

GÜHRING

- taps for metric, metric-fine, UNC, UNF and PT threads
- for universal applications, stainless steel, cast iron and aluminium as well as for hard machining
- HSS-E-PM high-performance taps with new TiAlN-coating for improved chip evacuation and short chip generation



JIS TAPS

GÜHRING – YOUR WORLDWIDE PARTNER

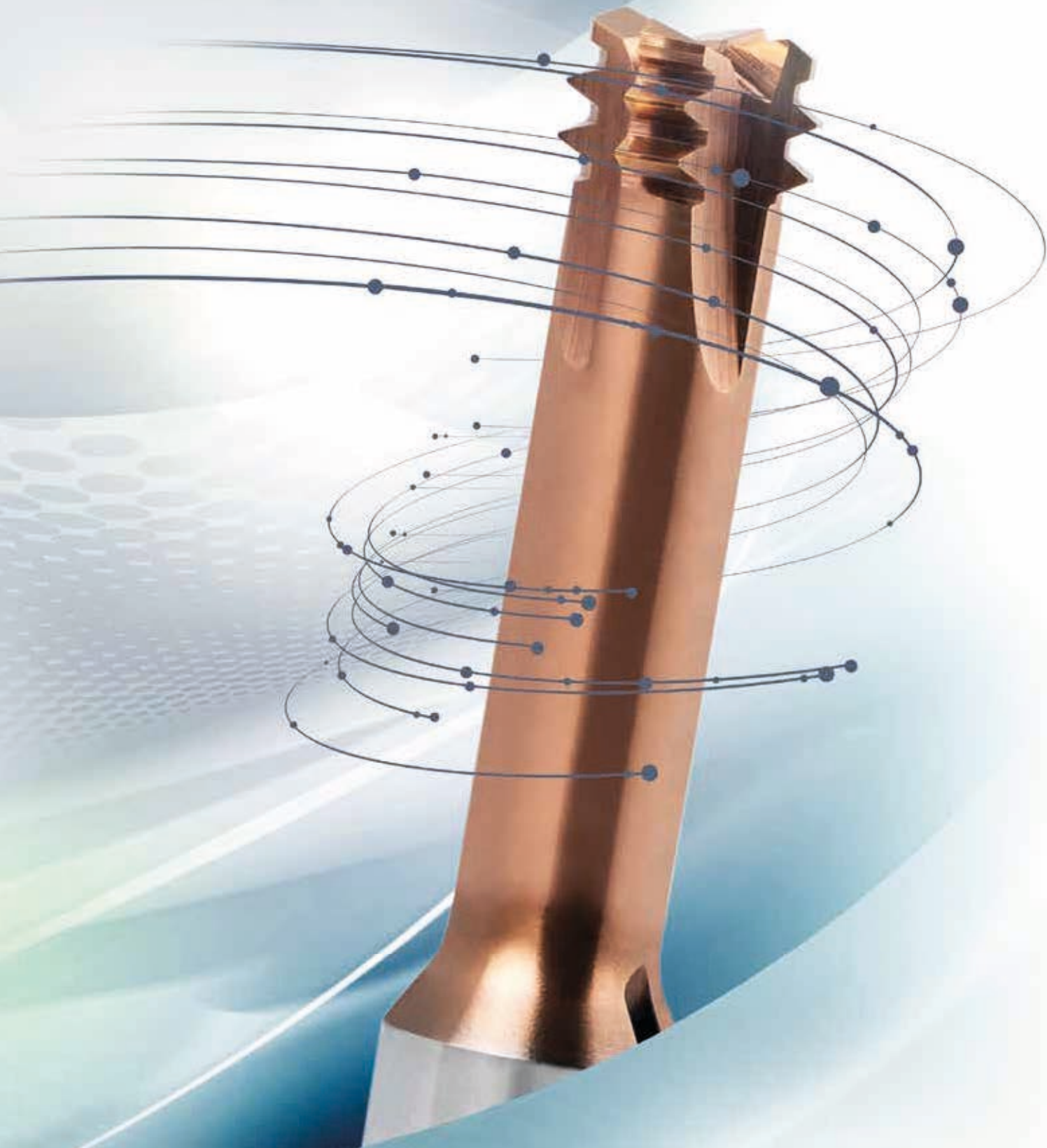
Pionex

TAP

Our expertise is your benefit

- high quality cutting tools made in Germany
- high precision grinding machines for finest tool geometries
- long tool life and best threading results

MTMH3-Z

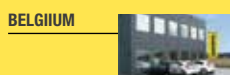
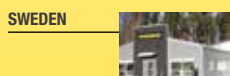
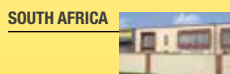


GÜHRING – YOUR PARTNER AROUND THE WORLD

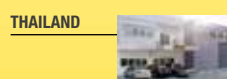
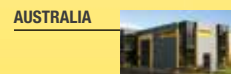
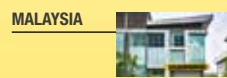
With a global network of manufacturing sites Gühring develops and produces precision tools for all the important markets. Users from the automotive industry, the aerospace industry or the machine tool and general industry rely on the trend-setting tools.

48 SUBSIDIARIES

70 PRODUCTION
AND SERVICE
CENTRES



With innovative technologies Gühring meets specific customer requirements from process proposal to series application of the precision tools – **flexibly, promptly, globally**. For this, experts are in action internationally looking after customers on site. Production, service and contact persons are available from one supplier world-wide.










ISO codes

P	Steel, high-alloyed steel
M	Stainless steel
K	Grey cast iron, spheroidal graphite iron and malleable cast iron
N	Aluminium and other non-ferrous metals
S	Special, super and titanium alloys
H	Hardened steel and chilled cast iron

On the programme pages you will find for every tool recommendations regarding suitability for the application groups and details of max. tensile strength and hardness.

- optimal suitability
- limited suitability

Pictograms

Tool material	VHM Solid carbide			HSS-E HSS-E-PM High-speed steel					
Type	GG	H	MTMH3-Z	MTM3-SP	N	NR40	TM-SP	VA	VA R45
Machining depth	2xD	2,5xD	3xD						
Hole type									
	Through-hole threads		Blind-hole threads			Through-hole and blind-hole threads			
Cutting direction									
	right-hand			left-hand					
Form	B	C	D	E					
Internal coolant									
	with internal coolant				without internal coolant				

Surfaces

○ bright

● **A** TiAlN

● **C** TiCN

● **S** TiN

● TiSiN

Select & order

Product page

All data at a glance!

JIS Threading tools

Micro thread milling cutters

VHM MTMH3-Z 2,5xD

P	M	K	N	S	H
•	•	•	•	•	≤ 65

Cutting data page 74

with cooling grooves
rotating direction left-hand

Tool material	Solid carbide
Surface	●
Type	MTMH3-Z
Shank form	HB

NEW

Application recommendation:

- optimal suitability
- limited suitability

Company std.
Article no. **4002**

D	P	d1	d2	l1	l2	l5	Z	Order no.
		mm	mm	mm	mm	mm		
M2	0.400	1.40	3.00	39.00	1.20	5.00	4	4002 2.000
M2,5	0.450	1.80	3.00	39.00	1.30	6.50	4	4002 2.500
M3	0.500	2.40	6.00	58.00	1.50	7.50	4	4002 3.000
M3,5	0.600	2.70	6.00	58.00	1.80	9.00	4	4002 3.500
M4	0.700	3.10	6.00	58.00	2.10	10.00	4	4002 4.000
M5	0.800	3.80	6.00	58.00	2.40	12.50	4	4002 5.000
M6	1.000	4.60	8.00	64.00	3.00	15.00	4	4002 6.000
M6 x 0,5	0.500	3.80	6.00	58.00	2.40	15.00	4	4002 6.003
M8	1.250	6.20	8.00	64.00	3.60	20.00	4	4002 8.000
M8 x 0,75	0.750	4.60	8.00	64.00	3.00	20.00	4	4002 8.004
M10	1.500	7.50	10.00	73.00	4.50	25.00	4	4002 10.000
M12	1.750	9.00	10.00	73.00	5.20	30.00	4	4002 12.000

2
Nominal size

1
Order no.

When ordering please always state the **order no.**, i.e.:
Micro thread milling cutters for nominal size M2 = **4002 2.000**

Re-production – even in part – is not permitted.

Possible misprints or any type of intermediate changes do not entitle to any claims. All DIN marked products can be supplied deviating from the catalogue dimensions as long as they correspond to the specified DIN standard.

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JIS TAPS

Application recommendations p. 10

Taps

for ISO metric threads.....	p. 18
for ISO metric fine threads	p. 34
for UNC threads.....	p. 48
for UNF threads	p. 50
for PT threads	p. 52

Fluteless taps

for ISO metric threads.....	p. 56
for ISO metric fine threads	p. 60








Thread milling cutters p. 63

Technical section

Cutting data.....	p. 68
General technical information	p. 76

Article no. index p. 103










JIS TAPS

 THROUGH HOLES	Thread depth	≤3xD						
	Tool material	HSS-E				HSS-E-PM		
	Form	B	B	B	B	B		
	Surface	○	●	○	●	●		
	Coolant supply	☒	☒	☒	☒	☒		
	Spiral flute angle	-	-	-	-	-		
								
				Pionex	Pionex			
								
<ul style="list-style-type: none"> ● = Neat oil ○ = Soluble oil △ = Paste 	Thread type	Tolerance	Dim. to	Article no. / page				
	M	OH	JIS B 4430	1014 p. 18	1015 p. 18	4460 p. 22	4550 p. 19	4470 p. 21
	MF	OH	JIS B 4430	4434 p. 34	4435 p. 34	4461 p. 37	4552 p. 35	4471 p. 36
	UNC	OH	~JIS B 4430	4465 p. 48				
	UNF	OH	~JIS B 4430	4455 p. 50				
	PT	JIS2	Company std.					
	Suitable lubricant:			○/●/△	○/●/△	○/●/△	○/●/△	○/●/△

	Material group	Hardness	Example materials	Material no.	Application recommendations					
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	●	●	●	●	●	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	●	●	●	●	●	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	○	○	○	●	●	
M	M1 Stainless steel sulfured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	●	●	●	●	●	
	M2 Stainless and acid-resist. steel steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	○	○	○	●	●	
	M3 Duplex and super duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	x	x	x	○	○	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	○	○	○	○	○	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	○	○	○	○	○	
	K3 ADI GGv	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		x	○	x	○	○	
N	N1 Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	●	x	●	●	●	
	N2 Aluminium-cast alloys	≤600 N/mm ²	GD-AISI5Cu1Mg GD-AISI8Cu3 G-AISI9Mg G-AISI12	3.2134 3.2162 3.2373 3.2581	○	○	○	●	●	
	N3 Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08	x	x	x	x	x	
	N4 Copper and copper alloys	long-chipping		CuZn20 CuZn37Pb0,5	2.0250 2.0332	●	x	●	●	●
		short-chipping		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	●	x	●	●	●
	N5 Copper special alloys	≤1400 N/mm ²	Ampco		x	x	x	x	x	
N6 Plastics [thermo-, duroplastics]	long-chipping short-chipping		PMMA, POM, PVC Pertinax		○	x	○	○		
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702-5 3.7115 3.7165	x	x	x	○	○	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	x	x	x	○	○	
H	H1 High tensile steels, hardened steels	45 - 55 HRC			x	x	x	x	x	
	H2	55 - 62 HRC			x	x	x	x	x	

● optimally suited ○ suited x not suitable

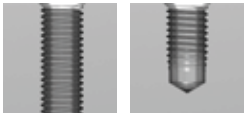




JIS TAPS

 BLIND HOLES	Thread depth	≤3xD									
	Tool material	HSS-E							HSS-E-PM		
	Form	C	C	C	E	C	C	C	C		
	Surface	○	●	○	○	○	●	●	●		
	Coolant supply	☒	☒	☒	☒	☒	☒	☒	☒		
	Spiral flute angle	40°	40°	40°	40°	45°	45°	45°	45°		
											
							NEW	NEW	NEW	NEW	Pionex
<ul style="list-style-type: none"> ● = Neat oil ○ = Soluble oil △ = Paste 	Thread type	Tolerance	Dim. to	Article no. / page							
	M	OH	JIS B 4430	1012 p. 23	1013 p. 23	4462 p. 29	4432 p. 25	4589 p. 26	4588 p. 26	4587 p. 26	4449 p. 28
	MF	OH	JIS B 4430	4438 p. 38	4439 p. 38	4463 p. 43	4580 p. 40	4592 p. 41	4591 p. 41	4590 p. 41	4450 p. 42
	UNC	OH	~JIS B 4430	4454 p. 49							
	UNF	OH	~JIS B 4430	4457 p. 51							
	PT	JIS2	Company std.								
	Suitable lubricant:			○/●/△	○/●/△	○/●/△	○/●/△	○/●/△	○/●/△	○/●/△	○/●/△

	Material group	Hardness	Example materials	Material no.	Application recommendations								
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	●	●	●	●	●	●	●	●	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	●	●	●	●	●	●	●	●	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	○	○	○	○	●	●	●	●	
M	M1 Stainless steel sulfured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	x	○	x	x	●	●	●	●	
	M2 Stainless and acid-resist. steel steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	x	○	x	x	●	●	●	●	
	M3 Duplex and super duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	x	x	x	x	○	○	○	○	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	○	○	○	○	○	○	○	○	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	○	○	○	○	○	○	○	○	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		x	x	x	x	x	○	○	○	
N	N1 Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	●	x	●	●	●	○	●	●	
	N2 Aluminium-cast alloys	≤600 N/mm ²	GD-AISi5Cu1Mg GD-AISi8Cu3 G-AISi9Mg G-AISi12	3.2134 3.2162 3.2373 3.2581	○	○	○	○	○	○	●	●	
	N3 Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08	x	x	x	x	x	x	x	x	
	N4 Copper and copper alloys	long-chipping		CuZn20 CuZn37Pb0,5	2.0250 2.0332	●	x	●	●	●	○	●	●
		short-chipping		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	●	x	●	●	●	○	●	●
	N5 Copper special alloys	≤1400 N/mm ²	Ampco		x	x	x	x	x	x	x	x	
N6 Plastics [thermo-, duroplastics]	long-chipping short-chipping		PMMA, POM, PVC Pertinax		○	x	○	○	○	○	○	○	
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702-5 3.7115 3.7165	x	x	x	x	x	○	○	○	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	x	x	x	x	x	○	○	○	
H	H1 High tensile steels, hardened steels	45 - 55 HRC			x	x	x	x	x	x	x	x	
	H2	55 - 62 HRC			x	x	x	x	x	x	x	x	

● optimally suited ○ suited x not suitable

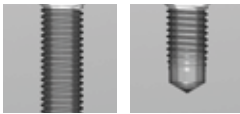









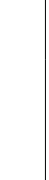



JIS TAPS

 THROUGH AND BLIND HOLES	Thread depth	depend. on PT		$\leq 3 \times D$		$\leq 2 \times D$	
	Tool material	HSS-E		HSS-E-PM			
	Form	C	C	C	D		
	Surface	○	○	●	●		
	Coolant supply	☒	☒	axial			
	Spiral flute angle	25°	-	-	-		
							
Thread type	Tolerance	Dim. to	Article no. / page				
● = Neat oil ○ = Soluble oil △ = Paste	M	OH	JIS B 4430	4452 p. 31	4448 p. 32	4453 p. 33	
	MF	OH	JIS B 4430	4451 p. 44	4472 p. 45	4459 p. 46	
	UNC	OH	~JIS B 4430				
	UNF	OH	~JIS B 4430				
	PT	JIS2	Company std.	4464 p. 52			
	Suitable lubricant:		○/●/△	○/●/△	○/●/△	○/●/△	○/●/△

	Material group	Hardness	Example materials	Material no.	Application recommendations				
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤ 800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	●	x	x	x	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	●	x	●	x	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	○	x	●	x	
M	M1 Stainless steel sulfured, austenitic	≤ 1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	x	x	x	x	
	M2 Stainless and acid-resist. steel steels, martensitic	≤ 1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	x	x	x	x	
	M3 Duplex and super duplex	≤ 1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	x	x	x	x	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	○	●	●	●	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	○	●	●	●	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		x	x	●	●	
N	N1 Aluminium and wrought alloys	≤ 450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	●	x	x	x	
	N2 Aluminium-cast alloys	≤ 600 N/mm ²	GD-AISI5Cu1Mg GD-AISI8Cu3 G-AISI9Mg G-AISI12	3.2134 3.2162 3.2373 3.2581	○	○	●	x	
	N3 Magnesium alloys	≤ 500 N/mm ²	GDMgAl8Zn1	3.5812.08	x	○	○	x	
	N4 Copper and copper alloys	long-chipping		CuZn20 CuZn37Pb0,5	2.0250 2.0332	●	x	x	x
		short-chipping		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	●	x	x	x
	N5 Copper special alloys	≤ 1400 N/mm ²	Ampco		x	x	○	●	
N6 Plastics [thermo-, duroplastics]	long-chipping short-chipping		PMMA, POM, PVC Pertinax		○	x	x	x	
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702-5 3.7115 3.7165	x	x	x	x	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	x	x	x	x	
H	H1 High tensile steels, hardened steels	45 - 55 HRC			x	x	x	●	
	H2	55 - 62 HRC			x	x	x	x	

● optimally suited ○ suited x not suitable

JIS FLUTELESS TAPS

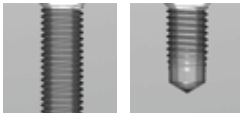



 THROUGH AND BLIND HOLES	Thread depth	≤2xD	≤3xD		
	Tool material	HSS-E		HSS-E-PM	Solid carbide
	Form	C	C	C	C
	Surface				
	Coolant supply				radial
Oil grooves	no	yes	yes	yes	
					
				Pionex	
					

<ul style="list-style-type: none"> ● = Neat oil ○ = Soluble oil △ = Paste 	Thread type	Tolerance	Dim. to	Article no. / page			
	M	RH	JIS B 4430	1017 p. 56	4443 p. 57	4583 p. 58	4447 p. 59
	MF	RH	JIS B 4430		4444 p. 60	4585 p. 61	
	UNC	RH	~JIS B 4430				
	UNF	RH	~JIS B 4430				
	PT	JIS2	Company std.				
	Suitable lubricant:				○/●/△	○/●/△	○/●/△

	Material group	Hardness	Example materials	Material no.	Application recommendations				
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	●	●	●	●	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	●	●	●	●	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	○	○	●	●	
M	M1 Stainless steel sulfured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	●	●	●	x	
	M2 Stainless and acid-resist. steel steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	●	●	●	x	
	M3 Duplex and super duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	○	○	○	x	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	x	x	x	x	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	●	●	●	●	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		●	●	●	●	
N	N1 Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	x	x	●	●	
	N2 Aluminium-cast alloys	≤600 N/mm ²	GD-AISI5Cu1Mg GD-AISI8Cu3 G-AISI9Mg G-AISI12	3.2134 3.2162 3.2373 3.2581	○	○	●	●	
	N3 Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08	x	x	x	x	
	N4 Copper and copper alloys	long-chipping		CuZn20 CuZn37Pb0,5	2.0250 2.0332	○	○	○	○
		short-chipping		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	○	○	○	○
	N5 Copper special alloys	≤1400 N/mm ²	Ampco		x	x	x	x	
N6 Plastics [thermo-, duroplastics]	long-chipping short-chipping		PMMA, POM,PVC Pertinax		x	x	x	x	
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702<5 3.7115 3.7165	○	○	●	x	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	○	○	●	x	
H	H1 High tensile steels, hardened steels	45 - 55 HRC			x	x	x	x	
	H2	55 - 62 HRC			x	x	x	x	

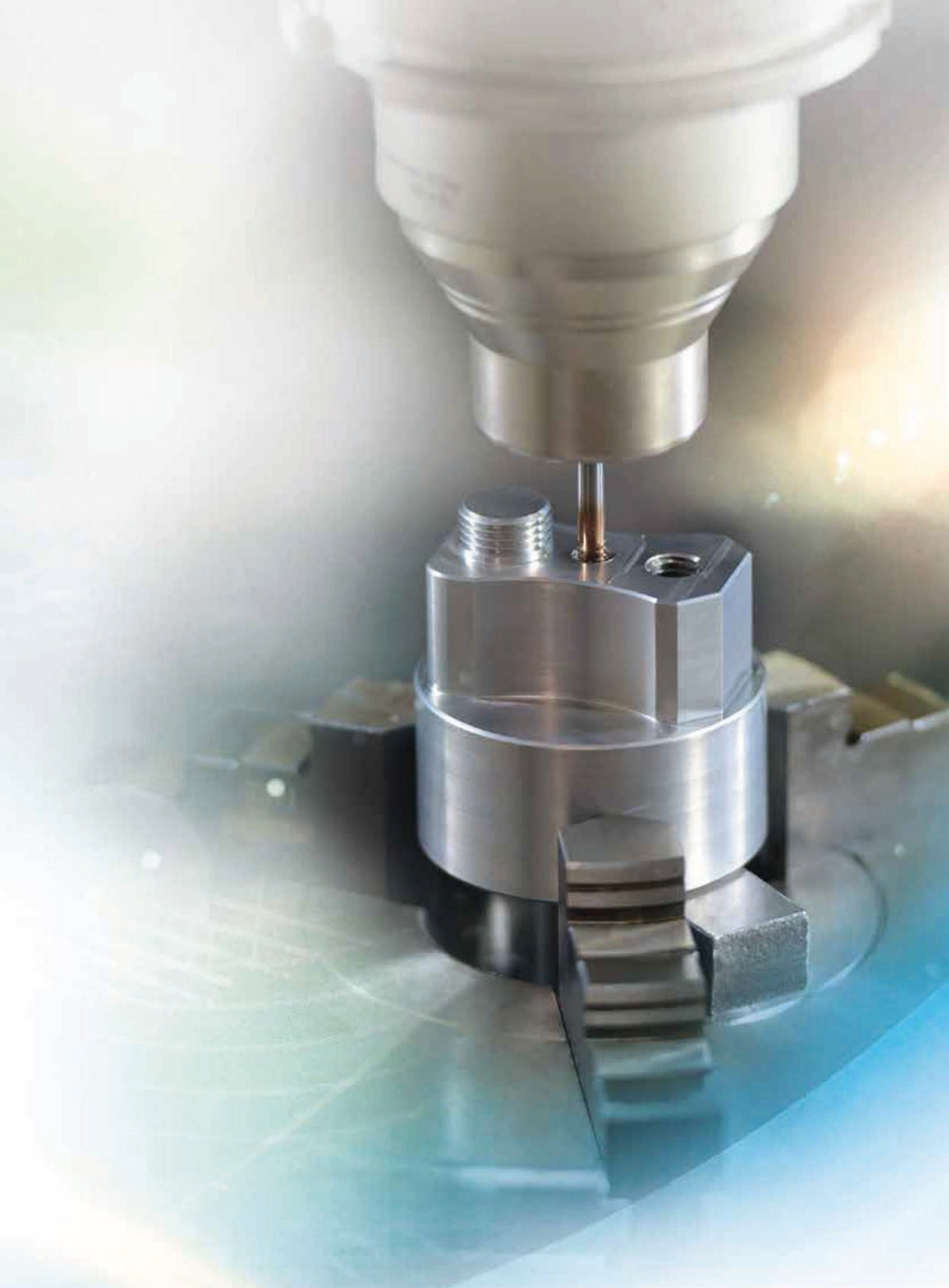
● optimally suited ○ suited x not suitable

JIS THREAD MILLING CUTTERS

 <p>THROUGH AND BLIND HOLES</p>	Thread depth	≤3xD		≤2xD		≤2.5xD	
	Tool material	Solid carbide					
	Shank form	HA		HA		HB	
	Surface	C		C		C	
	Coolant supply	☒		axial		with cooling grooves	
	Type	MTM3 SP		TM SP		MTMH3-Z	
							
<ul style="list-style-type: none"> ● = Neat oil ○ = Soluble oil △ = Paste 	Thread type	Tolerance	Dim. to	Article no. / page			
	M		Company std.	4226 p. 64	3737 p. 65	4002 p. 66	
	MF		Company std.		3737 p. 65	4002 p. 66	
	UNC		Company std.				
	UNF		Company std.				
	PT		Company std.				
	Suitable lubricant:				○/●/△	○/●/△	○/●/△

	Material group	Hardness	Example materials	Material no.	Application recommendations			
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	●	●	●	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	●	●	●	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	●	○	●	
M	M1 Stainless steel sulfured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	●	○	●	
	M2 Stainless and acid-resist. steel steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	●	○	●	
	M3 Duplex and super duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	●	○	●	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	●	●	●	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	●	●	●	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		●	●	●	
N	N1 Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	●	●	x	
	N2 Aluminium-cast alloys	≤600 N/mm ²	GD-AISi5Cu1Mg GD-AISi8Cu3 G-AISi9Mg G-AISi12	3.2134 3.2162 3.2373 3.2581	●	●	●	
	N3 Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08	●	●	x	
	N4 Copper and copper alloys	long-chipping		CuZn20 CuZn37Pb0,5	2.0250 2.0332	●	●	●
		short-chipping		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	●	●	●
	N5 Copper special alloys	≤1400 N/mm ²	Ampco		●	●	●	
N6 Plastics [thermo-, duroplastics]	long-chipping short-chipping		PMMA, POM,PVC Pertinax		●	●	x	
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702<5 3.7115 3.7165	●	●	●	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	●	●	●	
H	H1 High tensile steels, hardened steels	45 - 55 HRC			●	○	●	
	H2	55 - 62 HRC			x	x	●	

● optimally suited ○ suited x not suitable



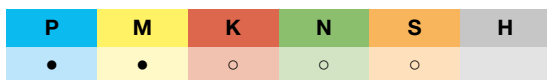




TAPS

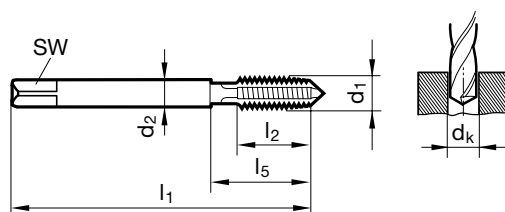
for ISO metric threads	p. 18
for ISO metric fine threads	p. 34
for UNC threads	p. 48
for UNF threads.....	p. 50
for PT threads	p. 52

Taps for ISO metric threads



Cutting data page 68

Tool material	HSS-E	
Surface	○	Ⓢ
Type	N	N
Form	B	B
Cutting direction	right-hand	right-hand



JIS B 4430

Article no.

1014

1015

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.	
mm	mm	mm	mm	mm	mm	mm	mm				
M2	0.40	3.000	2.50	1.60	40.00	8.00	15.00	3	OH2	1014 2.020	1015 2.020
M2	0.40	3.000	2.50	1.60	40.00	8.00	15.00	3	OH4	1014 2.040	1015 2.040
M2.5	0.45	3.000	2.50	2.05	44.00	9.00	16.00	3	OH2	1014 2.520	1015 2.520
M2.5	0.45	3.000	2.50	2.05	44.00	9.00	16.00	3	OH4	1014 2.540	1015 2.540
M3	0.50	4.000	3.20	2.50	46.00	10.00	19.00	3	OH2	1014 3.020	1015 3.020
M3	0.50	4.000	3.20	2.50	46.00	10.00	19.00	3	OH4	1014 3.040	1015 3.040
M4	0.70	5.000	4.00	3.30	52.00	12.00	20.00	3	OH2	1014 4.020	1015 4.020
M4	0.70	5.000	4.00	3.30	52.00	12.00	20.00	3	OH4	1014 4.040	1015 4.040
M5	0.80	5.500	4.50	4.20	60.00	14.00	24.00	3	OH2	1014 5.020	1015 5.020
M5	0.80	5.500	4.50	4.20	60.00	14.00	24.00	3	OH4	1014 5.040	1015 5.040
M6	1.00	6.000	4.50	5.00	62.00	16.00	29.00	3	OH2	1014 6.020	1015 6.020
M6	1.00	6.000	4.50	5.00	62.00	16.00	29.00	3	OH4	1014 6.040	1015 6.040
M7	1.00	6.200	5.00	6.00	65.00	16.00	33.00	3	OH2	1014 7.020	1015 7.020
M8	1.25	6.200	5.00	6.80	70.00	17.00	37.00	3	OH2	1014 8.020	1015 8.020
M8	1.25	6.200	5.00	6.80	70.00	17.00	37.00	3	OH5	1014 8.050	1015 8.050
M9	1.25	7.000	5.50	7.80	72.00	17.00	39.00	3	OH2	1014 9.020	1015 9.020
M10	1.50	7.000	5.50	8.50	75.00	20.00	41.00	3	OH2	1014 10.020	1015 10.020
M10	1.50	7.000	5.50	8.50	75.00	20.00	41.00	3	OH5	1014 10.050	1015 10.050
M12	1.75	8.500	6.50	10.20	82.00	24.00	48.00	4	OH3	1014 12.030	1015 12.030
M12	1.75	8.500	6.50	10.20	82.00	24.00	48.00	4	OH5	1014 12.050	1015 12.050
M14	2.00	10.500	8.00	12.00	88.00	26.00	48.00	4	OH3	1014 14.030	1015 14.030
M14	2.00	10.500	8.00	12.00	88.00	26.00	48.00	4	OH5	1014 14.050	1015 14.050
M16	2.00	12.500	10.00	14.00	95.00	26.00	52.00	4	OH3	1014 16.030	1015 16.030
M16	2.00	12.500	10.00	14.00	95.00	26.00	52.00	4	OH5	1014 16.050	1015 16.050
M18	2.50	14.000	11.00	15.50	100.00	30.00	55.00	4	OH4	1014 18.040	1015 18.040
M18	2.50	14.000	11.00	15.50	100.00	30.00	55.00	4	OH5	1014 18.050	1015 18.050
M20	2.50	15.000	12.00	17.50	105.00	32.00	58.00	4	OH4	1014 20.040	1015 20.040
M20	2.50	15.000	12.00	17.50	105.00	32.00	58.00	4	OH5	1014 20.050	1015 20.050



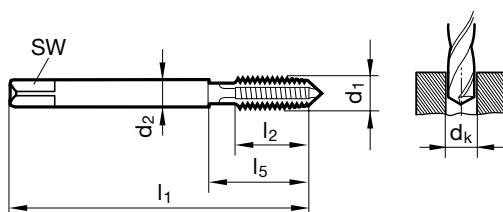
Taps for ISO metric threads



P	M	K	N	S	H
•	•	○	○	○	

Cutting data page 68

Tool material	HSS-E
Surface	A
Type	VA
Form	B
Cutting direction	right-hand



JIS B 4430	Article no.	4550
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d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
mm	mm	mm	mm	mm	mm	mm	mm			
M2	0.40	3.000	2.50	1.60	40.00	8.00	15.00	3	OH2	4550 2.020
M2	0.40	3.000	2.50	1.60	40.00	8.00	15.00	3	OH3	4550 2.030
M2	0.40	3.000	2.50	1.60	40.00	8.00	15.00	3	OH4	4550 2.040
M2.5	0.45	3.000	2.50	2.05	44.00	9.00	16.00	3	OH2	4550 2.520
M2.5	0.45	3.000	2.50	2.05	44.00	9.00	16.00	3	OH3	4550 2.530
M2.5	0.45	3.000	2.50	2.05	44.00	9.00	16.00	3	OH4	4550 2.540
M3	0.50	4.000	3.20	2.50	46.00	10.00	19.00	3	OH2	4550 3.020
M3	0.50	4.000	3.20	2.50	46.00	10.00	19.00	3	OH3	4550 3.030
M3	0.50	4.000	3.20	2.50	46.00	10.00	19.00	3	OH4	4550 3.040
M4	0.70	5.000	4.00	3.30	52.00	12.00	20.00	3	OH2	4550 4.020
M4	0.70	5.000	4.00	3.30	52.00	12.00	20.00	3	OH3	4550 4.030
M4	0.70	5.000	4.00	3.30	52.00	12.00	20.00	3	OH4	4550 4.040
M5	0.80	5.500	4.50	4.20	60.00	14.00	24.00	3	OH2	4550 5.020
M5	0.80	5.500	4.50	4.20	60.00	14.00	24.00	3	OH3	4550 5.030
M5	0.80	5.500	4.50	4.20	60.00	14.00	24.00	3	OH4	4550 5.040
M6	1.00	6.000	4.50	5.00	62.00	16.00	29.00	3	OH2	4550 6.020
M6	1.00	6.000	4.50	5.00	62.00	16.00	29.00	3	OH3	4550 6.030
M6	1.00	6.000	4.50	5.00	62.00	16.00	29.00	3	OH4	4550 6.040
M8	1.25	6.200	5.00	6.80	70.00	17.00	37.00	3	OH3	4550 8.030
M8	1.25	6.200	5.00	6.80	70.00	17.00	37.00	3	OH4	4550 8.040
M8	1.25	6.200	5.00	6.80	70.00	17.00	37.00	3	OH5	4550 8.050
M10	1.50	7.000	5.50	8.50	75.00	20.00	41.00	3	OH3	4550 10.030
M10	1.50	7.000	5.50	8.50	75.00	20.00	41.00	3	OH4	4550 10.040
M10	1.50	7.000	5.50	8.50	75.00	20.00	41.00	3	OH5	4550 10.050
M12	1.75	8.500	6.50	10.20	82.00	24.00	48.00	4	OH3	4550 12.030
M12	1.75	8.500	6.50	10.20	82.00	24.00	48.00	4	OH4	4550 12.040
M12	1.75	8.500	6.50	10.20	82.00	24.00	48.00	4	OH5	4550 12.050
M14	2.00	10.500	8.00	12.00	88.00	26.00	48.00	4	OH3	4550 14.030
M14	2.00	10.500	8.00	12.00	88.00	26.00	48.00	4	OH4	4550 14.040
M14	2.00	10.500	8.00	12.00	88.00	26.00	48.00	4	OH5	4550 14.050



JIS B 4430

Article no.

