	5368516	VTSP06525 WU40EG	D9	5368616	VTSP06552 WP49EG	D10	5368736	VTSTF6516 WP42EG	D17
5276199	RNPJ10T3MOSMH WP35CM	A37	5368517	VTSP06526 WU41EG	D9	5368617	VTSP06552 WU40EG	D10	5368737	VTSTF6516 WP49EG	D17
5276240	RNPJ10T3MOSMH WP25PM	A37	5368518	VTSP06526 WP49EG	D9	5368618	VTSP06553 WP49EG	D10	5368738	VTSTF6516 WU40EG	D17
5276241	RNPJ10T3MOSMH WP20CM	A37	5368519	VTSP06526 WU40EG	D9	5368619	VTSP06553 WU40EG	D10	5368739	VTSTF6517 WP49EG	D17
5276243	RNPJ10T3MOSMH WK15CM	A37	5368540	VTSP06527 WU41EG	D9	5368620	VTSP06554 WP49EG	D10	5368740	VTSTF6518 WU41EG	D18
5276360	RNPJ1204MOSMM WP35CM	A45	5368541	VTSP06527 WP49EG	D9	5368621	VTSP06554 WU40EG	D10	5368741	VTSTF6518 WP42EG	D18
5276361	RNPJ1204MOSMM WP25PM	A45	5368542	VTSP06527 WU40EG	D9	5368622	VTSP06555 WP49EG	D10	5368742	VTSTF6518 WP49EG	D18
5276362	RNPJ1204MOSMM WP20CM	A45	5368543	VTSP06528 WU41EG	D9	5368623	VTSP06555 WU40EG	D10	5368743	VTSTF6518 WU40EG	D18
5276363	RNPJ1204MOSMH WP35CM	A45	5368544	VTSP06528 WP49EG	D9	5368624	VTSP06556 WP49EG	D10	5368744	VTSTF6519 WP49EG	D18
5276364	RNPJ1204MOSMH WP25PM	A45	5368545	VTSP06528 WU40EG	D9	5368625	VTSP06556 WU40EG	D10	5368745	VTSTF6520 WP49EG	D18
5276365	RNPJ1204MOSMH WK15CM	A45	5368546	VTSP06529 WU41EG	D10	5368626	VTSP06557 WP49EG	D10	5368746	VTSTF6520 WU40EG	D18
5276366	RNPJ1204MOSMH WK15CM	A45	5368547	VTSP06529 WP49EG	D10	5368627	VTSP06557 WU40EG	D10	5368748	VTSTF6521 WU41EG	D18
5276470	RNPJ1605MOSMM WP35CM	A50	5368548	VTSP06529 WU40EG	D10	5368628	VTSP06558 WP49EG	D10	5368749	VTSTF6521 WP42EG	D18
5276471	RNPJ1605MOSMM WP25PM	A50	5368549	VTSP06530 WU41EG	D10	5368629	VTSP06558 WU40EG	D10	5368750	VTSTF6521 WP49EG	D18
5276472	RNPJ1605MOSMM WP20CM	A50	5368550	VTSP06530 WP49EG	D10	5368630	VTSP06559 WP49EG	D10	5368751	VTSTF6521 WU40EG	D18
5276473	RNPJ1605MOSMH WP35CM	A50	5368551	VTSP06530 WU40EG	D10	5368631	VTSP06559 WU40EG	D10	5368752	VTSTF6522 WP49EG	D18
5276474	RNPJ1605MOSMH WP25PM	A50	5368552	VTSP06531 WU41EG	D10	5368632	VTSP06560 WP49EG	D10	5368753	VTSTF6523 WU41EG	D18
5276475	RNPJ1605MOSMH WP20CM	A50	5368553	VTSP06531 WP42EG	D10	5368633	VTSP06560 WU40EG	D10	5368754	VTSTF6523 WP42EG	D18
5276476	RNPJ1605MOSMH WK15CM	A50	5368554	VTSP06531 WP49EG	D10	5368634	VTSP06561 WP49EG	D10	5368755	VTSTF6523 WP49EG	D18
5366646	VTSP06505 WU41EG	D9	5368555	VTSP06531 WU40EG	D10	5368635	VTSP06561 WU40EG	D10	5368756	VTSTF6523 WU40EG	D18
5366647	VTSP06505 WP42EG	D9	5368556	VTSP06532 WP49EG	D10	5368636	VTSP06562 WP49EG	D10	5368757	VTSTF6524 WP49EG	D18
5366648	VTSP06505 WP49EG	D9	5368557	VTSP06533 WU41EG	D10	5368637	VTSP06562 WU40EG	D10	5387434	VTSTF6574 WP42EG	D20
5366649	VTSP06505 WU40EG	D9	5368558	VTSP06533 WP42EG	D10	5368638	VTSP06563 WP49EG	D10	5387435	VTSTF6574 WP49EG	D20
5366660	VTSP06506 WP49EG	D9	5368559	VTSP06533 WP49EG	D10	5368639	VTSP06563 WU40EG	D10	5387436	VTSTF6575 WP42EG	D20
5366661	VTSP06507 WP49EG	D9	5368560	VTSP06533 WU40EG	D10	5368640	VTSP06564 WP49EG	D10	5387437	VTSTF6575 WP49EG	D20
5366662	VTSP06508 WU41EG	D9	5368561	VTSP06534 WP49EG	D10	5368641	VTSP06564 WU40EG	D10	5387438	VTSTF6576 WP42EG	D20
5366663	VTSP06508 WP49EG	D9	5368562	VTSP06535 WU41EG	D10	5368642	VTSP06565 WP49EG	D10	5387439	VTSTF6576 WP49EG	D20
5366664	VTSP06508 WU40EG	D9	5368563	VTSP06535 WP42EG	D10	5368643	VTSP06565 WU40EG	D10	5387460	VTSTF6577 WP42EG	D20
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5366666	VTSP06510 WU41EG	D9	5368566	VTSP06535 WU40EG	D10	5368684	VTSP06566 WU40EG	D10	5387462	VTSTF6578 WP42EG	D20
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5366669	VTSP06510 WU40EG	D9	5368569	VTSP06537 WP42EG	D10	5368687	VTSP06568 WP49EG	D10	5387465	VTSTF6579 WP49EG	D20
5366670	VTSP06511 WP49EG	D9	5368570	VTSP06537 WP49EG	D10	5368688	VTSP06568 WU40EG	D10	5387466	VTSTF6580 WP42EG	D20
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5366674	VTSP06512 WU40EG	D9	5368573	VTSP06538 WP42EG	D10	5368691	VTSP06570 WP49EG	D10	5387469	VTSTF6581 WP49EG	D20
5366675	VTSP06513 WU41EG	D9	5368574	VTSP06538 WP49EG	D10	5368692	VTSP06570 WU40EG	D10	5387470	VTSTF6582 WP49EG	D20
5366676	VTSP06513 WP42EG	D9	5368575	VTSP06538 WU40EG	D10	5368693	VTSP06571 WP49EG	D11	5387471	VTSTF6583 WP42EG	D20
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5366678	VTSP06513 WU40EG	D9	5368577	VTSP06539 WP42EG	D11	5368695	VTSP06572 WU40EG	D11	5387473	VTSTF6584 WP42EG	D20
5366679	VTSP06514 WP49EG	D9	5368578	VTSP06539 WP49EG	D11	5368696	VTSP06573 WP49EG	D11	5387474	VTSTF6584 WP49EG	D20
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5366681	VTSP06515 WP42EG	D9	5368580	VTSP06540 WU41EG	D11	5368698	VTSP06574 WU40EG	D11	5387476	VTSTF6585 WP49EG	D20
5366682	VTSP06515 WP49EG	D9	5368581	VTSP06540 WP42EG	D11	5368699	VTSP06575 WU40EG	D11	5387477	VTSTF6586 WP42EG	D20
5366684	VTSP06515 WU40EG	D9	5368582	VTSP06540 WP49EG	D11	5368702	VTSTF6506 WU41EG	D17	5387478	VTSTF6586 WP49EG	D20
5366685	VTSP06516 WP49EG	D9	5368583	VTSP06540 WU40EG	D11	5368703	VTSTF6506 WP42EG	D17	5387479	VTSTF6587 WP42EG	D20

