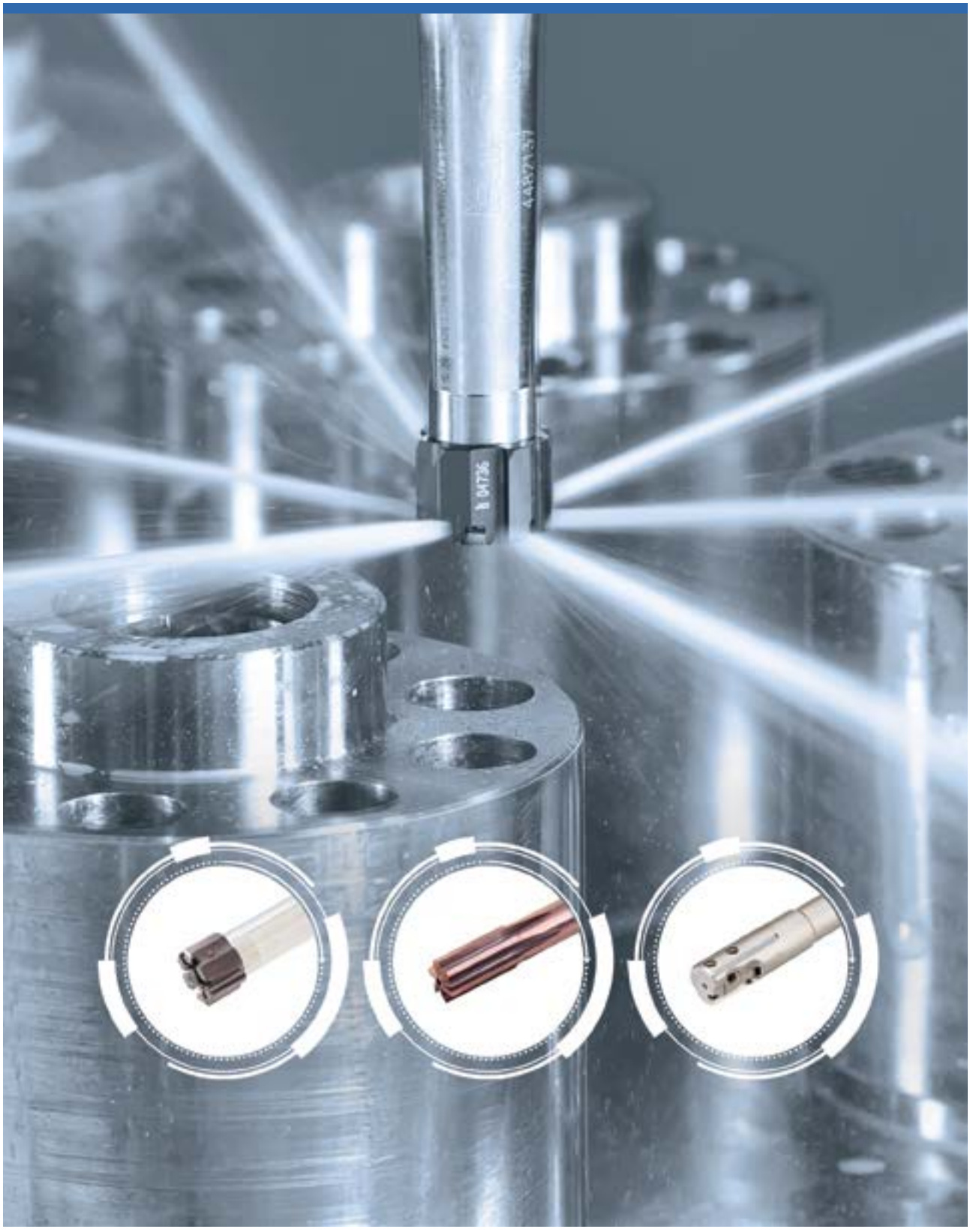
HIGH PRECISION REAMING



Holder Designation Code Key

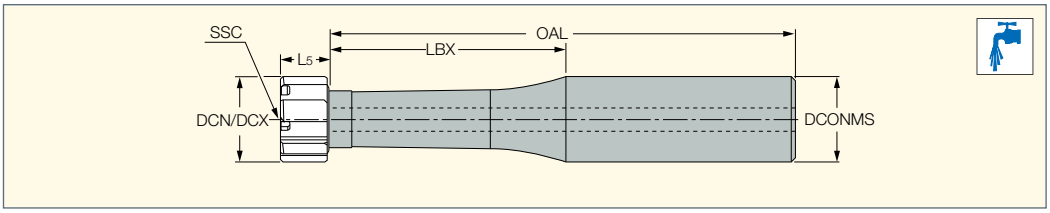
RM	-	BNT6	-	3D	-	16	-	C [1]	-	□ [2]
Reamer		Bayonet Tool Size		Functional Length		Shank Diameter		Shank Type		Shank Material