4550

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm	mm			
M16	2.00	12.500	10.00	14.00	95.00	26.00	52.00	4	OH3	4550 16.030
M16	2.00	12.500	10.00	14.00	95.00	26.00	52.00	4	OH4	4550 16.040
M16	2.00	12.500	10.00	14.00	95.00	26.00	52.00	4	OH5	4550 16.050
M18	2.50	14.000	11.00	15.50	100.00	30.00	55.00	4	OH4	4550 18.040
M18	2.50	14.000	11.00	15.50	100.00	30.00	55.00	4	OH5	4550 18.050
M18	2.50	14.000	11.00	15.50	100.00	30.00	55.00	4	OH6	4550 18.060
M20	2.50	15.000	12.00	17.50	105.00	32.00	58.00	4	OH4	4550 20.040
M20	2.50	15.000	12.00	17.50	105.00	32.00	58.00	4	OH5	4550 20.050
M20	2.50	15.000	12.00	17.50	105.00	32.00	58.00	4	OH6	4550 20.060



Taps for ISO metric threads

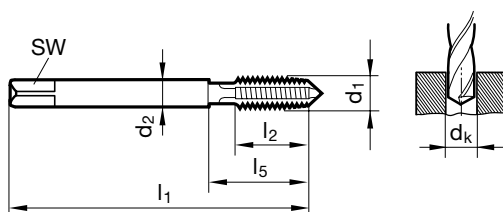


P	M	K	N	S	H
•	•	○	○	○	

Cutting data page 68

Tool material	HSS-E-PM
Surface	A
Type	VA
Form	B
Cutting direction	right-hand

Pionex



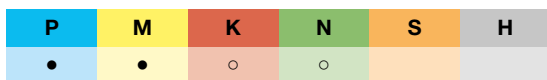
JIS B 4430

Article no.

4470

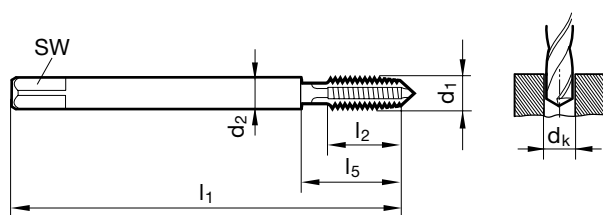
d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm	mm			
M2	0.40	3.000	2.50	1.60	40.00	8.00	15.00	3	OH1.5	4470 2.150
M2.5	0.45	3.000	2.50	2.05	44.00	9.00	16.00	3	OH2	4470 2.520
M3	0.50	4.000	3.20	2.50	46.00	10.00	19.00	3	OH2	4470 3.020
M4	0.70	5.000	4.00	3.30	52.00	12.00	20.00	3	OH3	4470 4.030
M5	0.80	5.500	4.50	4.20	60.00	14.00	24.00	3	OH3	4470 5.030
M6	1.00	6.000	4.50	5.00	62.00	16.00	29.00	3	OH3	4470 6.030
M8	1.25	6.200	5.00	6.80	70.00	17.00	37.00	3	OH3	4470 8.030
M10	1.50	7.000	5.50	8.50	75.00	20.00	41.00	3	OH3	4470 10.030
M12	1.75	8.500	6.50	10.20	82.00	24.00	48.00	4	OH4	4470 12.040
M14	2.00	10.500	8.00	12.00	88.00	26.00	48.00	4	OH4	4470 14.040
M16	2.00	12.500	10.00	14.00	95.00	26.00	52.00	4	OH4	4470 16.040
M18	2.50	14.000	11.00	15.50	100.00	30.00	55.00	4	OH5	4470 18.050
M20	2.50	15.000	12.00	17.50	105.00	32.00	58.00	4	OH5	4470 20.050

Taps for ISO metric threads



Cutting data page 68

Tool material	HSS-E
Surface	○
Type	N
Form	B
Cutting direction	right-hand



Company std.

Article no.

4460

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm	mm			
M3	0.50	4.000	3.20	2.50	100.00	10.00	19.00	3	OH2	4460 3.020
M4	0.70	5.000	4.00	3.30	100.00	12.00	20.00	3	OH2	4460 4.020
M5	0.80	5.500	4.50	4.20	100.00	14.00	24.00	3	OH2	4460 5.020
M6	1.00	6.000	4.50	5.00	150.00	16.00	29.00	3	OH2	4460 6.120
M8	1.25	6.200	5.00	6.80	150.00	17.00	37.00	3	OH2	4460 8.120
M10	1.50	7.000	5.50	8.50	150.00	20.00	41.00	3	OH2	4460 10.120
M12	1.75	8.500	6.50	10.20	150.00	24.00	48.00	4	OH2	4460 12.120
M14	2.00	10.500	8.00	12.00	150.00	28.00	48.00	4	OH2	4460 14.120
M16	2.00	12.500	10.00	14.00	150.00	30.00	52.00	4	OH2	4460 16.120
M20	2.50	15.000	12.00	17.50	200.00	32.00	58.00	4	OH3	4460 20.030



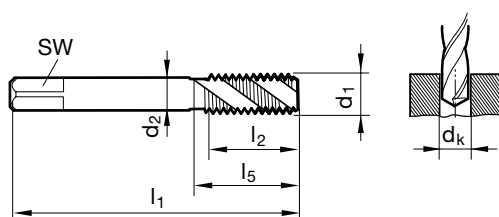
Taps for ISO metric threads



P	M	K	N	S	H
•	○	○	○		

Cutting data page 69

Tool material	HSS-E	
Surface	○	Ⓢ
Type	N R40	N R40
Form	C	C
Cutting direction	right-hand	right-hand



JIS B 4430

Article no.

1012

1013

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.	
mm	mm	mm	mm	mm	mm	mm	mm				
M1.2	0.25	3.000	2.50	0.95	36.00	4.80	4.80	2	OH1	1012 1.210	1013 1.210
M1.4	0.30	3.000	2.50	1.10	36.00	5.60	5.60	2	OH1	1012 1.410	1013 1.410
M1.6	0.35	3.000	2.50	1.25	36.00	6.40	6.40	2	OH1	1012 1.610	1013 1.610
M1.7	0.35	3.000	2.50	1.35	36.00	6.80	6.80	2	OH1	1012 1.710	1013 1.710
M2	0.40	3.000	2.50	1.60	40.00	4.50	15.00	3	OH2	1012 2.020	1013 2.020
M2	0.40	3.000	2.50	1.60	40.00	4.50	15.00	3	OH4	1012 2.040	1013 2.040
M2.3	0.40	3.000	2.50	1.90	42.00	4.50	15.00	3	OH2	1012 2.320	1013 2.320
M2.5	0.45	3.000	2.50	2.05	44.00	5.00	16.00	3	OH2	1012 2.520	1013 2.520
M2.5	0.45	3.000	2.50	2.05	44.00	5.00	16.00	3	OH4	1012 2.540	1013 2.540
M2.6	0.45	3.000	2.50	2.15	44.00	5.00	16.00	3	OH2	1012 2.620	1013 2.620
M3	0.50	4.000	3.20	2.50	46.00	6.00	19.00	3	OH2	1012 3.020	1013 3.020
M3	0.50	4.000	3.20	2.50	46.00	6.00	19.00	3	OH4	1012 3.040	1013 3.040
M3.5	0.60	4.000	3.20	2.90	48.00	7.00	20.00	3	OH2	1012 3.520	1013 3.520
M4	0.70	5.000	4.00	3.30	52.00	7.50	20.00	3	OH2	1012 4.020	1013 4.020
M4	0.70	5.000	4.00	3.30	52.00	7.50	20.00	3	OH4	1012 4.040	1013 4.040
M5	0.80	5.500	4.50	4.20	60.00	8.50	24.00	3	OH2	1012 5.020	1013 5.020
M5	0.80	5.500	4.50	4.20	60.00	8.50	24.00	3	OH4	1012 5.040	1013 5.040
M6	1.00	6.000	4.50	5.00	62.00	11.00	29.00	3	OH2	1012 6.020	1013 6.020
M6	1.00	6.000	4.50	5.00	62.00	11.00	29.00	3	OH4	1012 6.040	1013 6.040
M7	1.00	6.200	5.00	6.00	65.00	11.00	33.00	3	OH2	1012 7.020	1013 7.020
M8	1.25	6.200	5.00	6.80	70.00	14.00	37.00	3	OH2	1012 8.020	1013 8.020
M8	1.25	6.200	5.00	6.80	70.00	14.00	37.00	3	OH5	1012 8.050	1013 8.050
M9	1.25	7.000	5.50	7.80	72.00	14.00	39.00	3	OH2	1012 9.020	1013 9.020
M10	1.50	7.000	5.50	8.50	75.00	16.00	41.00	3	OH2	1012 10.020	1013 10.020
M10	1.50	7.000	5.50	8.50	75.00	16.00	41.00	3	OH5	1012 10.050	1013 10.050
M12	1.75	8.500	6.50	10.20	82.00	18.50	48.00	3	OH3	1012 12.030	1013 12.030
M12	1.75	8.500	6.50	10.20	82.00	18.50	48.00	3	OH5	1012 12.050	1013 12.050
M14	2.00	10.500	8.00	12.00	88.00	20.00	48.00	3	OH3	1012 14.030	1013 14.030
M14	2.00	10.500	8.00	12.00	88.00	20.00	48.00	3	OH5	1012 14.050	1013 14.050
M16	2.00	12.500	10.00	14.00	95.00	20.00	52.00	4	OH3	1012 16.030	1013 16.030

JIS B 4430

Article no.

1012

1013

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.	
										mm	mm
M16	2.00	12.500	10.00	14.00	95.00	20.00	52.00	4	OH5	1012 16.050	1013 16.050
M18	2.50	14.000	11.00	15.50	100.00	25.00	55.00	4	OH4	1012 18.040	1013 18.040
M18	2.50	14.000	11.00	15.50	100.00	25.00	55.00	4	OH5	1012 18.050	1013 18.050
M20	2.50	15.000	12.00	17.50	105.00	25.00	58.00	4	OH4	1012 20.040	1013 20.040
M20	2.50	15.000	12.00	17.50	105.00	25.00	58.00	4	OH5	1012 20.050	1013 20.050
M22	2.50	17.000	13.00	19.50	115.00	27.00	63.00	4	OH4	1012 22.040	1013 22.040
M24	3.00	19.000	15.00	21.00	120.00	30.00	66.00	4	OH4	1012 24.040	1013 24.040
M30	3.50	23.000	17.00	26.50	135.00	35.00	74.00	4	OH4	1012 30.040	1013 30.040



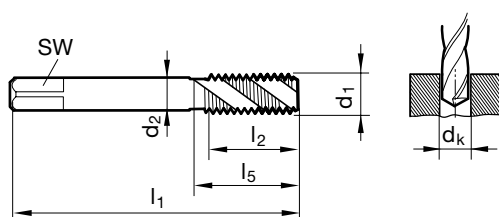
Taps for ISO metric threads



P	M	K	N	S	H
•	○	○	○		

Cutting data page 69

Tool material	HSS-E
Surface	○
Type	N R40
Form	E
Cutting direction	right-hand



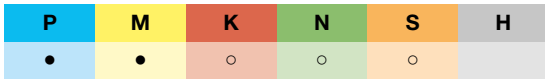
JIS B 4430

Article no.

4432

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
mm	mm	mm	mm	mm	mm	mm	mm			
M2	0.40	3.000	2.50	1.60	40.00	4.50	15.00	3	OH2	4432 2.020
M2.5	0.45	3.000	2.50	2.05	44.00	5.00	16.00	3	OH2	4432 2.520
M3	0.50	4.000	3.20	2.50	46.00	6.00	19.00	3	OH2	4432 3.020
M4	0.70	5.000	4.00	3.30	52.00	7.50	20.00	3	OH2	4432 4.020
M5	0.80	5.500	4.50	4.20	60.00	8.50	24.00	3	OH2	4432 5.020
M6	1.00	6.000	4.50	5.00	62.00	11.00	29.00	3	OH2	4432 6.020
M8	1.25	6.200	5.00	6.80	70.00	14.00	37.00	3	OH2	4432 8.020
M10	1.50	7.000	5.50	8.50	75.00	16.00	41.00	3	OH2	4432 10.020
M12	1.75	8.500	6.50	10.20	82.00	18.50	48.00	3	OH3	4432 12.030
M14	2.00	10.500	8.00	12.00	88.00	20.00	48.00	3	OH3	4432 14.030
M16	2.00	12.500	10.00	14.00	95.00	20.00	52.00	4	OH3	4432 16.030
M18	2.50	14.000	11.00	15.50	100.00	25.00	55.00	4	OH4	4432 18.040
M20	2.50	15.000	12.00	17.50	105.00	25.00	58.00	4	OH4	4432 20.040

Taps for ISO metric threads

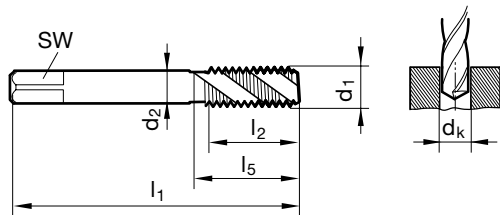


Cutting data page 69

Tool material	HSS-E		
Surface	○	Ⓢ	Ⓐ
Type	VA R45	VA R45	VA R45
Form	C	C	C
Cutting direction	right-hand	right-hand	right-hand



Pionex



JIS B 4430	Article no.	4589	4588	4587
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d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.		
mm	mm	mm	mm	mm	mm	mm	mm					
M2	0.40	3.000	2.50	1.60	40.00	4.50	15.00	3	OH2	4589 2.020	4588 2.020	4587 2.020
M2	0.40	3.000	2.50	1.60	40.00	4.50	15.00	3	OH3	4589 2.030	4588 2.030	4587 2.030
M2	0.40	3.000	2.50	1.60	40.00	4.50	15.00	3	OH4	4589 2.040	4588 2.040	4587 2.040
M2.5	0.45	3.000	2.50	2.05	44.00	5.00	16.00	3	OH2	4589 2.520	4588 2.520	4587 2.520
M2.5	0.45	3.000	2.50	2.05	44.00	5.00	16.00	3	OH3	4589 2.530	4588 2.530	4587 2.530
M2.5	0.45	3.000	2.50	2.05	44.00	5.00	16.00	3	OH4	4589 2.540	4588 2.540	4587 2.540
M3	0.50	4.000	3.20	2.50	46.00	6.00	19.00	3	OH2	4589 3.020	4588 3.020	4587 3.020
M3	0.50	4.000	3.20	2.50	46.00	6.00	19.00	3	OH3	4589 3.030	4588 3.030	4587 3.030
M3	0.50	4.000	3.20	2.50	46.00	6.00	19.00	3	OH4	4589 3.040	4588 3.040	4587 3.040
M4	0.70	5.000	4.00	3.30	52.00	7.50	20.00	3	OH2	4589 4.020	4588 4.020	4587 4.020
M4	0.70	5.000	4.00	3.30	52.00	7.50	20.00	3	OH3	4589 4.030	4588 4.030	4587 4.030
M4	0.70	5.000	4.00	3.30	52.00	7.50	20.00	3	OH4	4589 4.040	4588 4.040	4587 4.040
M5	0.80	5.500	4.50	4.20	60.00	8.50	24.00	3	OH2	4589 5.020	4588 5.020	4587 5.020
M5	0.80	5.500	4.50	4.20	60.00	8.50	24.00	3	OH3	4589 5.030	4588 5.030	4587 5.030
M5	0.80	5.500	4.50	4.20	60.00	8.50	24.00	3	OH4	4589 5.040	4588 5.040	4587 5.040
M6	1.00	6.000	4.50	5.00	62.00	11.00	29.00	3	OH2	4589 6.020	4588 6.020	4587 6.020
M6	1.00	6.000	4.50	5.00	62.00	11.00	29.00	3	OH3	4589 6.030	4588 6.030	4587 6.030
M6	1.00	6.000	4.50	5.00	62.00	11.00	29.00	3	OH4	4589 6.040	4588 6.040	4587 6.040
M8	1.25	6.200	5.00	6.80	70.00	14.00	37.00	3	OH3	4589 8.030	4588 8.030	4587 8.030
M8	1.25	6.200	5.00	6.80	70.00	14.00	37.00	3	OH4	4589 8.040	4588 8.040	4587 8.040
M8	1.25	6.200	5.00	6.80	70.00	14.00	37.00	3	OH5	4589 8.050	4588 8.050	4587 8.050
M10	1.50	7.000	5.50	8.50	75.00	16.00	41.00	3	OH3	4589 10.030	4588 10.030	4587 10.030
M10	1.50	7.000	5.50	8.50	75.00	16.00	41.00	3	OH4	4589 10.040	4588 10.040	4587 10.040
M10	1.50	7.000	5.50	8.50	75.00	16.00	41.00	3	OH5	4589 10.050	4588 10.050	4587 10.050
M12	1.75	8.500	6.50	10.20	82.00	18.50	48.00	3	OH3	4589 12.030	4588 12.030	4587 12.030
M12	1.75	8.500	6.50	10.20	82.00	18.50	48.00	3	OH4	4589 12.040	4588 12.040	4587 12.040
M12	1.75	8.500	6.50	10.20	82.00	18.50	48.00	3	OH5	4589 12.050	4588 12.050	4587 12.050
M14	2.00	10.500	8.00	12.00	88.00	20.00	48.00	3	OH3	4589 14.030	4588 14.030	4587 14.030
M14	2.00	10.500	8.00	12.00	88.00	20.00	48.00	3	OH4	4589 14.040	4588 14.040	4587 14.040
M14	2.00	10.500	8.00	12.00	88.00	20.00	48.00	3	OH5	4589 14.050	4588 14.050	4587 14.050

**JIS B 4430**

Article no.

4589**4588****4587**

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.		
	mm	mm	mm	mm	mm	mm	mm					
M16	2.00	12.500	10.00	14.00	95.00	20.00	52.00	4	OH3	4589 16.030	4588 16.030	4587 16.030
M16	2.00	12.500	10.00	14.00	95.00	20.00	52.00	4	OH4	4589 16.040	4588 16.040	4587 16.040
M16	2.00	12.500	10.00	14.00	95.00	20.00	52.00	4	OH5	4589 16.050	4588 16.050	4587 16.050
M18	2.50	14.000	11.00	15.50	100.00	25.00	55.00	4	OH4	4589 18.040	4588 18.040	4587 18.040
M18	2.50	14.000	11.00	15.50	100.00	25.00	55.00	4	OH5	4589 18.050	4588 18.050	4587 18.050
M18	2.50	14.000	11.00	15.50	100.00	25.00	55.00	4	OH6	4589 18.060	4588 18.060	4587 18.060
M20	2.50	15.000	12.00	17.50	105.00	25.00	58.00	4	OH4	4589 20.040	4588 20.040	4587 20.040
M20	2.50	15.000	12.00	17.50	105.00	25.00	58.00	4	OH5	4589 20.050	4588 20.050	4587 20.050
M20	2.50	15.000	12.00	17.50	105.00	25.00	58.00	4	OH6	4589 20.060	4588 20.060	4587 20.060

Taps for ISO metric threads

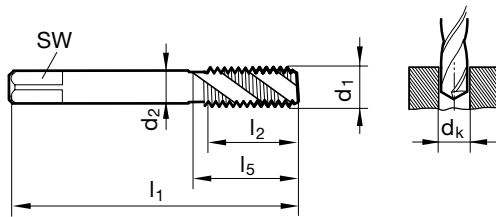


P	M	K	N	S	H
•	•	○	○	○	

Cutting data page 69

Tool material	HSS-E-PM
Surface	A
Type	VA R45
Form	C
Cutting direction	right-hand

Pionex



JIS B 4430 Article no. **4449**

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
mm	mm	mm	mm	mm	mm	mm	mm			
M2	0.40	3.000	2.50	1.60	40.00	4.50	15.00	3	OH1.5	4449 2.150
M2.5	0.45	3.000	2.50	2.05	44.00	5.00	16.00	3	OH2	4449 2.520
M3	0.50	4.000	3.20	2.50	46.00	6.00	19.00	3	OH2	4449 3.020
M4	0.70	5.000	4.00	3.30	52.00	7.50	20.00	3	OH3	4449 4.030
M5	0.80	5.500	4.50	4.20	60.00	8.50	24.00	3	OH3	4449 5.030
M6	1.00	6.000	4.50	5.00	62.00	11.00	29.00	3	OH3	4449 6.030
M8	1.25	6.200	5.00	6.80	70.00	14.00	37.00	3	OH3	4449 8.030
M10	1.50	7.000	5.50	8.50	75.00	16.00	41.00	3	OH3	4449 10.030
M12	1.75	8.500	6.50	10.20	82.00	18.50	48.00	3	OH4	4449 12.040
M14	2.00	10.500	8.00	12.00	88.00	20.00	48.00	3	OH4	4449 14.040
M16	2.00	12.500	10.00	14.00	95.00	20.00	52.00	4	OH4	4449 16.040
M18	2.50	14.000	11.00	15.50	100.00	25.00	55.00	4	OH5	4449 18.050
M20	2.50	15.000	12.00	17.50	105.00	25.00	58.00	4	OH5	4449 20.050



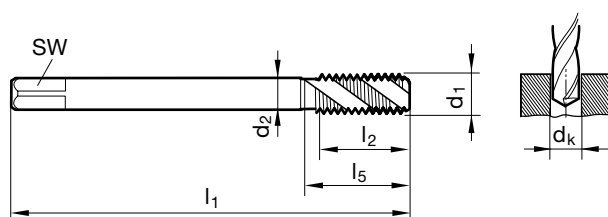
Taps for ISO metric threads



P	M	K	N	S	H
•	○	○	○		

Cutting data page 69

Tool material	HSS-E
Surface	○
Type	N R40
Form	C
Cutting direction	right-hand



Company std.

Article no.

4462

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
mm	mm	mm	mm	mm	mm	mm	mm			
M2	0.40	3.000	2.50	1.60	100.00	4.50	15.00	3	OH1	4462 2.010
M2.5	0.45	3.000	2.50	2.05	100.00	5.00	16.00	3	OH1	4462 2.510
M3	0.50	4.000	3.20	2.50	100.00	6.00	19.00	3	OH2	4462 3.020
M3	0.50	4.000	3.20	2.50	150.00	6.00	19.00	3	OH2	4462 3.120
M4	0.70	5.000	4.00	3.30	100.00	7.50	20.00	3	OH2	4462 4.020
M4	0.70	5.000	4.00	3.30	150.00	7.50	20.00	3	OH2	4462 4.120
M5	0.80	5.500	4.50	4.20	100.00	8.50	24.00	3	OH2	4462 5.020
M5	0.80	5.500	4.50	4.20	150.00	8.50	24.00	3	OH2	4462 5.120
M6	1.00	6.000	4.50	5.00	100.00	11.00	29.00	3	OH2	4462 6.020
M6	1.00	6.000	4.50	5.00	150.00	11.00	29.00	3	OH2	4462 6.120
M8	1.25	6.200	5.00	6.80	100.00	14.00	37.00	3	OH2	4462 8.020
M8	1.25	6.200	5.00	6.80	150.00	14.00	37.00	3	OH2	4462 8.120
M10	1.50	7.000	5.50	8.50	100.00	16.00	41.00	3	OH2	4462 10.020
M10	1.50	7.000	5.50	8.50	150.00	16.00	41.00	3	OH2	4462 10.120
M12	1.75	8.500	6.50	10.20	100.00	18.50	48.00	3	OH2	4462 12.020
M12	1.75	8.500	6.50	10.20	150.00	18.50	48.00	3	OH2	4462 12.120
M14	2.00	10.500	8.00	12.00	150.00	20.00	48.00	3	OH2	4462 14.120
M16	2.00	12.500	10.00	14.00	150.00	20.00	52.00	4	OH2	4462 16.120
M18	2.50	14.000	11.00	15.50	200.00	25.00	55.00	4	OH3	4462 18.030
M20	2.50	15.000	12.00	17.50	200.00	25.00	58.00	4	OH3	4462 20.030
M20	2.50	15.000	12.00	17.50	150.00	25.00	58.00	4	OH3	4462 20.130



Standard nut taps

by

GÜHRING



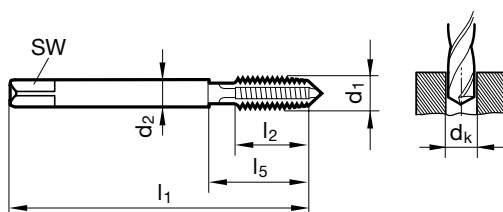
Taps for ISO metric threads



P	M	K	N	S	H
		•	≤ 7		

Cutting data page 70

Tool material	HSS-E
Surface	○
Type	GG
Form	C
Cutting direction	right-hand



JIS B 4430

Article no.

4452

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm	mm			
M2	0.40	3.000	2.50	1.60	40.00	8.00	15.00	3	OH2	4452 2.020
M2.5	0.45	3.000	2.50	2.05	44.00	9.00	16.00	3	OH2	4452 2.520
M3	0.50	4.000	3.20	2.50	46.00	10.00	19.00	3	OH3	4452 3.030
M4	0.70	5.000	4.00	3.30	52.00	12.00	20.00	3	OH3	4452 4.030
M5	0.80	5.500	4.50	4.20	60.00	14.00	24.00	4	OH3	4452 5.030
M6	1.00	6.000	4.50	5.00	62.00	16.00	29.00	4	OH3	4452 6.030
M8	1.25	6.200	5.00	6.80	70.00	17.00	37.00	4	OH4	4452 8.040
M10	1.50	7.000	5.50	8.50	75.00	20.00	41.00	4	OH4	4452 10.040
M12	1.75	8.500	6.50	10.20	82.00	24.00	48.00	4	OH5	4452 12.050
M14	2.00	10.500	8.00	12.00	88.00	26.00	48.00	4	OH5	4452 14.050
M16	2.00	12.500	10.00	14.00	95.00	26.00	52.00	4	OH5	4452 16.050
M18	2.50	14.000	11.00	15.50	100.00	30.00	55.00	5	OH5	4452 18.050
M20	2.50	15.000	12.00	17.50	105.00	32.00	58.00	5	OH5	4452 20.050

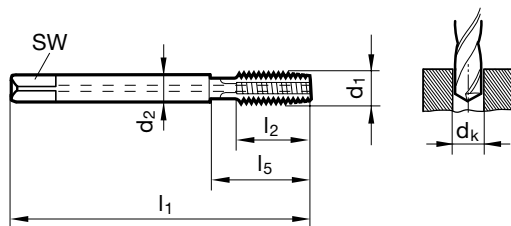
Taps for ISO metric threads



P	M	K	N	S	H
○		●	≤ 7		

Cutting data page 70

Tool material	HSS-E-PM
Surface	C
Type	GG
Form	C
Cutting direction	right-hand



JIS B 4430

Article no.