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5387642	VTSFT6010 WP49EG	D24	5387863	VTSP07506 WU40EG	D15	5402206	VTSFT6560 WP42EG	D18	5415250	XDPT110416PDSRMM WK15CM	A5
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5387644	VTSFT6012 WP49EG	D28	5387867	VTSP07507 WU40EG	D15	5402208	VTSFT6560 WU40EG	D18	5415254	XDPT110408PDSRMM WU35PM	A5
5387645	VTSFT6013 WP49EG	D24	5387869	VTSP07507 WU41EG	D15	5402209	VTSFT6561 WU40EG	D18	5415310	XDPT110412PDSRMM WK15CM	A5
5387646	VTSFT6014 WP49EG	D24	5387871	VTSP07508 WU40EG	D15	5402210	VTSFT6562 WP49EG	D18	5415312	XDPT110412PDSRMM WU35PM	A5
5387647	VTSFT6015 WP49EG	D28	5387873	VTSP07508 WU41EG	D15	5402211	VTSFT6562 WU40EG	D18	5415313	XDPT110412PDSRMM WP35CM	A5
5387648	VTSFT6016 WP49EG	D24	5387875	VTSP07509 WU40EG	D15	5402212	VTSFT6563 WU40EG	D18	5415314	XDPT110412PDSRMM WP25PM	A5
5387649	VTSFT6017 WP49EG	D24	5387877	VTSP07509 WU41EG	D15	5402213	VTSFT6564 WU40EG	D18	5415315	XDPT110408PDSRMM WK15CM	A5
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5387651	VTSFT6019 WP49EG	D24	5387881	VTSP07510 WU41EG	D15	5402215	VTSFT6565 WU40EG	D18	5415318	XDPT110408PDSRMM WP35CM	A5
5387652	VTSFT6020 WP49EG	D24	5387883	VTSP07511 WU40EG	D15	5402216	VTSFT6566 WU40EG	D18	5415319	XDPT110408PDSRMM WP25PM	A5
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5387654	VTSFT6022 WP49EG	D24	5387887	VTSP07513 WU40EG	D15	5402218	VTSFT6567 WU40EG	D18	5415425	XDPT110431PDSRMM WP35CM	A5
5387655	VTSFT6023 WP49EG	D24	5387889	VTSP07514 WU40EG	D15	5402219	VTSFT6568 WU40EG	D18	5415426	XDPT110408PDSRMM WP25PM	A5
5387656	VTSFT6024 WP49EG	D28	5387891	VTSP07515 WU40EG	D15	5402220	VTSFT6569 WP49EG	D18	5415428	XDPT110404PDSRMM WK15CM	A5
5387657	VTSFT6025 WP49EG	D24	5387893	VTSP07516 WU40EG	D15	5402221	VTSFT6569 WU40EG	D18	5415450	XDPT110404PDSRMM WP35CM	A5
5387658	VTSFT6026 WP49EG	D24	5387895	VTSP07517 WU40EG	D15	5402222	VTSFT6570 WU40EG	D18	5415546	XDCT110408PDERML WU35PM	A4
5387659	VTSFT6027 WP49EG	D28	5387898	VTSP07518 WU40EG	D15	5402223	VTSFT6571 WP49EG	D19	5415547	XDCT110408PDERML WP35CM	A4
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5387672	VTSFT6030 WP49EG	D28	5398709	VTSFT7505 WU41EG	D29	5402226	VTSFT6573 WU40EG	D19	5427370	HNGJ0905ANSNGD WK15CM	A11
5387673	VTSFT6031 WP49EG	D24	5398790	VTSFT7506 WU40EG	D29	5402227	VTSFT6573 WP49EG	D17	5427371	HNPJ0905ANSNHD WK15CM	A12
5387674	VTSFT6032 WP49EG	D24	5398791	VTSFT7506 WU41EG	D29	5402228	VTSFT6575 WU40EG	D17	5427372	HNPJ0905ANSNGD WK15CM	A12
5387675	VTSFT6033 WP49EG	D24	5398792	VTSFT7507 WU40EG	D29	5402229	VTSFT6576 WP49EG	D18	5427373	XNGJ0704ANENLD3W WK15CM	A8
5387676	VTSFT6034 WP49EG	D25	5398793	VTSFT7507 WU41EG	D29	5402250	VTSFT6576 WU40EG	D17	5427374	HNPJ0704ANSNGD WK15CM	A9
5387677	VTSFT6035 WP49EG	D25	5398794	VTSFT7508 WU40EG	D29	5402251	VTSFT6577 WP49EG	D17	5427375	HNPJ0704ANSNHD WK15CM	A9
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5387679	VTSFT6037 WP49EG	D25	5398796	VTSFT7509 WU40EG	D29	5402253	VTSFT6578 WP49EG	D18	5427388	HPGT06T3DZERGD3W WK15CM	A13
5387700	VTSFT6038 WP49EG	D25	5398797	VTSFT7509 WU41EG	D29	5402254	VTSFT6578 WU40EG	D18	5427423	SDMT1204PDRML WK15CM	A14
5387701	VTSFT6039 WP49EG	D25	5398798	VTSFT7510 WU40EG	D29	5402255	VTSFT6579 WP49EG	D18	5472587	HNPJ0704ANSNGD WK15CM	D24
5387702	VTSFT6040 WP49EG	D25	5398799	VTSFT7510 WU41EG	D29	5402256	VTSFT6579 WU40EG	D18	5472589	VTSFT6007 WU41EG	D24
5387704	VTSP06005 WP49EG	D12	5398800	VTSFT7511 WU40EG	D29	5402257	VTSFT6530 WP49EG	D18	5472600	VTSFT6008 WU41EG	D24
5387705	VTSP06006 WP49EG	D14	5398801	VTSFT7512 WU40EG	D29	5402258	VTSFT6530 WU40EG	D18	5472602	VTSFT6010 WU41EG	D24
5387707	VTSP06007 WP49EG	D12	5398802	VTSFT7513 WU40EG	D29	5402259	VTSFT6531 WU41EG	D18	5472603	VTSFT6011 WU41EG	D24
5387708	VTSP06008 WP49EG	D12	5398803	VTSFT7514 WU40EG	D29	5402260	VTSFT6531 WP42EG	D18	5472605	VTSFT6013 WU41EG	D24
5387709	VTSP06009 WP49EG	D14	5398804	VTSFT7515 WU40EG	D29	5402261	VTSFT6531 WP49EG	D18	5472606	VTSFT6014 WU41EG	D24
5387760	VTSP06010 WP49EG	D12	5398805	VTSFT7516 WU40EG	D29	5402262	VTSFT6531 WU40EG	D18	5472608	VTSFT6016 WU41EG	D24
5387761	VTSP06011 WP49EG	D12	5398806	VTSFT7517 WU40EG	D29	5402263	VTSFT6532 WP49EG	D18	5472609	VTSFT6017 WU41EG	D24
5387762	VTSP06012 WP49EG	D14	5398807	VTSFT7518 WU40EG	D29	5402264	VTSFT6533 WU41EG	D18	5472611	VTSFT6019 WU41EG	D24
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5387764	VTSP06014 WP49EG	D12	5400965	HNGJ0905ANSNGD WP25PM	A11	5402266	VTSFT6529 WP49EG	D18	5472614	VTSFT6022 WU41EG	D24
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5387768	VTSP06018 WP49EG	D14	5402181	VTSFT6547 WP49EG	D17	5402270	VTSFT6535 WP49EG	D18	5472620	VTSFT6028 WU41EG	D24
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5387770	VTSP06020 WP49EG	D12	5402183	VTSFT6548 WP49EG	D17	5402272	VTSFT6536 WP49EG	D18	5472623	VTSFT6031 WU41EG	D24
5387771	VTSP06021 WP49EG	D14	5402184	VTSFT6549 WU40EG	D17	5402273	VTSFT6537 WU41EG	D18	5472624	VTSFT6032 WU41EG	D24
5387772	VTSP06022 WP49EG	D12	5402185	VTSFT6549 WP49EG	D17	5402274	VTSFT6537 WP49EG	D18	5472625	VTSFT6033 WU41EG	D24
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5387777	VTSP06026 WP49EG	D12	5402189	VTSFT6551 WP49EG	D18	5402278	VTSFT6538 WU40EG	D18	5472629	VTSFT6037 WU41EG	D25
5387778	VTSP06027 WP49EG	D14	5402190	VTSFT6551 WU40EG	D18	5402279	VTSFT6539 WU41EG	D18	5472630	VTSFT6038 WU41EG	D25
5387779	VTSP06028 WP49EG	D12	5402191	VTSFT6552 WU40EG	D18	5402280	VTSFT6539 WP49EG	D18	5472631	VTSFT6039 WU41EG	D25
5387780	VTSP06029 WP49EG	D12	5402192	VTSFT6553 WP49EG	D18	5402281	VTSFT6539 WU40EG	D18	5472632	VTSFT6040 WU41EG	D25
5387781	VTSP06030 WP49EG	D14	5402193	VTSFT6553 WU40EG	D18	5402282	VTSFT6540 WU41EG	D19	5472633	VTSP06005 WU41EG	D12
5387782	VTSP06031 WP49EG	D12	5402194	VTSFT6554 WP42EG	D18	5402283	VTSFT6540 WP49EG	D19	5472634	VTSP06006 WU41EG	D14
5387783	VTSP06032 WP49EG	D12	5402195	VTSFT6554 WP49EG	D18	5402284	VTSFT6540 WU40EG	D19	5472635	VTSP06007 WU41EG	D12
5387784	VTSP06033 WP49EG	D12	5402196	VTSFT6554 WU40EG	D18	5402285	VTSFT6541 WU41EG	D19	5472636	VTSP06008 WU41EG	D12
5387785	VTSP06034 WP49EG	D13	5402197	VTSFT6555 WP49EG	D18	5402286	VTSFT6541 WP49EG	D19	5472637	VTSP06009 WU41EG	D14