[1] C- cylindrical, W-Weldon, M-Morse
[2] No letter - Steel (default), C-Carbide, W- Heavy metal

BAYOT-REAM

RM-BNT (Shanks)

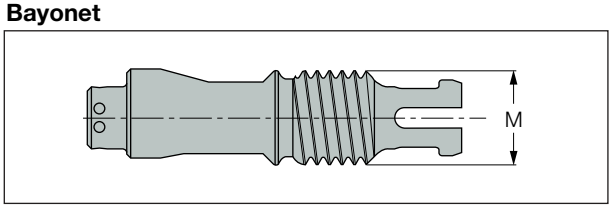
Shanks for BAYO T-REAM
Interchangeable Head Reamers



Designation	ULDR[1]	DCN[2]	DCX[3]	LBX	OAL	L5	DCONMS	SSC[4]		
RM-BNT5-1.5D-16C	1.5	11.501	13.500	20.3	68.25	9.50	16.00	BN5	RM-BN5-SR	RM-BN5-K
RM-BNT6-1.5D-16C	1.5	13.501	16.000	24.0	72.00	9.50	16.00	BN6	RM-BN6-SR	RM-BN6-K
RM-BNT7-1.5D-20C	1.5	16.001	20.000	30.0	80.00	10.70	20.00	BN7	RM-BN7-SR	RM-BN7-K
RM-BNT8-1.5D-20C	1.5	20.001	25.400	38.1	88.10	12.90	20.00	BN8	RM-BN8-SR	RM-BN8-K
RM-BNT9-1.5D-25C	1.5	25.401	32.000	48.0	104.00	12.90	25.00	BN9	RM-BN9-SR	RM-BN9-K
RM-BNT9-1.5D-32C	1.5	25.401	32.000	48.0	108.00	12.90	32.00	BN9	RM-BN9-SR	RM-BN9-K
RM-BNT5-3D-16C	3.0	11.501	13.500	40.5	88.50	9.50	16.00	BN5	RM-BN5-SR	RM-BN5-K
RM-BNT6-3D-16C	3.0	13.501	16.000	48.0	96.00	9.50	16.00	BN6	RM-BN6-SR	RM-BN6-K
RM-BNT7-3D-20C	3.0	16.001	20.000	60.0	110.00	10.70	20.00	BN7	RM-BN7-SR	RM-BN7-K
RM-BNT8-3D-20C	3.0	20.001	25.400	75.0	125.00	12.90	20.00	BN8	RM-BN8-SR	RM-BN8-K
RM-BNT9-3D-25C	3.0	25.401	32.000	94.2	150.20	12.90	25.00	BN9	RM-BN9-SR	RM-BN9-K
RM-BNT9-3D-32C	3.0	25.401	32.000	94.2	154.20	12.90	32.00	BN9	RM-BN9-SR	RM-BN9-K
RM-BNT5-5D-16C	5.0	11.501	13.500	67.7	115.70	9.50	16.00	BN5	RM-BN5-SR	RM-BN5-K
RM-BNT6-5D-16C	5.0	13.501	16.000	80.0	128.00	9.50	16.00	BN6	RM-BN6-SR	RM-BN6-K
RM-BNT7-5D-20C	5.0	16.001	20.000	100.0	150.00	10.70	20.00	BN7	RM-BN7-SR	RM-BN7-K
RM-BNT8-5D-20C	5.0	20.001	25.400	125.0	175.00	12.90	20.00	BN8	RM-BN8-SR	RM-BN8-K
RM-BNT9-5D-32C	5.0	25.401	32.000	158.2	218.20	12.90	32.00	BN9	RM-BN9-SR	RM-BN9-K
RM-BNT5-8D-16C	8.0	11.501	13.500	108.2	156.20	9.50	16.00	BN5	RM-BN5-SR	RM-BN5-K
RM-BNT6-8D-16C	8.0	13.501	16.000	128.0	176.00	9.50	16.00	BN6	RM-BN6-SR	RM-BN6-K
RM-BNT7-8D-20C	8.0	16.001	20.000	160.0	210.00	10.70	20.00	BN7	RM-BN7-SR	RM-BN7-K
RM-BNT8-8D-20C	8.0	20.001	25.400	200.0	250.00	12.90	20.00	BN8	RM-BN8-SR	RM-BN8-K
RM-BNT9-8D-32C	8.0	25.401	32.000	254.2	314.20	12.90	32.00	BN9	RM-BN9-SR	RM-BN9-K