4448

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm	mm			
M5	0.80	5.500	4.50	4.20	60.00	14.00	24.00	4	OH3	4448 5.030
M6	1.00	6.000	4.50	5.00	62.00	16.00	29.00	4	OH3	4448 6.030
M8	1.25	6.200	5.00	6.80	70.00	17.00	37.00	4	OH4	4448 8.040
M10	1.50	7.000	5.50	8.50	75.00	20.00	41.00	4	OH4	4448 10.040
M12	1.75	8.500	6.50	10.20	82.00	24.00	48.00	4	OH5	4448 12.050
M14	2.00	10.500	8.00	12.00	88.00	26.00	48.00	4	OH5	4448 14.050
M16	2.00	12.500	10.00	14.00	95.00	26.00	52.00	4	OH5	4448 16.050
M18	2.50	14.000	11.00	15.50	100.00	30.00	55.00	5	OH5	4448 18.050
M20	2.50	15.000	12.00	17.50	105.00	32.00	58.00	5	OH5	4448 20.050



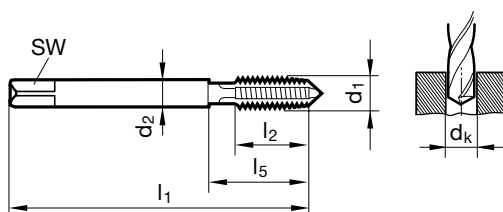
Taps for ISO metric threads



P	M	K	N	S	H
		•			≤ 55

Cutting data page 70

Tool material	HSS-E-PM
Surface	Ⓢ
Type	H
Form	D
Cutting direction	right-hand



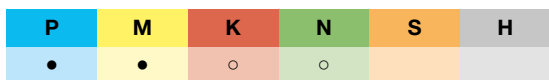
JIS B 4430

Article no.

4453

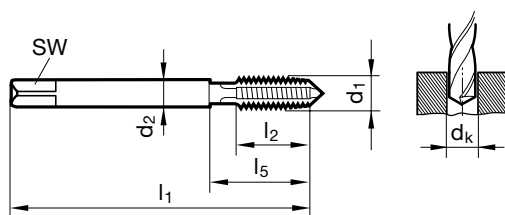
d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm	mm			
M3	0.50	4.000	3.20	2.60	46.00	10.00	19.00	3	OH3	4453 3.030
M4	0.70	5.000	4.00	3.40	52.00	12.00	20.00	4	OH3	4453 4.030
M5	0.80	5.500	4.50	4.30	60.00	14.00	24.00	4	OH3	4453 5.030
M6	1.00	6.000	4.50	5.10	62.00	16.00	29.00	4	OH3	4453 6.030
M8	1.25	6.200	5.00	6.90	70.00	17.00	37.00	5	OH3	4453 8.030
M10	1.50	7.000	5.50	8.60	75.00	20.00	41.00	5	OH3	4453 10.030
M12	1.75	8.500	6.50	10.40	82.00	24.00	48.00	5	OH3	4453 12.030

Taps for ISO metric fine threads



Cutting data page 68

Tool material	HSS-E	
Surface	○	Ⓢ
Type	N	N
Form	B	B
Cutting direction	right-hand	right-hand



JIS B 4430

Article no.

4434

4435

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.	
	mm	mm	mm	mm	mm	mm				
M6 x 0.75	6.000	4.50	5.20	62.00	13.00	30.00	3	OH2	4434 6.024	4435 6.024
M8 x 1	6.200	5.00	7.00	70.00	17.00	35.00	3	OH2	4434 8.025	4435 8.025
M10 x 1	7.000	5.50	9.00	70.00	16.00	35.00	3	OH2	4434 10.025	4435 10.025
M10 x 1.25	7.000	5.50	8.80	75.00	20.00	39.00	3	OH2	4434 10.026	4435 10.026
M12 x 1	8.500	6.50	11.00	70.00	20.00	40.00	4	OH2	4434 12.025	4435 12.025
M12 x 1.25	8.500	6.50	10.80	80.00	20.00	40.00	4	OH2	4434 12.026	4435 12.026
M12 x 1.5	8.500	6.50	10.50	82.00	20.00	40.00	4	OH2	4434 12.027	4435 12.027
M14 x 1.5	10.500	8.00	12.50	88.00	20.00	40.00	4	OH2	4434 14.027	4435 14.027
M16 x 1.5	12.500	10.00	14.50	95.00	22.00	44.00	4	OH2	4434 16.027	4435 16.027
M18 x 1.5	14.000	11.00	16.50	95.00	25.00	44.00	4	OH2	4434 18.027	4435 18.027
M20 x 1.5	15.000	12.00	18.50	95.00	25.00	44.00	4	OH2	4434 20.027	4435 20.027

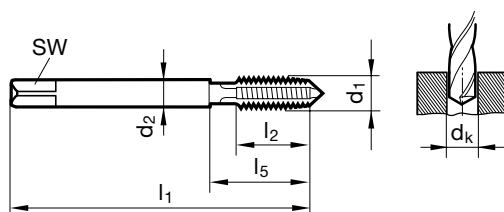


Taps for ISO metric fine threads



Cutting data page 68

Tool material	HSS-E
Surface	A
Type	VA
Form	B
Cutting direction	right-hand



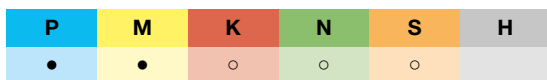
~JIS B 4430

Article no.

4552

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.20	62.00	13.00	30.00	3	OH2	4552 6.024
M6 x 0.75	6.000	4.50	5.20	62.00	13.00	30.00	3	OH3	4552 6.034
M8 x 1	6.200	5.00	7.00	70.00	17.00	35.00	3	OH3	4552 8.035
M8 x 1	6.200	5.00	7.00	70.00	17.00	35.00	3	OH4	4552 8.045
M10 x 1	7.000	5.50	9.00	75.00	20.00	35.00	3	OH3	4552 10.035
M10 x 1.25	7.000	5.50	8.80	75.00	20.00	39.00	3	OH3	4552 10.036
M10 x 1	7.000	5.50	9.00	75.00	20.00	35.00	3	OH4	4552 10.045
M10 x 1.25	7.000	5.50	8.80	75.00	20.00	39.00	3	OH4	4552 10.046
M12 x 1	8.500	6.50	11.00	82.00	20.00	40.00	4	OH3	4552 12.035
M12 x 1.25	8.500	6.50	10.80	82.00	20.00	40.00	4	OH3	4552 12.036
M12 x 1.5	8.500	6.50	10.50	82.00	20.00	40.00	4	OH3	4552 12.037
M12 x 1	8.500	6.50	11.00	82.00	20.00	40.00	4	OH4	4552 12.045
M12 x 1.25	8.500	6.50	10.80	82.00	20.00	40.00	4	OH4	4552 12.046
M12 x 1.5	8.500	6.50	10.50	82.00	20.00	40.00	4	OH4	4552 12.047
M12 x 1	8.500	6.50	11.00	82.00	20.00	40.00	4	OH5	4552 12.055
M12 x 1.25	8.500	6.50	10.80	82.00	20.00	40.00	4	OH5	4552 12.056
M12 x 1.5	8.500	6.50	10.50	82.00	20.00	40.00	4	OH5	4552 12.057
M14 x 1.5	10.500	8.00	12.50	88.00	20.00	40.00	4	OH3	4552 14.037
M14 x 1.5	10.500	8.00	12.50	88.00	20.00	40.00	4	OH4	4552 14.047
M14 x 1.5	10.500	8.00	12.50	88.00	20.00	40.00	4	OH5	4552 14.057
M16 x 1.5	12.500	10.00	14.50	95.00	22.00	44.00	4	OH3	4552 16.037
M16 x 1.5	12.500	10.00	14.50	95.00	22.00	44.00	4	OH4	4552 16.047
M16 x 1.5	12.500	10.00	14.50	95.00	22.00	44.00	4	OH5	4552 16.057
M18 x 1.5	14.000	11.00	16.50	100.00	25.00	44.00	4	OH4	4552 18.047
M18 x 1.5	14.000	11.00	16.50	100.00	25.00	44.00	4	OH5	4552 18.057
M20 x 1.5	15.000	12.00	18.50	105.00	25.00	44.00	4	OH4	4552 20.047
M20 x 1.5	15.000	12.00	18.50	105.00	25.00	44.00	4	OH5	4552 20.057

Taps for ISO metric fine threads



Cutting data page 68

Tool material **HSS-E-PM**

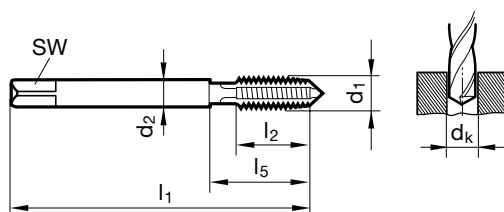
Surface **A**

Type VA

Form B

Cutting direction right-hand

Pionex



JIS B 4430

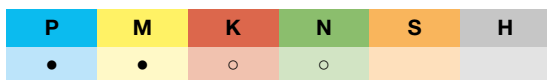
Article no.

4471

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.20	62.00	13.00	30.00	3	OH2	4471 6.024
M8 x 1	6.200	5.00	7.00	70.00	17.00	35.00	3	OH3	4471 8.035
M10 x 1	7.000	5.50	9.00	70.00	16.00	35.00	3	OH3	4471 10.035
M10 x 1.25	7.000	5.50	8.80	75.00	20.00	39.00	3	OH3	4471 10.036
M12 x 1	8.500	6.50	11.00	70.00	20.00	40.00	4	OH3	4471 12.035
M12 x 1.25	8.500	6.50	10.80	80.00	20.00	40.00	4	OH3	4471 12.036
M12 x 1.5	8.500	6.50	10.50	82.00	20.00	40.00	4	OH3	4471 12.037
M14 x 1.5	10.500	8.00	12.50	88.00	20.00	40.00	4	OH3	4471 14.037
M16 x 1.5	12.500	10.00	14.50	95.00	22.00	44.00	4	OH3	4471 16.037
M20 x 1.5	15.000	12.00	18.50	95.00	25.00	44.00	4	OH4	4471 20.047

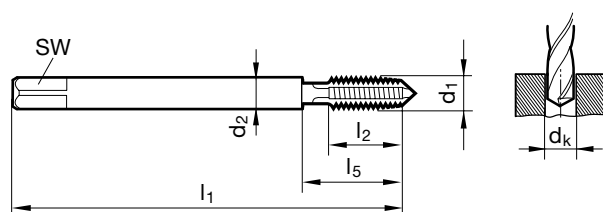


Taps for ISO metric fine threads



Cutting data page 68

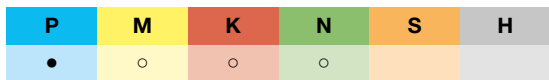
Tool material	HSS-E
Surface	○
Type	N
Form	B
Cutting direction	right-hand



Company std. Article no. **4461**

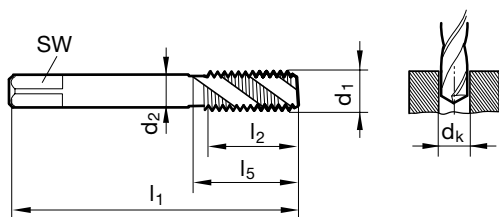
d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.20	150.00	13.00	30.00	3	OH2	4461 6.024
M8 x 1	6.200	5.00	7.00	150.00	17.00	35.00	3	OH2	4461 8.025
M10 x 1	7.000	5.50	9.00	150.00	16.00	35.00	3	OH2	4461 10.025
M10 x 1.25	7.000	5.50	8.80	150.00	20.00	39.00	3	OH2	4461 10.026
M12 x 1	8.500	6.50	11.00	150.00	20.00	40.00	4	OH2	4461 12.025
M12 x 1.25	8.500	6.50	10.80	150.00	20.00	40.00	4	OH2	4461 12.026
M12 x 1.5	8.500	6.50	10.50	150.00	20.00	40.00	4	OH2	4461 12.027
M14 x 1.5	10.500	8.00	12.50	150.00	20.00	40.00	4	OH2	4461 14.027
M16 x 1.5	12.500	10.00	14.50	150.00	22.00	44.00	4	OH2	4461 16.027
M20 x 1.5	15.000	12.00	18.50	200.00	25.00	44.00	4	OH2	4461 20.027

Taps for ISO metric fine threads



Cutting data page 69

Tool material	HSS-E	
Surface	○	Ⓢ
Type	N R40	N R40
Form	C	C
Cutting direction	right-hand	right-hand



JIS B 4430	Article no.	4438	4439
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d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.	
	mm	mm	mm	mm	mm	mm				
M4 x 0.5	5.000	4.00	3.50	52.00	5.00	21.00	3	OH2	4438 4.023	4439 4.023
M5 x 0.5	5.500	4.50	4.50	52.00	5.00	25.00	3	OH2	4438 5.023	4439 5.023
M6 x 0.5	6.000	4.50	5.50	52.00	5.00	30.00	3	OH2	4438 6.023	4439 6.023
M6 x 0.75	6.000	4.50	5.20	62.00	8.00	30.00	3	OH2	4438 6.024	4439 6.024
M8 x 0.75	6.200	5.00	7.20	62.00	8.00	30.00	3	OH2	4438 8.024	4439 8.024
M8 x 1	6.200	5.00	7.00	70.00	11.00	35.00	3	OH2	4438 8.025	4439 8.025
M10 x 1	7.000	5.50	9.00	70.00	11.00	35.00	3	OH2	4438 10.025	4439 10.025
M10 x 1.25	7.000	5.50	8.80	75.00	14.00	39.00	3	OH2	4438 10.026	4439 10.026
M12 x 1	8.500	6.50	11.00	70.00	11.00	40.00	3	OH2	4438 12.025	4439 12.025
M12 x 1.25	8.500	6.50	10.80	80.00	15.00	40.00	3	OH2	4438 12.026	4439 12.026
M12 x 1.5	8.500	6.50	10.50	82.00	15.00	40.00	3	OH2	4438 12.027	4439 12.027
M14 x 1.5	10.500	8.00	12.50	88.00	15.00	40.00	3	OH2	4438 14.027	4439 14.027
M16 x 1.5	12.500	10.00	14.50	95.00	15.00	44.00	4	OH2	4438 16.027	4439 16.027
M18 x 1.5	14.000	11.00	16.50	95.00	16.00	44.00	4	OH2	4438 18.027	4439 18.027
M20 x 1.5	15.000	12.00	18.50	95.00	16.00	44.00	4	OH2	4438 20.027	4439 20.027
M22 x 1.5	17.000	13.00	20.50	95.00	16.00	44.00	4	OH2	4438 22.027	4439 22.027

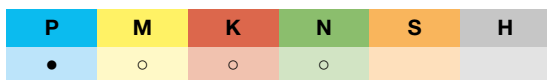
HPC end mill



The all-round end mill

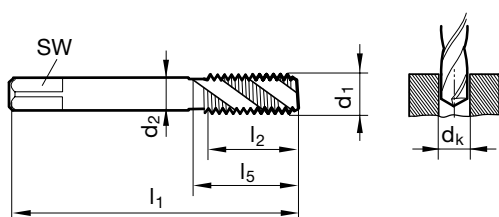
- universally applicable
- excellent performance
- very durable

Taps for ISO metric fine threads



Cutting data page 69

Tool material	HSS-E
Surface	○
Type	N R40
Form	E
Cutting direction	right-hand

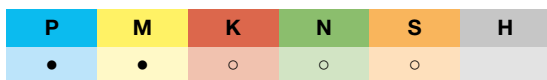


JIS B 4430 Article no. **4580**

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.20	62.00	8.00	30.00	3	OH2	4580 6.024
M6 x 0.75	6.000	4.50	5.20	62.00	8.00	30.00	3	OH3	4580 6.034
M8 x 1	6.200	5.00	7.00	70.00	11.00	35.00	3	OH3	4580 8.035
M8 x 1	6.200	5.00	7.00	70.00	11.00	35.00	3	OH4	4580 8.045
M10 x 1	7.000	5.50	9.00	70.00	11.00	35.00	3	OH3	4580 10.035
M10 x 1.25	7.000	5.50	8.80	75.00	14.00	39.00	3	OH3	4580 10.036
M10 x 1	7.000	5.50	9.00	70.00	11.00	35.00	3	OH4	4580 10.045
M10 x 1.25	7.000	5.50	8.80	75.00	14.00	39.00	3	OH4	4580 10.046
M12 x 1	8.500	6.50	11.00	70.00	11.00	40.00	3	OH3	4580 12.035
M12 x 1.25	8.500	6.50	10.80	80.00	15.00	40.00	3	OH3	4580 12.036
M12 x 1.5	8.500	6.50	10.50	82.00	15.00	40.00	3	OH3	4580 12.037
M12 x 1	8.500	6.50	11.00	70.00	11.00	40.00	3	OH4	4580 12.045
M12 x 1.25	8.500	6.50	10.80	80.00	15.00	40.00	3	OH4	4580 12.046
M12 x 1.5	8.500	6.50	10.50	82.00	15.00	40.00	3	OH4	4580 12.047
M14 x 1.5	10.500	8.00	12.50	88.00	15.00	40.00	3	OH3	4580 14.037
M16 x 1.5	12.500	10.00	14.50	95.00	15.00	44.00	4	OH3	4580 16.037
M18 x 1.5	14.000	11.00	16.50	95.00	16.00	44.00	4	OH3	4580 18.037
M20 x 1.5	15.000	12.00	18.50	95.00	16.00	44.00	4	OH3	4580 20.037



Taps for ISO metric fine threads

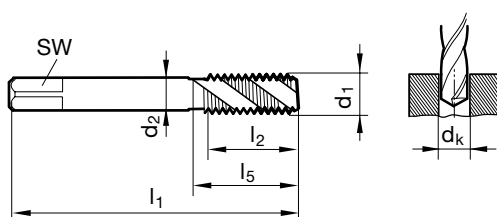


Cutting data page 69

Tool material	HSS-E		
Surface	○	Ⓢ	Ⓐ
Type	VA R45	VA R45	VA R45
Form	C	C	C
Cutting direction	right-hand	right-hand	right-hand



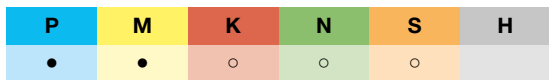
Pionex



~JIS B 4430	Article no.	4592	4591	4590
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d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.		
	mm	mm	mm	mm	mm	mm					
M6 x 0.75	6.000	4.50	5.20	62.00	8.00	30.00	3	OH2	4592 6.024	4591 6.024	4590 6.024
M6 x 0.75	6.000	4.50	5.20	62.00	8.00	30.00	3	OH3	4592 6.034	4591 6.034	4590 6.034
M8 x 1	6.200	5.00	7.00	70.00	11.00	35.00	3	OH3	4592 8.035	4591 8.035	4590 8.035
M8 x 1	6.200	5.00	7.00	70.00	11.00	35.00	3	OH4	4592 8.045	4591 8.045	4590 8.045
M10 x 1	7.000	5.50	9.00	75.00	11.00	35.00	3	OH3	4592 10.035	4591 10.035	4590 10.035
M10 x 1.25	7.000	5.50	8.80	75.00	14.00	39.00	3	OH3	4592 10.036	4591 10.036	4590 10.036
M10 x 1	7.000	5.50	9.00	75.00	11.00	35.00	3	OH4	4592 10.045	4591 10.045	4590 10.045
M10 x 1.25	7.000	5.50	8.80	75.00	14.00	39.00	3	OH4	4592 10.046	4591 10.046	4590 10.046
M12 x 1	8.500	6.50	11.00	82.00	11.00	40.00	3	OH3	4592 12.035	4591 12.035	4590 12.035
M12 x 1.25	8.500	6.50	10.80	82.00	15.00	40.00	3	OH3	4592 12.036	4591 12.036	4590 12.036
M12 x 1.5	8.500	6.50	10.50	82.00	15.00	40.00	3	OH3	4592 12.037	4591 12.037	4590 12.037
M12 x 1	8.500	6.50	11.00	82.00	11.00	40.00	3	OH4	4592 12.045	4591 12.045	4590 12.045
M12 x 1.25	8.500	6.50	10.80	82.00	15.00	40.00	3	OH4	4592 12.046	4591 12.046	4590 12.046
M12 x 1.5	8.500	6.50	10.50	82.00	15.00	40.00	3	OH4	4592 12.047	4591 12.047	4590 12.047
M12 x 1	8.500	6.50	11.00	82.00	11.00	40.00	3	OH5	4592 12.055	4591 12.055	4590 12.055
M12 x 1.25	8.500	6.50	10.80	82.00	15.00	40.00	3	OH5	4592 12.056	4591 12.056	4590 12.056
M12 x 1.5	8.500	6.50	10.50	82.00	15.00	40.00	3	OH5	4592 12.057	4591 12.057	4590 12.057
M14 x 1.5	10.500	8.00	12.50	88.00	15.00	40.00	3	OH3	4592 14.037	4591 14.037	4590 14.037
M14 x 1.5	10.500	8.00	12.50	88.00	15.00	40.00	3	OH4	4592 14.047	4591 14.047	4590 14.047
M14 x 1.5	10.500	8.00	12.50	88.00	15.00	40.00	3	OH5	4592 14.057	4591 14.057	4590 14.057
M16 x 1.5	12.500	10.00	14.50	95.00	15.00	44.00	4	OH3	4592 16.037	4591 16.037	4590 16.037
M16 x 1.5	12.500	10.00	14.50	95.00	15.00	44.00	4	OH4	4592 16.047	4591 16.047	4590 16.047
M16 x 1.5	12.500	10.00	14.50	95.00	15.00	44.00	4	OH5	4592 16.057	4591 16.057	4590 16.057
M18 x 1.5	14.000	11.00	16.50	100.00	16.00	44.00	4	OH4	4592 18.047	4591 18.047	4590 18.047
M18 x 1.5	14.000	11.00	16.50	100.00	16.00	44.00	4	OH5	4592 18.057	4591 18.057	4590 18.057
M20 x 1.5	15.000	12.00	18.50	105.00	16.00	44.00	4	OH4	4592 20.047	4591 20.047	4590 20.047
M20 x 1.5	15.000	12.00	18.50	105.00	16.00	44.00	4	OH5	4592 20.057	4591 20.057	4590 20.057

Taps for ISO metric fine threads



Cutting data page 69

Tool material **HSS-E-PM**

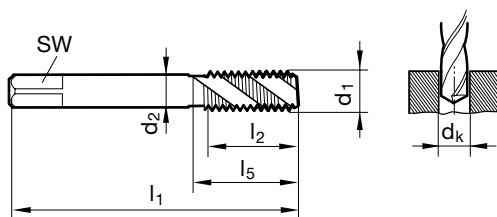
Surface **A**

Type VA R45

Form C

Cutting direction right-hand

Pionex



JIS B 4430

Article no.

4450

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.20	62.00	8.00	30.00	3	OH2	4450 6.024
M8 x 1	6.200	5.00	7.00	70.00	11.00	35.00	3	OH3	4450 8.035
M10 x 1	7.000	5.50	9.00	70.00	11.00	35.00	3	OH3	4450 10.035
M10 x 1.25	7.000	5.50	8.80	75.00	14.00	39.00	3	OH3	4450 10.036
M12 x 1	8.500	6.50	11.00	70.00	11.00	40.00	3	OH3	4450 12.035
M12 x 1.25	8.500	6.50	10.80	80.00	15.00	40.00	3	OH3	4450 12.036
M12 x 1.5	8.500	6.50	10.50	82.00	15.00	40.00	3	OH3	4450 12.037
M14 x 1.5	10.500	8.00	12.50	88.00	15.00	40.00	3	OH3	4450 14.037
M16 x 1.5	12.500	10.00	14.50	95.00	15.00	44.00	4	OH3	4450 16.037
M20 x 1.5	15.000	12.00	18.50	95.00	16.00	44.00	4	OH4	4450 20.047



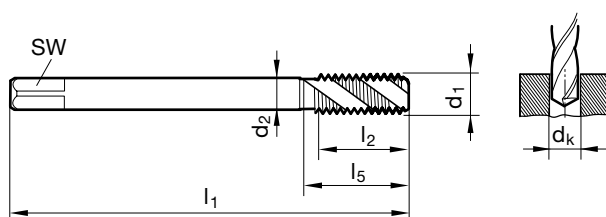
Taps for ISO metric fine threads



P	M	K	N	S	H
•	○	○	○		

Cutting data page 69

Tool material	HSS-E
Surface	○
Type	N R40
Form	C
Cutting direction	right-hand



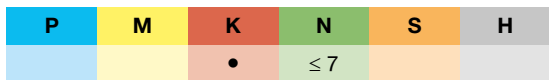
Company std.

Article no.

4463

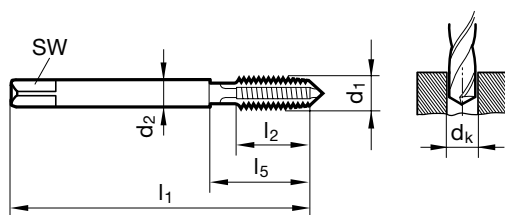
d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.20	150.00	8.00	30.00	3	OH2	4463 6.024
M8 x 1	6.200	5.00	7.00	150.00	11.00	35.00	3	OH2	4463 8.025
M10 x 1	7.000	5.50	9.00	150.00	11.00	35.00	3	OH2	4463 10.025
M10 x 1.25	7.000	5.50	8.80	150.00	14.00	39.00	3	OH2	4463 10.026
M12 x 1	8.500	6.50	11.00	150.00	11.00	40.00	3	OH2	4463 12.025
M12 x 1.25	8.500	6.50	10.80	150.00	15.00	40.00	3	OH2	4463 12.026
M12 x 1.5	8.500	6.50	10.50	150.00	15.00	40.00	3	OH2	4463 12.027
M14 x 1.5	10.500	8.00	12.50	150.00	15.00	40.00	3	OH2	4463 14.027
M16 x 1.5	12.500	10.00	14.50	150.00	15.00	44.00	4	OH2	4463 16.027
M20 x 1.5	15.000	12.00	18.50	200.00	16.00	44.00	4	OH2	4463 20.027

Taps for ISO metric fine threads



Cutting data page 70

Tool material	HSS-E
Surface	○
Type	GG
Form	C
Cutting direction	right-hand



JIS B 4430

Article no.

4451

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.20	62.00	13.00	30.00	4	OH3	4451 6.034
M8 x 1	6.200	5.00	7.00	70.00	17.00	35.00	4	OH3	4451 8.035
M9 x 1	7.000	5.50	8.00	70.00	16.00	35.00	4	OH3	4451 9.035
M10 x 1	7.000	5.50	9.00	70.00	16.00	35.00	4	OH3	4451 10.035
M10 x 1.25	7.000	5.50	8.80	75.00	20.00	39.00	4	OH4	4451 10.046
M12 x 1	8.500	6.50	11.00	70.00	20.00	40.00	4	OH3	4451 12.035
M12 x 1.25	8.500	6.50	10.80	80.00	20.00	40.00	4	OH4	4451 12.046
M12 x 1.5	8.500	6.50	10.50	82.00	20.00	40.00	4	OH4	4451 12.047
M14 x 1.5	10.500	8.00	12.50	88.00	20.00	40.00	4	OH4	4451 14.047
M16 x 1.5	12.500	10.00	14.50	95.00	22.00	44.00	4	OH4	4451 16.047
M20 x 1.5	15.000	12.00	18.50	95.00	25.00	44.00	5	OH4	4451 20.047



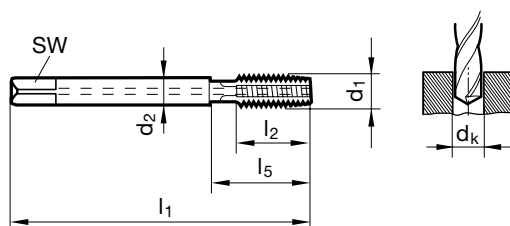
Taps for ISO metric fine threads



P	M	K	N	S	H
○		●	≤ 7		

Cutting data page 70

Tool material	HSS-E-PM
Surface	Ⓢ
Type	GG
Form	C
Cutting direction	right-hand



JIS B 4430

Article no.

4472

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.20	62.00	13.00	30.00	4	OH3	4472 6.034
M8 x 1	6.200	5.00	7.00	70.00	17.00	35.00	4	OH3	4472 8.035
M9 x 1	7.000	5.50	8.00	70.00	16.00	35.00	4	OH3	4472 9.035
M10 x 1	7.000	5.50	9.00	70.00	16.00	35.00	4	OH3	4472 10.035
M10 x 1.25	7.000	5.50	8.80	75.00	20.00	39.00	4	OH4	4472 10.046
M12 x 1	8.500	6.50	11.00	70.00	20.00	40.00	4	OH3	4472 12.035
M12 x 1.25	8.500	6.50	10.80	80.00	20.00	40.00	4	OH4	4472 12.046
M12 x 1.5	8.500	6.50	10.50	82.00	20.00	40.00	4	OH4	4472 12.047
M14 x 1.5	10.500	8.00	12.50	88.00	20.00	40.00	4	OH4	4472 14.047
M16 x 1.5	12.500	10.00	14.50	95.00	22.00	44.00	4	OH4	4472 16.047
M20 x 1.5	15.000	12.00	18.50	95.00	25.00	44.00	5	OH4	4472 20.047

Taps for ISO metric fine threads



P	M	K	N	S	H
		•			≤ 55

Cutting data page 70

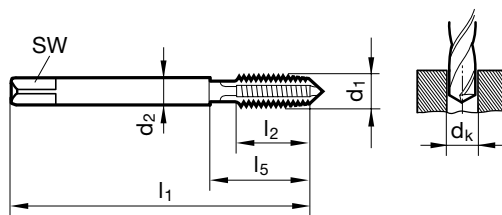
Tool material **HSS-E-PM**

Surface **C**

Type **H**

Form **D**

Cutting direction **right-hand**



JIS B 4430

Article no.

