

GUHRING

THE NEW GENERATION

- ▶ torque reduction up to 30 %
- ▶ reduced axial forces
- ▶ increased tool life
- ▶ improved surface finish quality

Pionex *the new generation FLUTELESS MACHINE TAPS*

GUHRING – YOUR WORLDWIDE PARTNER

Pionex

the new generation **FLUTELESS MACHINE TAPS**

A special surface finish treatment in combination with the TiCN-coating ensures increased wear-resistance.



Optimized polygon form

Based on a geometric modification the contact surface between tool and workpiece have been optimized. This reduces torque by up to 30 %.

Tool material

Increased wear-resistance thanks to the application of a new powder metallurgical base material.

Shank tolerance h6

Due to the shank tolerance h6 the new fluteless tap generation can be applied in all standard clamping chucks.

New lubricating groove geometry

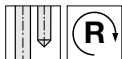
Thanks to the optimized lubricating grooves the lubricating effect has been clearly improved in the forming lead area.



	Thread depth	≤3xD				
	Tool material	HSS-E-PM				
	Lead form	C	E	C	E	
	Surface					
	Coolant delivery					
	Shank tolerance	h6	h6	h6	h6	
<ul style="list-style-type: none"> ● = Neat oil ○ = Soluble oil △ = Paste □ = MQL 	Thread type	Tolerance	Article no./page			
	M	6HX	4487 p. 4	4494 p. 4	4485 p. 6	4483 p. 5
		6GX	4488 p. 4			
	MF	6HX	4489 p. 7	4495 p. 7	4486 p. 9	4484 p. 8
		6GX	4490 p. 7			
	UNC	2BX	4491 p. 10			
	UNF	2BX	4492 p. 11			
G	- X	4493 p. 12				
	Suitable lubricant:	○/●/△	○/●/△	○/●/△/□	○/●/△/□	

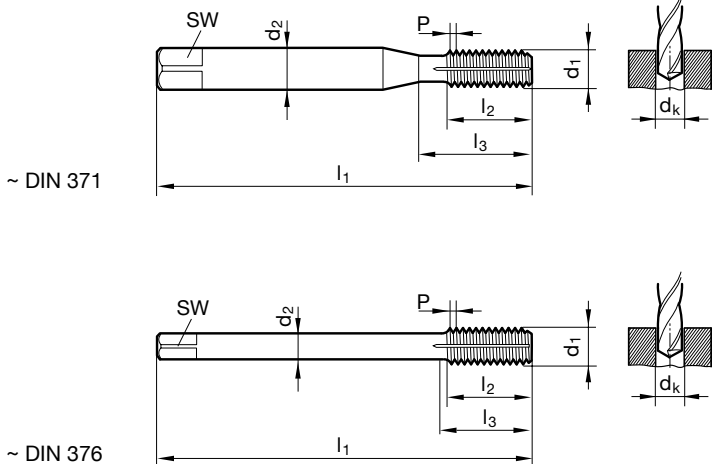
Group of materials		Tensile strength	Material example	Material no.	Recommended cutting speed v _c [SFM]				
P	P1 Structural and free cutting steels, heat-treatable steels unalloyed	≤800 N/mm ²	S235JR C15 11SMnPb30	1.0037 1.0401 1.0718	80	80	80	80	
	P2 Free-cutting steels, unalloyed case hardened steels, nitriding steels	800 - 1000 N/mm ²	S355J2 C60 31CrMo12	1.0577 1.0601 1.8515	80	80	80	80	
	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	50	50	50	50	
M	M1 Stainless steels, sulphured, austenitic	≤1000 N/mm ²	X5CrNi18-10 X6CrNiTi18-10 X8CrNiS18-9	1.4301 1.4571 1.4305	50	50	50	50	
	M2 Stainless- and acidresistant steels, martensitic	≤1000 N/mm ²	X17CrNi16-2 X90CrMoV18 X2CrTi12	1.4057 1.4112 1.4512	35	35	35	35	
	M3 Duplex and Super Duplex	≤1300 N/mm ²	X2CrNiMoN22-5-3 X2CrNiMoN25-7-4 X2CrNiMoCuWN25-7-4	1.4462 1.4410 1.4501	20	20	20	20	
K	K1 Cast Iron	300 HB	EN-GJL-150 EN-GJL-250 EN-GJL-300	0.6015 0.6025 0.6030					
	K2 Spheroidal graphite iron and malleable cast iron	350 HB	EN-GJS-400-15 EN-GJS-600-3 EN-GJS-700-2	0.7040 0.7060 0.7070	100	100	100	100	
	K3 ADI GGV	1000 N/mm ² 350 HB	EN-GJS1000-5 EN-GJV250 EN-GJV400		80	80	80	80	
N	N1 Aluminium and wrought alloys	≤450 N/mm ²	Al99,5H AlMgSi1 AlZn4,5Mg	3.0250 3.2315 3.4335	50	50	50	50	
	N2 Al cast alloys	≤600 N/mm ²	GD-AlSi8Cu1Mg GD-AlSi8Cu3 G-AlSi9Mg G-AlSi12	3.2134 3.2162 3.2373 3.2581	100	100	100	100	
	N3 Magnesium alloys	≤500 N/mm ²	GDMgAl8Zn1	3.5812.08					
	N4 Copper and copper alloys	long-chipping		CuZn20 CuZn37Pb0,5	2.0250 2.0332	100	100	100	100
		short-chipping		CuZn39Pb2 CuZn43Pb2	2.0380 2.0410				
	N5 Copper special alloys	≤1400 N/mm ²	Ampco						
N6 Plastics (Thermoplastics, Duroplastics)	long-chipping short-chipping	PMMA, POM,PVC Pertinax							
S	S1 Titanium and Titanium alloys	≤ 1200 N/mm ²	Titan TiAl5Sn2 TiAl6V4	3.702<5 3.7115 3.7165	25	25	25	25	
	S2 Nickel, cobalt, iron alloys	≤ 1400 N/mm ²	Hastelloy C4 Inconel 718 Nimonic 105	2.4610 2.4668 2.4634	25	25	25	25	
H	H1 High tensile/	45 - 55 HRC							
	H2 hardened steels	55 - 62 HRC							