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5472638	VTSP06010 WU41EG	D12	5521078	CVK50HCHT125315	E15	5825552	28481600T032 TIALN	B36	5825943	D0140800T019 TIALN	B31
5472639	VTSP06011 WU41EG	D12	5521079	KM63XMHZCHT125315	E7	5825553	28481800T032 TIALN	B36	5825944	D0040900T013 TIALN	B31
5472640	VTSP06012 WU41EG	D14	5522490	SDMX120408RMM WS30PM	A14	5825554	28482000T038 TIALN	B36	5825945	D0140900T019 TIALN	B31
5472641	VTSP06013 WU41EG	D12	5528973	HNGJ0905ANENLD WS30PM	A10	5825555	40000200T006 TIALN	B37	5825946	D0041000T014 TIALN	B31
5472644	VTSP06014 WU41EG	D12	5528974	HNGJ0905ANSNGD WS30PM	A11	5825556	40000300T020 TIALN	B37	5825947	D0141000T022 TIALN	B31
5472645	VTSP06015 WU41EG	D14	5528975	HNGJ0704ANENLD WS30PM	A8	5825557	40000400T014 TIALN	B37	5825948	D0041200T016 TIALN	B31
5472646	VTSP06016 WU41EG	D12	5528976	HNPJ0704ANSNGD WS30PM	A9	5825558	40100400T025 TIALN	B37	5825949	D0141200T026 TIALN	B31
5472647	VTSP06017 WU41EG	D12	5528978	HPGT06T3DZENGD WS30PM	A13	5825559	40000500T016 TIALN	B37	5825950	D0041400T018 TIALN	B31
5472648	VTSP06018 WU41EG	D14	5536670	XDCT110404PDERML WP35CM	A4	5825560	40100500T030 TIALN	B37	5825951	D0141400T026 TIALN	B31
5472649	VTSP06019 WU41EG	D12	5536671	XDCT110404PDERML WP25PM	A4	5825573	40000600T016 TIALN	B37	5825952	D0041600T022 TIALN	B31
5472650	VTSP06020 WU41EG	D12	5542327	RNPJ10T3MOSMM WP40PM	A37	5825574	40100600T019 TIALN	B37	5825953	D0141600T032 TIALN	B31
5472651	VTSP06021 WU41EG	D14	5542328	RNPJ10T3MOSMH WP40PM	A37	5825575	40100600T030 TIALN	B37	5825954	D0041800T024 TIALN	B31
5472652	VTSP06022 WU41EG	D12	5542329	RNPJ1204MOSMM WP40PM	A45	5825576	40000800T019 TIALN	B37	5825955	D0141800T032 TIALN	B31
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5472654	VTSP06024 WU41EG	D14	5542341	RNPJ1605MOSMM WP40PM	A50	5825578	40001000T022 TIALN	B37	5825957	D0142000T038 TIALN	B31
5472655	VTSP06025 WU41EG	D12	5542342	RNPJ1605MOSMH WP40PM	A50	5825579	40101000T040 TIALN	B37	5825958	D0041200W016 TIALN	B31
5472656	VTSP06026 WU41EG	D12	5545063	XDPT110408PDSRMM WP40PM	A5	5825580	40001200T025 TIALN	B37	5825959	D0141200W026 TIALN	B31
5472657	VTSP06027 WU41EG	D14	5545065	XDCT110408PDERML WP40PM	A4	5825581	40101200T045 TIALN	B37	5825960	D0041400W018 TIALN	B31
5472658	VTSP06028 WU41EG	D12	5550905	HNGJ0704ANENLD WP40PM	A8	5825583	40001400T032 TIALN	B37	5825961	D0141400W026 TIALN	B31
5472659	VTSP06029 WU41EG	D12	5550906	HNPJ0704ANSNGD WP40PM	A9	5825584	40101400T050 TIALN	B37	5825962	D0041600W022 TIALN	B31
5472660	VTSP06030 WU41EG	D14	5550907	HNPJ0704ANSNHDP WP40PM	A9	5825585	40001600T032 TIALN	B37	5825963	D0141600W032 TIALN	B31
5472661	VTSP06031 WU41EG	D12	5550908	HNPJ0905ANSNHDP WP40PM	A12	5825586	40101600T065 TIALN	B37	5825964	D0041800W024 TIALN	B31
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5472663	VTSP06033 WU41EG	D12	5622622	XNGJ0905ANSNGD3W WK15CM	A10	5825588	40102000T056 TIALN	B37	5825966	D0042000W026 TIALN	B31
5472664	VTSP06034 WU41EG	D13	5642230	XDCT110404PDERML WP40PM	A4	5825589	D0101200W026 UNCOATED	B35	5825967	D0142000W038 UNCOATED	B31
5472665	VTSP06035 WU41EG	D13	5642231	XDPT110404PDSRMM WP40PM	A5	5825590	D0101400W026 UNCOATED	B35	5825968	D0041200W016 UNCOATED	B31
5472666	VTSP06036 WU41EG	D13	5642232	XDPT110412PDSRMM WP40PM	A5	5825591	D0101600W032 UNCOATED	B35	5825969	D0141200W026 UNCOATED	B31
5472667	VTSP06037 WU41EG	D13	5642233	XDPT110416PDSRMM WP40PM	A5	5825592	D0101800W032 UNCOATED	B35	5825970	D0041400W018 UNCOATED	B31
5472668	VTSP06038 WU41EG	D13	5642234	XDPT110431PDSRMM WP40PM	A5	5825593	D0102000W038 UNCOATED	B35	5825971	D0141400W026 UNCOATED	B31
5472669	VTSP06039 WU41EG	D13	5642237	XDPT110404PDSRMM WP25PM	A5	5825594	28480400T011 UNCOATED	B36	5825972	D0041600W022 UNCOATED	B31
5472670	VTSP06040 WU41EG	D13	5647194	CV40HCHT125400	E12	5825595	28480500T013 UNCOATED	B36	5825973	D0141600W032 UNCOATED	B31
5476633	RNPJ10T3MOSMH WJ35PM	A37	5710285	VSM490D02520ZB25XN15	A21	5825596	28480600T013 UNCOATED	B36	5825974	D0041800W024 UNCOATED	B31
5476634	RNPJ1204MOSMM WJ35PM	A45	5710286	VSM490D03220Z3832XN15	A21	5825597	28480800T019 UNCOATED	B36	5825975	D0141800W032 UNCOATED	B31
5476635	RNPJ1204MOSMH WJ35PM	A45	5710287	VSM490D02520Z2A25XN15L170	A22	5825598	28481000T022 UNCOATED	B36	5825976	D0042000W026 UNCOATED	B31
5476636	RNPJ1605MOSMH WJ35PM	A50	5710288	VSM490D03220Z3A32XN15L200	A22	5825599	28481200T026 UNCOATED	B36	5825977	D0142000W038 UNCOATED	B31
5476637	RNPJ1605MOSMM WJ35PM	A50	5710289	VSM490D04020Z4516XN15	A23	5825600	28481400T026 UNCOATED	B36	5825978	25280400T011 TIALN	B32
5517826	XDCT110408PDERML WS30PM	A4	5710520	VSM490D04020Z516XN15	A23	5825601	28481600T032 UNCOATED	B36	5825979	25280500T013 TIALN	B32
5517827	XDPT110431PDSRMM WS30PM	A5	5710521	VSM490D05020Z5S22XN15	A23	5825602	28481800T032 UNCOATED	B36	5825980	25280600T013 TIALN	B32
5519572	SDMX120412RMM WS30PM	A14	5710522	VSM490D05020Z6S22XN15	A23	5825603	28482000T038 UNCOATED	B36	5825981	25280800T019 TIALN	B32
5519921	XDPT110408PDSRMM WS30PM	A5	5710523	VSM490D06320Z6S22XN15	A23	5825604	D0100300T008 UNCOATED	B35	5825982	25281000T022 TIALN	B32
5520350	RNGJ1204MOEML WS30PM	A44	5710524	VSM490D06320Z7S22XN15	A23	5825605	D0100400T011 UNCOATED	B35	5825983	25281200T026 TIALN	B32
5520351	RNGJ1204MOSMM WS30PM	A45	5710525	VSM490D08020Z7S27XN15	A23	5825606	D0100500T013 UNCOATED	B35	5825984	25281400T026 TIALN	B32
5520352	RNGJ10T3MOEML WS30PM	A37	5710526	VSM490D10020Z8S32XN15	A23	5825607	D0100600T013 UNCOATED	B35	5825985	25281600T032 TIALN	B32
5520353	RNGJ10T3MOSMM WS30PM	A37	5710527	XNGU15T608SRMM WP25PM	A25	5825608	D0100800T019 UNCOATED	B35	5825986	25281800T032 TIALN	B32
5520354	RNGJ1605MOEML WS30PM	A49	5710528	XNGU15T608SRMM WP40PM	A25	5825609	D0101000T022 UNCOATED	B35	5825987	25282000T038 TIALN	B32
5520958	HSK63AHCHT075350	E4	5710529	XNGU15T608SRMM WJ35PM	A25	5825610	D0101200T026 UNCOATED	B35	5825988	25281200T026 UNCOATED	B32
5520959	HSK100AHCHT125400	E5	5825527	D0100300T008 TIALN	B35	5825611	D0101400T026 UNCOATED	B35	5825989	25281400T026 UNCOATED	B32
5520971	BT40HCHT20070M	E10	5825528	D0100400T011 TIALN	B35	5825612	D0101600T032 UNCOATED	B35	5825990	25281600T032 UNCOATED	B32
5520972	BT50HCHT132090M	E11	5825529	D0100500T013 TIALN	B35	5825613	D0101800T032 UNCOATED	B35	5825991	25281800T032 UNCOATED	B32
5520973	DV40HCHT20070M	E13	5825530	D0100600T013 TIALN	B35	5825614	D0102000T038 UNCOATED	B35	5825992	25282000T038 UNCOATED	B32
5520974	DV50HCHT32080M	E13	5825531	D0100800T019 TIALN	B35	5825894	D0040200T004 TIALN	B30	5825993	25280400T011 UNCOATED	B32
5520975	HSK63AHCHT20090M	E4	5825532	D0101000T022 TIALN	B35	5825895	D0140200T007 TIALN	B30	5825994	25280500T013 UNCOATED	B32
5520976	HSK100AHCHT20090M	E5	5825533	D0101200T026 TIALN	B35	5825896	D0140250T008 TIALN	B30	5825995	25280600T013 UNCOATED	B32
5520977	HSK100AHCHT32100M	E5	5825534	D0101400T026 TIALN	B35	5825897	D0040300T005 TIALN	B30	5825996	25280800T019 UNCOATED	B32
5520978	KM63XMHZCHT32085M	E7	5825536	D0101600T032 TIALN	B35	5825898	D0140300T008 TIALN	B30	5825997	25281000T022 UNCOATED	B32
5520979	KM63TSHCHT32080M	E6	5825538	D0101800T032 TIALN	B35	5825899	D0140350T010 TIALN	B30	5826016	40040100T004 TIALN	B33
5520990	KM4X63HCHT20090M	E8	5825539	D0102000T038 TIALN	B35	5825900	D0040400T008 TIALN	B30	5826017	40040150T004 TIALN	B33
5520991	KM4X100HCHT20085M	E9	5825540	D0101200W026 TIALN	B35	5825931	D0140400T011 TIALN	B30	5826018	40040200T006 TIALN	B33
5520992	KM4X100HCHT32095M	E9	5825541	D0101400W026 TIALN	B35	5825932	D0140450T011 TIALN	B30	5826019	40040250T006 TIALN	B33
5520993	BTKV40HCHT120070M	E14	5825542	D0101600W032 TIALN	B35	5825933	D0040500T009 TIALN	B30	5826020	40040300T009 TIALN	B33
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5521070	KM63TSHCHT125315	E6	5825544	D0102000W038 TIALN	B35	5825935	D0140550T013 TIALN	B30	5826022	40240300T025 TIALN	B33
5521071	KM4X63HCHT075350	E8	5825545	28480400T011 TIALN	B36	5825936	D0040600T010 TIALN	B30	5826023	40040350T012 TIALN	B33
5521072	KM4X100HCHT125375	E9	5825546	28480500T013 TIALN	B36	5825937	D0140600T013 TIALN	B30	5826024	40040400T011 TIALN	B33
5521073	BT40HCHT075275	E10	5825547	28480600T013 TIALN	B36	5825938	D0140650T016 TIALN	B30	5826025	40140400T019 TIALN	B33
5521074	BT50HCHT125350	E11	5825548	28480800T019 TIALN	B36	5825939	D0040700T011 TIALN	B30	5826026	40240400T031 TIALN	B33
5521075	CV40HCHT075275	E12	5825549	28481000T022 TIALN	B36	5825940	D0140700T016 TIALN	B30	5826027	40040450T014 TIALN	B33
5521076	CV50HCHT125315	E12	5825550	28481200T026 TIALN	B36	5825941	D0140750T019 TIALN	B31	5826028	40040500T013 TIALN	B33
5521077	CVK40HCHT075275	E15	5825551	28481400T026 TIALN	B36	5825942	D0040800T012 TIALN	B31	5826029	40040500T020 TIALN	B33