4459

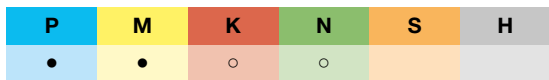
d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M8 x 1	6.200	5.00	7.10	70.00	17.00	35.00	5	OH3	4459 8.035
M10 x 1	7.000	5.50	9.10	70.00	16.00	35.00	5	OH3	4459 10.035
M10 x 1.25	7.000	5.50	8.90	75.00	20.00	39.00	5	OH3	4459 10.036
M12 x 1.5	8.500	6.50	10.60	82.00	20.00	40.00	5	OH3	4459 12.037
M12 x 1.25	8.500	6.50	10.90	80.00	20.00	40.00	5	OH4	4459 12.046



Pionex

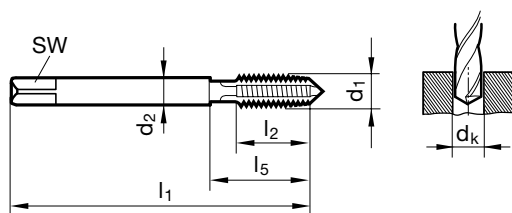
- high-performance machining
- higher cutting speeds
- outstanding tool life
- universal application in a wide variety of materials

Taps for UNC threads



Cutting data page 68

Tool material	HSS-E
Surface	○
Type	N
Form	B
Cutting direction	right-hand



Company std. Article no. 4465

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
6 - 32	4.000	3.20	2.85	48.00	12.00	21.00	3	OH2	4465 3.505
8 - 32	5.000	4.00	3.50	52.00	12.00	21.00	3	OH2	4465 4.166
10 - 24	5.500	4.50	3.90	60.00	14.00	25.00	3	OH2	4465 4.826
12 - 24	5.500	4.50	4.50	60.00	16.00	25.00	3	OH2	4465 5.486
1/4 - 20	6.000	4.50	5.10	62.00	16.00	29.00	3	OH3	4465 6.350
5/16 - 18	6.100	5.00	6.60	70.00	18.00	37.00	3	OH3	4465 7.938
3/8 - 16	7.000	5.50	8.00	75.00	20.00	41.00	3	OH3	4465 9.525
7/16 - 14	8.000	6.00	9.40	80.00	22.00	48.00	3	OH3	4465 11.113
1/2 - 13	9.000	7.00	10.80	85.00	25.00	48.00	4	OH3	4465 12.700
9/16 - 12	10.500	8.00	12.20	90.00	28.00	48.00	4	OH3	4465 14.288
5/8 - 11	12.000	9.00	13.50	95.00	30.00	52.00	4	OH3	4465 15.875
3/4 - 10	14.000	11.00	16.50	105.00	33.00	58.00	4	OH3	4465 19.050
7/8 - 9	17.000	13.00	19.50	115.00	35.00	63.00	4	OH4	4465 22.225
1 - 8	20.000	15.00	22.25	125.00	38.00	68.00	4	OH4	4465 25.400



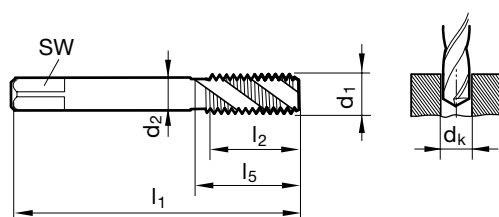
Taps for UNC threads



P	M	K	N	S	H
•	○	○	○		

Cutting data page 69

Tool material	HSS-E
Surface	○
Type	N R40
Form	C
Cutting direction	right-hand



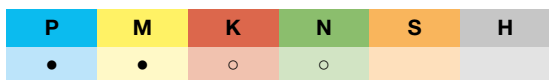
Company std.

Article no.

4454

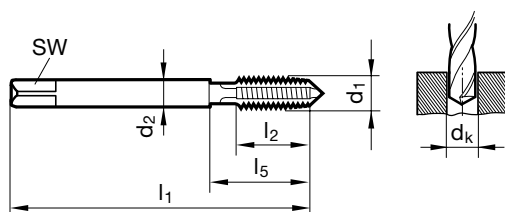
d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
2 - 56	3.000	2.50	1.85	42.00	5.00	21.00	3	OH1	4454 2.184
4 - 40	3.000	2.50	2.35	44.00	7.00	21.00	3	OH1	4454 2.845
5 - 40	4.000	3.20	2.65	46.00	7.00	21.00	3	OH1	4454 3.175
6 - 32	4.000	3.20	2.85	48.00	8.00	21.00	3	OH2	4454 3.505
8 - 32	5.000	4.00	3.50	52.00	8.00	21.00	3	OH2	4454 4.166
10 - 24	5.500	4.50	3.90	60.00	11.00	25.00	3	OH2	4454 4.826
12 - 24	5.500	4.50	4.50	60.00	11.00	25.00	3	OH2	4454 5.486
1/4 - 20	6.000	4.50	5.10	62.00	13.00	29.00	3	OH3	4454 6.350
5/16 - 18	6.100	5.00	6.60	70.00	14.00	37.00	3	OH3	4454 7.938
3/8 - 16	7.000	5.50	8.00	75.00	16.00	41.00	3	OH3	4454 9.525
7/16 - 14	8.000	6.00	9.40	80.00	18.00	48.00	3	OH3	4454 11.113
1/2 - 13	9.000	7.00	10.80	85.00	20.00	48.00	3	OH3	4454 12.700
9/16 - 12	10.500	8.00	12.20	90.00	21.00	48.00	3	OH3	4454 14.288
5/8 - 11	12.000	9.00	13.50	95.00	24.00	52.00	4	OH3	4454 15.875
3/4 - 10	14.000	11.00	16.50	105.00	25.00	58.00	4	OH3	4454 19.050
7/8 - 9	17.000	13.00	19.50	115.00	28.00	63.00	4	OH4	4454 22.225
1 - 8	20.000	15.00	22.25	125.00	32.00	68.00	4	OH4	4454 25.400

Taps for UNF threads



Cutting data page 68

Tool material	HSS-E
Surface	○
Type	N
Form	B
Cutting direction	right-hand



Company std.

Article no.

4455

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
6 - 40	4.000	3.20	2.95	48.00	11.00	21.00	3	OH2	4455 3.505
8 - 36	5.000	4.00	3.50	52.00	12.00	21.00	3	OH2	4455 4.166
10 - 32	5.500	4.50	4.10	60.00	14.00	25.00	3	OH2	4455 4.826
12 - 28	5.500	4.50	4.60	60.00	16.00	25.00	3	OH2	4455 5.486
1/4 - 28	6.000	4.50	5.50	62.00	16.00	29.00	3	OH2	4455 6.350
5/16 - 24	6.100	5.00	6.90	70.00	17.00	37.00	3	OH3	4455 7.938
3/8 - 24	7.000	5.50	8.50	75.00	18.00	41.00	3	OH3	4455 9.525
7/16 - 20	8.000	6.00	9.90	80.00	22.00	48.00	3	OH3	4455 11.113
1/2 - 20	9.000	7.00	11.50	85.00	20.00	48.00	4	OH3	4455 12.700
9/16 - 18	10.500	8.00	12.90	90.00	22.00	48.00	4	OH3	4455 14.288
5/8 - 18	12.000	9.00	14.50	95.00	22.00	52.00	4	OH3	4455 15.875
3/4 - 16	14.000	11.00	17.50	105.00	25.00	58.00	4	OH3	4455 19.050
7/8 - 14	17.000	13.00	20.40	115.00	25.00	63.00	4	OH3	4455 22.225
1 - 12	20.000	15.00	23.25	125.00	28.00	68.00	4	OH3	4455 25.400



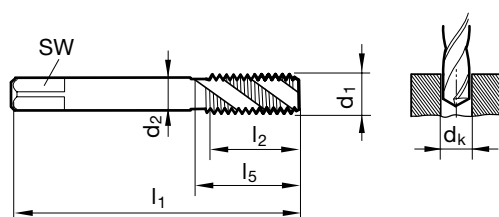
Taps for UNF threads



P	M	K	N	S	H
•	○	○	○		

Cutting data page 69

Tool material	HSS-E
Surface	○
Type	N R40
Form	C
Cutting direction	right-hand



Company std. Article no. 4457

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
6 - 40	4.000	3.20	2.95	48.00	6.50	21.00	3	OH2	4457 3.505
8 - 36	5.000	4.00	3.50	52.00	7.00	21.00	3	OH2	4457 4.166
10 - 32	5.500	4.50	4.10	60.00	8.50	25.00	3	OH2	4457 4.826
12 - 28	5.500	4.50	4.60	60.00	9.50	25.00	3	OH2	4457 5.486
1/4 - 28	6.000	4.50	5.50	62.00	9.50	29.00	3	OH2	4457 6.350
5/16 - 24	6.100	5.00	6.90	70.00	11.50	37.00	3	OH3	4457 7.938
3/8 - 24	7.000	5.50	8.50	75.00	11.50	41.00	3	OH3	4457 9.525
7/16 - 20	8.000	6.00	9.90	80.00	13.00	48.00	3	OH3	4457 11.113
1/2 - 20	9.000	7.00	11.50	85.00	13.00	48.00	3	OH3	4457 12.700
9/16 - 18	10.500	8.00	12.90	90.00	14.00	48.00	3	OH3	4457 14.288
5/8 - 18	12.000	9.00	14.50	95.00	15.00	52.00	4	OH3	4457 15.875
3/4 - 16	14.000	11.00	17.50	105.00	16.00	58.00	4	OH3	4457 19.050
7/8 - 14	17.000	13.00	20.40	115.00	19.00	63.00	4	OH3	4457 22.225
1 - 12	20.000	15.00	23.25	125.00	22.00	68.00	4	OH3	4457 25.400

Taps for PT threads



P	M	K	N	S	H
•	○	○	○		

Cutting data page 70

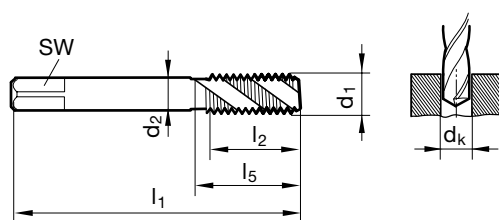
Tool material **HSS-E**

Surface ○

Type **N**

Form **C**

Cutting direction right-hand



Company std.

Article no.

4464

d1	P	d2	SW	dk	l1	l2	l5	Z	Order no.
	G/inch	mm	mm	mm	mm	mm	mm		
1/16	28	8.000	6.00	6.20	55.00	19.00	32.00	3	4464 7.723
1/8	28	8.000	6.00	8.20	55.00	19.00	33.00	3	4464 9.728
1/4	19	11.000	9.00	10.90	62.00	28.00	40.00	3	4464 13.157
3/8	19	14.000	11.00	14.40	65.00	28.00	42.00	4	4464 16.662
1/2	14	18.000	14.00	18.00	80.00	35.00	49.00	4	4464 20.955
3/4	14	23.000	17.00	23.00	85.00	35.00	50.00	4	4464 26.441
1	11	26.000	21.00	29.00	95.00	45.00	66.00	4	4464 33.249

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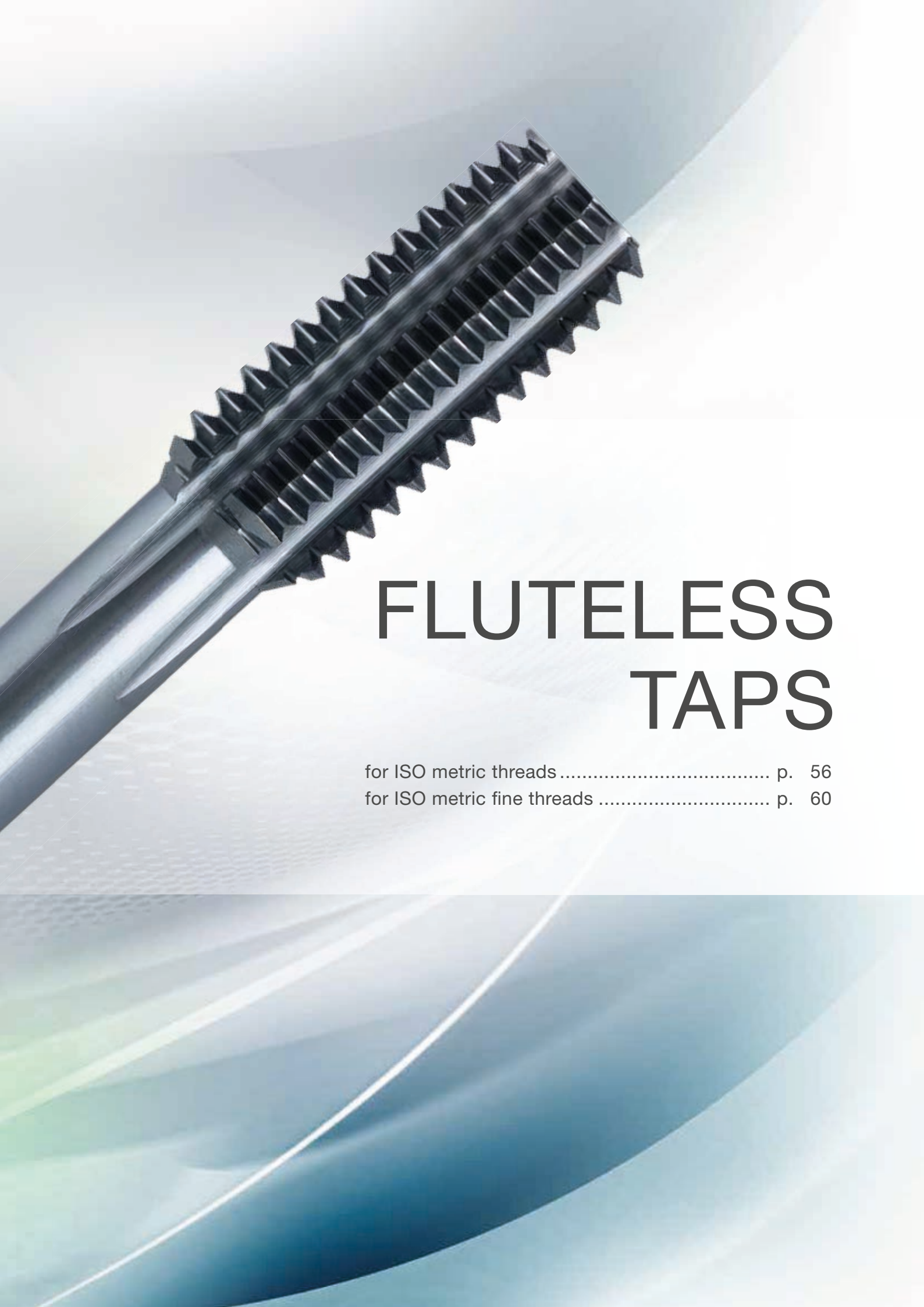


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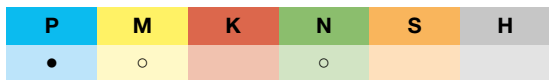




FLUTELESS TAPS

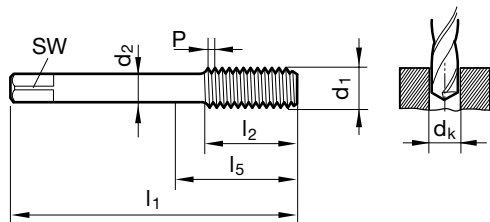
for ISO metric threads	p. 56
for ISO metric fine threads	p. 60

Fluteless taps w/o oil grooves for ISO metric threads



Cutting data page 71

Tool material	HSS-E
Surface	S
Type	N
Form	C
Cutting direction	right-hand



JIS B 4430

Article no.

1017

d1	P	d2	SW	dk	l1	l2	l5	Tolerance	Order no.
mm	mm	mm	mm	mm	mm	mm	mm		
M1	0.25	3.000	2.50	0.90	36.00	4.00		RH4	1017 1.040
M1.2	0.25	3.000	2.50	1.10	36.00	4.80	4.80	RH4	1017 1.240
M1.4	0.30	3.000	2.50	1.25	36.00	5.60	5.60	RH4	1017 1.440
M1.6	0.35	3.000	2.50	1.45	36.00	6.40	6.40	RH4	1017 1.640
M1.7	0.35	3.000	2.50	1.55	36.00	6.80	6.80	RH4	1017 1.740
M1.8	0.35	3.000	2.50	1.65	36.00	7.30	7.30	RH4	1017 1.840
M2	0.40	3.000	2.50	1.85	40.00	8.00	15.00	RH4	1017 2.040
M2.5	0.45	3.000	2.50	2.30	44.00	9.00	16.00	RH4	1017 2.540
M3	0.50	4.000	3.20	2.80	46.00	10.00	19.00	RH5	1017 3.050
M4	0.70	5.000	4.00	3.70	52.00	12.00	20.00	RH6	1017 4.060
M5	0.80	5.500	4.50	4.65	60.00	14.00	24.00	RH6	1017 5.060
M6	1.00	6.000	4.50	5.55	62.00	16.00	29.00	RH7	1017 6.070
M8	1.25	6.200	5.00	7.40	70.00	17.00	37.00	RH7	1017 8.070
M10	1.50	7.000	5.50	9.30	75.00	20.00	41.00	RH7	1017 10.070
M12	1.75	8.500	6.50	11.20	82.00	24.00	48.00	RH8	1017 12.080
M14	2.00	10.500	8.00	13.10	88.00	26.00	48.00	RH10	1017 14.100
M16	2.00	12.500	10.00	15.10	95.00	26.00	52.00	RH10	1017 16.100
M18	2.50	14.000	11.00	16.90	100.00	30.00	55.00	RH11	1017 18.110
M20	2.50	15.000	12.00	18.90	105.00	32.00	58.00	RH11	1017 20.110



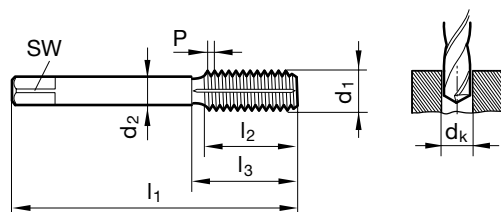
Fluteless taps with oil grooves for ISO metric threads



P	M	K	N	S	H
•	○		○		

Cutting data page 71

Tool material	HSS-E
Surface	S
Type	N
Form	C
Cutting direction	right-hand



JIS B 4430

Article no.

4443

d1	P	d2	SW	dk	l1	l2	l3	Z	Tolerance	Order no.
mm	mm	mm	mm	mm	mm	mm	mm			
M4	0.70	5.000	4.00	3.70	52.00	12.00	20.00	4	RH4	4443 4.040
M4	0.70	5.000	4.00	3.70	52.00	12.00	20.00	4	RH6	4443 4.060
M5	0.80	5.500	4.50	4.65	60.00	14.00	24.00	4	RH4	4443 5.040
M5	0.80	5.500	4.50	4.65	60.00	14.00	24.00	4	RH6	4443 5.060
M6	1.00	6.000	4.50	5.55	62.00	16.00	29.00	5	RH5	4443 6.050
M6	1.00	6.000	4.50	5.55	62.00	16.00	29.00	5	RH7	4443 6.070
M8	1.25	6.200	5.00	7.40	70.00	17.00	37.00	5	RH5	4443 8.050
M8	1.25	6.200	5.00	7.40	70.00	17.00	37.00	5	RH7	4443 8.070
M10	1.50	7.000	5.50	9.30	75.00	20.00	41.00	5	RH5	4443 10.050
M10	1.50	7.000	5.50	9.30	75.00	20.00	41.00	5	RH7	4443 10.070
M12	1.75	8.500	6.50	11.20	82.00	24.00	48.00	5	RH5	4443 12.050
M12	1.75	8.500	6.50	11.20	82.00	24.00	48.00	5	RH8	4443 12.080
M16	2.00	12.500	10.00	15.10	95.00	26.00	52.00	6	RH6	4443 16.060
M16	2.00	12.500	10.00	15.10	95.00	26.00	52.00	6	RH10	4443 16.100
M20	2.50	15.000	12.00	18.90	105.00	32.00	58.00	7	RH6	4443 20.060
M20	2.50	15.000	12.00	18.90	105.00	32.00	58.00	7	RH11	4443 20.110

Fluteless taps with oil grooves for ISO metric threads

HSS-E-PM

N

C



Tool material **HSS-E-PM**

Surface **C**

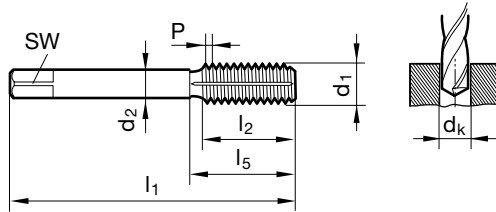
Type **N**

Form **C**

Cutting direction **right-hand**

P	M	K	N	S	H
•	•	•	•	•	

Cutting data page 71



JIS B 4430

Article no.

4583

d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
mm	mm	mm	mm	mm	mm	mm	mm			
M3	0.50	4.000	3.20	2.80	46.00	10.00	19.00	4	RH5	4583 3.050
M3	0.50	4.000	3.20	2.80	46.00	10.00	19.00	4	RH6	4583 3.060
M4	0.70	5.000	4.00	3.70	52.00	12.00	20.00	4	RH6	4583 4.060
M4	0.70	5.000	4.00	3.70	52.00	12.00	20.00	4	RH7	4583 4.070
M5	0.80	5.500	4.50	4.65	60.00	14.00	24.00	5	RH6	4583 5.060
M5	0.80	5.500	4.50	4.65	60.00	14.00	24.00	5	RH7	4583 5.070
M6	1.00	6.000	4.50	5.55	62.00	16.00	29.00	5	RH7	4583 6.070
M6	1.00	6.000	4.50	5.55	62.00	16.00	29.00	5	RH8	4583 6.080
M8	1.25	6.200	5.00	7.40	70.00	17.00	37.00	5	RH7	4583 8.070
M8	1.25	6.200	5.00	7.40	70.00	17.00	37.00	5	RH8	4583 8.080
M10	1.50	7.000	5.50	9.30	75.00	20.00	41.00	5	RH7	4583 10.070
M10	1.50	7.000	5.50	9.30	75.00	20.00	41.00	5	RH8	4583 10.080
M12	1.75	8.500	6.50	11.20	82.00	24.00	48.00	7	RH8	4583 12.080
M12	1.75	8.500	6.50	11.20	85.00	24.00	48.00	7	RH10	4583 12.100
M14	2.00	10.500	8.00	13.10	88.00	26.00	48.00	7	RH10	4583 14.100
M16	2.00	12.500	10.00	15.10	95.00	26.00	52.00	8	RH10	4583 16.100
M20	2.50	15.000	12.00	18.90	105.00	32.00	58.00	8	RH11	4583 20.110



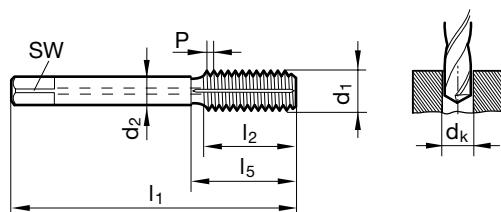
Fluteless taps with coolant ducts and oil grooves f. ISO metric threads



P	M	K	N	S	H
•	○	•	•	○	

Cutting data page 71

Tool material	Solid carbide
Surface	A
Type	N
Form	C
Cutting direction	right-hand



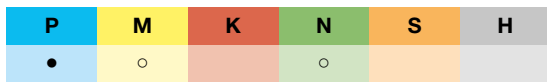
JIS B 4430

Article no.

4447

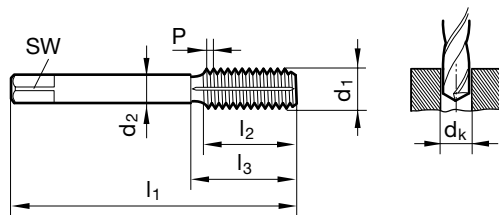
d1	P	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
mm	mm	mm	mm	mm	mm	mm	mm			
M5	0.80	5.500	4.50	4.65	60.00	8.50	24.00	4	RH6	4447 5.060
M6	1.00	6.000	4.50	5.55	62.00	11.00	29.00	5	RH7	4447 6.070
M8	1.25	6.200	5.00	7.40	70.00	14.00	37.00	5	RH7	4447 8.070
M10	1.50	7.000	5.50	9.30	75.00	16.00	41.00	5	RH7	4447 10.070
M12	1.75	8.500	6.50	11.20	82.00	18.50	48.00	6	RH8	4447 12.080
M16	2.00	12.500	10.00	15.10	95.00	20.00	52.00	6	RH10	4447 16.100
M20	2.50	15.000	12.00	18.90	105.00	25.00	58.00	7	RH11	4447 20.110

Fluteless taps with oil grooves for ISO metric fine threads



Cutting data page 71

Tool material	HSS-E
Surface	S
Type	N
Form	C
Cutting direction	right-hand

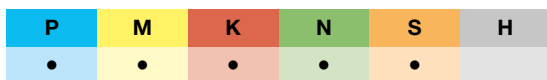


JIS B 4430 Article no. **4444**

d1	d2	SW	dk	l1	l2	l3	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.65	62.00	13.00	30.00	5	RH4	4444 6.044
M6 x 0.75	6.000	4.50	5.65	62.00	13.00	30.00	5	RH6	4444 6.064
M8 x 1	6.200	5.00	7.55	70.00	17.00	35.00	5	RH4	4444 8.045
M8 x 1	6.200	5.00	7.55	70.00	17.00	35.00	5	RH7	4444 8.075
M10 x 1	7.000	5.50	9.55	70.00	16.00	35.00	5	RH5	4444 10.055
M10 x 1.25	7.000	5.50	9.40	75.00	20.00	39.00	5	RH5	4444 10.056
M10 x 1	7.000	5.50	9.55	70.00	16.00	35.00	5	RH7	4444 10.075
M10 x 1.25	7.000	5.50	9.40	75.00	20.00	39.00	5	RH7	4444 10.076
M12 x 1	8.500	6.50	11.55	70.00	20.00	40.00	6	RH5	4444 12.055
M12 x 1.25	8.500	6.50	11.40	80.00	20.00	40.00	6	RH5	4444 12.056
M12 x 1.5	8.500	6.50	11.30	82.00	20.00	40.00	6	RH5	4444 12.057
M12 x 1	8.500	6.50	11.55	70.00	20.00	40.00	6	RH7	4444 12.075
M12 x 1.25	8.500	6.50	11.40	80.00	20.00	40.00	6	RH7	4444 12.076
M12 x 1.5	8.500	6.50	11.30	82.00	20.00	40.00	6	RH7	4444 12.077
M14 x 1.5	10.500	8.00	13.30	88.00	20.00	40.00	6	RH5	4444 14.057
M14 x 1.5	10.500	8.00	13.30	88.00	20.00	40.00	6	RH9	4444 14.097
M16 x 1.5	12.500	10.00	15.30	95.00	22.00	44.00	6	RH5	4444 16.057
M16 x 1.5	12.500	10.00	15.30	95.00	22.00	44.00	6	RH9	4444 16.097
M20 x 1.5	15.000	12.00	19.30	95.00	25.00	44.00	7	RH6	4444 20.067
M20 x 1.5	15.000	12.00	19.30	95.00	25.00	44.00	7	RH10	4444 20.107

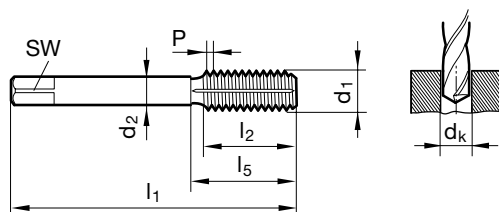


Fluteless taps with oil grooves for ISO metric fine threads



Cutting data page 71

Tool material	HSS-E-PM
Surface	ⓐ
Type	N
Form	C
Cutting direction	right-hand



JIS B 4430 Article no. 4585

d1	d2	SW	dk	l1	l2	l5	Z	Tolerance	Order no.
	mm	mm	mm	mm	mm	mm			
M6 x 0.75	6.000	4.50	5.65	62.00	13.00	30.00	5	RH4	4585 6.044
M6 x 0.75	6.000	4.50	5.65	62.00	13.00	30.00	5	RH6	4585 6.064
M8 x 1	6.200	5.00	7.55	70.00	17.00	35.00	5	RH4	4585 8.045
M8 x 1	6.200	5.00	7.55	70.00	17.00	35.00	5	RH7	4585 8.075
M10 x 1	7.000	5.50	9.55	75.00	20.00	35.00	6	RH5	4585 10.055
M10 x 1.25	7.000	5.50	9.40	75.00	20.00	39.00	6	RH5	4585 10.056
M10 x 1	7.000	5.50	9.55	75.00	20.00	35.00	6	RH7	4585 10.075
M10 x 1.25	7.000	5.50	9.40	75.00	20.00	39.00	6	RH7	4585 10.076
M12 x 1	8.500	6.50	11.55	82.00	20.00	40.00	7	RH5	4585 12.055
M12 x 1.25	8.500	6.50	11.40	82.00	20.00	40.00	7	RH5	4585 12.056
M12 x 1.5	8.500	6.50	11.30	82.00	20.00	40.00	7	RH5	4585 12.057
M12 x 1	8.500	6.50	11.55	82.00	20.00	40.00	7	RH7	4585 12.075
M12 x 1.25	8.500	6.50	11.40	82.00	20.00	40.00	7	RH7	4585 12.076
M12 x 1.5	8.500	6.50	11.30	82.00	20.00	40.00	7	RH7	4585 12.077
M14 x 1.5	10.500	8.00	13.30	88.00	20.00	40.00	8	RH5	4585 14.057
M14 x 1.5	10.500	8.00	13.30	88.00	20.00	40.00	8	RH9	4585 14.097
M16 x 1.5	12.500	10.00	15.30	95.00	22.00	44.00	8	RH5	4585 16.057
M16 x 1.5	12.500	10.00	15.30	95.00	22.00	44.00	8	RH9	4585 16.097
M20 x 1.5	15.000	12.00	19.30	105.00	25.00	44.00	8	RH6	4585 20.067
M20 x 1.5	15.000	12.00	19.30	105.00	25.00	44.00	8	RH9	4585 20.097





THREAD MILLING CUTTERS

Micro thread milling cutters



P	M	K	N	S	H
•	•	•	•	•	≤ 55

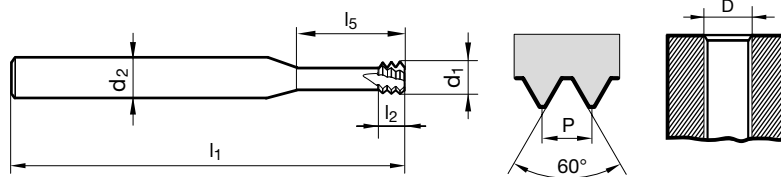
Cutting data page 72

Tool material **Solid carbide**

Surface

Type **MTM3 SP**

Shank form **HA**



Company std.