Fluteless machine taps for ISO metric threads



P	•
M	•
K	•
N	○
S	•
H	•

Tool material	HSS-E-PM		
Tolerance on Ø	4HX/6HX	6GX	6HX
Surface	C	C	C
Type	N	N	N
Chamfer Form	C (2-3)	C (2-3)	E (1.5-2)
Internal cooling	N/A	N/A	N/A



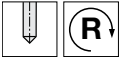
DIN 2174 ~DIN 371/~DIN 376 Series no. 4487 4488 4494

d1	P	d2	SW	dk	l1	l2	l3	Code no.	EDP Number		
mm	mm	mm	mm	mm	mm	mm	mm				
*M1	0.250	2.500	2.100	0.89 - 0.92	40.000	4.000		1.000	9044870010000		
*M1.2	0.250	2.500	2.100	1.09 - 1.12	40.000	4.800		1.200	9044870012000		
*M1.4	0.300	2.500	2.100	1.27 - 1.30	40.000	5.600		1.400	9044870014000		
*M1.6	0.350	2.500	2.100	1.45 - 1.48	40.000	6.400		1.600	9044870016000		
*M1.7	0.350	2.500	2.100	1.55 - 1.58	40.000	6.800		1.700	9044870017000		
*M1.8	0.350	2.500	2.100	1.65 - 1.68	40.000	7.300		1.800	9044870018000		
M2	0.400	2.800	2.100	1.84 - 1.88	45.000	8.000	13.500	2.000	9044870020000	9044880020000	9044940020000
M2.5	0.450	2.800	2.100	2.28 - 2.32	50.000	9.000	14.500	2.500	9044870025000	9044880025000	9044940025000
M3	0.500	3.500	2.700	2.78 - 2.85	56.000	10.000	18.000	3.000	9044870030000	9044880030000	9044940030000
M4	0.700	4.500	3.400	3.68 - 3.76	63.000	12.000	21.000	4.000	9044870040000	9044880040000	9044940040000
M5	0.800	6.000	4.900	4.62 - 4.71	70.000	14.000	25.000	5.000	9044870050000	9044880050000	9044940050000
M6	1.000	6.000	4.900	5.52 - 5.62	80.000	16.000	30.000	6.000	9044870060000	9044880060000	9044940060000
M8	1.250	8.000	6.200	7.36 - 7.47	90.000	17.000	35.000	8.000	9044870080000	9044880080000	9044940080000
M10	1.500	10.000	8.000	9.26 - 9.38	100.000	20.000	39.000	10.000	9044870100000	9044880100000	9044940100000
M12	1.750	9.000	7.000	11.15 - 11.29	110.000	24.000	49.000	12.000	9044870120000	9044880120000	9044940120000
M14	2.000	11.000	9.000	13.05 - 13.20	110.000	26.000	53.000	14.000	9044870140000	9044880140000	9044940140000
M16	2.000	12.000	9.000	15.05 - 15.20	110.000	26.000	54.000	16.000	9044870160000	9044880160000	9044940160000
M20	2.500	16.000	12.000	16.83 - 19.02	140.000	32.000	62.000	20.000	9044870200000	9044880200000	9044940200000

Series no. 4487 from Ø M2 with oil grooves, Ø tolerance ≤ M1.4 = 4HX
 No coolant grooves under 2.0mm Ø



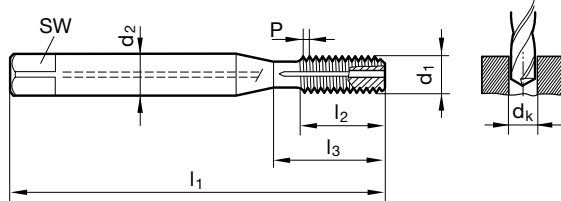
Oil feed fluteless taps f. ISO metric threads



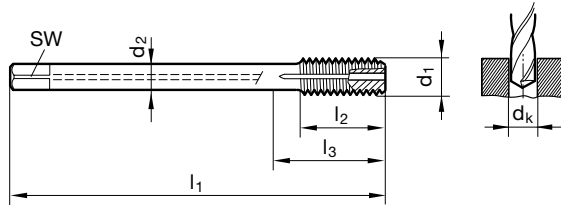
P	•
M	•
K	•
N	○
S	•
H	

Tool material	HSS-E-PM
Tolerance on Ø	6HX
Surface	C
Type	N
Chamfer Form	E (1.5-2)
Internal cooling	Axial

~ DIN 371



~ DIN 376



DIN 2174 ~DIN 371/~DIN 376

Series no.