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5826032	40040600T016 TIALN	B33	5826124	40241600T075 UNCOATED	B34	5873496	40020450T014 TIALN	B7	5877540	D0021600W016 TIALN	B5
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5826040	40041000T022 TIALN	B34	5826142	40141200W045 UNCOATED	B34	5873504	40120600T038 TIALN	B7	5877558	D0021800W014 UNCOATED	B5
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5826071	40141200W045 TIALN	B34	5873216	VSM490D025202A25XN15L100	A22	5873533	40021800T038 TIALN	B8	5877579	D0120500T010 UNCOATED	B4
5826072	40241200W075 TIALN	B34	5873217	VSM490D032203A32XN15L110	A22	5873534	40021800T060 TIALN	B8	5877581	D0020600T007 UNCOATED	B4
5826073	40041400W032 TIALN	B34	5873218	VSM490D032204A32XN15L110	A22	5873535	40121800T075 TIALN	B8	5877582	D0120600T010 UNCOATED	B4
5826074	40141400W050 TIALN	B34	5873219	VSM490D032204A32XN15L200	A22	5873536	40022000T038 TIALN	B8	5877583	D0020700T008 UNCOATED	B4
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5826080	40141800W060 TIALN	B34	5873226	VSM490D125209S40XN15	A23	5877503	D0020300T004 TIALN	B4	5877590	D0021000T011 UNCOATED	B5
5826081	40241800W075 TIALN	B34	5873227	VSM490D125212S40XN15	A23	5877504	D0120300T007 TIALN	B4	5877591	D0121000T019 UNCOATED	B5
5826082	40042000W038 TIALN	B34	5873228	VSM490D160212S40XN15	A23	5877505	D0020350T004 TIALN	B4	5877592	D0021200T012 UNCOATED	B5
5826083	40142000W056 TIALN	B34	5873415	XNPU15T608SRMM WP25PM	A16, A25	5877506	D0020400T005 TIALN	B4	5877593	D0121200T022 UNCOATED	B5
5826084	40242000W075 TIALN	B34	5873416	XNPU15T608SRMM WP40PM	A16, A25	5877507	D0120400T008 TIALN	B4	5877594	D0021400T014 UNCOATED	B5
5826085	40040100T004 UNCOATED	B33	5873417	XNPU15T608SRMM WU35PM	A16, A25	5877509	D0020450T005 TIALN	B4	5877595	D0121400T022 UNCOATED	B5
5826086	40040150T004 UNCOATED	B33	5873418	XNPU15T608SRMM WP35CM	A16, A25	5877510	D0120450T008 TIALN	B4	5877596	D0021600T016 UNCOATED	B5
5826087	40040200T006 UNCOATED	B33	5873419	XNPU15T608SRMM WK15PM	A16, A25	5877511	D0020500T006 TIALN	B4	5877597	D0121600T026 UNCOATED	B5
5826088	40040250T006 UNCOATED	B33	5873420	XNPU15T608SRMM WK15CM	A16, A25	5877512	D0120500T010 TIALN	B4	5877598	D0021800T018 UNCOATED	B5
5826089	40040300T009 UNCOATED	B33	5873481	XNGU15T608ERML WP25PM	A15, A24	5877513	D0020600T007 TIALN	B4	5877599	D0121800T026 UNCOATED	B5
5826090	40140300T019 UNCOATED	B33	5873482	XNGU15T608ERML WP40PM	A15, A24	5877514	D0120600T010 TIALN	B4	5877601	D0022000T020 UNCOATED	B5
5826101	40240300T025 UNCOATED	B33	5873483	XNGU15T608ERML WU35PM	A15, A24	5877515	D0020700T008 TIALN	B4	5877602	D0122000T032 UNCOATED	B5
5826102	40040350T012 UNCOATED	B33	5873484	40020100T004 TIALN	B7	5877516	D0120700T013 TIALN	B4	5877603	28190300T007 TIALN	B6
5826103	40040400T011 UNCOATED	B33	5873485	40020150T004 TIALN	B7	5877517	D0020800T009 TIALN	B4	5877604	28190400T008 TIALN	B6
5826104	40040450T014 UNCOATED	B33	5873486	40020180T004 TIALN	B7	5877518	D0120800T016 TIALN	B5	5877605	28190500T010 TIALN	B6
5826105	40040500T020 UNCOATED	B33	5873487	40020200T006 TIALN	B7	5877520	D0020900T010 TIALN	B5	5877606	28190600T010 TIALN	B6
5826106	40040600T016 UNCOATED	B33	5873488	40020250T006 TIALN	B7	5877521	D0120900T016 TIALN	B5	5877607	28190700T013 TIALN	B6
5826107	40140600T028 UNCOATED	B33	5873489	40020300T009 TIALN	B7	5877522	D0021000T011 TIALN	B5	5877608	28190800T016 TIALN	B6
5826108	40240600T038 UNCOATED	B33	5873490	40020300T019 TIALN	B7	5877523	D0121000T019 TIALN	B5	5877609	28190900T016 TIALN	B6
5826109	40040800T020 UNCOATED	B34	5873491	40120300T025 TIALN	B7	5877524	D0021200T012 TIALN	B5	5877610	28191000T019 TIALN	B6
5826110	40140800T028 UNCOATED	B34	5873492	40020350T012 TIALN	B7	5877525	D0121200T022 TIALN	B5	5877611	28191200T022 TIALN	B6
5826111	40240800T041 UNCOATED	B34	5873493	40020400T012 TIALN	B7	5877526	D0021400T014 TIALN	B5	5877612	28191400T022 TIALN	B6
5826113	40041000T022 UNCOATED	B34				5877527	D0121400T022 TIALN	B5	5877613	28191500T026 TIALN	B6
5826114	40141000T032 UNCOATED	B34				5877529	D0021600T016 TIALN	B5	5877614	28191600T026 TIALN	B6
5826115	40241000T045 UNCOATED	B34				5877530	D0121600T026 TIALN	B5	5877615	28191800T026 TIALN	B6
5826116	40041200T025 UNCOATED	B34				5877531	D0021800T018 TIALN	B5	5877616	28192000T032 TIALN	B6
5826117	40141200T045 UNCOATED	B34				5877532	D0121800T026 TIALN	B5	5877617	28190300T007 UNCOATED	B6
5826118	40241200T075 UNCOATED	B34				5877533	D0022000T020 TIALN	B5	5877618	28190400T008 UNCOATED	B6
5826119	40041400T032 UNCOATED	B34				5877534	D0122000T032 TIALN	B5	5877619	28190500T010 UNCOATED	B6
5826120	40141400T050 UNCOATED	B34				5877535	D0021200W012 TIALN	B5	5877620	28190600T010 UNCOATED	B6
5826121	40241400T075 UNCOATED	B34				5877537	D0121200W022 TIALN	B5	5877621	28190700T013 UNCOATED	B6