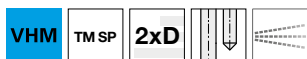
Article no.

4226

D	P	d1	d2	l1	l2	l5	Z	Order no.
	mm	mm	mm	mm	mm	mm		
M1.6	0.350	1.20	3.00	39.00	1.10	4.80	3	4226 1.600
M1.8	0.350	1.40	3.00	39.00	1.10	5.40	3	4226 1.800
M2	0.400	1.55	3.00	39.00	1.20	6.00	4	4226 2.000
M2.5	0.450	1.95	3.00	39.00	1.40	7.50	4	4226 2.500
M3	0.500	2.40	6.00	58.00	1.50	9.50	4	4226 3.000
M3.5	0.600	2.80	6.00	58.00	1.80	11.00	4	4226 3.500
M4	0.700	3.20	6.00	58.00	2.10	12.50	4	4226 4.000
M5	0.800	4.00	6.00	58.00	2.40	16.00	4	4226 5.000
M6	1.000	4.80	6.00	58.00	3.00	20.00	4	4226 6.000
M8	1.250	5.95	6.00	58.00	3.80	24.00	4	4226 8.000
M10	1.500	7.80	8.00	73.00	4.50	33.00	4	4226 10.000
M12	1.750	9.00	10.00	84.00	5.30	38.00	4	4226 12.000
M16	2.000	11.80	12.00	84.00	6.00	35.00	5	4226 16.000
M20	2.500	15.00	16.00	109.00	7.50	56.00	5	4226 20.000



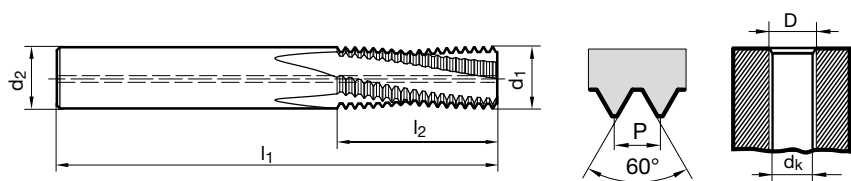
Thread milling cutters without chamfer for ISO metric threads



P	M	K	N	S	H
•	○	•	•	○	≤ 55

Cutting data page 72

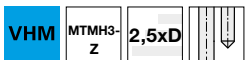
Tool material	Solid carbide
Surface	Ⓢ
Type	TM SP
Shank form	HA



Company std.	Article no.	3737
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D	P	d1	d2	dk	l1	l2	Z	Order no.
	mm	mm	mm	mm	mm	mm		
M6	1.000	4.80	6.00	5.00	54.00	13.50	3	3737 6.000
M8	1.250	6.40	8.00	6.80	62.00	18.10	3	3737 8.000
M8 x 1	1.000	6.40	8.00	7.00	62.00	17.50	3	3737 8.005
M10	1.500	7.95	10.00	8.50	74.00	21.80	3	3737 10.000
M10 x 1	1.000	7.95	10.00	9.00	74.00	21.50	3	3737 10.005
M10 x 1.25	1.250	7.95	10.00	8.80	74.00	21.90	3	3737 10.006
M12	1.750	9.95	10.00	10.20	74.00	25.40	4	3737 12.000
M12 x 1.5	1.500	9.95	10.00	10.50	74.00	26.30	4	3737 12.007
M14	2.000	11.20	12.00	12.00	90.00	31.00	4	3737 14.000
M14 x 1.5	1.500	11.20	12.00	12.50	90.00	30.80	4	3737 14.007
M16	2.000	12.80	14.00	14.00	90.00	35.00	4	3737 16.000
M16 x 1.5	1.500	12.80	14.00	14.50	90.00	33.80	4	3737 16.007
M20	2.500	14.95	16.00	17.50	102.00	41.30	4	3737 20.000
M20 x 1.5	1.500	14.95	16.00	18.50	102.00	42.80	4	3737 20.007

Micro thread milling cutters

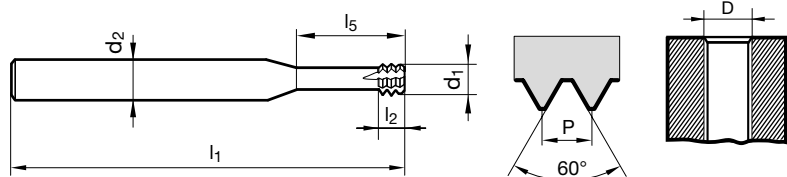


P	M	K	N	S	H
•	•	•	•	•	≤ 65

Cutting data page 74

with cooling grooves
rotating direction left-hand

Tool material	Solid carbide
Surface	
Type	MTMH3-Z
Shank form	HB



Company std.

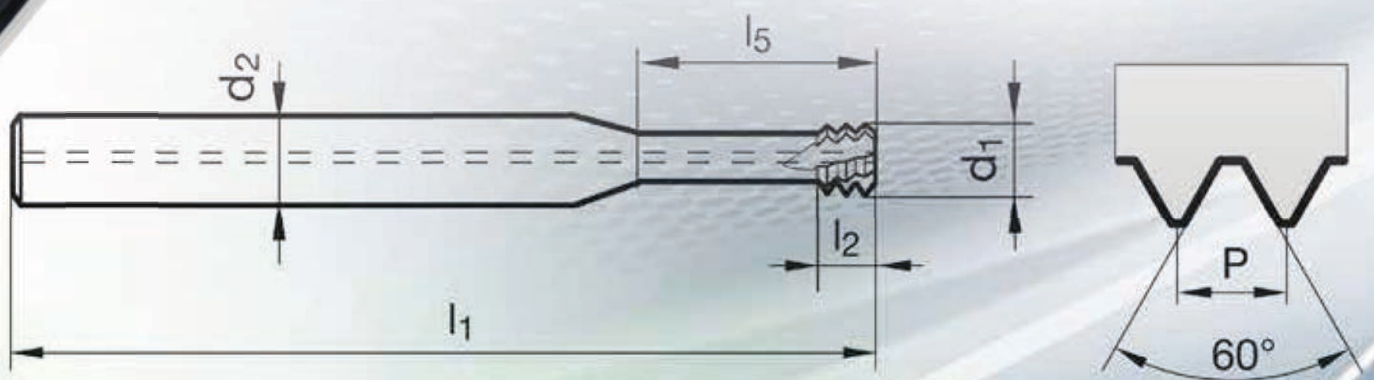
Article no.

4002







D	P	d1	d2	l1	l2	l5	Z	Order no.
	mm	mm	mm	mm	mm	mm		
M2	0.400	1.40	3.00	39.00	1.20	5.00	4	4002 2.000
M2.5	0.450	1.80	3.00	39.00	1.30	6.50	4	4002 2.500
M3	0.500	2.40	6.00	58.00	1.50	7.50	4	4002 3.000
M3.5	0.600	2.70	6.00	58.00	1.80	9.00	4	4002 3.500
M4	0.700	3.10	6.00	58.00	2.10	10.00	4	4002 4.000
M5	0.800	3.80	6.00	58.00	2.40	12.50	4	4002 5.000
M6	1.000	4.60	8.00	64.00	3.00	15.00	4	4002 6.000
M6 x 0.5	0.500	3.80	6.00	58.00	2.40	15.00	4	4002 6.003
M8	1.250	6.20	8.00	64.00	3.60	20.00	4	4002 8.000
M8 x 0.75	0.750	4.60	8.00	64.00	3.00	20.00	4	4002 8.004
M10	1.500	7.50	10.00	73.00	4.50	25.00	4	4002 10.000
M12	1.750	9.00	10.00	73.00	5.20	30.00	4	4002 12.000
M12 x 1	1.000	7.50	8.00	64.00	3.00	25.00	4	4002 12.005
M16	2.000	11.50	12.00	90.00	6.00	40.00	4	4002 16.000
M16 x 1.5	1.500	11.50	12.00	90.00	4.50	40.00	4	4002 16.007
M20	2.500	14.50	16.00	105.00	7.50	50.00	4	4002 20.000












TECHNICAL SECTION



JIS Cutting data

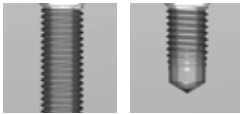




 THROUGH HOLES	Thread depth		≤3xD					
	Tool material		HSS-E				HSS-E-PM	
	Form		B	B	B	B	B	
	Surface		○	●	○	●	●	
	Coolant supply		☒	☒	☒	☒	☒	
	Spiral flute angle		-	-	-	-	-	
								
● = Neat oil ○ = Soluble oil △ = Paste	Thread type	Tolerance	Dim. to	Article no. / page				
	M	OH	JIS B 4430	1014 p. 18	1015 p. 18	4460 p. 22	4550 p. 19	4470 p. 21
	MF	OH	JIS B 4430	4434 p. 34	4435 p. 34	4461 p. 37	4552 p. 35	4471 p. 36
	UNC	OH	~JIS B 4430	4465 p. 48				
	UNF	OH	~JIS B 4430	4455 p. 50				
	G	JIS2	Company std.					
Suitable lubricant:			○/●/△	○/●/△	○/●/△	○/●/△	○/●/△	

	Material group	Hardness	Example materials	Material no.	Application recommendations					
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	10	15	10	20	25	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	8	12	8	15	20	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	6	8	6	10	15	
M	M1 Stainless steel sulfured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	6	8	6	12	15	
	M2 Stainless and acid-resist. steel steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	6	8	6	10	12	
	M3 Duplex and super duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	x	x	x	6	8	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	10	12	10	20	25	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	10	12	10	20	25	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		x	8	x	10	15	
N	N1 Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	10	x	10	10	12	
	N2 Aluminium-cast alloys	≤600 N/mm ²	GD-AlSi5Cu1Mg GD-AlSi8Cu3 G-AlSi9Mg G-AlSi12	3.2134 3.2162 3.2373 3.2581	8	10	8	20	25	
	N3 Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08	x	x	x	x	x	
	N4 Copper and copper alloys	langspanend		CuZn20 CuZn37Pb0,5	2.0250 2.0332	10	x	10	20	25
		kurzspanend		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	10	x	10	20	25
	N5 Copper special alloys	≤1400 N/mm ²	Ampco		x	x	x	x	x	
N6 Plastics [thermo-, duroplastics]	langspanend kurzspanend		PMMA, POM,PVC Pertinax		6	x	6	8	10	
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702<5 3.7115 3.7165	x	x	x	3	5	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	x	x	x	2	3	
H	H1 High tensile steels, hardened steels	45 - 55 HRC			x	x	x	x	x	
	H2	55 - 62 HRC			x	x	x	x	x	

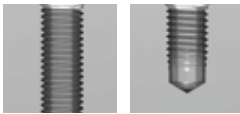





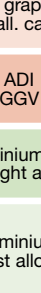
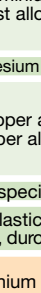
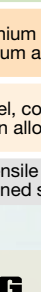
 BLIND HOLES	Thread depth	≤3xD									
	Tool material	HSS-E							HSS-E-PM		
	Form	C	C	C	E	C	C	C	C		
	Surface	○	●	○	○	○	●	●	●		
	Coolant supply	☒	☒	☒	☒	☒	☒	☒	☒		
	Spiral flute angle	40°	40°	40°	40°	45°	45°	45°	45°		
											
● = Neat oil ○ = Soluble oil △ = Paste	Thread type	Tolerance	Dim. to	Article no. / page							
	M	OH	JIS B 4430	1012 p. 23	1013 p. 23	4462 p. 29	4432 p. 25	4589 p. 26	4588 p. 26	4587 p. 26	4449 p. 28
	MF	OH	JIS B 4430	4438 p. 38	4439 p. 38	4463 p. 43	4580 p. 40	4592 p. 41	4591 p. 41	4590 p. 41	4450 p. 42
	UNC	OH	~JIS B 4430	4454 p. 49							
	UNF	OH	~JIS B 4430	4457 p. 51							
	G	JIS2	Company std.								
Suitable lubricant:				○/●/△	○/●/△	○/●/△	○/●/△	○/●/△	○/●/△	○/●/△	○/●/△

	Material group	Hardness	Example materials	Material no.	Application recommendations								
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	10	15	10	10	18	20	20	25	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	8	12	8	8	12	15	15	20	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	6	8	6	6	8	10	10	12	
M	M1 Stainless steel sulfured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	x	6	x	x	6	12	12	15	
	M2 Stainless and acid-resist. steel steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	x	6	x	x	6	10	10	12	
	M3 Duplex and super duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	x	x	x	x	4	6	6	8	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	10	12	10	10	12	20	20	25	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	10	12	10	10	12	20	20	25	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		x	x	x	x	x	10	10	15	
N	N1 Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	10	x	10	10	10	10	10	12	
	N2 Aluminium-cast alloys	≤600 N/mm ²	GD-AISi5Cu1Mg GD-AISi8Cu3 G-AISi9Mg G-AISi12	3.2134 3.2162 3.2373 3.2581	8	12	8	8	8	20	20	25	
	N3 Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08	x	x	x	x	x	x	x	x	
	N4 Copper and copper alloys	langspanend		CuZn20 CuZn37Pb0,5	2.0250 2.0332	8	x	8	8	12	15	20	25
		kurzspanend		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	8	x	8	8	12	15	20	25
	N5 Copper special alloys	≤1400 N/mm ²	Ampco		x	x	x	x	x	x	x	x	
N6 Plastics [thermo-, duroplastics]	langspanend kurzspanend		PMMA, POM, PVC Pertinax		6	x	6	6	6	6	6	8	
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702-5 3.7115 3.7165	x	x	x	x	x	3	3	5	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	x	x	x	x	x	2	2	3	
H	H1 High tensile steels,	45 - 55 HRC			x	x	x	x	x	x	x	x	
	H2 hardened steels	55 - 62 HRC			x	x	x	x	x	x	x	x	

JIS Cutting data

 THROUGH AND BLIND HOLES	Thread depth	depend. on PT		$\leq 3 \times D$		$\leq 2 \times D$	
	Tool material	HSS-E		HSS-E-PM			
	Form	C	C	C	D		
	Surface	○	○	⊙	⊙		
	Coolant supply	☒	☒	axial	☒		
	Spiral flute angle	25°	-	-	-		
							
● = Neat oil ○ = Soluble oil △ = Paste	Thread type	Tolerance	Dim. to	Article no. / page			
	M	OH	JIS B 4430		4452 p. 31	4448 p. 32	4453 p. 33
	MF	OH	JIS B 4430		4451 p. 44	4472 p. 45	4459 p. 46
	UNC	OH	~JIS B 4430				
	UNF	OH	~JIS B 4430				
	G	JIS2	Company std.	4464 p. 52			
	Suitable lubricant:		○/●/△	○/●/△	○/●/△	○/●/△	○/●/△

	Material group	Hardness	Example materials	Material no.	Application recommendations				
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤ 800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	10	x	x	x	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	8	x	15	x	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	6	x	12	x	
M	M1 Stainless steel sulfured, austenitic	≤ 1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	x	x	x	x	
	M2 Stainless and acid-resist. steel steels, martensitic	≤ 1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	x	x	x	x	
	M3 Duplex and super duplex	≤ 1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	x	x	x	x	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	10	20	25	15	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	10	15	20	10	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		x	x	10	10	
N	N1 Aluminium and wrought alloys	≤ 450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	10	x	x	x	
	N2 Aluminium-cast alloys	≤ 600 N/mm ²	GD-AISI5Cu1Mg GD-AISI8Cu3 G-AISI9Mg G-AISI12	3.2134 3.2162 3.2373 3.2581	8	15	25	x	
	N3 Magnesium alloys	≤ 500 N/mm ²	GDMgAl8Zn1	3.5812.08	x	8	8	x	
	N4 Copper and copper alloys	long-chipping		CuZn20 CuZn37Pb0,5	2.0250 2.0332	10	x	x	x
		short-chipping		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	10	x	x	x
	N5 Copper special alloys	≤ 1400 N/mm ²	Ampco		x	x	4	6	
N6 Plastics [thermo-, duroplastics]	long-chipping short-chipping		PMMA, POM,PVC Pertinax		6	x	x	x	
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702-5 3.7115 3.7165	x	x	x	x	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	x	x	x	x	
H	H1 High tensile steels, hardened steels	45 - 55 HRC			x	x	x	4	
	H2	55 - 62 HRC			x	x	x	x	

 THROUGH AND BLIND HOLES	Thread depth	≤2xD	≤3xD				
	Tool material	HSS-E		HSS-E-PM	Solid carbide		
	Form	C	C	C	C		
	Surface						
	Coolant supply	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	radial		
	Oil grooves	no	yes	yes	yes		
							
● = Neat oil ○ = Soluble oil △ = Paste	Thread type	Tolerance	Dim. to	Article no. / page			
	M	RH	JIS B 4430	1017 p. 56	4443 p. 57	4583 p. 58	4447 p. 59
	MF	RH	JIS B 4430		4444 p. 60	4585 p. 61	
	UNC	RH	~JIS B 4430				
	UNF	RH	~JIS B 4430				
	G	JIS2	Company std.				
	Suitable lubricant:				○/●/△	○/●/△	○/●/△

	Material group	Hardness	Example materials	Material no.	Application recommendations				
P	P1 Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	10	12	25	35	
	P2 Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	10	12	25	35	
	P3 Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	8	10	15	25	
M	M1 Stainless steel sulfured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	6	8	15	x	
	M2 Stainless and acid-resist. steel steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	4	6	10	x	
	M3 Duplex and super duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	2	4	6	x	
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	x	x	x	x	
	K2 Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	15	15	30	40	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		10	10	25	30	
N	N1 Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	x	x	15	25	
	N2 Aluminium-cast alloys	≤600 N/mm ²	GD-AISI5Cu1Mg GD-AISI8Cu3 G-AISI9Mg G-AISI12	3.2134 3.2162 3.2373 3.2581	15	20	30	40	
	N3 Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08	x	x	x	x	
	N4 Copper and copper alloys	long-chipping		CuZn20 CuZn37Pb0,5	2.0250 2.0332	12	12	30	40
		short-chipping		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410	10	10	20	25
	N5 Copper special alloys	≤1400 N/mm ²	Ampco		x	x	x	x	
N6 Plastics [thermo-, duroplastics]	long-chipping short-chipping		PMMA, POM,PVC Pertinax		x	x	x	x	
S	S1 Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702-5 3.7115 3.7165	4	4	8	x	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	4	4	8	x	
H	H1 High tensile steels,	45 - 55 HRC			x	x	x	x	
	H2 hardened steels	55 - 62 HRC			x	x	x	x	

JIS Cutting data

General recommendations:

- 1.) From 2.5xD [thread depth] thread Ø should be programmed in 2 passes. [2/3-1/3 in the conventional milling]
- 2.) Generally in VA and in hard machining from >HRC40 it is recommended thread Ø is programmed in 2 passes. [2/3-1/3 in the conventional milling]

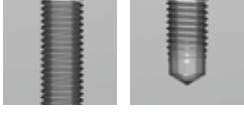







Please note:

The cutting values specified in the respective columns are guide values, they have to be adapted according to application conditions (material, lubrication, tool clamping, machine etc.)

Depending on the machining task the optimal cutting values can differ from those in the table by up to ±30 %!

optimally suited ●●
suited ●
not suitable ○

		Material group	Hardness	Example materials	Material no.	Cutting speed V _c m/min
P	P1	Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	90
	P2	Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	80
	P3	Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	70
M	M1	Stainless steel sulfured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	55
	M2	Stainless and acid-resist. steel steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	50
	M3	Duplex and super duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	45
K	K1	Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	120
	K2	Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	100
	K3	ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		80
N	N1	Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	250
	N2	Aluminium-cast alloys	≤600 N/mm ²	GD-AlSi5Cu1Mg GD-AlSi8Cu3 G-AlSi9Mg G-AlSi12	3.2134 3.2162 3.2373 3.2581	230
	N3	Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08	180
	N4	Copper and copper alloys	long-chipping short-chipping	CuZn20 CuZn37Pb0,5 CuZn39Pb2 CuZn43Pb2	2.0250 2.0332 2.0380 2.0410	130 130
	N5	Copper special alloys	≤1400 N/mm ²	Ampco		160
	N6	Plastics [thermo-, duroplastics]	long-chipping short-chipping	PMMA, POM,PVC Pertinax		300
S	S1	Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702<5 3.7115 3.7165	40
	S2	Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	30
H	H1	High tensile steels, hardened steels	45 - 55 HRC			45
	H2		55 - 62 HRC			40

 <p>THROUGH AND BLIND HOLES</p>	Thread depth	≤3xD	≤2xD	
	Tool material	Solid carbide	Solid carbide	
	Shank form	HA	HA	
	Surface			
	Coolant supply		axial	
	Type	MTM3 SP	TM SP	
				
<ul style="list-style-type: none"> ● = Neat oil ○ = Soluble oil △ = Paste 	Thread type	Article no. / page		
	M	Company std.	4226 S. 64	3737 S. 65
	MF	Company std.		3737 S. 65
	Suitable lubricant:			

Milling part diameter [d ₁] / feed per tooth [f _z]															Application recommendations	
Ø1 mm	Ø2 mm	Ø3 mm	Ø4 mm	Ø5 mm	Ø6 mm	Ø7 mm	Ø8 mm	Ø9 mm	Ø10 mm	Ø12 mm	Ø14 mm	Ø16 mm	Ø18 mm	Ø20 mm		
0,01	0,02	0,02	0,025	0,03	0,035	0,045	0,05	0,055	0,06	0,06	0,065	0,065	0,07	0,08	●●	●●
0,01	0,02	0,02	0,025	0,03	0,035	0,045	0,05	0,055	0,06	0,06	0,065	0,065	0,07	0,08	●●	●●
0,01	0,02	0,02	0,025	0,03	0,035	0,045	0,05	0,055	0,06	0,06	0,065	0,065	0,07	0,08	●	●●
0,01	0,02	0,025	0,03	0,03	0,03	0,035	0,04	0,05	0,055	0,06	0,065	0,065	0,07	0,075	●	●●
0,01	0,02	0,025	0,03	0,03	0,03	0,035	0,04	0,05	0,055	0,06	0,065	0,065	0,07	0,075	●	●●
0,01	0,02	0,025	0,03	0,035	0,04	0,045	0,05	0,06	0,065	0,07	0,08	0,09	0,1	0,12	●●	●●
0,01	0,02	0,025	0,03	0,035	0,04	0,045	0,05	0,06	0,065	0,07	0,08	0,09	0,1	0,12	●●	●●
0,01	0,02	0,025	0,03	0,035	0,04	0,045	0,05	0,06	0,065	0,07	0,08	0,09	0,1	0,12	●●	●●
0,02	0,03	0,035	0,04	0,045	0,05	0,055	0,06	0,065	0,07	0,08	0,085	0,09	0,1	0,12	●●	●●
0,02	0,03	0,035	0,04	0,045	0,05	0,055	0,06	0,065	0,07	0,08	0,085	0,09	0,1	0,12	●●	●●
0,02	0,03	0,035	0,04	0,045	0,05	0,055	0,06	0,065	0,07	0,08	0,085	0,09	0,1	0,12	●●	●●
0,01	0,02	0,025	0,03	0,035	0,04	0,045	0,05	0,055	0,06	0,065	0,07	0,075	0,08	0,09	●●	●●
0,01	0,02	0,025	0,03	0,035	0,04	0,045	0,05	0,055	0,06	0,065	0,07	0,075	0,08	0,09	●●	●●
0,01	0,01	0,015	0,02	0,025	0,03	0,035	0,04	0,04	0,045	0,05	0,055	0,06	0,065	0,07	●●	●●
0,01	0,01	0,015	0,02	0,025	0,03	0,035	0,04	0,04	0,045	0,05	0,055	0,06	0,065	0,07	●●	●●
x	0,01	0,015	0,02	0,025	0,03	0,03	0,035	0,04	0,045	0,05	0,055	0,06	0,065	0,07	●	●●
x	0,01	0,015	0,02	0,025	0,03	0,03	0,035	0,04	0,045	0,05	0,055	0,06	0,065	0,07	○	○

JIS Cutting data



Please note:

The cutting values specified in the respective columns are guide values, they have to be adapted according to application conditions (material, lubrication, tool clamping, machine etc.)

Depending on the machining task the optimal cutting values can differ from those in the table by up to $\pm 30\%$!

optimally suited ●●
 suited ●
 not suitable ○

		Material group	Hardness	Example materials	Material no.	Cutting speed V_c m/min
P	P1	Structural/free-cutting steels, unalloyed heat-treatable-/ case hardened steels	≤ 800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	80
	P2	Free-cutting steels, unalloyed case, hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	70
	P3	Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800 - 1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	70
M	M1	Stainless steel sulfured, austenitic	≤ 1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	55
	M2	Stainless and acid-resist. steel steels, martensitic	≤ 1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	50
	M3	Duplex and super duplex	≤ 1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	50
K	K1	Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030	80
	K2	Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	75
	K3	ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		65
N	N1	Aluminium and wrought alloys	≤ 450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	x
	N2	Aluminium-cast alloys	≤ 600 N/mm ²	GD-AlSi5Cu1Mg GD-AlSi8Cu3 G-AlSi9Mg G-AlSi12	3.2134 3.2162 3.2373 3.2581	120
	N3	Magnesium alloys	≤ 500 N/mm ²	GDMgAl8Zn1	3.5812.08	x
	N4	Copper and copper alloys	long-chipping short-chipping	CuZn20 CuZn37Pb0,5 CuZn39Pb2 CuZn43Pb2	2.0250 2.0332 2.0380 2.0410	80 80
	N5	Copper special alloys	≤ 1400 N/mm ²	Ampco		65
	N6	Plastics [thermo-, duroplastics]	long-chipping short-chipping	PMMA, POM,PVC Pertinax		x
S	S1	Titanium und titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702<5 3.7115 3.7165	45
	S2	Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	45
H	H1	High tensile steels, hardened steels	45 - 55 HRC			40
	H2		55 - 62 HRC			30

 <p>THROUGH AND BLIND HOLES</p>	Thread depth	$\leq 2,5xD$
	Tool material	Solid carbide
	Shank form	HB
	Surface	
	Coolant supply	with cooling grooves
	Type	MTMH3-Z

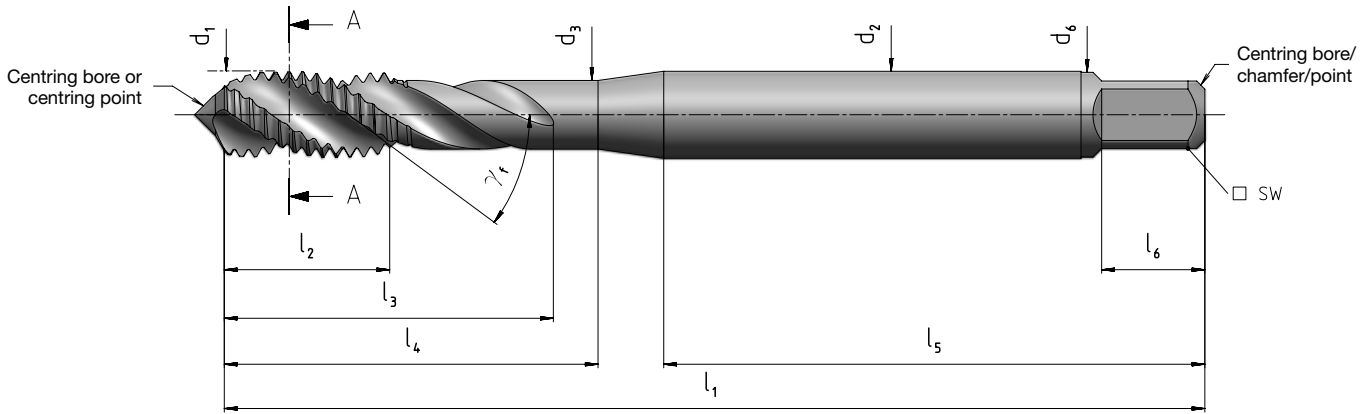
Please note: M4 counter clockwise



<ul style="list-style-type: none"> ● = Neat oil ○ = Soluble oil △ = Paste 	Thread type	Dim. to	Article no. / page
	M	Company std.	4002 S. 66
	MF	Company std.	4002 S. 66
	Suitable lubricant:		○/●/△