4483

d1	P	d2	SW	dk	l1	l2	l3	Code no.	EDP Number
mm	mm	mm	mm	mm	mm	mm	mm		
M5	0.800	6.000	4.900	4.620 - 4.680	70.000	8.500	25.000	5.000	9044830050000
M6	1.000	6.000	4.900	5.520 - 5.600	80.000	11.000	30.000	6.000	9044830060000
M8	1.250	8.000	6.200	7.390 - 7.470	90.000	14.000	35.000	8.000	9044830080000
M10	1.500	10.000	8.000	9.290 - 9.370	100.000	16.000	39.000	10.000	9044830100000
M12	1.750	9.000	7.000	11.180 - 11.280	110.000	18.500	49.000	12.000	9044830120000
M14	2.000	11.000	9.000	13.070 - 13.160	110.000	20.000	53.000	14.000	9044830140000
M16	2.000	12.000	9.000	15.070 - 15.160	110.000	20.000	54.000	16.000	9044830160000
M20	2.500	16.000	12.000	18.850 - 19.000	140.000	25.000	62.000	20.000	9044830200000

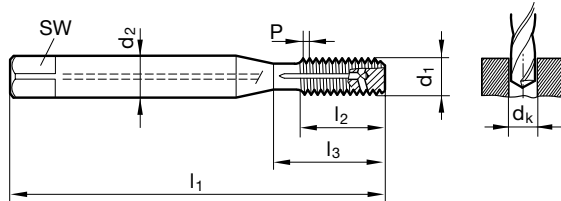
Oil feed fluteless taps f. ISO metric threads



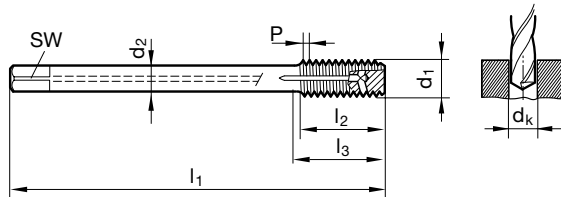
P	•
M	•
K	•
N	○
S	•
H	

Tool material	HSS-E-PM
Tolerance on Ø	6HX
Surface	C
Type	N
Chamfer Form	C (2-3)
Internal cooling	Radial

~ DIN 371



~ DIN 376



DIN 2174 ~DIN 371/~DIN 376

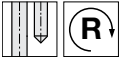
Series no.

4485

d1	P	d2	SW	dk	l1	l2	l3	Code no.	EDP Number
mm	mm	mm	mm	mm	mm	mm	mm		
M5	0.800	6.000	4.900	4.62 - 4.71	70.000	8.500	25.000	5.000	9044850050000
M6	1.000	6.000	4.900	5.52 - 5.62	80.000	11.000	30.000	6.000	9044850060000
M8	1.250	8.000	6.200	7.36 - 7.47	90.000	14.000	35.000	8.000	9044850080000
M10	1.500	10.000	8.000	9.26 - 9.38	100.000	16.000	39.000	10.000	9044850100000
M12	1.750	9.000	7.000	11.15 - 11.29	110.000	18.500	49.000	12.000	9044850120000
M14	2.000	11.000	9.000	13.05 - 13.20	110.000	20.000	53.000	14.000	9044850140000
M16	2.000	12.000	9.000	15.05 - 15.20	110.000	20.000	54.000	16.000	9044850160000
M20	2.500	16.000	12.000	16.83 - 19.02	140.000	25.000	62.000	20.000	9044850200000



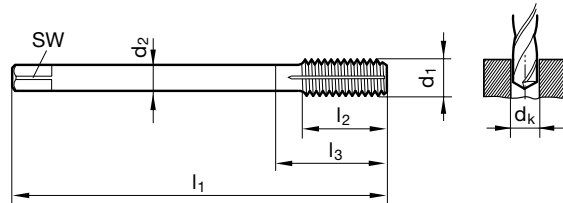
Fluteless machine taps for ISO metric fine threads



P	•
M	•
K	•
N	○
S	•
H	

Tool material	HSS-E-PM		
Tolerance on Ø	6HX	6GX	6HX
Surface	C	C	C
Type	N	N	N
Chamfer Form	C (2-3)	C (2-3)	E (1.5-2)
Internal cooling	N/A	N/A	N/A

DIN 371



DIN 2174 ~DIN 374

Series no. 4489 4490 4495

d1	d2	SW	dk	l1	l2	l3	Code no.	EDP Number		
	mm	mm	mm	mm	mm	mm				
M8 x 1	6.000	4.900	7.52 - 7.62	90.000	16.000	35.000	8.005	9044890080050	9044900080050	9044950080050
M10 x 1	7.000	5.500	9.52 - 9.62	90.000	16.000	35.000	10.005	9044890100050	9044900100050	9044950100050
M10 x 1.25	7.000	5.500	9.36 - 9.47	100.000	20.000	39.000	10.006	9044890100060	9044900100060	9044950100060
M12 x 1.25	9.000	7.000	11.36 - 11.47	100.000	20.000	40.000	12.006	9044890120060	9044900120060	9044950120060
M12 x 1.5	9.000	7.000	11.26 - 11.38	100.000	20.000	40.000	12.007	9044890120070	9044900120070	9044950120070
M14 x 1.25	11.000	9.000	13.36 - 13.47	100.000	20.000	40.000	14.006	9044890140060	9044900140060	9044950140060
M14 x 1.5	11.000	9.000	13.26 - 13.38	100.000	20.000	40.000	14.007	9044890140070	9044900140070	9044950140070
M16 x 1.5	12.000	9.000	15.26 - 15.38	100.000	22.000	44.000	16.007	9044890160070	9044900160070	9044950160070
M20 x 1.5	16.000	12.000	19.26 - 19.38	125.000	25.000	44.000	20.007	9044890200070	9044900200070	9044950200070