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5877623	28190900T016 UNCOATED	B6	5880446	40211200T075 UNCOATED	B12	5895347	HNGJ0905ANENLD WP35CM	A10	5988152	XDPT170412PESRMM WU35PM	A7
5877624	28191000T019 UNCOATED	B6	5880447	40011400T032 UNCOATED	B12	5895348	HNGJ0905ANENLD WP40PM	A10	5988153	XDPT170416PESRMM WK15CM	A7
5877625	28191200T022 UNCOATED	B6	5880448	40011600T032 UNCOATED	B12	5895349	HNGJ0905ANSNGD WP35CM	A11	5988154	XDPT170416PESRMM WP40PM	A7
5877626	28191400T022 UNCOATED	B6	5880449	40012000T038 UNCOATED	B12	5895350	HNGJ0905ANSNGD WP40PM	A11	5988155	XDPT170416PESRMM WP25PM	A7
5877627	28191500T026 UNCOATED	B6	5880450	40112000T075 UNCOATED	B12	5895371	HNGJ0905ANSNHD WP25PM	A11	5988156	XDPT170416PESRMM WP35CM	A7
5877628	28191600T026 UNCOATED	B6	5880451	28380200T007 TIALN	B10	5895372	HNGJ0905ANSNHD WP35CM	A11	5988158	XDPT170420PESRMM WP25PM	A7
5877629	28191800T026 UNCOATED	B6	5880452	28380300T007 TIALN	B10	5895373	HNGJ0905ANSNHD WP40PM	A11	5988159	XDPT170420PESRMM WP40PM	A7
5877630	28192000T032 UNCOATED	B6	5880453	28380400T008 TIALN	B10	5895374	HNPJ0905ANSNGD WP25PM	A12	5988160	XDPT170420PESRMM WP35CM	A7
5880362	D0110200T006 TIALN	B9	5880454	28380500T010 TIALN	B10	5895375	HNPJ0905ANSNGD WP35CM	A12	5988202	XDPT170424PESRMM WP40PM	A7
5880363	D0010300T004 TIALN	B9	5880455	28380600T010 TIALN	B10	5895376	HNPJ0905ANSNHD WP25PM	A12	5988203	XDPT170424PESRMM WP25PM	A7
5880364	D0110300T007 TIALN	B9	5880456	28380800T016 TIALN	B10	5895377	HNPJ0905ANSNHD WP35CM	A12	5988204	XDPT170432PESRMM WP35CM	A7
5880365	D0010400T005 TIALN	B9	5880457	28381000T019 TIALN	B10	5895378	HNPJ090543ANSNHD WP25PM	A12	5988205	XDPT170432PESRMM WP40PM	A7
5880366	D0110400T008 TIALN	B9	5880458	28381200T022 TIALN	B10	5895379	HNPJ090543ANSNHD WP35CM	A12	5988206	XDPT170432PESRMM WP25PM	A7
5880367	D0110500T010 TIALN	B9	5880459	28381400T022 TIALN	B10	5895380	HNPJ090543ANSNHD WP40PM	A12	5988969	XDPT170440PESRMM WP40PM	A7
5880368	D0110600T010 TIALN	B9	5880460	28381600T026 TIALN	B10	5895381	XNGJ0905ANSNGD3W WP25PM	A10	5988970	XDPT170440PESRMM WP25PM	A7
5880369	D0110700T013 TIALN	B9	5880461	28382000T032 TIALN	B10	5895382	XNGJ0905ANSNGD3W WP40PM	A10	5988981	XDCT170408PEERML WP40PM	A6
5880370	D0110800T016 TIALN	B9	5880462	28380300T007 UNCOATED	B10	5895782	HPGT06T3DZENG WP25PM	A13	5988982	XDCT170408PEERML WP35CM	A6
5880381	D0111000T019 TIALN	B9	5880463	28380400T008 UNCOATED	B10	5895783	HPGT06T3DZENG WP40PM	A13	5988983	XDCT170408PEERML WP25PM	A6
5880382	D0111200T022 TIALN	B9	5880464	28380500T010 UNCOATED	B10	5895784	HPGT06T3DZERLD WP25PM	A13	5988986	XDCT170412PEERML WP40PM	A6
5880383	D0111400T022 TIALN	B9	5880465	28380600T010 UNCOATED	B10	5895785	HPGT06T3DZERLD WP40PM	A13	5988987	XDCT170412PEERML WP35CM	A6
5880384	D0111600T026 TIALN	B9	5880466	28380800T016 UNCOATED	B10	5895786	HPGT06T3DZERLD3W WP25PM	A13	5988988	XDCT170412PEERML WP25PM	A6
5880385	D0012000T020 TIALN	B9	5880467	28381000T019 UNCOATED	B10	5895787	HPGT06T3DZERLD3W WP40PM	A13	5989010	XDCT170404PEERML WP25PM	A6
5880386	D0112000T032 TIALN	B9	5880468	28381200T022 UNCOATED	B10	5895788	HPPT06T3DZENG WP25PM	A13	5998607	32MHCSCFC120M	E26
5880387	40010100T004 TIALN	B11	5880469	28381400T022 UNCOATED	B10	5895789	HPPT06T3DZENG WP40PM	A13	5998608	32MHCSCFC140M	E26
5880388	40010150T005 TIALN	B11	5880470	28381600T026 UNCOATED	B10	5895790	HPPT06T3DZENG WP35CM	A13	5998609	32MHCSCFC160M	E26
5880389	40010200T006 TIALN	B11	5880471	28382000T032 UNCOATED	B10	5901354	XDPT110424PDSRMM WP40PM	A5	5998610	32MHCSCFC200M	E26
5880390	40010250T007 TIALN	B11	5883097	XNPU15T608ERML WP25PM	A25	5901355	XDPT110424PDSRMM WP25PM	A5	5998751	32MHCSCFC250M	E26
5880391	40010300T009 TIALN	B11	5883098	XNPU15T608ERML WP40PM	A25	5905657	TTWCNGNA	E33	5998754	12HCSFC0500	E26
5880392	40010350T012 TIALN	B11	5883099	XNPU15T608ERML WU35PM	A25	5906168	TTWCNGEJ	E33	5998755	12HCSFC0625	E26
5880393	40010400T012 TIALN	B11	5883447	XNPU15T616SRMM WP25PM	A16,	5949204	XNGU15T604SRMM WP25PM	A25	5998756	12HCSFC0750	E26
5880395	40110400T019 TIALN	B11			A25	5949205	XNGU15T604SRMM WP40PM	A25	5998757	12HCSFC1000	E26
5880396	40210400T031 TIALN	B11	5883448	XNPU15T616SRMM WP40PM	A16,	5949206	XNGU15T604SRMM WU35PM	A25	6001239	XDCT170440PEERML WP25PM	A6
5880397	40210500T014 TIALN	B11			A25	5966234	VSM490KITS025Z02WP40PM	A27	6001251	XDCT170432PEERML WP25PM	A6
5880398	40010600T020 TIALN	B11	5883449	XNPU15T616SRMM WU35PM	A16,	5966235	VSM490KITS032Z03WP40PM	A27	6001253	XDCT170424PEERML WP25PM	A6
5880399	40110600T028 TIALN	B11			A25	5966236	VSM490KITS040Z04WP40PM	A27	6001255	XDCT170420PEERML WP25PM	A6
5880400	40210600T038 TIALN	B11	5883450	XNPU15T616SRMM WP35CM	A16,	5966237	VSM490KITS050Z05WP40PM	A27	6001257	XDCT170416PEERML WP25PM	A6
5880401	40010600T020 TIALN	B11			A25	5966238	VSM490KITS050Z06WP40PM	A27	6003570	XNGU15T608SRMM WP25PM	A25
5880402	40110800T028 TIALN	B11	5883521	XNPU15T616SRMM WK15PM	A16,	5966239	VSM490KITS063Z06WP40PM	A27	6003721	XNGU15T608SRMM WP40PM	A25
5880403	40210800T040 TIALN	B11			A25	5966240	VSM490KITS080Z07WP40PM	A27	6003722	XNGU15T608SRMM WU35PM	A25
5880404	40011000T022 TIALN	B11	5883522	XNPU15T616SRMM WK15CM	A16,	5966251	VSM490KITS0100Z08WP40PM	A27	6003723	XNGU15T608SRMM WP35CM	A25
5880405	40111000T032 TIALN	B11			A25	5966252	VSM490KITS025Z02WU35PM	A28	6003724	XNGU15T608SRMM WK15PM	A25
5880406	40211000T045 TIALN	B11	5890728	XNPU15T612SRMM WP25PM	A16,	5966253	VSM490KITS032Z03WU35PM	A28	6003725	XNGU15T608SRMM WK15CM	A25
5880407	40011200T025 TIALN	B12			A25	5966255	VSM490KITS040Z04WU35PM	A28	6030372	XNPU15T620SRMM WP25PM	A16,
5880408	40111200T045 TIALN	B12	5890729	XNPU15T612SRMM WP40PM	A16,	5966256	VSM490KITS050Z05WU35PM	A28			A25
5880409	40211200T075 TIALN	B12			A25	5966257	VSM490KITS050Z06WU35PM	A28	6030373	XNPU15T620SRMM WP40PM	A16,
5880410	40011400T032 TIALN	B12	5890730	XNPU15T612SRMM WU35PM	A16,	5966258	VSM490KITS063Z06WU35PM	A28			A25
5880411	40011600T032 TIALN	B12			A25	5966259	VSM490KITS080Z07WU35PM	A28	6030374	XNPU15T620SRMM WP35CM	A16,
5880412	40012000T038 TIALN	B12	5890761	XNPU15T612SRMM WP35CM	A16,	5966260	VSM490KITS080Z07WU35PM	A28			A25
5880413	40112000T075 TIALN	B12			A25	5966261	VSM490KITS032Z03WK15PM	A28	6030375	XNPU15T620SRMM WK15CM	A16,
5880425	40010100T004 UNCOATED	B11	5890762	XNPU15T612SRMM WK15PM	A16,	5966262	VSM490KITS040Z04WK15PM	A28			A25
5880426	40010150T005 UNCOATED	B11			A25	5966263	VSM490KITS050Z05WK15PM	A28	6030376	XNGU15T616SRMM WP25PM	A25
5880427	40010200T006 UNCOATED	B11	5890763	XNPU15T612SRMM WK15CM	A16,	5966264	VSM490KITS050Z06WK15PM	A28	6030377	XNGU15T616SRMM WP35CM	A25
5880428	40010250T007 UNCOATED	B11			A25	5966265	VSM490KITS063Z07WK15PM	A28	6030378	XNGU15T616SRMM WK15PM	A25
5880429	40010300T009 UNCOATED	B11	5890821	XNGU15T604ERML WP25PM	A15,	5966266	VSM490KITS080Z09WK15PM	A28	6030380	XNGU15T616SRMM WK15CM	A25
5880430	40010400T012 UNCOATED	B11			A24	5966267	VSM490KITS0100Z11WK15PM	A28	6048237	HSK63AHCTHT32100	E4
5880431	40110400T019 UNCOATED	B11	5890822	XNGU15T604ERML WP40PM	A15,	5980398	XDPT110420PDSRMM WP40PM	A5	6048238	HSK63AHCTHT125400	E4
5880432	40210400T031 UNCOATED	B11			A24	5980399	XDPT110420PDSRMM WP25PM	A5	6048255	DV40HCTHT32080M	E13
5880433	40010500T014 UNCOATED	B11	5890823	XNGU15T604ERML WU35PM	A15,	5980400	XDPT110420PDSRMM WP35CM	A5	6048256	DV40HCTHT125315	E13
5880435	40010600T020 UNCOATED	B11			A24	5987689	XDPT170404PESRMM WP40PM	A7	6048257	BT40HCTHT32080M	E10
5880436	40110600T028 UNCOATED	B11	5895291	HNGJ0704ANENLD WP25PM	A8	5987690	XDPT170404PESRMM WU35PM	A7	6048258	BT40HCTHT125315	E10
5880437	40210600T038 UNCOATED	B11	5895292	HNGJ0704ANENLD WP35CM	A8	5987946	XDPT170408PESRMM WP40PM	A7	6048259	BT40HCTHT32080M	E14
5880438	40010800T020 UNCOATED	B11	5895293	HNPJ0704ANSNGD WP25PM	A9	5987947	XDPT170408PESRMM WP35CM	A7	6048260	BT40HCTHT125315	E14
5880439	40110800T028 UNCOATED	B11	5895294	HNPJ0704ANSNGD WP35CM	A9	5987948	XDPT170408PESRMM WK15CM	A7	6048261	CVK40HCTHT125315	E15
5880440	40210800T040 UNCOATED	B11	5895295	HNPJ0704ANSNHD WP25PM	A9	5987949	XDPT170408PESRMM WP25PM	A7	6055331	TRF11000H7SF WU05PR	C5
5880441	40011000T022 UNCOATED	B11	5895296	HNPJ0704ANSNHD WP35CM	A9	5987950	XDPT170408PESRMM WU35PM	A7	6055332	TRF15000H7SF WU05PR	C5
5880442	40111000T032 UNCOATED	B11	5895297	HNPJ070432ANSNHD WP40PM	A9	5988138	XDPT170412PESRMM WK15CM	A7	6055333	TRF16000H7SF WU05PR	C5
5880443	40211000T045 UNCOATED	B11	5895298	XNGJ0704ANENLD3W WP25PM	A8	5988139	XDPT170412PESRMM WP40PM	A7	6055334	TRF17000H7SF WU05PR	C5
5880444	40011200T025 UNCOATED	B12	5895299	XNGJ0704ANENLD3W WP40PM	A8	5988140	XDPT170412PESRMM WP35CM	A7	6055335	TRF18000H7SF WU05PR	C5