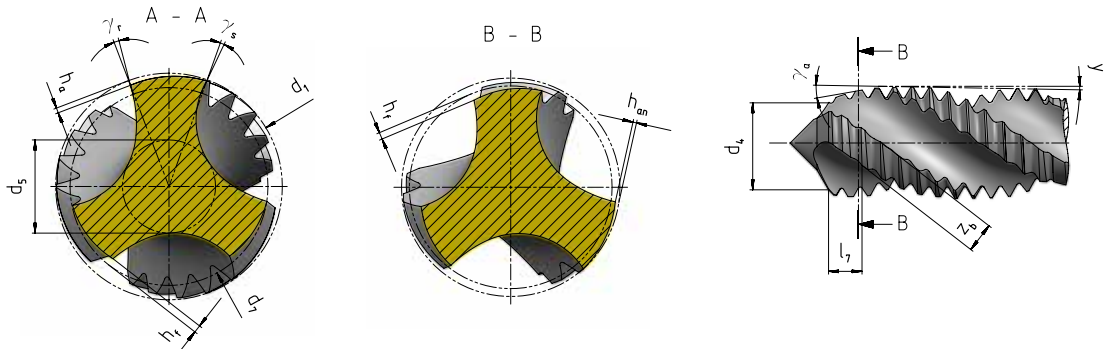
Milling part diameter [d ₁] / feed per tooth [f _z]											Application recommendations
M2 0,4 mm	M2,5 0,45 mm	M3 0,5 mm	M3,5 0,6 mm	M4 0,7 mm	M5 0,8 mm	M6 1 mm	[climb milling]				
							M8 1,25 mm	M10 1,5 mm	M12 1,75 mm	M16 2 mm	
0,008	0,008	0,012	0,014	0,018	0,026	0,028	0,03	0,035	0,04	0,048	●●
0,008	0,008	0,012	0,014	0,018	0,026	0,028	0,03	0,035	0,04	0,048	●●
0,007	0,007	0,01	0,011	0,012	0,016	0,02	0,025	0,03	0,036	0,044	●●
0,007	0,007	0,01	0,011	0,012	0,016	0,02	0,025	0,03	0,036	0,044	●●
0,007	0,007	0,01	0,011	0,012	0,016	0,02	0,025	0,03	0,036	0,044	●●
0,005	0,005	0,007	0,008	0,01	0,014	0,016	0,018	0,02	0,026	0,033	●●
0,008	0,008	0,012	0,014	0,016	0,02	0,024	0,03	0,036	0,04	0,048	●●
0,008	0,008	0,012	0,014	0,016	0,02	0,024	0,03	0,036	0,04	0,048	●●
0,007	0,007	0,011	0,013	0,015	0,018	0,022	0,028	0,033	0,038	0,046	●●
x	x	x	x	x	x	x	x	x	x	x	○
0,007	0,007	0,011	0,013	0,015	0,018	0,022	0,028	0,033	0,038	0,046	●●
x	x	x	x	x	x	x	x	x	x	x	○
0,008	0,008	0,012	0,014	0,016	0,02	0,024	0,03	0,036	0,04	0,048	●●
0,008	0,008	0,012	0,014	0,016	0,02	0,024	0,03	0,036	0,04	0,048	●●
0,007	0,007	0,01	0,011	0,012	0,016	0,02	0,025	0,03	0,036	0,048	●●
x	x	x	x	x	x	x	x	x	x	x	○
0,007	0,007	0,01	0,011	0,012	0,016	0,02	0,025	0,03	0,036	0,044	●●
0,007	0,007	0,01	0,011	0,012	0,016	0,02	0,025	0,03	0,036	0,044	●●
0,007	0,007	0,01	0,011	0,012	0,016	0,02	0,025	0,03	0,036	0,044	●●
0,005	0,005	0,008	0,009	0,01	0,014	0,018	0,022	0,028	0,033	0,042	●●

Illustration of tap terms



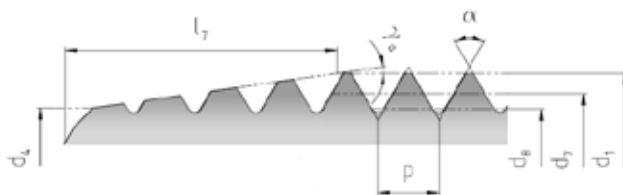
- | | | |
|-----------------------|---------------------|---------------------|
| d1 = outside diameter | l1 = overall length | l4 = useable length |
| d2 = shank diameter | l2 = thread length | l6 = square length |
| d3 = neck diameter | l3 = flute length | SW = square |

Flute design and reliefs



- | | |
|-------------------------|---------------------------|
| γ_r = rake angle | h_f = pitch relief |
| d_5 = core diameter | h_a = outside relief |
| Z_b = width of land | h_{an} = chamfer relief |

Thread detail



- | | | |
|-----------------------|------------------------|----------------------------|
| d1 = outside diameter | d8 = core diameter | γ_a = chamfer angle |
| d4 = chamfer diameter | P = pitch | l7 = chamfer length |
| d7 = pitch diameter | α = pitch angle | |



Different types of taps and their function and application

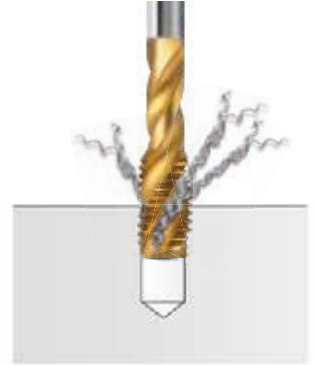
Type 1: Spiral fluted tap



BLIND
HOLE



- spiral flutes
- for long chipping material
- chip flow is against the feed in shank direction
- for thread depth more than $2,5xD$ we prefer the 45° helix



Type 2: Spiral point tap



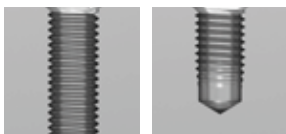
THROUGH
HOLE



- spiral point
- for long chipping material
- pushes the chips forward in the feed direction
- only for through hole application



Type 3: Straight fluted tap



THROUGH HOLE
BLIND HOLE



- straight flute
- for short chipping material and hard machining
- the tap does not guide the chip in a direction
- with internal coolant the chips will be removed perfectly



Chamfer forms

Form B

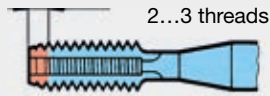


medium, 3.5 - 5.5 threads, with spiral point, for all through holes in medium and long-chipping materials



THROUGH HOLE

Form C

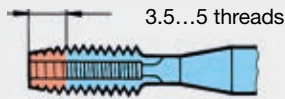


short, 2 - 3 threads for blind holes and generally for aluminium, grey cast iron and brass

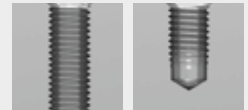


**THROUGH HOLE
BLIND HOLE**

Form D

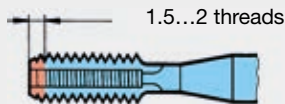


medium, 3.5 - 5 threads for short through holes



**THROUGH HOLE
BLIND HOLE**

Form E



extremely short, 1.5-2 threads, for blind holes with little run-out depth



BLIND HOLE

Why different chamfer forms?

Based on the workpiece construction there are different clearances between the useful thread depth and the drill depth.

How to calculate the right chamfer length?
(Drill depth - useful thread depth - 1pitch safety)/pitch

Example: M10x1.5

Drill depth: 20mm

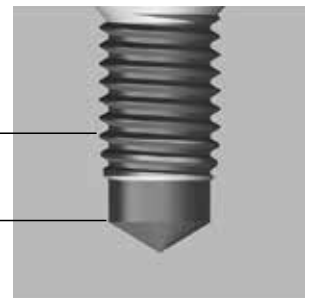
Thread depth: 15mm

$(20\text{mm} - 15\text{mm} - 1.5\text{mm}) / 1.5\text{mm} = 2.3$ pitch chamfer length

You have to choose chamfer **Form E**.

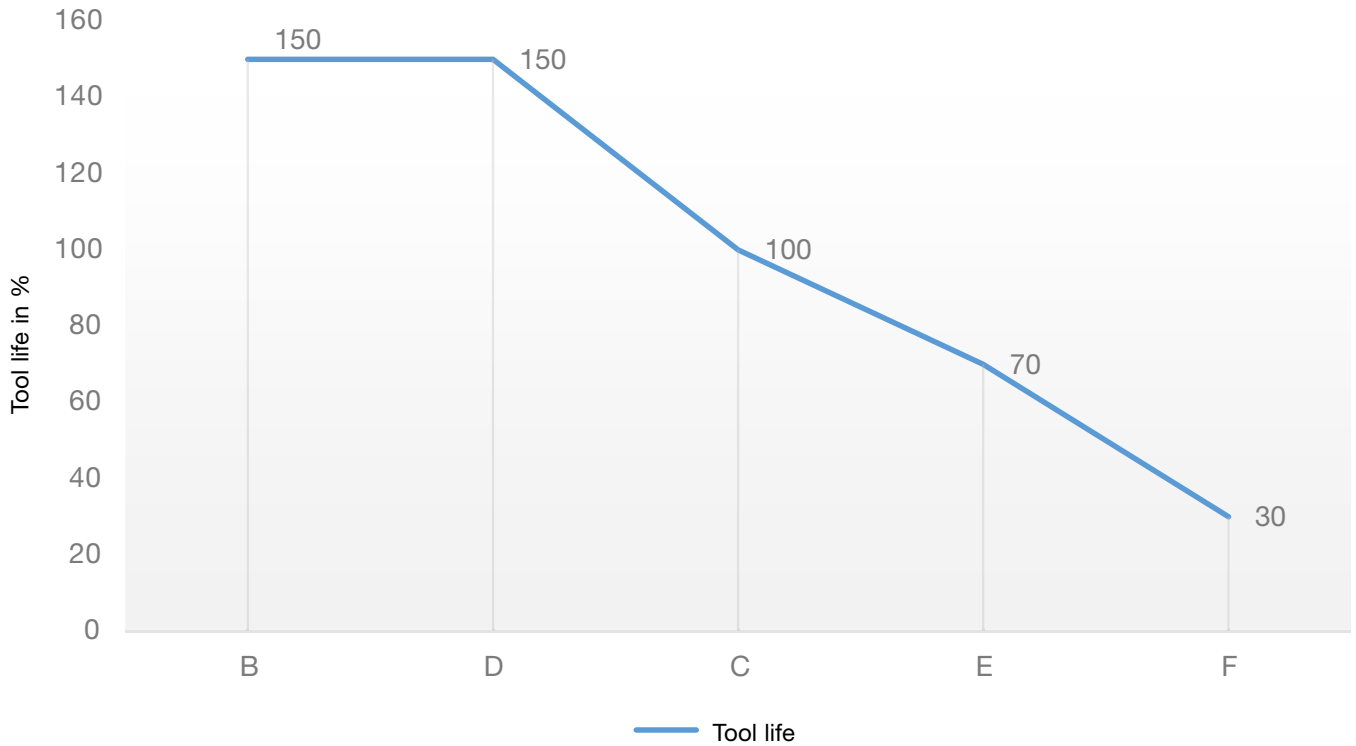
Useful thread depth

Drill depth





The effect of different chamfer forms to the tool life







The right technology

for the different clearance between the hole depth and the thread depth

$\geq 2 \times$ pitch	$1.5 - 2 \times$ pitch	$< 1.5 \times$ pitch
 	 	 
		
		

Surface treatments

Coating	Layer structure	Microhardness (HV 0.05)	Properties	Application
TiN 	Titan nitride	2400	<ul style="list-style-type: none"> all-round coating with good sliding properties 	<ul style="list-style-type: none"> steel and stainless steels up to 1000 N/mm²
TiCN 	Titan carbo nitride	3000	<ul style="list-style-type: none"> high hardness and wear resistance for high mechanical stress 	<ul style="list-style-type: none"> steel, stainless steel hard machining, cast iron, cast aluminium
TiAlN 	Titan aluminium nitride + WC/C	3000	<ul style="list-style-type: none"> low friction high wear resistant perfect chip flow 	<ul style="list-style-type: none"> long chipping materials universal useable high performance
TiSiN 	Titan silicium nitride	3800	<ul style="list-style-type: none"> high temperature and wear resistant wet and dry processing 	<ul style="list-style-type: none"> universal useable steels up to 66 HRC

Tool substrate




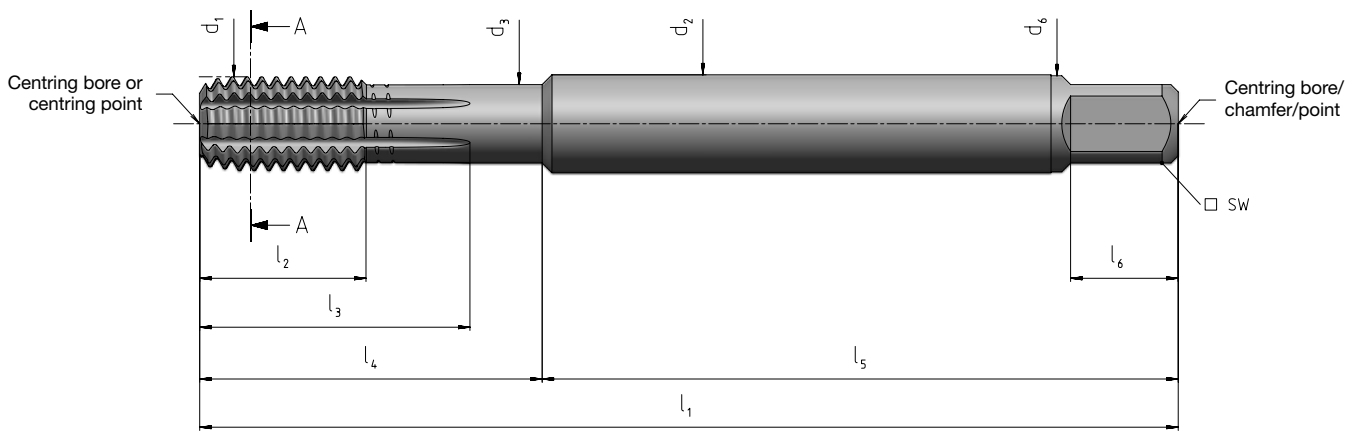
Icon	Hardness	Toughness	Structure
HSS-E	●	●●●	
PM HSS-E	●●	●●	
Carbide	●●●	—	



Illustration of fluteless taps terms

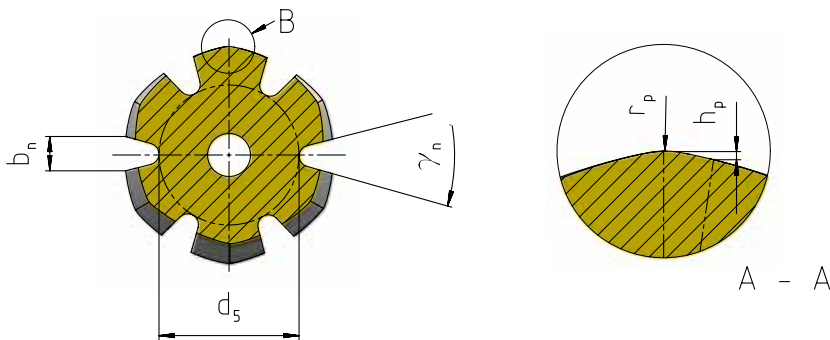


d_1 = outside diameter
 d_2 = shank diameter
 d_3 = neck diameter

l_1 = overall length
 l_2 = thread length
 l_3 = flute length

l_4 = useable length
 l_6 = square length
 SW = square

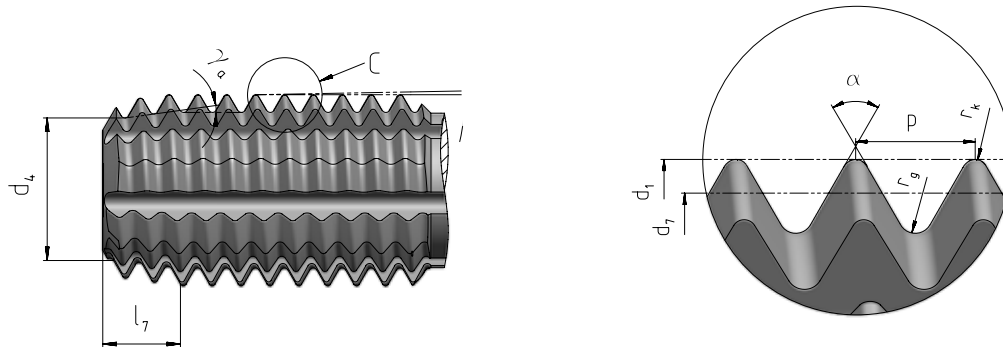
Groove and polygon design



γ_n = groove angle
 d_5 = core diameter
 b_n = width of flute

r_p = polygon radius
 h_p = steepness

Thread details



d_1 = outside diameter
 d_4 = chamfer diameter
 d_7 = pitch diameter

l_7 = chamfer length
 γ_a = chamfer angle
 α = pitch angle

P = pitch
 r_k = top radius
 r_g = core radius

Thread production by pressure deformation

Fluteless taps are used for the forming of internal threads without chip removal. In contrast to conventional tapping where material is cut from the workpiece, thread forming is a pressure deformation process without chip removal for the production of internal threads. During the process the material is cold formed without interrupting the grain flow.

According to DIN 8583, thread forming is described as “pressing the thread into the workpiece with a tool possessing a spiral working area”. The spiral threaded, polygonal portion of the fluteless tap is “screwed” into the pre-drilled workpiece with an appropriate constant feed rate equal to the thread pitch. Hereby the thread profile is pressed gradually via the forming lead into the material of the workpiece so to speak. Subsequently, the pressure in the deformation zone exceeds the compression limit, the workpiece becomes ductile and is deformed. The material yields radially, “flows” along the thread profile in the unoccupied base of the tool and forms the minor diameter of the internal thread. The flow process creates the process specific form pockets (claws).

The tapping size hole diameter is heavily dependent on the formability of the material, the workpiece geometry and the required effective depth of the thread. In comparison to conventional tapping, a larger diameter tapping size hole should be selected. With a larger diameter tapping size hole the load on the tool is reduced whilst increasing the tool life. Thanks to the uninterrupted grain flow, the loading capacity of the thread remains sufficient with a 50% effective thread depth.

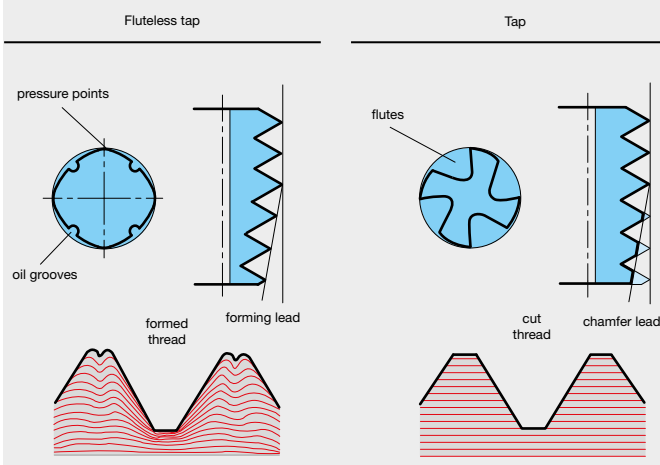
The partially formed crests of the thread with decreasing effective thread depth are a typical characteristic of threads produced by the thread forming process. With the flanks of the thread fully formed, they have no influence on the tensile strength of the thread. If necessary, the required deformation level of the thread should be determined by performing a test.

Lubrication is of significant importance. The lubrication prevents material from building up on the thread flanks and ensures that the necessary torque for the forming process is not too high. Therefore, under no circumstances should there ever be a break-down in lubrication! Preference should be given to lubricants such as cooling agents or oils containing graphite such as those used in rolling processes. Always follow the rule: “The better the lubrication the easier the thread forming process!”

It offers the following advantages

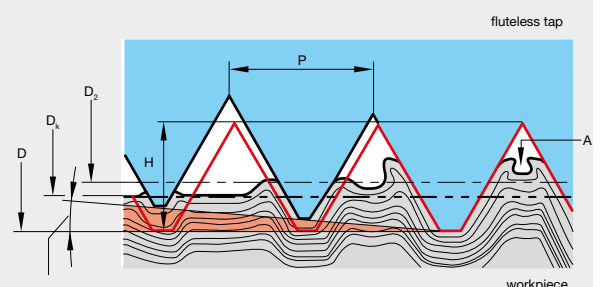
- no chip formation.
- one tool for the production of threads in through and blind holes.
- application in wide range of materials.
- no cutting errors.
- pitch and angle of thread errors that can occur with thread cutting are eliminated.
- internal threads produced by thread forming possess a higher tensile strength particularly at the thread flanks thanks to the so-called “uninterrupted grain flow” and the cold forming process.
- the surface of the thread is improved.
- fluteless taps can be applied at higher speeds because the formability of many materials increases with the forming speed. This does not have a negative effect on the tool life.
- reduced danger of breakage through rigid design

Process
The production of internal threads without chip removal (thread forming) in comparison to conventional tapping



Flow characteristics of the material during thread forming and the deformation process

- D = nominal \varnothing
- D₂ = flank \varnothing
- D_k = hole \varnothing
- H = profile height
- P = thread pitch
- A = form pocket (claw)
- finished internal thread

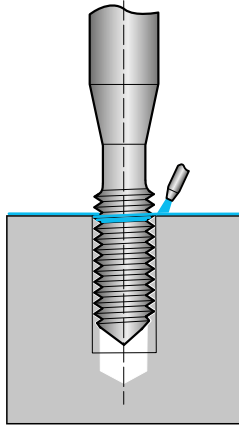




Lubrication for thread forming with fluteless taps

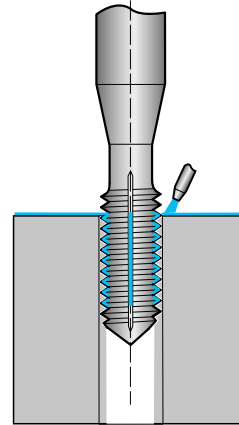
For tool design four different cases should be differentiated between

Vertical machining of a blind hole



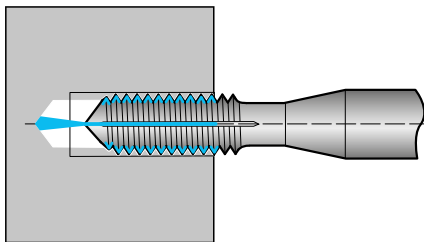
Lubrication grooves and internal coolant delivery is not necessary; external coolant delivery is sufficient (Axial coolant is recommended for very deep threads).

Vertical machining of a through hole (> 1,5xD_N)



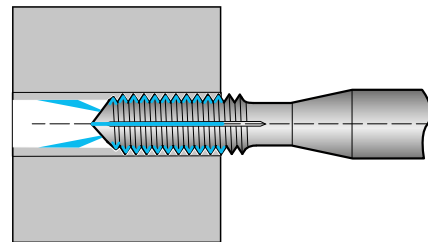
Lubrication grooves are required; internal coolant delivery is not necessary. Via the lubrication grooves the externally delivered coolant can advance to the form edges (Radial coolant is recommended for very deep threads).

Horizontal machining of blind hole



Lubrication grooves and internal coolant delivery is necessary. Axial coolant exit is sufficient.

Horizontal machining of through hole



Lubrication grooves are required. Internal coolant delivery with radial exit is recommended.

Cooling lubricants with fluteless taps

With fluteless taps the main task of the coolant is lubrication. The better the lubrication with the maximum concentration, the longer the tool life.

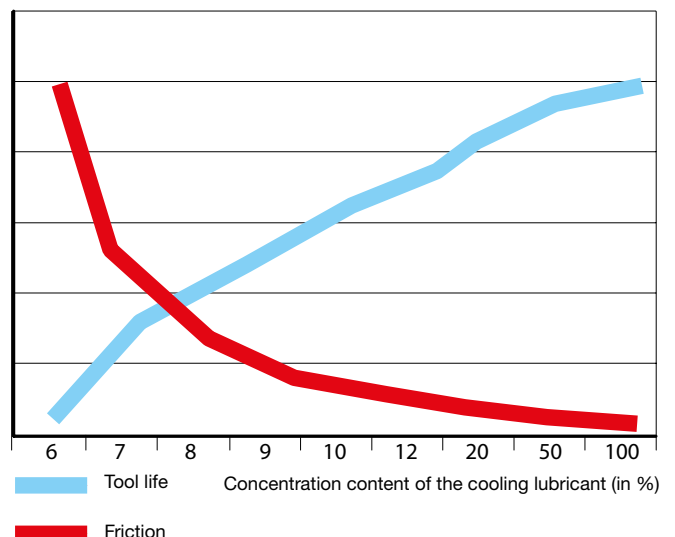
There are two different types of lubricant:

Oil based lubricants

These are mineral oils with the best lubricating characteristics. They reduce friction and achieve optimal life.

Soluble lubricants

These soluble lubricants are a concentrate thinned to an emulsion prior to the use with water. The concentration must not be below 6%. A content more than 12% is ideal in order to achieve a long life thanks to a good lubrication effect



Tapping size hole diameter

With fluteless tapping, the tapping size hole diameter influences the distinction of the formed thread. A too small tapping size hole diameter results in an over-forming of the thread which must definitely be prevented because this

can lead to tool breakage. A too large tapping size hole is acceptable with certain tolerances because formed threads have a sufficient loading capacity from a 50% bearing depth.

The thread M18x1.5 mm example clearly shows the influence of the tapping size hole diameter selection:

M 18 x 1.00	17.55	17.52	17.62	16.917	17.217
M 18 x 1.50	17.30	17.26	17.38	16.376	16.751
M 18 x 2.00	17.10	17.05	17.20	15.835	16.310

Pre-drilling Ø 17.1 mm



Pre-drilling Ø 17.3 mm

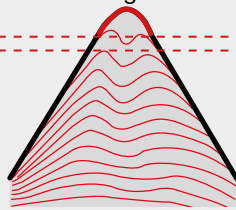


Pre-drilling Ø 17.4 mm



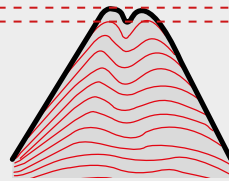
Tapping size hole diameter is too small:

- thread over-formed
- no form pocket (claw)
- profile too high



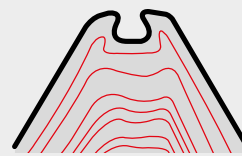
Optimal tapping size hole diameter:

- thread fully formed
- small form pocket (claw)
- optimal height of profile



Tapping size hole diameter is too large:

- thread not formed
- large form pocket (claw)
- height of profile too low

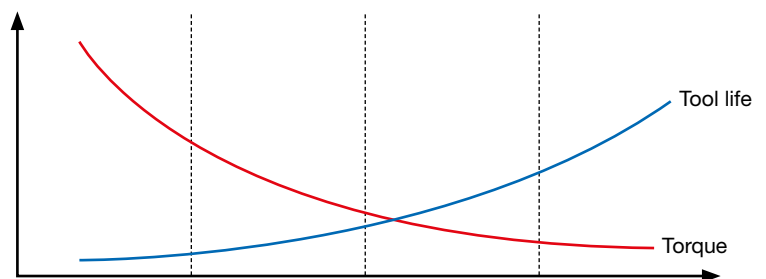


min.
max.