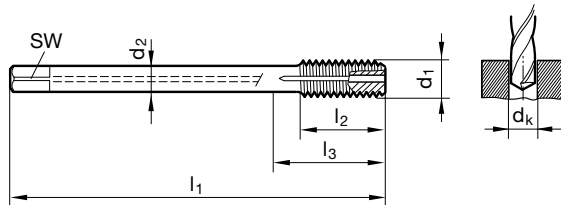
Oil feed fluteless taps f. ISO metric fine threads



P	•
M	•
K	•
N	○
S	•
H	

Tool material	HSS-E-PM
Tolerance on Ø	6HX
Surface	C
Type	N
Chamfer Form	E (1.5-2)
Internal cooling	Axial

~ DIN 374



DIN 2174 ~DIN 374

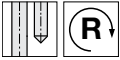
Series no.

4484

d1	d2	SW	dk	l1	l2	l3	Code no.	EDP Number
	mm	mm	mm	mm	mm	mm		
M8 x 1	6.000	4.900	7.52 - 7.62	90.000	11.000	35.000	8.005	9044840080050
M10 x 1	7.000	5.500	9.52 - 9.62	90.000	11.000	35.000	10.005	9044840100050
M10 x 1.25	7.000	5.500	9.36 - 9.47	100.000	14.000	39.000	10.006	9044840100060
M12 x 1.25	9.000	7.000	11.36 - 11.47	100.000	16.000	40.000	12.006	9044840120060
M12 x 1.5	9.000	7.000	11.26 - 11.38	100.000	16.000	40.000	12.007	9044840120070
M14 x 1.25	11.000	9.000	13.36 - 13.47	100.000	15.000	40.000	14.006	9044840140060
M14 x 1.5	11.000	9.000	13.26 - 13.38	100.000	15.000	40.000	14.007	9044840140070
M16 x 1.5	12.000	9.000	15.26 - 15.38	100.000	15.000	44.000	16.007	9044840160070
M20 x 1.5	16.000	12.000	19.26 - 19.38	125.000	16.000	44.000	20.007	9044840200070



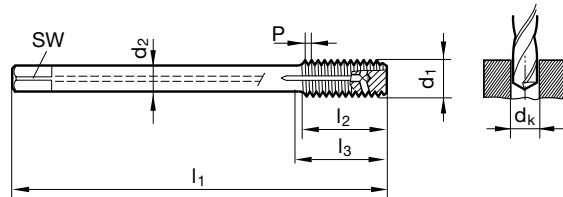
Oil feed fluteless taps f. ISO metric fine threads



P	•
M	•
K	•
N	○
S	•
H	

Tool material	HSS-E-PM
Tolerance on Ø	6HX
Surface	C
Type	N
Chamfer Form	C (2-3)
Internal cooling	Radial

~ DIN 374



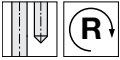
DIN 2174 ~DIN 374

Series no.

4486

d1	d2	SW	dk	l1	l2	l3	Code no.	EDP Number
	mm	mm	mm	mm	mm	mm		
M8 x 1	6.000	4.900	7.52 - 7.62	90.000	11.000	35.000	8.005	9044860080050
M10 x 1	7.000	5.500	9.52 - 9.62	90.000	11.000	35.000	10.005	9044860100050
M10 x 1.25	7.000	5.500	9.36 - 9.47	100.000	14.000	39.000	10.006	9044860100060
M12 x 1.25	9.000	7.000	11.36 - 11.47	100.000	16.000	40.000	12.006	9044860120060
M12 x 1.5	9.000	7.000	11.26 - 11.38	100.000	16.000	40.000	12.007	9044860120070
M14 x 1.25	11.000	9.000	13.36 - 13.47	100.000	15.000	40.000	14.006	9044860140060
M14 x 1.5	11.000	9.000	13.26 - 13.38	100.000	15.000	40.000	14.007	9044860140070
M16 x 1.5	12.000	9.000	15.26 - 15.38	100.000	15.000	44.000	16.007	9044860160070
M20 x 1.5	16.000	12.000	19.26 - 19.38	125.000	16.000	44.000	20.007	9044860200070