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6055337	TRF20000H7SF WU05PR	C5	6071093	4X47250NDL25 WP15PE	B46	6085377	D0141200T026S TIALN	B31	6085578	40240400T031S TIALN	B33
6055338	TRF14000H7HF WU05PR	C6	6071094	4X47320NDL32 WP15PE	B46	6085378	D0041400T018S TIALN	B31	6085579	40040450T014S TIALN	B33
6055339	TRF15000H7HF WU05PR	C6	6071111	4X481603DL16 WS15PE	B47	6085379	D0141400T026S TIALN	B31	6085580	40040500T013S TIALN	B33
6055340	TRF16000H7HF WU05PR	C6	6071112	4X481605DL16 WS15PE	B47	6085380	D0041600T022S TIALN	B31	6085581	40040500T020S TIALN	B33
6055341	TRF17000H7HF WU05PR	C6	6071113	4X481607DL16 WS15PE	B47	6085391	D0141600T032S TIALN	B31	6085582	40140500T030S TIALN	B33
6055342	TRF18000H7HF WU05PR	C6	6071114	4X482003DL20 WS15PE	B47	6085392	D0041800T024S TIALN	B31	6085583	40240500T031S TIALN	B33
6055343	TRF19000H7HF WU05PR	C6	6071115	4X482005DL20 WS15PE	B47	6085393	D0141800T032S TIALN	B31	6085584	40040600T016S TIALN	B33
6055344	TRF20000H7HF WU05PR	C6	6071116	4X482007DL20 WS15PE	B47	6085394	D0042000T026S TIALN	B31	6085585	40140600T028S TIALN	B33
6055345	SS20WST175RR3M	C9	6071117	4X482008DL20 WS15PE	B47	6085395	D0142000T038S TIALN	B31	6085586	40240600T038S TIALN	B33
6055346	SS20WST175RR5M	C9	6071118	4X482503DL25 WS15PE	B47	6085396	D0041200W016S TIALN	B31	6085587	40040700T020S TIALN	B33
6055347	SS20WST200RR3M	C9	6071119	4X482505DL25 WS15PE	B47	6085397	D0141200W026S TIALN	B31	6085588	40040800T020S TIALN	B34
6055348	SS20WST200RR5M	C9	6071120	4X482507DL25 WS15PE	B47	6085398	D0041400W018S TIALN	B31	6085589	40140800T028S TIALN	B34
6055349	SS25WST250RR3M	C9	6071121	4X482508DL25 WS15PE	B47	6085399	D0141400W026S TIALN	B31	6085590	40240800T041S TIALN	B34
6055350	SS25WST250RR5M	C9	6071122	4X483205DL32 WS15PE	B47	6085400	D0041600W022S TIALN	B31	6085591	40040900T020S TIALN	B34
6055351	SS32WST300RR3M	C9	6071123	4X483207DL32 WS15PE	B47	6085401	D0141600W032S TIALN	B31	6085592	40041000T022S TIALN	B34
6055352	SS32WST300RR5M	C9	6071151	4XN01600DL16 WS15PE	B56	6085402	D0041800W024S TIALN	B31	6085593	40141000T032S TIALN	B34
6055353	SS32WST350RR3M	C9	6071152	4XN0200DL20 WP15PE	B56	6085403	D0141800W032S TIALN	B31	6085594	40241000T045S TIALN	B34
6055354	SS32WST350RR5M	C9	6071153	4XN0250DL25 WP15PE	B56	6085404	D0042000W026S TIALN	B31	6085595	40041200T025S TIALN	B34
6058784	VTSP08605 WP49EG	D30	6071362	5747160NDL16 WP15PE	B50	6085405	D0142000W038S TIALN	B31	6085596	40141200T045S TIALN	B34
6058785	VTSP08605 WU41EG	D30	6071363	5747200NDL20 WP15PE	B50	6085406	D0041200W016S UNCOATED	B31	6085597	40241200T075S TIALN	B34
6058786	VTSP08606 WP49EG	D30	6071364	5747250NDL25 WP15PE	B50	6085407	D0141200W026S UNCOATED	B31	6085598	40041400T032S TIALN	B34
6058787	VTSP08606 WU41EG	D30	6071365	5747320NDL32 WP15PE	B50	6085408	D0041400W018S UNCOATED	B31	6085599	40141400T050S TIALN	B34
6058788	VTSP08607 WP49EG	D30	6071372	57481603DL16 WS15PE	B51	6085409	D0141400W026S UNCOATED	B31	6085600	40241400T075S TIALN	B34
6058790	VTSP08607 WU41EG	D30	6071373	57481605DL16 WS15PE	B51	6085410	D0041600W022S UNCOATED	B31	6085601	40041600T032S TIALN	B34
6058791	VTSP08608 WP49EG	D30	6071374	57481607DL16 WS15PE	B51	6085421	D0141600W032S UNCOATED	B31	6085602	40141600T056S TIALN	B34
6058792	VTSP08608 WU41EG	D30	6071375	57482003DL20 WS15PE	B51	6085427	40241400W075S TIALN	B34	6085603	40241600T075S TIALN	B34
6058793	VTSP08609 WP49EG	D30	6071376	57482005DL20 WS15PE	B51	6085428	40041800W038S TIALN	B34	6085604	40041800T038S TIALN	B34
6058794	VTSP08609 WU41EG	D30	6071377	57482007DL20 WS15PE	B51	6085429	40141800W060S TIALN	B34	6085605	40141800T060S TIALN	B34
6058796	VTSP08610 WP49EG	D30	6071378	57482008DL20 WS15PE	B51	6085430	40241800W075S TIALN	B34	6085606	40241800T075S TIALN	B34
6058797	VTSP08610 WU41EG	D30	6071379	57482503DL25 WS15PE	B51	6085511	40042000W038S TIALN	B34	6085607	40042000T038S TIALN	B34
6058798	VTSP08611 WP49EG	D30	6071380	57482505DL25 WS15PE	B51	6085512	40142000W056S TIALN	B34	6085608	40142000T056S TIALN	B34
6058799	VTSP08611 WU41EG	D30	6071391	57482507DL25 WS15PE	B51	6085513	40242000W075S TIALN	B34	6085609	40242000T075S TIALN	B34
6058800	VTSP08612 WP49EG	D30	6071392	57482508DL25 WS15PE	B51	6085522	40040400T011S UNCOATED	B33	6085610	40041200W025S TIALN	B34
6058811	VTSP08612 WU41EG	D30	6071393	57483205DL32 WS15PE	B51	6085523	40040450T014S UNCOATED	B33	6085611	40141200W045S TIALN	B34
6058814	VTSTF8605 WP49EG	D31	6071394	57483207DL32 WS15PE	B51	6085524	40040500T020S UNCOATED	B33	6085612	40241200W075S TIALN	B34
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6058819	VTSTF8607 WU41EG	D31	6071525	774E2005DL20 WS15PE	B54	6085529	40140800T028S UNCOATED	B34	6086478	D0041800W024S UNCOATED	B31
6058820	VTSTF8608 WP49EG	D31	6071526	774E2007DL20 WS15PE	B54	6085530	40240800T041S UNCOATED	B34	6086479	D0141800W032S UNCOATED	B31
6058821	VTSTF8608 WU41EG	D31	6071527	774E2008DL20 WS15PE	B54	6085531	40041000T022S UNCOATED	B34	6086480	D0042000W026S UNCOATED	B31
6058822	VTSTF8609 WP49EG	D31	6071528	774E2503DL25 WS15PE	B54	6085532	40141000T032S UNCOATED	B34	6086491	D0142000W038S UNCOATED	B31
6058823	VTSTF8609 WU41EG	D31	6071529	774E2505DL25 WS15PE	B54	6085533	40241000T045S UNCOATED	B34	6086492	25280400T011S TIALN	B32
6058824	VTSTF8610 WP49EG	D31	6071530	774E2507DL25 WS15PE	B54	6085534	40041200T025S UNCOATED	B34	6086493	25280500T013S TIALN	B32
6058825	VTSTF8610 WU41EG	D31	6071531	774E2508DL25 WS15PE	B54	6085535	40141200T045S UNCOATED	B34	6086494	25280600T013S TIALN	B32
6058826	VTSTF8611 WP49EG	D31	6071532	774E3205DL32 WS15PE	B54	6085536	40241200T075S UNCOATED	B34	6086495	25280800T019S TIALN	B32
6058827	VTSTF8611 WU41EG	D31	6071533	774E3207DL32 WS15PE	B54	6085537	40041400T032S UNCOATED	B34	6086496	40241400T022S TIALN	B32
6058828	VTSTF8612 WP49EG	D31	6082644	XNGU15T604ERALP WN25PM	A24	6085538	40141400T050S UNCOATED	B34	6086497	25281200T026S TIALN	B32
6058829	VTSTF8612 WU41EG	D31	6082645	XNGU15T608ERALP WN25PM	A24	6085539	40241400T075S UNCOATED	B34	6086498	25281400T026S TIALN	B32
6058953	VTSTR8301 WU40EG	D32	6085348	D0040400T008S TIALN	B30	6085540	40041600T032S UNCOATED	B34	6086499	25281600T032S TIALN	B32
6058954	VTSTR8302 WU40EG	D32	6085349	D0140400T011S TIALN	B30	6085541	40141600T056S UNCOATED	B34	6086500	25281800T032S TIALN	B32
6058955	VTSTR8303 WU40EG	D32	6085350	D0140450T011S TIALN	B30	6085542	40241600T075S UNCOATED	B34	6086501	25282000T038S TIALN	B32
6058956	VTSTR8304 WU40EG	D32	6085361	D0040500T009S TIALN	B30	6085543	40041800T038S UNCOATED	B34	6086502	25281200T026S UNCOATED	B32
6058957	VTSTR8305 WU40EG	D32	6085362	D0140500T013S TIALN	B30	6085544	40141800T060S UNCOATED	B34	6086503	25281400T026S UNCOATED	B32
6058958	VTSTR8306 WU40EG	D32	6085363	D0140550T013S TIALN	B30	6085545	40241800T075S UNCOATED	B34	6086504	25281600T032S UNCOATED	B32
6058959	VTSTR8307 WU40EG	D32	6085364	D0040600T010S TIALN	B30	6085546	40042000T038S UNCOATED	B34	6086505	25281800T032S UNCOATED	B32
6058960	VTSTR8801 WU40EG	D32	6085365	D0140600T013S TIALN	B30	6085547	40142000T056S UNCOATED	B34	6086506	25282000T038S UNCOATED	B32
6059011	VTSTR8802 WU40EG	D32	6085366	D0140650T016S TIALN	B30	6085548	40242000T075S UNCOATED	B34	6086507	25280400T011S UNCOATED	B32
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6059013	VTSTR8804 WU40EG	D32	6085368	D0140700T016S TIALN	B30	6085550	40141200W045S UNCOATED	B34	6086509	25280600T013S UNCOATED	B32
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6059015	VTSTR8806 WU40EG	D32	6085370	D0040800T012S TIALN	B31	6085552	40041400W032S UNCOATED	B34	6086511	25281000T022S UNCOATED	B32
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6065590	RNGJ10T3M0FALP WN25PM	A36	6085372	D0040900T013S TIALN	B31	6085554	40241400W075S UNCOATED	B34	6086513	40041800W038S UNCOATED	B34
6065561	RNGJ1204M0FALP WN25PM	A44	6085373	D0140900T019S TIALN	B31	6085555	40041600W032S UNCOATED	B34	6086514	40141800W060S UNCOATED	B34
6065562	RNGJ1605M0FALP WN25PM	A49	6085374	D0041000T014S TIALN	B31	6085556	40141600W056S UNCOATED	B34	6086515	40241800W075S UNCOATED	B34
6071091	4X47160NDL16 WP15PE	B46	6085375	D0141000T022S TIALN	B31	6085576	40040400T011S TIALN	B33	6086516	40042000W038S UNCOATED	B34