[1] Usable length diameter ratio
[2] Reamer min. diameter
[3] Reamer max. diameter
[4] Connection size

Bayonet



Designation	Head Diameter	Bayonet Size	M
RM-BN5-SR	11.501-13.500	BN5	M5
RM-BN6-SR	13.501-16.000	BN6	M6
RM-BN7-SR	16.001-20.000	BN7	M7
RM-BN8-SR	20.001-25.400	BN8	M8
RM-BN9-SR	25.401-32.000	BN9	M9

Clamping

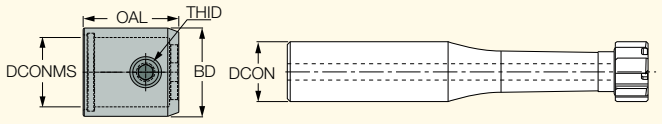
Designation	Head Diameter	Bayonet Size
RM-BN5-K	11.501-13.500	BN5
RM-BN6-K	13.501-16.000	BN6
RM-BN7-K	16.001-20.000	BN7
RM-BN8-K	20.001-25.400	BN8
RM-BN9-K	25.401-32.000	BN9

Accessories

BAYOT-REAM

RM-BN-RC-RING

Runout Adjustment Rings for
RM-BNT Reamer Holders



Designation	BD	OAL	DCONMS	THID	SS[1]	DCON[2]	
RM-BN5-RC-RING	20.00	20.00	16.20	M5x0.5	RM-BNT5	16.00	RM-BN5-RC-SR
RM-BN6-RC-RING	20.00	22.00	16.20	M6x0.5	RM-BNT6	16.00	RM-BN6-RC-SR
RM-BN7-RC-RING	24.00	26.00	20.20	M8x0.5	RM-BNT7	20.00	RM-BN7/8/9-RC-SR
RM-BN8-RC-RING	27.00	33.00	20.20	M8x0.5	RM-BNT8	20.00	RM-BN7/8/9-RC-SR
RM-BN9-RC-RING	39.00	35.00	32.20	M8x0.5	RM-BNT9	32.00	RM-BN7/8/9-RC-SR

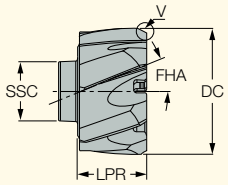
(1) Reamer bayonet size

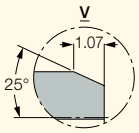
(2) RM-BNT reamer holder shank size

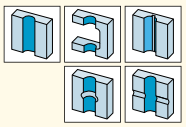
BAYOT-REAM

RM-BN-H7LB

Quick Change Left-Hand Flute Interchangeable Solid Carbide Reaming Heads for High Speed Reaming of Through Holes