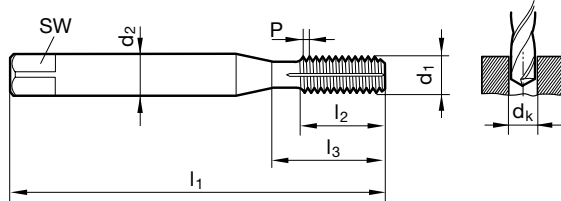
Fluteless machine taps for UNC-threads



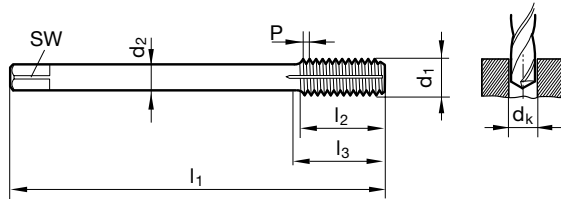
P	•
M	•
K	•
N	○
S	•
H	

Tool material	HSS-E-PM
Tolerance on Ø	2BX
Surface	C
Type	N
Chamfer Form	C (2-3)
Internal cooling	N/A

~ DIN 371



~ DIN 376



DIN 2184-1 ~DIN 371/~DIN 376

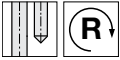
Series no.

4491

d1	d2	SW	dk	l1	l2	l3	Code no.	EDP Number
	mm	mm	mm	mm	mm	mm		
4 - 40	3.500	2.700	0.100 - 0.102	56.000	11.000	18.000	2.845	9044910028450
6 - 32	4.000	3.000	0.124 - 0.126	56.000	12.000	20.000	3.505	9044910035050
8 - 32	4.500	3.400	0.149 - 0.150	63.000	12.000	21.000	4.166	9044910041660
10 - 24	6.000	4.900	0.171 - 0.173	70.000	14.000	25.000	4.826	9044910048260
12 - 24	6.000	4.900	0.196 - 0.198	80.000	16.000	30.000	5.486	9044910054860
1/4 - 20	7.000	5.500	0.225 - 0.228	80.000	16.000	30.000	6.350	9044910063500
5/16 - 18	8.000	6.200	0.286 - 0.290	90.000	18.000	35.000	7.938	9044910079380
3/8 - 16	10.000	8.000	0.345 - 0.350	90.000	20.000	35.000	9.525	9044910095250
7/16 - 14	8.000	6.200	0.404 - 0.408	100.000	22.000	42.000	11.113	9044910111130
1/2 - 13	9.000	7.000	0.463 - 0.468	100.000	25.000	40.000	12.700	9044910127000
9/16 - 12	11.000	9.000	0.532 - 0.527	100.000	28.000	40.000	14.288	9044910142880
5/8 - 11	12.000	9.000	0.582 - 0.587	100.000	30.000	44.000	15.875	9044910158750
3/4 - 10	14.000	11.000	0.703 - 0.708	110.000	33.000	44.000	19.050	9044910190500

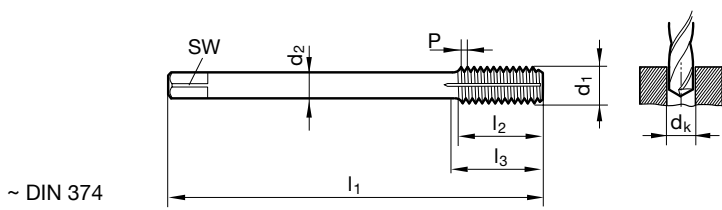
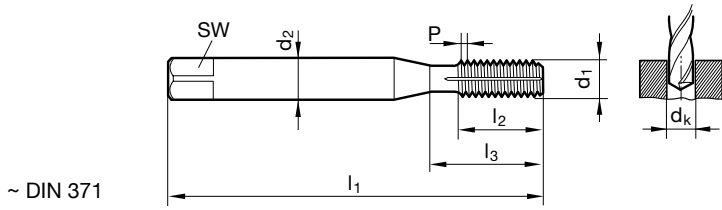


Fluteless machine taps for UNF-threads



P	•
M	•
K	•
N	○
S	•
H	

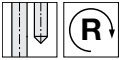
Tool material	HSS-E-PM
Tolerance on Ø	2BX
Surface	C
Type	N
Chamfer Form	C (2-3)
Internal cooling	N/A



DIN 2184-1 ~DIN 371/~DIN 374 Article no. **4492**

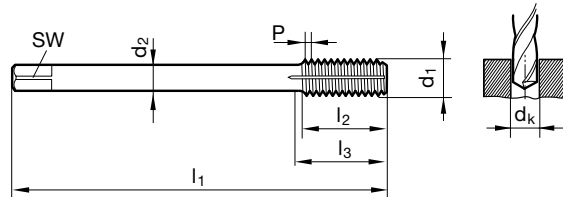
d1	d2	SW	dk	l1	l2	l3	Code no.	EDP Number
	mm	mm	mm	mm	mm	mm		
4 - 48	3.500	2.700	2.59 - 2.63	56.000	10.000	18.000	2.845	9044920028450
6 - 40	4.000	3.000	3.19 - 3.24	56.000	11.000	20.000	3.505	9044920035050
8 - 36	4.500	3.400	3.83 - 3.88	63.000	12.000	21.000	4.166	9044920041660
10 - 32	6.000	4.900	4.42 - 4.49	70.000	14.000	25.000	4.826	9044920048260
12 - 28	6.000	4.900	5.07 - 5.13	80.000	16.000	30.000	5.486	9044920054860
1/4 - 28	7.000	5.500	5.92 - 5.99	80.000	16.000	30.000	6.350	9044920063500
5/16 - 24	8.000	6.200	7.42 - 7.50	90.000	18.000	35.000	7.938	9044920079380
3/8 - 24	10.000	8.000	9.02 - 9.10	100.000	18.000	39.000	9.525	9044920095250
7/16 - 20	8.000	6.200	10.48 - 10.58	100.000	22.000	42.000	11.113	9044920111130
1/2 - 20	9.000	7.000	12.08 - 12.18	100.000	20.000	40.000	12.700	9044920127000
9/16 - 18	11.000	9.000	13.61 - 13.72	100.000	22.000	40.000	14.288	9044920142880
5/8 - 18	12.000	9.000	15.21 - 15.32	100.000	22.000	44.000	15.875	9044920158750
3/4 - 16	14.000	11.000	15.30 - 18.41	110.000	25.000	44.000	19.050	9044920190500