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6092298	D0020400T005S TIALN	B4	6092435	D0121800T026S UNCOATED	B5	6135057	SS20SLDL20070M	B61	6136958	PSC63DL20050M	B58
6092299	D0120400T008S TIALN	B4	6092436	D0022000T020S UNCOATED	B5	6135059	SS25SLDL16115M	B61	6136959	PSC63DL25060M	B58
6092300	D0020450T005S TIALN	B4	6092438	D0122000T032S UNCOATED	B5	6135061	SS25SLDL20095M	B61	6136960	PSC63DL32068M	B58
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6092307	D0120700T013S TIALN	B4	6092565	28191000T019S TIALN	B6	6135191	TRF22000H7SF WU05PR	C5	6136991	BT40BDL25060M	B59
6092308	D0020800T009S TIALN	B4	6092566	28191200T022S TIALN	B6	6135192	TRF23000H7SF WU05PR	C5	6136992	BT40BDL32068M	B59
6092309	D0120800T016S TIALN	B5	6092567	28191400T022S TIALN	B6	6135193	TRF24000H7SF WU05PR	C5	6136995	DV40BDL16050M	B60
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6092333	D0122000T032S TIALN	B5	6092583	28191500T026S UNCOATED	B6	6135207	TRF38000H7SF WU05PR	C5	6143824	D0130800T016S UNCOATED	B21
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6092336	D0021400W014S TIALN	B5	6092586	28192000T032S UNCOATED	B6	6135210	TRF41000H7SF WU05PR	C5	6143827	D0131400T022S UNCOATED	B21
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6092341	D0121800W026S TIALN	B5	6092626	40020480T014S TIALN	B7	6135215	TRF24000H7HF WU05PR	C6	6143832	D0130250W007S UNCOATED	B20
6092342	D0022000W020S TIALN	B5	6092627	40020500T014S TIALN	B7	6135216	TRF25000H7HF WU05PR	C6	6143833	D0130300W007S UNCOATED	B20
6092344	D0122000W032S TIALN	B5	6092628	40020500T038S TIALN	B7	6135217	TRF26000H7HF WU05PR	C6	6143834	D0130350W007S UNCOATED	B20
6092345	D0021200W012S UNCOATED	B5	6092631	40120500T031S TIALN	B7	6135218	TRF27000H7HF WU05PR	C6	6143835	D0130400W008S UNCOATED	B20
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6092350	D0121600W026S UNCOATED	B5	6092637	40020700T020S TIALN	B7	6135223	TRF32000H7HF WU05PR	C6	6143840	D0130700W013S UNCOATED	B20
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6092384	D0122000W032S UNCOATED	B5	6092641	40020900T020S TIALN	B8	6135227	TRF36000H7HF WU05PR	C6	6143844	D0131400W022S UNCOATED	B21
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6092394	D0020450T005S UNCOATED	B4	6092645	40121000T045S TIALN	B8	6135230	TRF39000H7HF WU05PR	C6	6143847	D0132000W032S UNCOATED	B21
6092395	D0120450T008S UNCOATED	B4	6092646	40021100T025S TIALN	B8	6135231	TRF40000H7HF WU05PR	C6	6144056	4003010T004S TIALN	B24
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6092422	D0121000T019S UNCOATED	B5	6092682	40121800T075S TIALN	B8	6135421	TWTMINSERDL12W	B62	6144312	D0031000T011 TIALN	B22
6092423	D0021200T012S UNCOATED	B5	6092683	40022000T038S TIALN	B8	6135422	TWTMEXT	B62	6144313	D0031200T012 TIALN	B22
6092424	D0121200T022S UNCOATED	B5	6092684	40022000T056S TIALN	B8	6135423	TWTMBC	B62	6144314	D0031400T014 TIALN	B22
6092426	D0021400T014S UNCOATED	B5	6092685	40122000T075S TIALN	B8	6136951	HSK63ADL16057M	B58	6144315	D0031600T016 TIALN	B23
6092427	D0121400T022S UNCOATED	B5	6102465	40141600W056S TIALN	B34	6136952	HSK63ADL20057M	B58	6144316	D0031800T018 TIALN	B23
6092429	D0021600T016S UNCOATED	B5	6118069	XDCT170460PEERML WP40PM	A6	6136953	HSK63ADL25061M	B58	6144317	D0032000T020 TIALN	B23

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6145303	40130300T019S UNCOATED	B24	6172510	VTSFT-TC6530 WU41EG	D22	6172789	VTSFT-TC6014 WP49EG	D26	6172964	VTSFT-TC6048 WU41EG	D27
6145304	40130500W020 UNCOATED	B25	6172511	VTSFT-TC6536 WP49EG	D22	6172790	VTSFT-TC6014 WU41EG	D26	6172965	VTSFT-TC6049 WP49EG	D27
6145305	40130400T019S UNCOATED	B24	6172512	VTSFT-TC6536 WU41EG	D22	6172791	VTSFT-TC6015 WP49EG	D26	6172966	VTSFT-TC6049 WU41EG	D27
6145306	40130600W028 UNCOATED	B25	6172671	VTSFT-TC6532 WP49EG	D22	6172792	VTSFT-TC6015 WU41EG	D26	6173196	VTSFT-TC6708 WP49EG	D23
6145307	40130500T020S UNCOATED	B24	6172672	VTSFT-TC6532 WU41EG	D22	6172793	VTSFT-TC6016 WP49EG	D26	6173197	VTSFT-TC6708 WU41EG	D23
6145308	40130800W028 UNCOATED	B25	6172673	VTSFT-TC6534 WP49EG	D22	6172794	VTSFT-TC6016 WU41EG	D26	6173198	VTSFT-TC6710 WP49EG	D23
6145309	40130600T028S UNCOATED	B24	6172674	VTSFT-TC6534 WU41EG	D22	6172795	VTSFT-TC6017 WP49EG	D26	6173199	VTSFT-TC6710 WU41EG	D23
6145310	40131000W032 UNCOATED	B25	6172675	VTSFT-TC6564 WP49EG	D22	6172796	VTSFT-TC6017 WU41EG	D26	6173200	VTSFT-TC6711 WP49EG	D23
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6145316	40132000W064 UNCOATED	B25	6172691	VTSFT-TC6539 WP49EG	D22	6172802	VTSFT-TC6052 WU41EG	D26	6173216	VTSFT-TC6723 WP49EG	D23
6145317	40131600T056S UNCOATED	B24	6172692	VTSFT-TC6539 WU41EG	D22	6172803	VTSFT-TC6021 WP49EG	D26	6173217	VTSFT-TC6723 WU41EG	D23
6145318	40132000T064S UNCOATED	B24	6172693	VTSFT-TC6541 WP49EG	D22	6172804	VTSFT-TC6021 WU41EG	D26	6173218	VTSFT-TC6728 WP49EG	D23
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6145321	40130500W020S UNCOATED	B24	6172695	VTSFT-TC6542 WP49EG	D22	6172806	VTSFT-TC6054 WU41EG	D26	6173220	VTSFT-TC6732 WP49EG	D23
6145322	40130600W028S UNCOATED	B24	6172696	VTSFT-TC6542 WU41EG	D22	6172807	VTSFT-TC6056 WP49EG	D26	6173231	VTSFT-TC6732 WU41EG	D23
6145323	40130800W028S UNCOATED	B24	6172697	VTSFT-TC6543 WP49EG	D22	6172808	VTSFT-TC6056 WU41EG	D26	6173232	VTSFT-TC6735 WP49EG	D23
6145324	40131000W032S UNCOATED	B24	6172698	VTSFT-TC6543 WU41EG	D22	6172809	VTSFT-TC6024 WP49EG	D26	6173233	XDPT110408PDSRMM WS40PM	A5
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6172442	VTSFT-TC6510 WU41EG	D21	6172717	VTSFT-TC6548 WP49EG	D22	6172818	VTSFT-TC6062 WU41EG	D27	6180173	XDCT110408PDERML WS40PM	A4
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Visit widia.com for additional contact information for locations.

North America

United States

General Sales: +1 800 979 4342
w-na.service@widia.com
 Technical Support: +1 888 539 5145
na.techsupport@widia.com

Canada

General Sales: +1 800 979 4342
 Technical Support: +1 888 539 5145
na.techsupport@widia.com

Mexico

General Sales: 001 888 402 4963
 Technical Support: 888 539 5145
na.techsupport@widia.com

Central/South America

Argentina

General Sales: +54 11 4719 0700
w-ar.service@widia.com

Brazil

General Sales: +55 19 3936 9200
w-br.service@widia.com

Chile

General Sales: +56 2 2641177
w-cl.service@widia.com

El Salvador

General Sales: +503 2218 8096
prometca@salnet.net

Venezuela

General Sales: +58 305 595 5175
paxi@bellsouth.net

Africa

Egypt

General Sales: +20 2 263 9828
w-uk.service@widia.com

South Africa

General Sales: +27 11 748 9300
w-za.service@widia.com
 Technical Support: 0800 981644

Europe

Austria

General Sales: +43 2236 379898
 Technical Support: 0800 291630
w-at.service@widia.com

Belgium

General Sales: 0800 81372
 Technical Support: 0800 80410
w-be.service@widia.com

Czech Republic

General Sales: 800 900 840
w-cz.service@widia.com

Denmark

Technical Support: +45 808 89295
na.techsupport@widia.com

Finland

Technical Support: 0800 919413
na.techsupport@widia.com

France

General Sales: +33 1 60 12 81 00
 Technical Support: +33 080 5540 379
w-fr.service@widia.com

Germany

General Sales: 0800 7242999
 Technical Support: 0800 1015774
w-de.service@widia.com

Great Britain

General Sales: 0800 072 4528
 Technical Support: 0800 028 2996
w-uk.service@widia.com

Hungary

General Sales: +36 96 618 158
w-hu.service@widia.com

Italy

General Sales: +39 02 895 961
 Technical Support: 800 916568
w-it.service@widia.com

Luxemborg

General Sales: +32 4 248 48 48
w-be.service@widia.com

Netherlands

General Sales: 0800 3500103
 Technical Support: 0800 0201131
w-nl.service@widia.com

Norway

Technical Support: 800 10081
na.techsupport@widia.com

Poland

General Sales: 008004411941
w-pl.service@widia.com
 Technical Support: 00800 4411943

Portugal

General Sales: +351 22 4119 400
w-pt.service@widia.com

Russia

General Sales: +7 81080021431044
w-ru.service@widia.com
 Technical Support:
 Landline: +7 8800 5556395
 Cell Phone: +7 8005556395
eu.techsupport@widia.com

Slovakia

General Sales: 0800 044053
w-sk.service@widia.com

Spain

General Sales: +34 93706 06 10
w-es.service@widia.com

Sweden

Technical Support: +46 020798794
na.techsupport@widia.com

Turkey

General Sales: +90 216 574 4780
w-tr.service@widia.com

Ukraine

General Sales: +380 0048 616656573
w-ru.service@widia.com
 Technical Support: 0800502665
eu.techsupport@widia.com

East/Asia Pacific**Australia**

General Sales: +61 1300 094 342 (Local)
+61 7 3801 5844 (Overseas)
w-au.service@widia.com

China

General Sales: +86 400 889 2136
Technical Support: +86 400 889 2237
w-cn.service@widia.com

India

General Sales: +91 80 2219 8215
Technical Support: 1 800 103 5227
Order Support: 1 800 103 5139
in.techsupport@widia.com

Israel

General Sales: +972 3 5562211
w-il.sales@widia.com

Japan

General Sales: +81 3 3820 2855
w-jp.service@widia.com

Korea

General Sales: +82 2 2109 5505
w-kr-service@widia.com

Middle East*

General Sales: 0800 072 4528
Technical Support: 0800 028 2996
w-uk.service@widia.com

*Includes Bahrain, Dubai, and Kuwait.

Malaysia

General Sales: +60 03-5569 9080
w-my.service@widia.com

New Zealand

General Sales: 0800 536 626 (Local)
+61 1300 094 342 (Overseas)
w-nz.service@widia.com

Singapore*

General Sales: +65 65724466
w-sg.service@widia.com

*Vietnam, Philippines, and Indonesia individuals should contact the Singapore office.