Tapping size hole diameter tolerance zone to DIN 13, part 50

Influence of the tapping size hole on tool life, torque and process reliability

The optimisation of the pre-drilling diameter is especially worthwhile in mass production. The larger it is, the longer the tool life and the less the required torque is. The graphic clearly shows the relationship





Tapping size holes for thread cutting for cutting taps and thread milling cutters

Std. ISO metric threads DIN 13					ISO metric fine threads DIN 13					UNC threads ASME B1.1					UNF threads ASME B1.1				
nom. Ø	pitch P	tapping size hole Ø	core diameter of int. thread 6H		nom. Ø	x pitch P	tapping size hole Ø	core diameter of int. thread 6H		nom. Ø	threads	tapping size hole Ø	core diameter of int. thread 2B		nom. Ø	threads	tapping size hole Ø	core diameter of int. thread 2B	
		DIN 336	min.	max.			DIN 336	min.	max.			DIN 336	min.	max.			DIN 336	min.	max.
		mm	mm	mm	mm			mm	mm			mm	mm	mm			mm	mm	mm
M 1	0.25	0.75	0.729	0.785	M 4.0 x 0.50		3.50	3.459	3.599	No. 1 - 64		1.55	1.425	1.580	No. 1 - 72		1.55	1.473	1.610
M 1.1	0.25	0.85	0.829	0.885	M 4.5 x 0.50		4.00	3.959	4.099	No. 2 - 56		1.85	1.694	1.872	No. 2 - 64		1.85	1.755	1.910
M 1.2	0.25	0.95	0.929	0.985	M 5.0 x 0.50		4.50	4.459	4.599	No. 3 - 48		2.10	1.941	2.146	No. 3 - 56		2.15	2.024	2.197
M 1.4	0.30	1.10	1.075	1.142	M 5.5 x 0.50		5.00	4.959	5.099	No. 4 - 40		2.35	2.157	2.385	No. 4 - 48		2.40	2.271	2.459
M 1.6	0.35	1.25	1.221	1.321	M 6.0 x 0.75		5.20	5.188	5.378	No. 5 - 40		2.65	2.487	2.698	No. 5 - 44		2.70	2.550	2.741
M 1.8	0.35	1.45	1.421	1.521	M 7.0 x 0.75		6.20	6.188	6.378	No. 6 - 32		2.85	2.642	2.896	No. 6 - 40		2.95	2.819	3.023
M 2	0.40	1.60	1.567	1.679	M 8.0 x 0.50		7.50	7.459	7.599	No. 8 - 32		3.50	3.302	3.531	No. 8 - 36		3.50	3.404	3.607
M 2.2	0.45	1.75	1.713	1.838	M 8.0 x 0.75		7.20	7.188	7.378	No. 10 - 24		3.90	3.683	3.937	No. 10 - 32		4.10	3.962	4.166
M 2.5	0.45	2.05	2.013	2.138	M 8.0 x 1.00		7.00	6.917	7.153	No. 12 - 24		4.50	4.343	4.597	No. 12 - 28		4.60	4.496	4.724
M 3	0.50	2.50	2.459	2.599	M 9.0 x 0.75		8.20	8.188	8.378	1/4 - 20		5.10	4.978	5.258	1/4 - 28		5.50	5.359	5.588
M 3.5	0.60	2.90	2.850	3.010	M 9.0 x 1.00		8.00	7.917	8.153	5/16 - 18		6.60	6.401	6.731	5/16 - 24		6.90	6.782	7.036
M 4	0.70	3.30	3.242	3.422	M 10 x 0.75		9.20	9.188	9.378	3/8 - 16		8.00	7.798	8.153	3/8 - 24		8.50	8.382	8.636
M 4.5	0.75	3.70	3.688	3.878	M 10 x 1.00		9.00	8.917	9.153	7/16 - 14		9.40	9.144	9.550	7/16 - 20		9.90	9.728	10.033
M 5	0.80	4.20	4.134	4.334	M 10 x 1.25		8.80	8.647	8.912	1/2 - 13		10.80	10.592	11.024	1/2 - 20		11.50	11.328	11.608
M 6	1.00	5.00	4.917	5.153	M 11 x 0.75		10.20	10.188	10.378	9/16 - 12		12.20	11.989	12.446	9/16 - 18		12.90	12.751	13.081
M 7	1.00	6.00	5.917	6.153	M 11 x 1.00		10.00	9.917	10.153	5/8 - 11		13.50	13.386	13.868	5/8 - 18		14.50	14.351	14.681
M 8	1.25	6.80	6.647	6.912	M 12 x 1.00		11.00	10.917	11.153	3/4 - 10		16.50	16.307	16.840	3/4 - 16		17.50	17.323	17.678
M 9	1.25	7.80	7.647	7.912	M 12 x 1.25		10.80	10.647	10.912	7/8 - 9		19.50	19.177	19.761	7/8 - 14		20.40	20.269	20.650
M 10	1.50	8.50	8.376	8.676	M 12 x 1.50		10.50	10.376	10.676	1 - 8		22.25	21.971	22.606	1 - 12		23.25	23.114	23.571
M 11	1.50	9.50	9.376	9.676	M 14 x 1.00		13.00	12.917	13.153						1 1/8 - 12		26.50	26.289	26.746
M 12	1.75	10.20	10.106	10.441	M 14 x 1.25		12.80	12.647	12.912						1 1/4 - 12		29.50	29.464	29.921
M 14	2.00	12.00	11.835	12.210	M 14 x 1.50		12.50	12.376	12.676						1 3/8 - 12		32.75	32.639	33.096
M 16	2.00	14.00	13.835	14.210	M 15 x 1.00		14.00	13.917	14.153						1 1/2 - 12		36.00	35.814	36.271
M 18	2.50	15.50	15.294	15.744	M 15 x 1.50		13.50	13.376	13.676										
M 20	2.50	17.50	17.294	17.744	M 16 x 1.00		15.00	14.917	15.153										
M 22	2.50	19.50	19.294	19.744	M 16 x 1.25		14.80	14.647	14.912										
M 24	3.00	21.00	20.752	21.252	M 16 x 1.50		14.50	14.376	14.676										
M 27	3.00	24.00	23.752	24.252	M 17 x 1.00		16.00	15.917	16.153										
M 30	3.50	26.50	26.211	26.771	M 17 x 1.50		15.50	15.376	15.676										
					M 18 x 1.00		17.00	16.917	17.153										
					M 18 x 1.50		16.50	16.376	16.676										
					M 20 x 1.00		19.00	18.917	19.153										
					M 20 x 1.50		18.50	18.376	18.676										
					M 20 x 2.00		18.00	17.835	18.210										

PT JIS B 0203 TAPER PIPE THREAD CONE 1:16

nom. Ø	threads	tapping size hole Ø	tapping size hole Ø	cutting depth	
	per inch	Version A d1	Version B D1	ET mm	
PT 1/16	- 28	6.20	6.60	6.20	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Version A (avoid if possible)</p> </div> <div style="text-align: center;"> <p>Version B</p> </div> </div>
PT 1/8	- 28	8.20	8.60	6.20	
PT 1/4	- 19	10.90	11.50	9.40	
PT 3/8	- 19	14.40	15.00	9.70	
PT 1/2	- 14	17.90	18.70	12.70	
PT 3/4	- 14	23.30	24.20	14.10	
PT 1	- 11	29.30	30.30	16.20	

Tapping size holes for thread forming

Std. ISO metric threads DIN 13							Std. ISO metric fine threads DIN 13						
nom. Ø	pitch P	tapping size hole Ø	tapping size hole Ø		core diameter of int. thread 7H		nom. Ø	x P	tapping size hole Ø	tapping size hole Ø		core diameter of int. thread 7H	
			min.	max.	min.	max.				min.	max.	min.	max.
	mm	mm	mm	mm	mm	mm		mm	mm	mm	mm	mm	mm
M 1	0.25	0.90	0.89	0.92	0.729	0.819	M 6	x 0.75	5.65	5.62	5.70	5.188	5.424
M 1.1	0.25	1.00	0.99	1.03	0.829	0.885	M 7	x 0.75	6.65	6.62	6.70	6.188	6.424
M 1.2	0.25	1.10	1.09	1.12	0.929	1.019	M 8	x 0.75	7.65	7.62	7.70	7.188	7.424
M 1.4	0.30	1.28	1.27	1.30	1.075	1.181	M 8	x 1.00	7.55	7.52	7.62	6.917	7.217
M 1.6	0.35	1.46	1.45	1.48	1.221	1.346	M 9	x 0.75	8.65	8.62	8.70	8.188	8.424
M 1.8	0.35	1.66	1.65	1.68	1.421	1.546	M 9	x 1.00	8.55	8.52	8.62	7.917	8.217
M 2	0.40	1.85	1.84	1.88	1.567	1.679	M 10	x 0.75	9.65	9.62	9.70	9.188	9.424
M 2.2	0.45	2.00	2.01	2.05	1.713	1.838	M 10	x 1.00	9.55	9.52	9.62	8.917	9.217
M 2.5	0.45	2.30	2.28	2.32	2.013	2.138	M 10	x 1.25	9.40	9.36	9.47	8.647	8.982
M 3	0.50	2.80	2.78	2.85	2.459	2.639	M 11	x 0.75	10.65	10.62	10.70	10.188	10.424
M 3.5	0.60	3.25	3.23	3.30	2.850	3.050	M 11	x 1.00	10.55	10.52	10.62	9.917	10.217
M 4	0.70	3.70	3.68	3.76	3.242	3.466	M 12	x 1.00	11.55	11.52	11.62	10.917	11.217
M 4.5	0.75	4.20	4.16	4.23	3.688	3.924	M 12	x 1.25	11.40	11.36	11.47	10.647	10.982
M 5	0.80	4.65	4.62	4.71	4.134	4.384	M 12	x 1.50	11.30	11.26	11.38	10.376	10.751
M 6	1.00	5.55	5.52	5.62	4.917	5.217	M 14	x 1.00	13.55	13.52	13.62	12.917	13.217
M 7	1.00	6.55	6.52	6.62	5.917	6.217	M 14	x 1.25	13.40	13.36	13.47	12.647	12.982
M 8	1.25	7.40	7.36	7.47	6.647	6.982	M 14	x 1.50	13.30	13.26	13.38	12.376	12.751
M 9	1.25	8.40	8.36	8.47	7.647	7.982	M 15	x 1.00	14.55	14.52	14.62	13.917	14.217
M 10	1.50	9.30	9.26	9.38	8.376	8.751	M 15	x 1.50	14.30	14.26	14.38	13.376	13.751
M 11	1.50	10.30	10.26	10.38	9.376	9.751	M 16	x 1.00	15.55	15.52	15.62	14.917	15.217
M 12	1.75	11.20	11.15	11.29	10.106	10.531	M 16	x 1.50	15.30	15.26	15.38	14.376	14.751
M 14	2.00	13.10	13.05	13.20	11.835	12.310	M 20	x 1.50	19.30	19.26	19.38	18.376	19.751
M 16	2.00	15.10	15.05	15.20	13.835	14.310							
M 18	2.50	16.90	16.83	17.02	15.294	15.854							
M 20	2.50	18.90	18.83	19.02	17.294	17.854							

Tapping size hole dia. tolerance zone for thread forming (to DIN 13, section 50)

Due to the tensile strength it is not necessary to adhere to the tapping size hole diameter tolerance class 6H; tolerance class 7H satisfies the requirement that the flank coverage of external and internal threads should not fall below $0.32 \times P$. In addition, formed threads generally possess a higher tensile strength in comparison to cut threads thanks to an uninterrupted grain flow and subsequent work hardening.



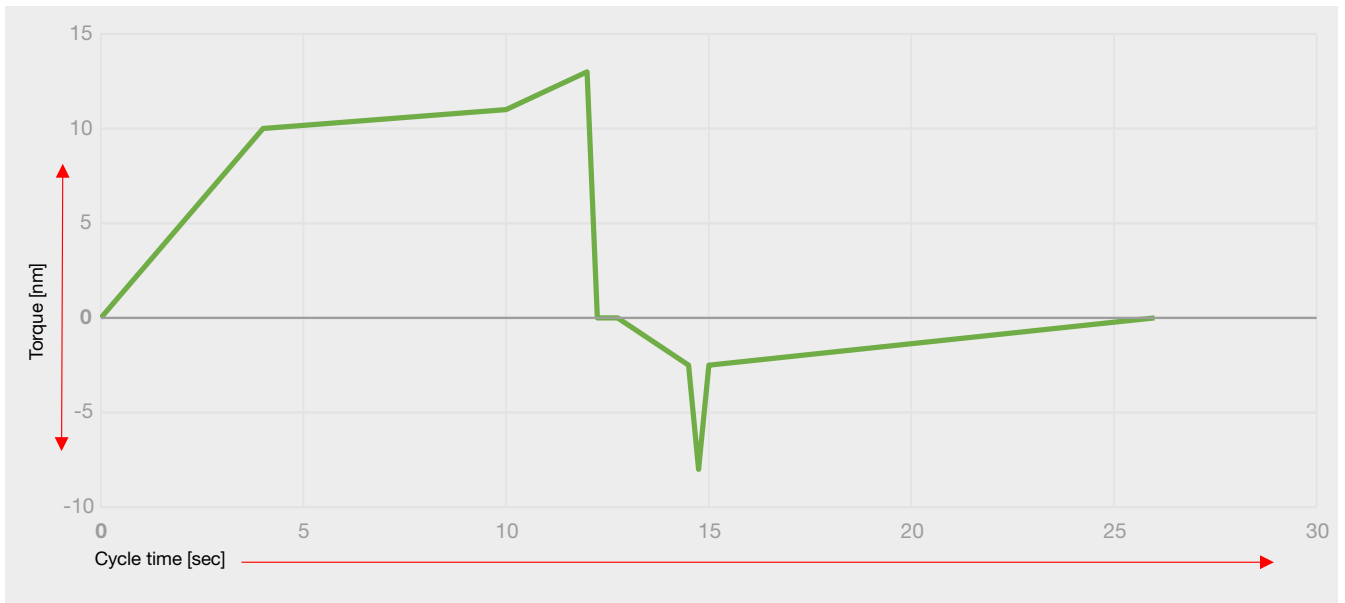
The characteristics of different thread types

Geometry drawing	Standard	Application	Geometry drawing	Standard	Application
<p>M ISO-metric thread</p>	DIN 13-1	General standard thread	<p>MF ISO-metric fine thread</p>	DIN 13-2 to DIN 13-11	General fine thread
<p>UNC Unified National Coarse thread</p>	ASME B1.1	General UN standard thread	<p>UNF Unified National Fine thread</p>	ASME B1.1 ISO-metric trapezoidal thread	General UN Fine thread
<p>PT Taper pipe thread (identical to Rc and BSPT)</p>	JIS B 0203 Japanese Industrial Standard	Internal thread for pipe threads and fittings	<p>UNJ inch thread</p>	ISO 3161	For the aerospace industry
<p>MJ thread metric thread</p>	DIN ISO 5855-1	For the aerospace industry	<p>external thread</p> <p>internal thread</p> <p>play clearance</p>		

Special thread types

Geometry drawing	Standard	Application	Geometry drawing	Standard	Application
<p>RD cylindrical round thread</p>	DIN 405	General, load hook, mining, food industry	<p>S metric saw thread</p>	DIN 513	when absorbing uni-directional forces
<p>TR ISO-metric trapezoidal thread</p>	DIN 103	General, draw collets, rolling stock	<p>Vg valve thread</p>	DIN 7756	Valves for car tyres manifold block

Torque curve for a cutting tap

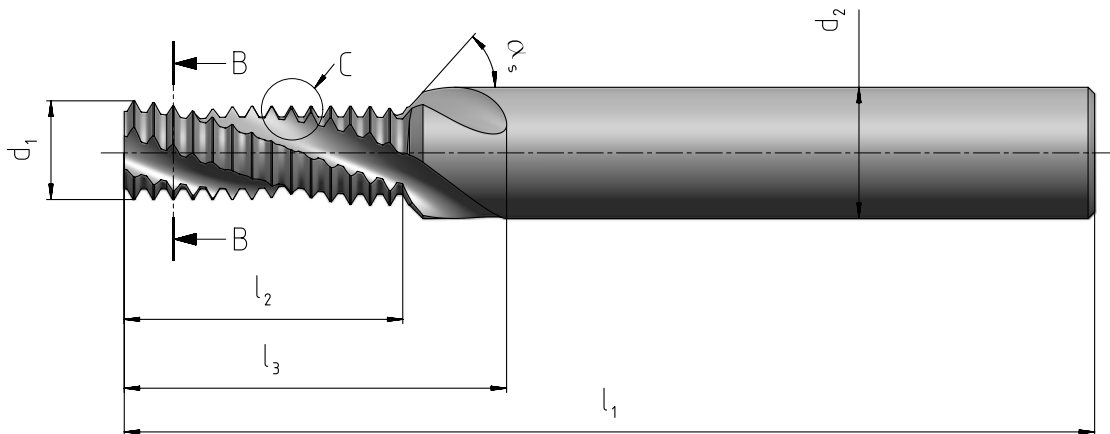


Torque curve for a forming tap





Illustration of thread milling cutter terms

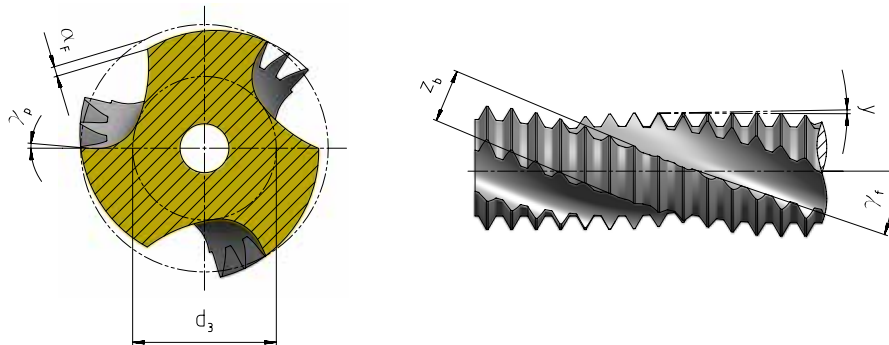


d_1 = milling cutter diameter
 d_2 = shank diameter

l_1 = overall length
 l_2 = thread length

l_3 = flute length
 α_s = countersink angle

Flute description

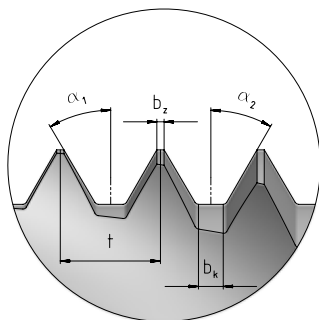


γ_p = rake angle
 α_f = clearance diameter

d_3 = core diameter
 γ_f = helix angle

Z_b = width of land
 γ = taper

Thread details



t = pitch
 b_z = outside width
 b_k = core width

α_1 = partial flank angle
 α_2 = partial flank angle

The Gühring thread milling cutter types

TM SP – thread milling cutter w/o countersink step



- Simple and cost-efficient tool for the milling of internal threads
 - 2-3 thread sizes with the same pitch can be produced over the specified nominal dimension
 - Application in materials $\leq 1000 \text{ N/mm}^2$
 - Available with or without internal cooling
- Thread types: M, MF, UNC, UNF, G, NPT**

TMCP SP – thread milling cutter with 45° countersinking step



- Countersinking and thread milling with only one tool
 - Very smooth running and low lateral forces
 - Designed for the application of difficult-to-machine materials also available w/o countersinking step
 - 2-3 thread sizes with the same pitch can be produced over the specified nominal dimension
 - Only available with internal cooling
- Thread types: M, MF, G**

TMU SP – universal milling cutter with collar recess



- Universal application possibilities
 - For various thread sizes with the same pitch, i.e. thread M30x1.5 with milling cutter $\varnothing 12 \times \text{M}1.5$, $\varnothing 16 \times \text{M}1.5$ or $\varnothing 20 \times \text{M}1.5$
 - Only available with internal cooling
- Thread types: M, MF, G, UN, NPT and external thread M, MF, G**

MTM 3 SP – micro thread milling cutter



- Thread size and pitch are predetermined
 - Excellent characteristics with high-tensile materials such as titanium, stainless steel etc.
 - Suitable for the machining of hardened steel 45 HRC - 65 HRC
 - Threads up to 3xD
 - Available with or without internal cooling
- Thread types: M, MF, G, UNC, UNF, MJ, UNJC, UNJF**

MTMH3-Z – helical drill thread milling cutter

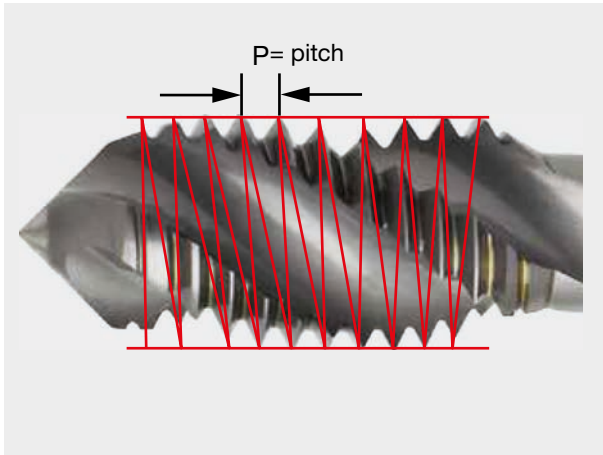


- Drilling, countersinking and thread milling with only one tool at the same time
 - Reduced cycle & pre-setting time
 - Reduced tool cost based on the combination tool
 - For steel, stainless steel, cast iron, Titanium & hard machining up to 66 HRC
- Thread types: M, MF, G; UNC, UNF**



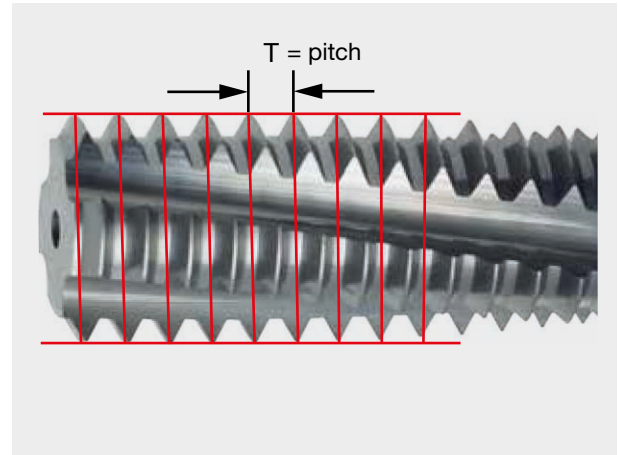
Difference between taps/fluteless taps and thread milling cutters

Taps/fluteless taps



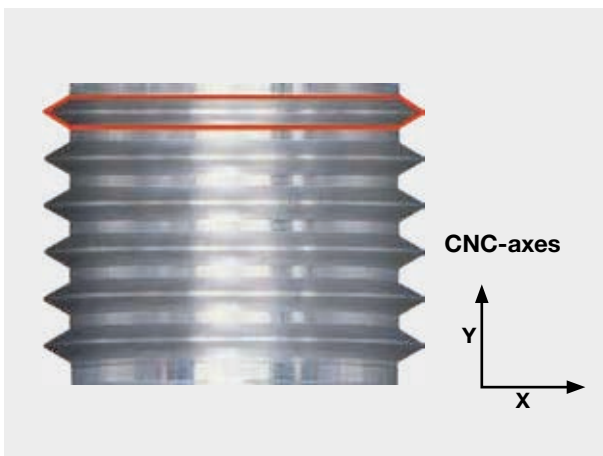
The red lines show the pitch angle of the thread that is ground into the tool. This means the pitch is cut into the workpiece by the tool.

Thread milling cutter

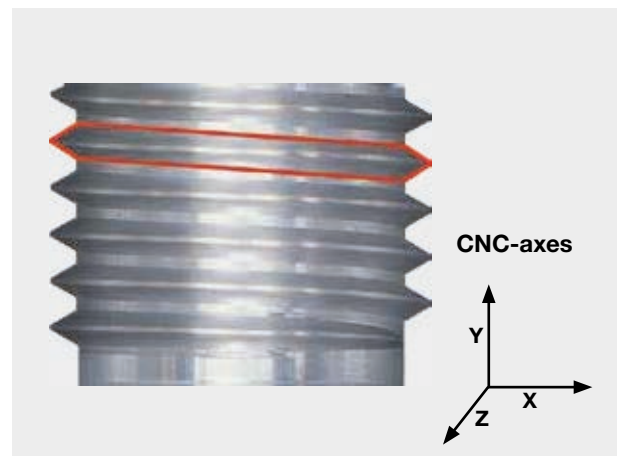


The red lines show that the tool does not possess a pitch angle. The pitch is produced by the Z-axis of a CNC machine.

Creation of the thread with thread milling



Thread profile without axial feed (Z-axis) of the machine. A groove profile is created without pitch. A functioning thread is not created.



Through the additional programming of the Z-axis the necessary pitch is produced.

Note:

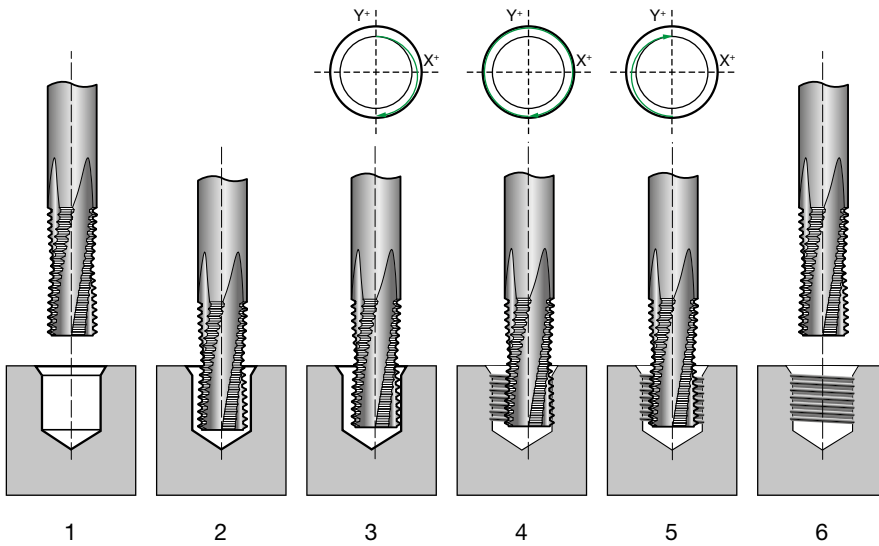
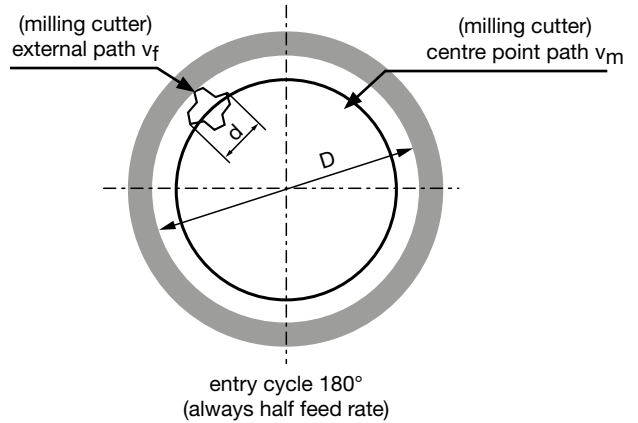
Due to diagonal milling in the pitch angle (**Z-axis**) the thread profile of the tool is **transferred onto the component distorted**.

The more the milling cutter diameter (80 % of nom. Ø) approaches the nominal thread diameter and the higher the thread pitch the more pronounced the profile distortion is.

Thread milling programming

CNC internal thread milling

1. Moving to start position
2. Moving to thread depth in bore
3. 180° descending loop to contour
4. 360° full circular movement of thread milling cutter
5. 180° exit loop to centre of bore
6. Rapid movement from bore to start position



Formula of calculation

$$v_c = \frac{d \cdot \pi \cdot n}{1000}$$

$$n = \frac{v_c \cdot 1000}{d \cdot \pi}$$

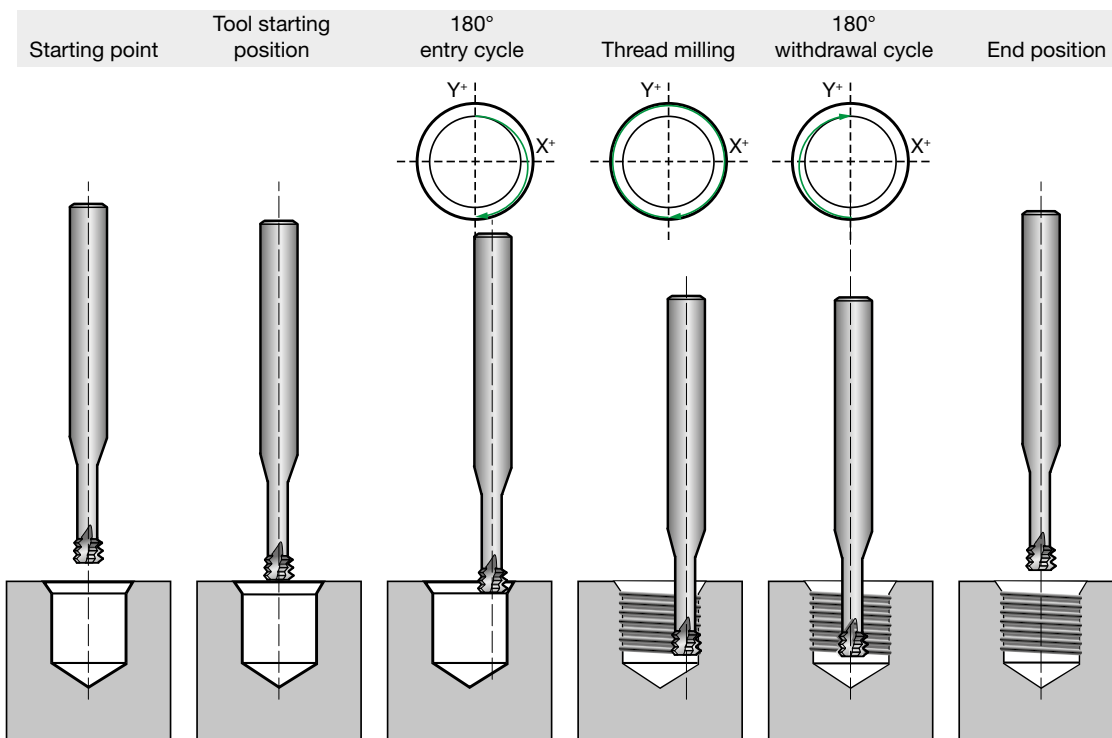
$$v_f = n \cdot Z \cdot f_z$$

$$v_m = \frac{v_f \cdot (D - d)}{D}$$

$$v_b = n \cdot f_b$$

v_c = cutting speed
 v_f = contour feed
 v_m = centre point path feed
 n = revolutions
 Z = number of teeth
 f_z = feed per tooth
 f_b = feed per drill per revolution*
 v_b = drill feed rate*
 D = Ø nom. of thread [mm]
 d = milling cutter nom. Ø [mm]
 * for drill/thread milling

Programming process for micro-thread milling (right-hand thread in reverse rotation)





Selecting the correct clamping chuck

Correct tool clamping also plays an essential role with thread milling. Thread milling cutters should as a rule be clamped as short as possible. A compact and mechanical clamping force is preferable. The error in concentricity should not exceed 0.02 millimetres.

Power chucks



max. permissible error in concentricity: 0.003 mm

A power chuck excels thanks to extremely accurate concentricity. The high clamping forces and optimal smooth running are a perfect prerequisite for the production of threads in all materials including a high pitch.

Side lock holders



max. permissible error in concentricity: 0.002 mm

A side lock holder for HB and HE shanks is a robust, cost-efficient clamping chuck with a maximum clamping force. The clamping surface prevents the tool twisting or being pulled out during machining. Therefore, side lock holders are suitable for the production in all materials including a high pitch.

Shrink fit chucks



max. permissible error in concentricity: 0.005 mm

A shrink fit chuck creates a rigid connection with the shrink fitted tool. Incorrect shrink fitting or older shrink fit chucks can result in the pulling out of the tool. Tool breakage and possible loss of the component would be the consequence. Therefore, the shrink fit chuck is only suitable for a thread pitch $< P=1.5$ mm.

Hydraulic chucks



max. permissible error in concentricity: 0.005 mm

A hydraulic chuck, similar to the shrink fit chuck, has only limited suitability for thread milling. Especially with high radial forces this clamping chuck reaches its limits. Therefore, the hydraulic chuck is recommended for softer materials such as aluminium and a thread pitch $< P=1.5$ mm.

Collet holders



max. permissible error in concentricity: 0.01 mm

Collet chucks are very well suited for micro-thread milling because only axial stresses are created. The low clamping forces only permit the milling of softer materials. Consequently, collet holders are not suitable for conventional thread milling.

Application recommendations thread milling cutters and micro-thread milling cutters

ISO	Material group	Hardness	Example materials	Material no.	
P	P1	Structural/free-cutting steels, Unalloyed heat-treatable-/case hardened steels	< 800 N/mm ²	S235JR C15 11SMnPB30	1.0037 1.0401 1.0718
	P2	Free-cutting steels, unalloyed case hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515
	P3	Alloyed heat-treatable steels, heat-treatable steels, high speed steels	800-1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343
M	M1	Stainless steel sulfured, austenitic	< 1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305
	M2	Stainless and acid-resit. steel steels, martensitic	< 1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512
	M3	duplex and super duplex	< 1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWn25-7-4	1.4462 1.441 1.4501
K	K1	Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.603
	K2	Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.704 0.706 0.707
	K3	ADI, GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400	3.025 3.2315 3.4335
N	N1	Aluminium and wrought alloys	< 450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.2134 3.2162 3.2373
	N2	Aluminium- cast alloys	< 600 N/mm ²	GD-AISi5Cu1Mg GD-AISi8Cu3 G-AISi9Mg	3.2581 3.5812.08 2.025
	N3	Magnesium alloys	< 500 N/mm ²	GDMgAl8Zn1 CuZn20	2.0332 2.038
	N4	Copper and copper alloys	long-chipping	CuZn37Pb0,5 CuZn39Pb2	2.041
	N5	Copper special alloys	short-chipping	CuZn43Pb2	
	N6	Plastics [thermoplastics, duroplastics]	long-chipping short-chipping	Ampco PMMA, POM,PVC Pertinax	
S	S1	Titanium und titanium alloys	< 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.7025 3.7115 3.7165
	S2	Nickel, cobalt, iron alloys	< 1400 N/mm ²	Hasteloy C4 Inconel 718 Nimonic	2.461 2.4668 2.4634
H	H1 H2	High tensile steels, hardened steels	45-55 HRC 55-62 HRC	Hardox PM30	

Application recommendations drill thread milling cutters 1.5xD, 2xD, 2.5xD

ISO	Material group	Hardness	Example materials	Material no.	
K	K1	Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030
	K2	Spher. graph. iron and mall. cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070
	K3	ADI, GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400	
N	N1	Aluminium and wrought alloys	< 450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335
	N2	Aluminium-cast alloys	< 600 N/mm ²	GD-AISi5Cu1Mg GD-AISi8Cu3 G-AISi9Mg	3.2134 3.2162 3.2373
	N3	Magnesium alloys	< 500 N/mm ²	GDMgAl8Zn1 CuZn20	3.5812.08 2.0250
	N4	Copper and copper alloys	long-chipping	CuZn37Pb0,5 CuZn39Pb2	2.0332 2.0380
	N5	Copper special alloys	short-chipping	CuZn43Pb2	2.0410
	N6	Plastics [thermoplastics, duroplastics]	long-chipping short-chipping	Ampco PMMA, POM,PVC Pertinax	

Please note:
The cutting values specified in the respective columns are guide values, they have to be adapted according to application conditions (material, lubrication, tool clamping, machine etc.)
Depending on the machining task the optimal cutting values can differ from those in the table by up to ±30%!