Fluteless machine taps for BSP-threads



P	•
M	•
K	•
N	○
S	•
H	

Tool material	HSS-E-PM
Tolerance on Ø	
Surface	C
Type	N
Chamfer Form	C (2-3)
Internal cooling	N/A



DIN 2184-1 DIN 2189

Series no.

4493

d1	P	d2	SW	dk	l1	l2	l3	Code no.	EDP Number
	G/inch								
G1/8	28.000	7.000	5.500	9.28 - 9.35	90.000	18.000	35.000	9.728	9044930097280
G1/4	19.000	11.000	9.000	12.48 - 12.55	100.000	20.000	40.000	13.157	9044930131570
G3/8	19.000	12.000	9.000	15.98 - 16.05	100.000	22.000	44.000	16.662	9044930166620
G1/2	14.000	16.000	12.000	19.98 - 20.12	125.000	25.000	44.000	20.955	9044930209550

GÜHROSynC

UP TO 30% BETTER PERFORMANCE AT A POWER PRICE

Allows for 0.3 mm of compensation for up to 75% reduction in axial forces

Offers internal, peripheral or MQL lubrication

Extreme concentricity and application speed

First tapping chuck to offer combination of steel and polymer components for independent axial and torsional force dampening

Quick and simple handling, slim design

Maximum tool life and thread accuracy



The new **GÜHROSynC** tapping chuck

Synchro and hydraulic clamping technology intelligently combined

by **GUHRING**

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. 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 nut thread. The flow process creates the process specific form pockets (claws).

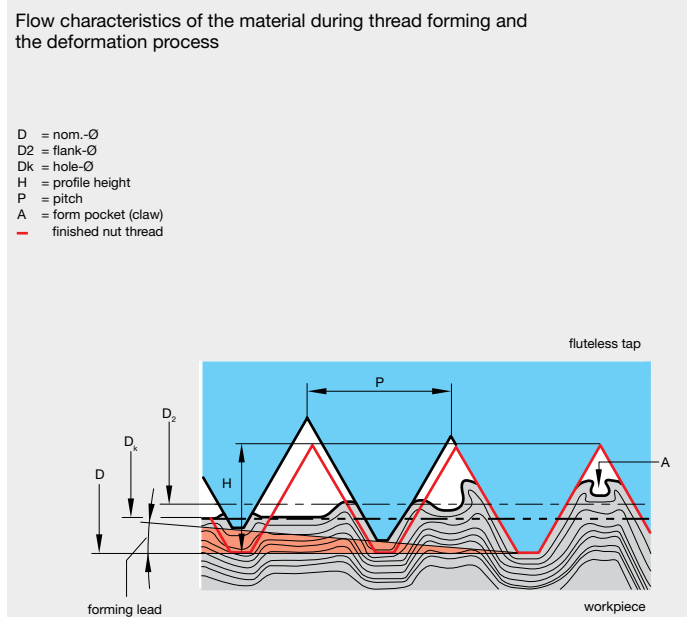
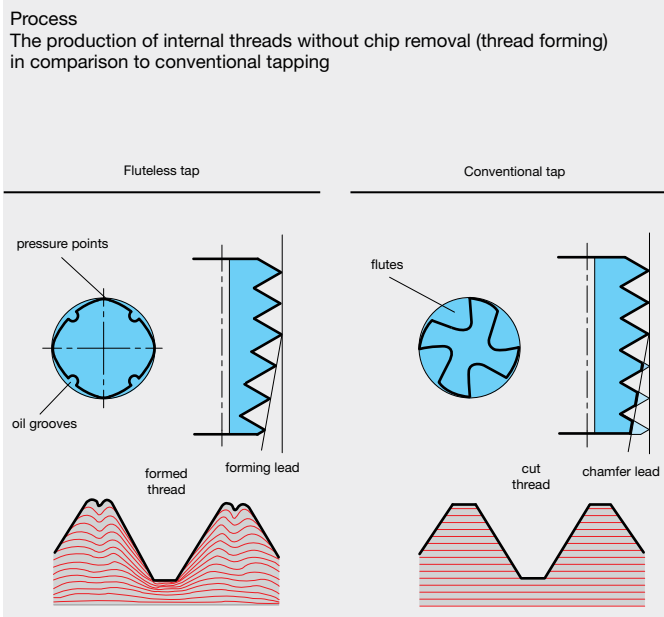
The tapping size hole diameter is heavily dependent on the formability of the material, the workpiece geometry and the required effective depth of the thread. In comparison to conventional tapping, a larger diameter tapping size hole should be selected. With a larger diameter tapping size hole the load on the tool is reduced while 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 breakdown 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





“Profile“ – Guhring’s new fluteless tap generation

Characteristics and advantages

Conventional fluteless taps, produced by a grinding process only, show traces of microscopic, very fine grinding marks on the surface of the tool. This also applies to the threaded portion of the tool required to perform the thread forming operation.