Taiwan

General Sales: +886 4 2350 1920
w-tw.service@widia.com

Thailand

General Sales: +66 2 642 3455
w-th.service@widia.com



Indexable Milling Icons

Face Milling	Slotting: Square End	Side Milling/ Shoulder Milling: Ball Nose	Side Milling/ Shoulder Milling: Square End	3D Profiling
Pocketing	Plain Shank	Weldon® Shank	Weldon Shank: 2 Flat	Screw-On Shank
Shell Mill Shank	Through Coolant: Radial: Indexable Milling			

Solid End Milling Icons

Plunge Milling	Ramping: Blank	Ramping: 3°	Slotting: Ball Nose	Slotting: Ball Nose with AP Dimension
Slotting: Square End	Slotting: Square End with AP Dimension	Trochoidal Milling	Side Milling/ Shoulder Milling: Ball Nose	Side Milling/ Shoulder Milling: Ball Nose with AE/AP Dimension
Side Milling/ Shoulder Milling: Square End	Side Milling/ Shoulder Milling: Square End with AE/AP Dimension	3D Profiling	Corner Style: Ball Nose	Corner Style: Corner Chamfer
Corner Style: Corner Radius	Corner Style: Square End	Shank: SK BT (MAS-403-BT)	Shank: SK DV (DIN 69871)	Shank: CAT: Drawbar Thread 5/8"-11 unc
Shank: HSK Shank: A/DIN Number 69893	Shank: Safe-Lock™ <h6	Shank: Safe-Lock™ Shank	Shank: PSC Shank	Duo-Lock™ Connection
Helix Angle: 30°	Helix Angle: 38°	Balance: G 2.5/25,000 min	DIN 6527	DIN 6528

(continued)

(continued)
Solid End Milling Icons

Through Coolant: Axial: Drilling	Tool Dimensions: Flute Configuration: 2	Tool Dimensions: Flute Configuration: 3	Tool Dimensions: Flute Configuration: 4	Tool Dimensions: Flute Configuration: 5
Tool Dimensions: Flute Configuration: 7	Manufacturer's Specs: ISO 26622			

Holemaking Icons

Reaming: Through Hole	Reaming: Blind Hole	Reaming: Through and Cross Holes	Reaming: Blind and Cross Holes	Shank: Cylindrical Plain
Shank: Cylindrical Plain ≤h6	Through Coolant: Radial Drilling	Through Coolant: Axial: Drilling	Through Coolant: Axial Reaming	

Tapping Icons

Tapping: Through Hole	Tapping: Blind Hole	HSS-E: High-Speed Steel with Cobalt for Materials with Higher Hardness	Square Shank	Chamfer Form B (3.5-5)
Chamfer Form C (2-3)	Chamfer Form E (1.5-2)	Plug Chamfer (3-5)	Tapping Helix: Angle: 0°	Tapping Helix: Angle: 42°
Tapping Helix: Angle: 45°	Multipurpose Taps: Spiral Point	Tension/ Compression	DIN Number 371	DIN Number 374
DIN Number 376	DIN Number 5156	Flood Coolant: Tapping	ISO 2	Manufacturer's Specs: JIS
Class of Fit: 2B	Class of Fit: 3B	Class of Fit: 6H	Class of Fit: 6G	Unified Fine Thread

(continued)

(continued)

Tapping Icons

Unified Course Thread	American Tapered Pipe Thread for Threads with Dryseal Material	American Tapered Pipe Thread for Threads without Dryseal Material	Manufacturer's Specs: G	Unified Course Thread: J Profile
Unified Fine Thread: J Profile	ISO Metric Coarse Thread	ISO Metric Fine Thread		

Tooling Systems Icons

Shank: Cylindrical Plain ≤h6	Shank: SK BT (MAS-403-BT)	SK Shank: CAT (ANSI B5.50)	Shank: SK DV (DIN 69871)	Shank: SK Shank: BT: Taper Face Contact
Shank: SK Shank: CAT: Taper Face Contact	Shank: HSK DIN Number 69893 Form A	Shank: HSK DIN Number 69893 Form A	Shank: KM-TS™ ISO 26622	Shank: KM-XMZ
Shank: KM4X™	Shank: Safe-Lock™ <h6	Axial Adjustments: End	Balance: G 2.5@ 25,000 min ⁻¹	Max RPM: 30,000
Accuracy: 3µm or Less	Through Coolant: Radial Drilling	Through Coolant: 100 bar	Through Coolant: 1500 psi	Through Coolant: Adaptor Face
Manufacturer's Specs: ISO 26622				

DIN – German Institute for Standardisation

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

material group	description	content	tensile strength RM (MPa)*	hardness (HB)	hardness (HRC)	material number
P0	Low-Carbon Steels, Long Chipping	C <0,25%	<530	<125	–	–
P1	Low-Carbon Steels, Short Chipping, Free Machining	C <0,25%	<530	<125	–	C15, Ck22, ST37-2, S235JR, 9SMnPb28, GS38
P2	Medium- and High-Carbon Steels	C >0,25%	>530	<220	<25	ST52, S355JR, C35, GS60, Cf53
P3	Alloy Steels and Tool Steels	C >0,25%	600–850	<330	<35	16MnCr5, Ck45, 21CrMoV5-7, 38SMn28
P4	Alloy Steels and Tool Steels	C >0,25%	850–1400	340–450	35–48	100Cr6, 30CrNiMo8, 42CrMo4, C70W2, S6525, X120Mn12
P5	Ferritic, Martensitic, and PH Stainless Steels	–	600–900	<330	<35	100Cr6, 30CrNiMo8, 42CrMo4, C70W2, S6525, X120Mn12
P6	High-Strength Ferritic, Martensitic, and PH Stainless Steels	–	900–1350	350–450	35–48	X102CrMo17, G-X120Cr29
M1	Austenitic Stainless Steel	–	<600	130–200	–	X5CrNi 18 10, X2CrNiMo 17 13 2, G-X25CrNiSi18 9, X15CrNiSi 20 12
M2	High-Strength Austenitic Stainless and Cast Stainless Steels	–	600–800	150–230	<25	X2CrNiMo 13 4, X5NiCr 32 21, X5CrNiNb 18 10, G-X15CrNi 25-20
M3	Duplex Stainless Steel	–	<800	135–275	<30	X8CrNiMo27 5, X2CrNiMoN22 5 3, X20CrNiSi25 4, G-X40CrNiSi27 4
K1	Grey Cast Iron	–	125–500	120–290	<32	GG15, GG25, GG30, GG40, GTW40
K2	Low- and Medium-Strength Ductile Irons (Nodular Irons) and Compacted Graphite Irons (CGI)	–	<600	130–260	<28	GGG40, GTS35
K3	High-Strength Ductile Irons and Austempered Ductile Iron (ADI)	–	>600	180–350	<43	GGG60, GTW55, GTS65
N1	Wrought Aluminium	–	–	–	–	AlMg1, Al99.5, AlCuMg1, AlCuBiPb, AlMgSi1, AlMgSiPb
N2	Low-Silicon Aluminium Alloys and Magnesium Alloys	Si <12,2%	–	–	–	GAISiCu4, GDAISi10Mg
N3	High-Silicon Aluminium Alloys and Magnesium Alloys	Si >12,2%	–	–	–	G-ALSi12, G-AISi17Cu4, G-AISi21CuNiMg
N4	Copper-, Brass-, Zinc-Based on Machinability Index Range of 70–100	–	–	–	–	CuZn40, Ms60, G-CuSn5ZnPb, CuZn37, CuSi3Mn
N5	Nylon, Plastics, Rubbers, Phenolics, Resins, Fibreglass	–	–	–	–	Lexan®, Hostalen™, Polystyrol, Makralon®
N6	Carbon, Graphite Composites, CFRP	–	–	–	–	CFK, GFK
N7	Metal Matrix Composites (MMC)	–	–	–	–	–
S1	Iron-Based, Heat-Resistant Alloys	–	500–1200	160–260	25–48	X1NiCrMoCu32 28 7, X12NiCrSi36 16, X5NiCrAlTi31 20, X40CoCrNi20 20
S2	Cobalt-Based, Heat-Resistant Alloys	–	1000–1450	250–450	25–48	Haynes® 188, Stellite® 6,21,31
S3	Nickel-Based, Heat-Resistant Alloys	–	600–1700	160–450	<48	INCONEL® 690, INCONEL 625, Hastelloy®, Nimonic® 75
S4	Titanium and Titanium Alloys	–	900–1600	300–400	33–48	Ti1, TiAl5Sn2, TiAl6V4, TiAl4Mo4Sn2
H1	Hardened Materials	–	–	–	44–48	GX260NiCr42, GX330NiCr42, GX300CrNiSi952, GX300CrMo153, Hardox® 400
H2	Hardened Materials	–	–	–	48–55	–
H3	Hardened Materials	–	–	–	56–60	–
H4	Hardened Materials	–	–	–	>60	–

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ORIGINATING COUNTRY	LANGUAGE	TEL	FAX	EMAIL
Australia	English	001-724-539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Austria	German	0800 291630	0049-911-9735-429 *	eu.techsupport@widia.com
Belgium	English/French	0800 80410	0049-911-9735-429 *	eu.techsupport@widia.com
China	Chinese	400-889-2237	+86-21-58999985 *	w-cn.techsupport@widia.com
Denmark	English	808 89295	001-724-539-6830 *	na.techsupport@widia.com
Finland	English	0800 919413	001-724-539-6830 *	na.techsupport@widia.com
France	French	080 5540 379	0049-911-9735-429*	eu.techsupport@widia.com
Germany	German	0800 1015774	0911-9735-429 *	eu.techsupport@widia.com
India	English	1 800 103 5227	—	in.techsupport@widia.com
Israel	English	1809 449907	001-724-539-6830 *	na.techsupport@widia.com
Italy	Italian	800 916568	02 89512146 *	eu.techsupport@widia.com
Japan	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Korea (South)	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Malaysia	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Netherlands	English	0800 0201131	001-724-539-6830 *	na.techsupport@widia.com
New Zealand	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Norway	English	800 10081	001-724-539-6830 *	na.techsupport@widia.com
Poland	Polish	00800 4411943	06166 56504 *	eu.techsupport@widia.com
Russia (landline)	Russian	8800 5556395	0048 6166 56504 *	eu.techsupport@widia.com
Russia (cell phone)	Russian	+7 8005556395	0048 6166 56504 *	eu.techsupport@widia.com
Singapore	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
South Africa	English	0800 981644	001-724-539-6830 *	na.techsupport@widia.com
Sweden	English	020798794	001-724-539-6830 *	na.techsupport@widia.com
Taiwan	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
Thailand	English	001-724539-6921 *	001-724-539-6830 *	ap.techsupport@widia.com
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Ukraine	Russian	800502665	0048 6166 56504 *	eu.techsupport@widia.com
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METALCUTTING SAFETY

Projectile and Fragmentation Hazards

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

To avoid injury:

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

Breathing and Skin Contact Hazards

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

To avoid injury:

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

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

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

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

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

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

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

INDIA HEADQUARTERS
WIDIA Products Group
Kennametal India Limited
CIN: L27109KA1964PLC001546
8/9th Mile, Tumkur Road
Bangalore - 560 073
Tel: +91 80 2839 4321
w-in.service@widia.com

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