APPLICATION RECOMMENDATIONS

MTMH3-Z 2.5xD [Please note, M4 counter clockwise]

ISO	Material group	Hardness	Example materials	Material no.	Cutting speed v _c (m/min)
P	P1 Structural and free cutting steels, heat-treatable steels unalloyed	< 800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	80
	P2 Free-cutting steels, unalloyed case hardened steels, nitriding steels	800-1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	70
	P3 Alloyed heat-treatable steels, tool steels, high speed steels	800-1200 N/mm ²	42CrMo4 36CrNiMo4 X36CrMo17 HS 6-5-2	1.7225 1.6511 1.2316 1.3343	70
M	M1 Stainless steels, sulphured, austenitic	< 1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	55
	M2 Stainless- and acidresistant steels, martensitic	< 1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	50
	M3 Duplex and Super Duplex	< 1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWn25-7-4	1.4462 1.441 1.4501	50
K	K1 Cast iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.603	80
	K2 Spheroidal graphite iron and malleable cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.704 0.706 0.707	75
	K3 ADI, GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		65
N	N1 Aluminium and wrought alloys	< 450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.025 3.2315 3.4335	x
	N2 Al cast alloys	< 600 N/mm ²	GD-ALSi5Cu1Mg GD-ALSi8Cu3 G-ALSi9Mg G-ALSi12	3.2134 3.2162 3.2373 3.2581	120
	N3 Magnesium alloys	< 500 N/mm ²	GDMgAl8Zn1	3.5812.08	x
	N4 Copper and copper alloys	long-chipping	CuZn20	2.025	80
		short-chipping	CuZn37Pb0,5 CuZn39Pb2 CuZn43Pb2	2.0332 2.038 2.041	
	N5 Copper special alloys	< 1400 N/mm ²	Ampco		65
N6 Plastics [Thermoplastics, Duroplastics]	long-chipping short-chipping	PMMA, POM,PVC Pertinax		x	
S	S1 Ti and Ti alloys	< 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.7025 3.7115 3.7165	45
	S2 Nickel, cobalt and iron alloys	< 1400 N/mm ²	Hasteloy C4 Inconel 718 Nimonic	2.461 2.4668 2.4634	45
H	H1 H2 High tensile steels, hardened steels	45-55 HRC	Hardox		40
		55-66 HRC	PM30		30

Please note:

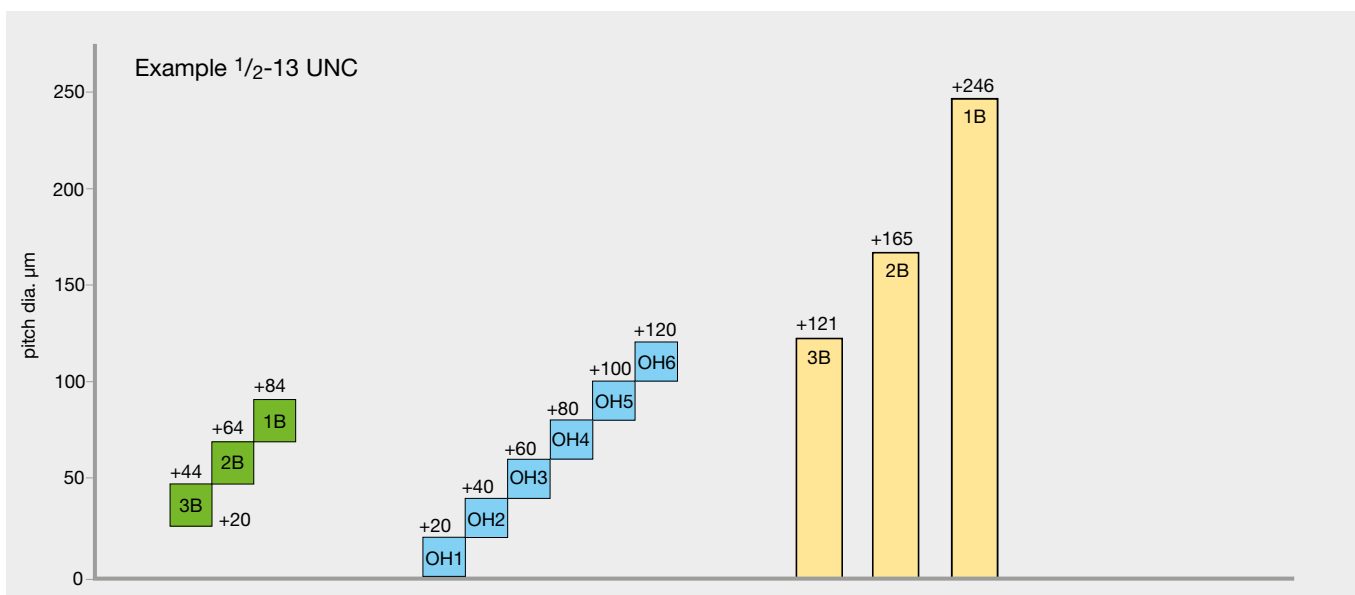
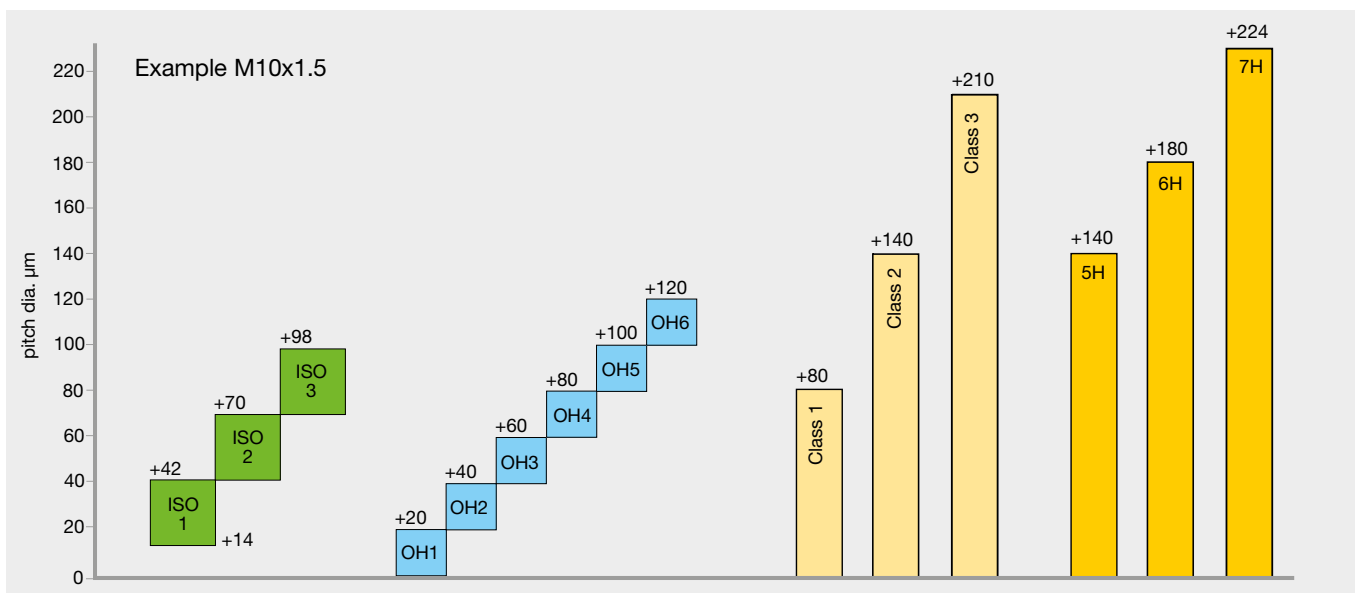
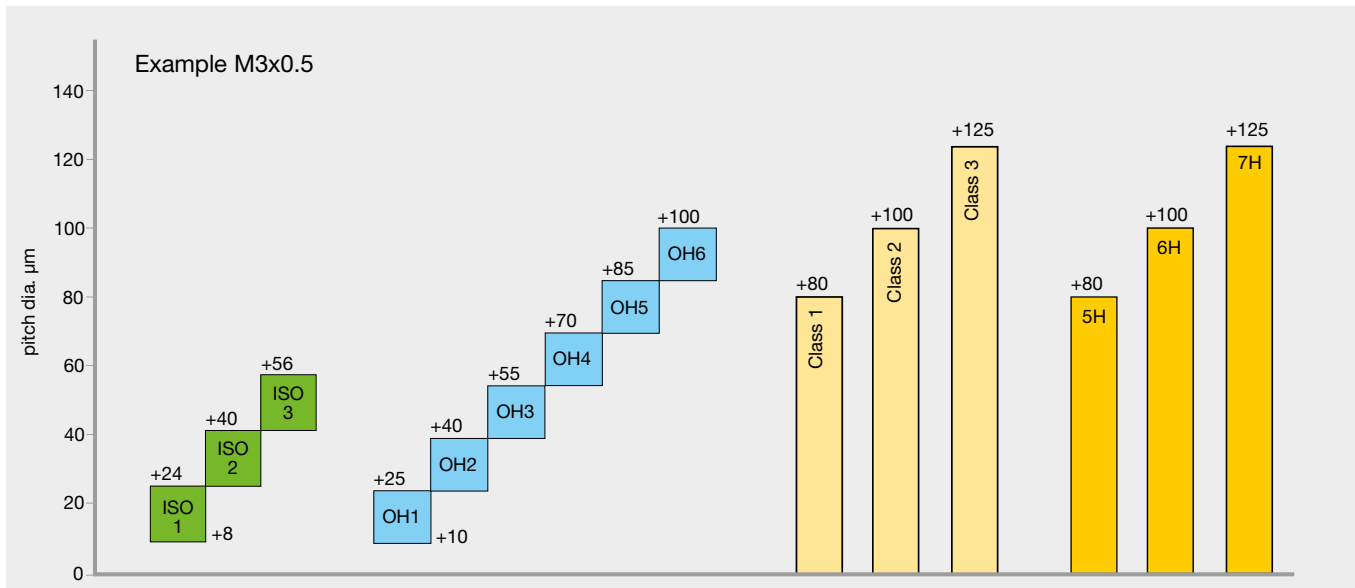
The cutting values specified in the respective columns are guide values, they have to be adapted according to application conditions (material, lubrication, tool clamping, machine etc.)

Depending on the machining task the optimal cutting values can differ from those in the table by up to ±30%!



Milling part diameter [d1] / feed per tooth [fz]											
Ø1-1,8		Ø1,81-2,4	Ø2,41-2,7	Ø2,71-3,1	Ø3,11-3,8	Ø3,81-4,6	Ø4,61-6,2	Ø6,21-7,5	Ø7,51-9,0	Ø9,01-16	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
0.008	0.008	0.012	0.014	0.018	0.026	0.028	0.030	0.035	0.040	0.048	●●
0.008	0.008	0.012	0.014	0.018	0.026	0.028	0.030	0.035	0.040	0.048	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.005	0.005	0.007	0.008	0.010	0.014	0.016	0.018	0.020	0.026	0.033	●●
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.007	0.007	0.011	0.013	0.015	0.018	0.022	0.028	0.033	0.038	0.046	●●
x	x	x	x	x	x	x	x	x	x	x	●
0.007	0.007	0.011	0.013	0.015	0.018	0.022	0.028	0.033	0.038	0.046	●
x	x	x	x	x	x	x	x	x	x	x	●
0.008	0.008	0.012	0.014	0.016	0.020	0.024	0.030	0.036	0.040	0.048	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.048	●●
x	x	x	x	x	x	x	x	x	x	x	○
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.007	0.007	0.010	0.011	0.012	0.016	0.020	0.025	0.030	0.036	0.044	●●
0.005	0.005	0.008	0.009	0.010	0.014	0.018	0.022	0.028	0.033	0.042	●●

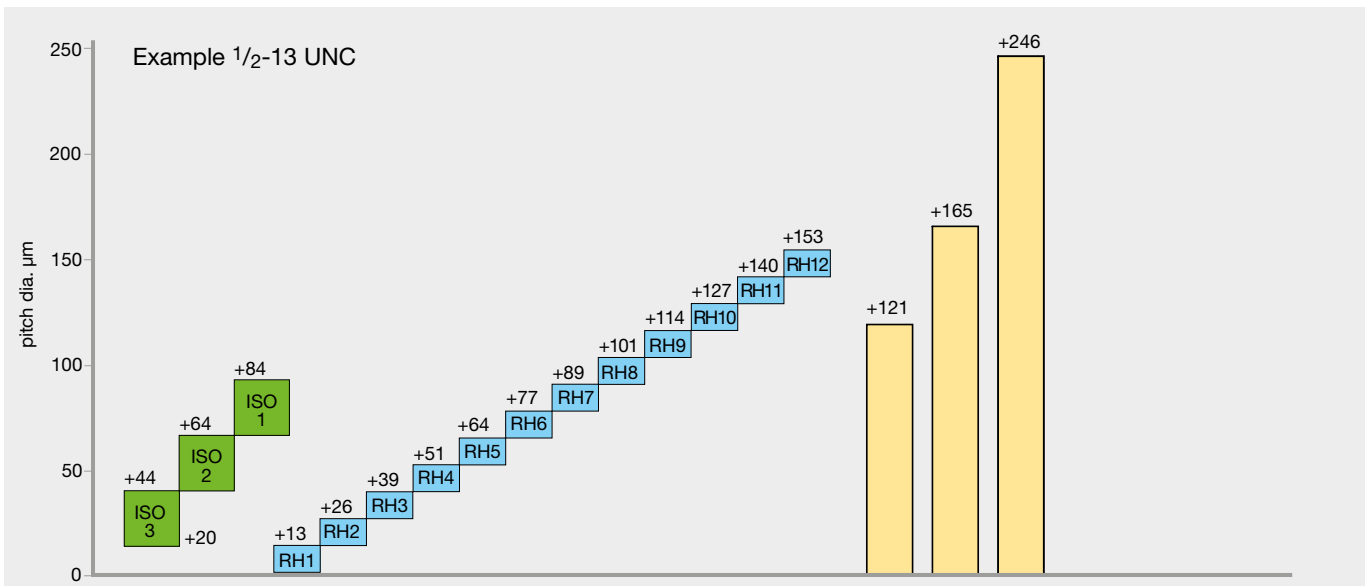
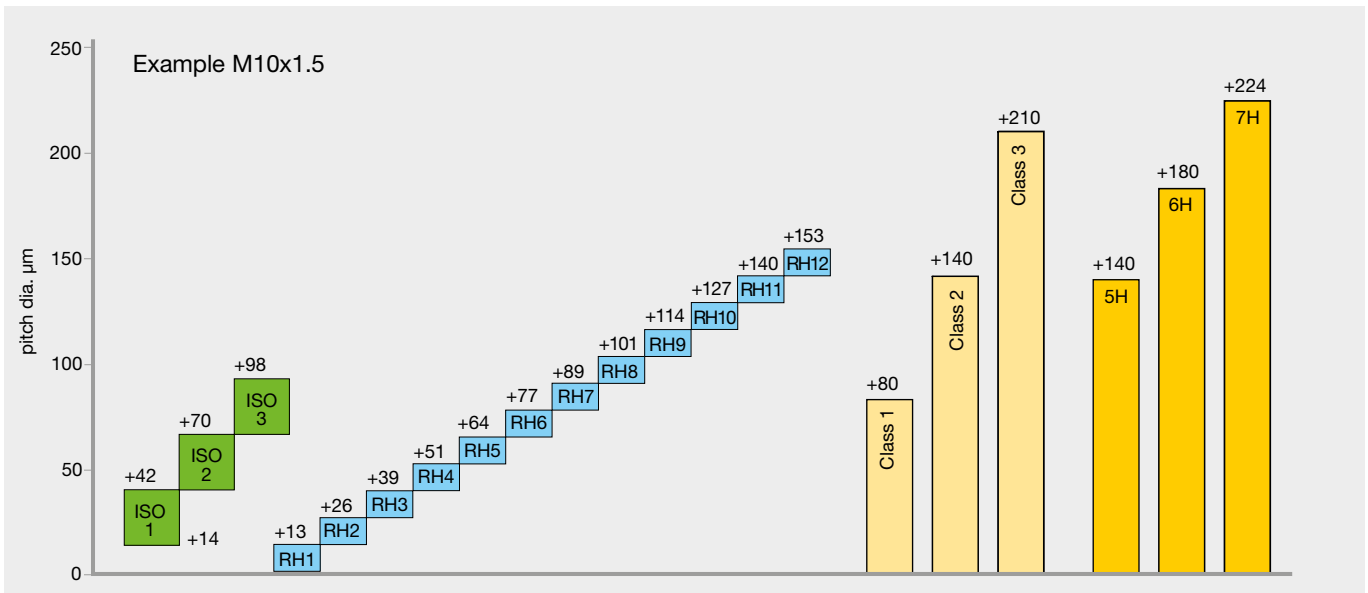
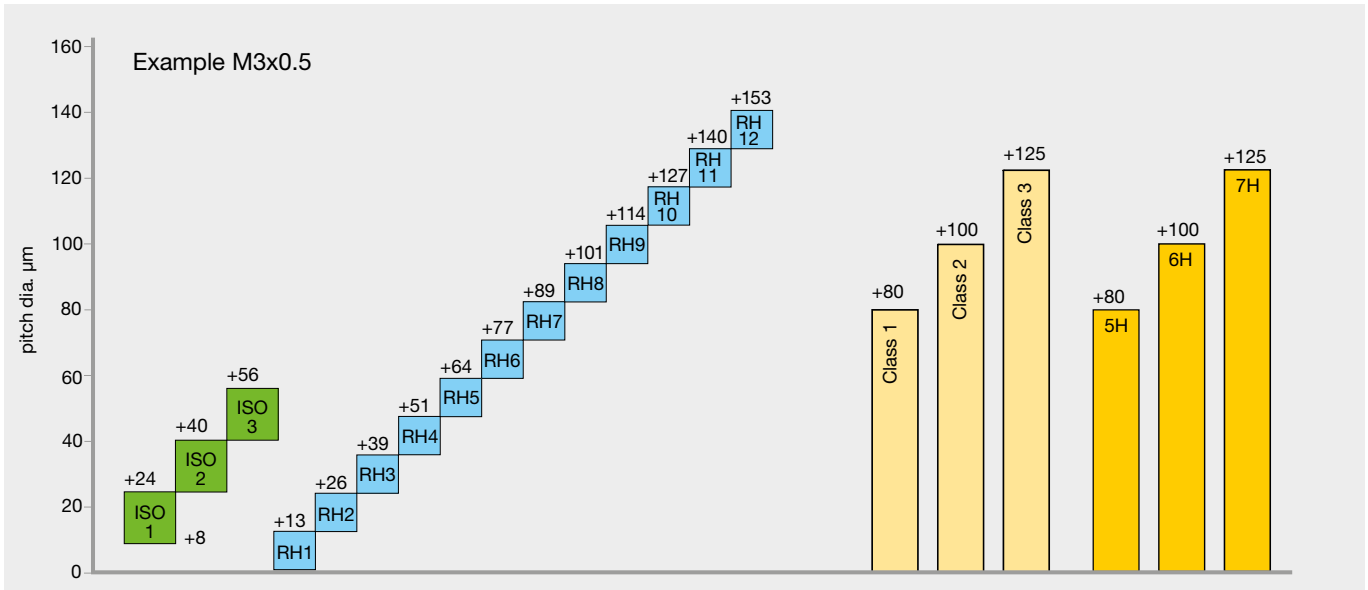
- optimally suited
- suited
- not suitable





ISO limits
OH limits

JIS internal thread
JIS internal thread tolerance



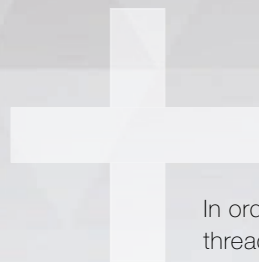
CNC Gühro

ThreadMill



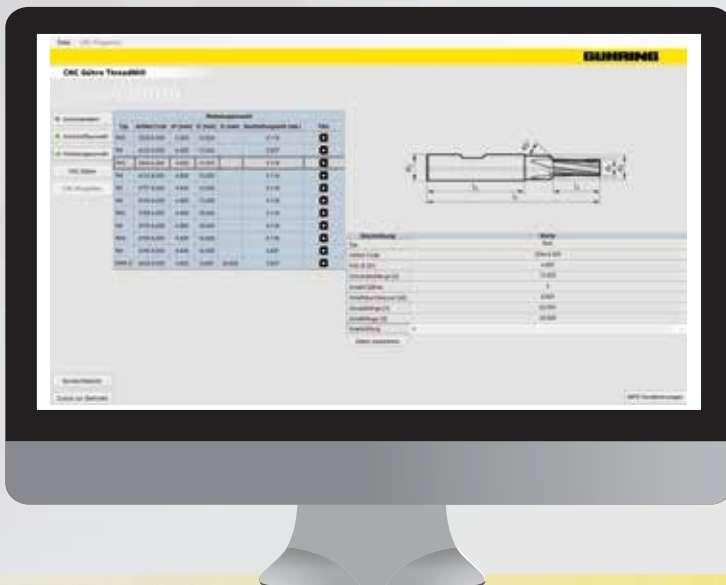
Free programming software

for thread milling cutters and drill thread milling cutters



In order to make the machining with Gühring thread milling cutters even more user friendly, we have developed the intuitive "CNC Gühro Thread Mill".

"CNC Gühro Thread Mill" is available free-of-charge. Simply download it from our homepage www.guehring.de.



To the optimal CNC programme in five steps

1. Specify the thread data
Select from all current thread standards
2. Select the material
You are always referred to the optimal parameters
3. Select the tool
Technical data, drawing, machining time and video simplify selection
4. Record CNC data
Enter required milling strategy and parameters
5. Receive CNC programme with code and data sheet
Programming data (Sinumerik, Haidenhain, FANUC, Philips, Mazatrol or Hurco) are imported and automatically recognised



Carbide inserts, Special solutions for thread milling cutter for internal and external threads.

Please feel free to contact us!

COMBINATION TOOL



- universally applicable
- excellent performance
- very durable

Benefit: Short cycle time, safe tool space in the machine, based on the modular system.

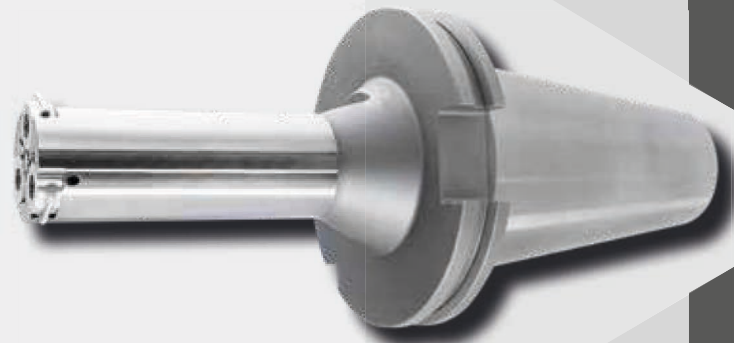


CIRCULAR THREAD MILLING WITH CARBIDE INSERTS



- different thread profiles
- size $\geq \text{Ø}24$ mm
- maximum pitch of 6 mm

Benefit: Universal usable, carbide inserts multiple usable, high stiffness by consistent high quality.



BELL THREAD MILLING CUTTER FOR EXTERNAL THREADS



- different thread profiles
- burr free thread milling
- carbide inserts 2 times usable

Benefit: Short cycle time, perfect thread quality, simple handling.



MTMH3-Z 2.5xD

HELICAL DRILL THREAD MILLING INTO SOLID MATERIAL UP TO 66 HRC

The new helical drill thread milling cutter for high-strength and hardened steels up to 66 HRC combines core hole and thread production in one tool. The MTMH3-Z guarantees process reliability and true to gauge threads.

Two oil grooves on the shaft ensure optimum cooling with emulsion or air.



Thanks to the special face geometry with hollow grinding, the process-safe core hole and thread milling in almost all steels is possible.



Thanks to the **left cutting geometry** the tool stabilises itself during the climb milling process – perfect, true to gauge threads up to 66 HRC are guaranteed.

Thanks to the **temperature-resistant TiSiN coating**, dry and wet machining is possible.

The MTMH3-Z is made of a **special fine-grained carbide**, which is characterised by its high hardness and is optimally suited for hard machining.

- process reliability guaranteed
- excellent machining results in dry and wet machining
- core holes and threads in one step: significantly shorter cycle and setting time
- universally applicable in unhardened and hardened materials up to 66 HRC



Article no.	Page	Drilling depth	Standard	Description	Tool material	Type	Form
1012	23		JIS B 4430	Taps for ISO metric threads	HSS-E	N R40	C
1013	23		JIS B 4430	Taps for ISO metric threads	HSS-E	N R40	C
1014	18		JIS B 4430	Taps for ISO metric threads	HSS-E	N	B
1015	18		JIS B 4430	Taps for ISO metric threads	HSS-E	N	B
1017	56		JIS B 4430	Fluteless taps w/o oil grooves for ISO metric threads	HSS-E	N	C
3737	65	2xD	Company std.	Thread milling cutters without chamfer for ISO metric threads	Solid carbide	TM SP	
4002	66	2.5xD	Company std.	Micro thread milling cutters	Solid carbide	MTMH3-Z	
4226	64	3xD	Company std.	Micro thread milling cutters	Solid carbide	MTM3 SP	
4432	25		JIS B 4430	Taps for ISO metric threads	HSS-E	N R40	E
4434	34		JIS B 4430	Taps for ISO metric fine threads	HSS-E	N	B
4435	34		JIS B 4430	Taps for ISO metric fine threads	HSS-E	N	B
4438	38		JIS B 4430	Taps for ISO metric fine threads	HSS-E	N R40	C
4439	38		JIS B 4430	Taps for ISO metric fine threads	HSS-E	N R40	C
4443	57		JIS B 4430	Fluteless taps with oil grooves for ISO metric threads	HSS-E	N	C
4444	60		JIS B 4430	Fluteless taps with oil grooves for ISO metric fine threads	HSS-E	N	C
4447	59		JIS B 4430	Fluteless taps with coolant ducts and oil grooves f. ISO metric threads	Solid carbide	N	C
4448	32		JIS B 4430	Taps for ISO metric threads	HSS-E-PM	GG	C
4449	28		JIS B 4430	Taps for ISO metric threads	HSS-E-PM	VA R45	C
4450	42		JIS B 4430	Taps for ISO metric fine threads	HSS-E-PM	VA R45	C
4451	44		JIS B 4430	Taps for ISO metric fine threads	HSS-E	GG	C
4452	31		JIS B 4430	Taps for ISO metric threads	HSS-E	GG	C
4453	33		JIS B 4430	Taps for ISO metric threads	HSS-E-PM	H	D
4454	49		Company std.	Taps for UNC threads	HSS-E	N R40	C
4455	50		Company std.	Taps for UNF threads	HSS-E	N	B
4457	51		Company std.	Taps for UNF threads	HSS-E	N R40	C
4459	46		JIS B 4430	Taps for ISO metric fine threads	HSS-E-PM	H	D
4460	22		Company std.	Taps for ISO metric threads	HSS-E	N	B
4461	37		Company std.	Taps for ISO metric fine threads	HSS-E	N	B
4462	29		Company std.	Taps for ISO metric threads	HSS-E	N R40	C
4463	43		Company std.	Taps for ISO metric fine threads	HSS-E	N R40	C
4464	52		Company std.	Taps for PT threads	HSS-E	N	C
4465	48		Company std.	Taps for UNC threads	HSS-E	N	B
4470	21		JIS B 4430	Taps for ISO metric threads	HSS-E-PM	VA	B
4471	36		JIS B 4430	Taps for ISO metric fine threads	HSS-E-PM	VA	B
4472	45		JIS B 4430	Taps for ISO metric fine threads	HSS-E-PM	GG	C
4550	19		JIS B 4430	Taps for ISO metric threads	HSS-E	VA	B
4552	35		~JIS B 4430	Taps for ISO metric fine threads	HSS-E	VA	B
4580	40		JIS B 4430	Taps for ISO metric fine threads	HSS-E	N R40	E
4583	58		JIS B 4430	Fluteless taps with oil grooves for ISO metric threads	HSS-E-PM	N	C
4585	61		JIS B 4430	Fluteless taps with oil grooves for ISO metric fine threads	HSS-E-PM	N	C
4587	26		JIS B 4430	Taps for ISO metric threads	HSS-E	VA R45	C
4588	26		JIS B 4430	Taps for ISO metric threads	HSS-E	VA R45	C
4589	26		JIS B 4430	Taps for ISO metric threads	HSS-E	VA R45	C
4590	41		~JIS B 4430	Taps for ISO metric fine threads	HSS-E	VA R45	C
4591	41		~JIS B 4430	Taps for ISO metric fine threads	HSS-E	VA R45	C
4592	41		~JIS B 4430	Taps for ISO metric fine threads	HSS-E	VA R45	C

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