This surface topography (structure) has a negative effect on the friction between the tool and the material to be re-formed as well as on the herewith associated heat development, on the necessary torque and last but not least on the wear of the pressure points of the fluteless tap. In addition, the “grinding marks” encourage the build-up of the material to be re-formed in the thread flanks of the fluteless tap. This is also called cold welding.

Thanks to a special process to improve the surface topography (structure), Guhring’s new Profile fluteless taps no longer possess these “grinding marks”. This has been confirmed in research and tool life studies in varying materials under production conditions.

For the user, a longer tool life and increased cutting speeds are the benefits of this special process. The tool life can be increased considerably depending on the material to be machined and the application conditions. A 100% increase in tool life is not unusual.

The improved surface topography is not only of benefit to tools with bright finish. Particularly coated tools also benefit from the new process. Outer contour and forming lead greatly determine the performance of the fluteless tap. Numerous tests have shown that fluteless taps with optimal pressure point geometry and quantity achieve increased tool life and dimensional accuracy.

Further improvements in quality are achieved when the fluteless tap is produced completely in one setting and with one grinding wheel - set-up with a special roll. Pitch errors between the thread crests and former lead transition area do not occur as with the conventional grinding process.

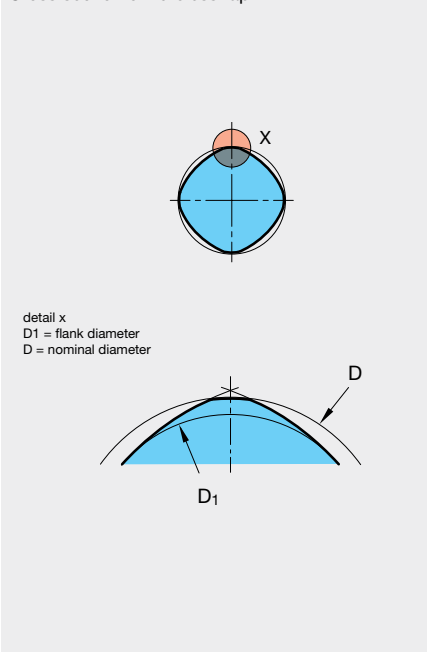


Surface of a conventional fluteless tap

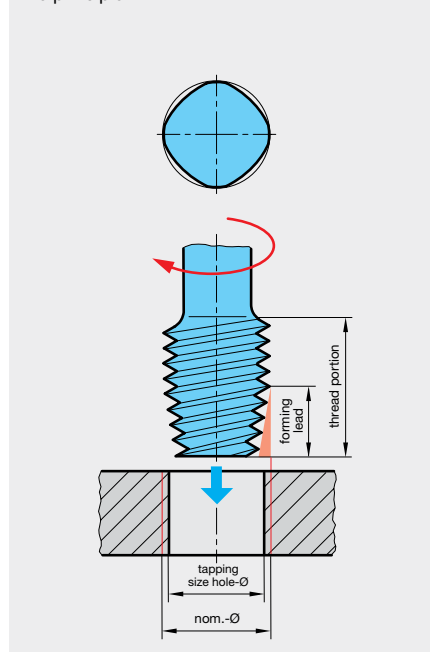


Optimised surface of a Guhring Profile fluteless tap

Cross section of fluteless tap



The principle



Types of tapping size hole

with fluteless taps without oil grooves
for thread depth $\leq 1 \times D$



for thread depth $\geq 1 \times D$



with fluteless taps with oil grooves
for all thread depths



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

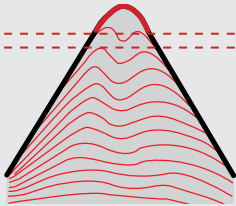


Pre-drilling Ø 17.4 mm



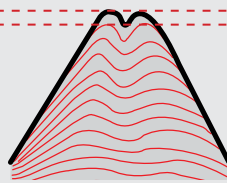
Tapping size hole diameter is too small:

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



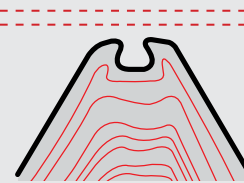
Optimal tapping size hole diameter:

- 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

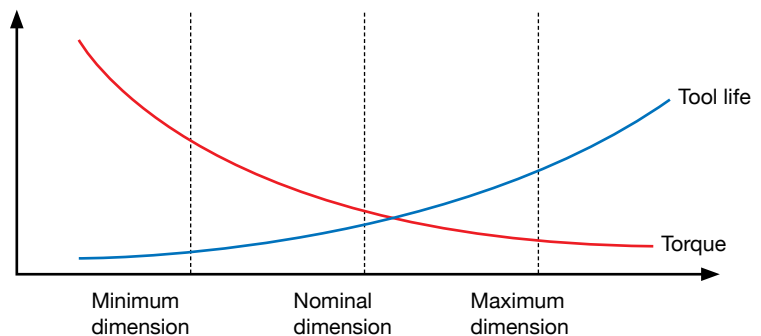


min.
max.

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.

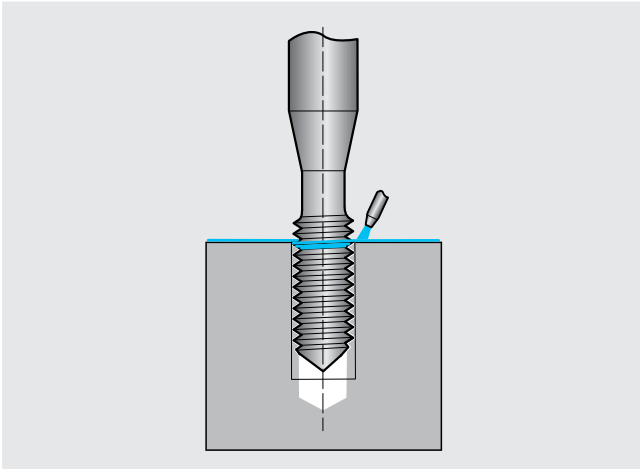




Lubrication for thread forming

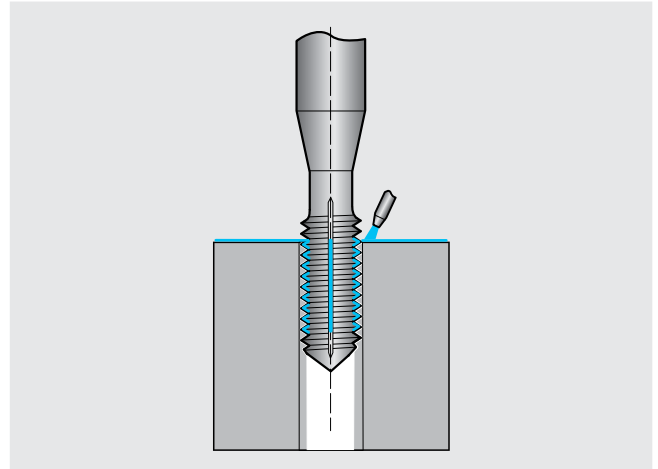
For tool design four different cases should be differentiated between.

Vertical machining of a blind hole



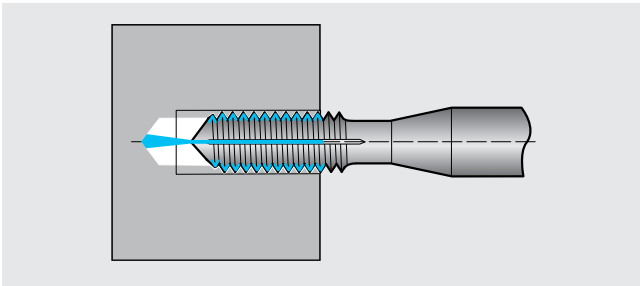
Lubrication grooves and internal coolant delivery is not necessary; external coolant delivery is sufficient (Axial coolant is recommended for very deep threads).

Vertical machining of a through hole ($> 1.5 \times D_{\text{th}}$)



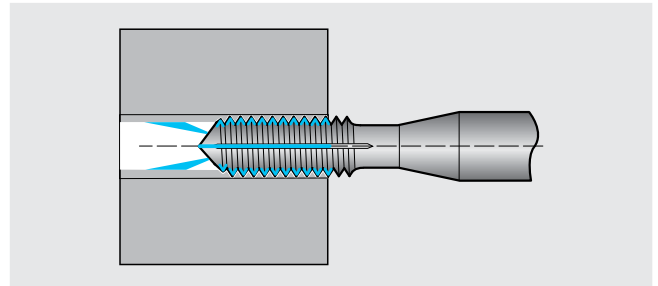
Lubrication grooves are required; internal coolant delivery is not necessary. Via the lubrication grooves the externally delivered coolant can advance to the form edges (Radial coolant is recommended for very deep threads).

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.

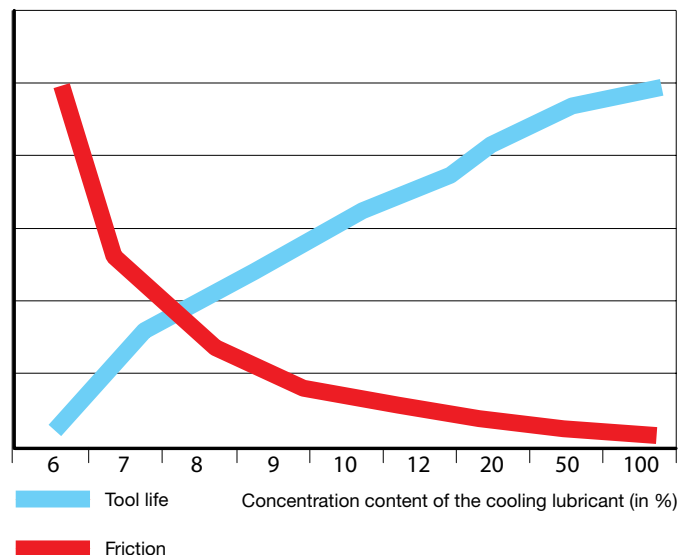
There are two different types of lubricant:

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 8%. A content more than 12% is ideal in order to achieve a long life thanks to a good lubrication effect.





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Fluteless tapping

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