Designation	Dimensions					Tough ↔ Hard	
	SSC[2]	DC	LPR	NOF[3]	FHA	IC08	IC908
RM-BN5-11.501-H7LB	BN5	11.501	9.50	6	20.0	•	•
RM-BN5-12.000-H7LB	BN5	12.000	9.50	6	20.0	•	•
RM-BN5-13.000-H7LB	BN5	13.000	9.50	6	20.0	•	•
RM-BN5-13.500-H7LB	BN5	13.500	9.50	6	20.0	•	•
RM-BN6-13.501-H7LB	BN6	13.501	9.50	6	20.0	•	•
RM-BN6-14.000-H7LB	BN6	14.000	9.50	6	20.0	•	•
RM-BN6-15.000-H7LB	BN6	15.000	9.50	6	20.0	•	•
RM-BN6-16.000-H7LB	BN6	16.000	9.50	6	20.0	•	•
RM-BN7-16.001-H7LB	BN7	16.001	10.70	6	20.0	•	•
RM-BN7-17.000-H7LB	BN7	17.000	10.70	6	20.0	•	•
RM-BN7-18.000-H7LB	BN7	18.000	10.70	6	20.0	•	•
RM-BN7-19.000-H7LB	BN7	19.000	10.70	6	20.0	•	•
RM-BN7-20.000-H7LB	BN7	20.000	10.70	6	20.0	•	•
RM-BN8-20.001-H7LB	BN8	20.001	12.90	8	20.0	•	•
RM-BN8-21.000-H7LB	BN8	21.000	12.90	8	20.0	•	•
RM-BN8-22.000-H7LB	BN8	22.000	10.90	8	20.0	•	•
RM-BN8-23.000-H7LB	BN8	23.000	12.90	8	20.0	•	•
RM-BN8-24.000-H7LB	BN8	24.000	12.90	8	20.0	•	•
RM-BN8-25.000-H7LB	BN8	25.000	12.90	8	20.0	•	•
RM-BN9-26.000-H7LB [1]	BN9	26.000	12.90	8	20.0		•
RM-BN9-27.000-H7LB [1]	BN9	27.000	12.90	8	20.0		•
RM-BN9-28.000-H7LB [1]	BN9	28.000	12.90	8	20.0		•
RM-BN9-29.000-H7LB [1]	BN9	29.000	12.90	8	20.0		•
RM-BN9-30.000-H7LB [1]	BN9	30.000	12.90	8	20.0		•
RM-BN9-31.000-H7LB [1]	BN9	31.000	12.90	8	20.0		•
RM-BN9-32.000-H7LB [1]	BN9	32.000	12.90	8	20.0		•

• For user guide, see pages 316-321

[1] The uncoated fine grain IC08 is available on request

[2] Seat size code

[3] Number of flutes

Complementary Grades (on request):

IC30N cermet tipped, recommended for reaming the following materials: non-alloyed (mild) steel,low alloyed steel (<5% of alloying elements), free cutting steel, tempered steel (tensile strength <1100 N/mm^2) and nodular iron (GGG40, GGG60, etc.)

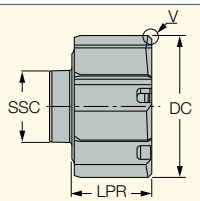
ID5 (PCD) recommended for high speed reaming of aluminum (special cases).

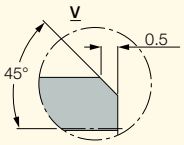
RN01 (DLC coating) recommended for reaming the following materials: aluminum alloys (cast, wrought, etc.), brass, bronze and other nonferrous materials.

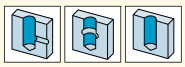
BAYOT-REAM

RM-BN-H7SA

Quick Change Straight Flute Interchangeable Solid Carbide Reaming Heads for High Speed Reaming of Blind Holes







Designation	Dimensions				Tough ↔ Hard	
	SSC(2)	DC	LPR	NOF(3)	IC08	IC908
RM-BN5-11.501-H7SA	BN5	11.501	9.50	6	•	•
RM-BN5-12.000-H7SA	BN5	12.000	9.50	6	•	•
RM-BN5-13.000-H7SA	BN5	13.000	9.50	6	•	•
RM-BN5-13.500-H7SA	BN5	13.500	9.50	6	•	•
RM-BN6-13.501-H7SA	BN6	13.501	9.50	6	•	•
RM-BN6-14.000-H7SA	BN6	14.000	9.50	6	•	•
RM-BN6-15.000-H7SA	BN6	15.000	9.50	6	•	•
RM-BN6-16.000-H7SA	BN6	16.000	9.50	6	•	•
RM-BN7-16.001-H7SA	BN7	16.001	10.70	6	•	•
RM-BN7-17.000-H7SA	BN7	17.000	10.70	6	•	•
RM-BN7-18.000-H7SA	BN7	18.000	10.70	6	•	•
RM-BN7-19.000-H7SA	BN7	19.000	10.70	6	•	•
RM-BN7-20.000-H7SA	BN7	20.000	10.70	6	•	•
RM-BN8-20.001-H7SA	BN8	20.001	12.90	8	•	•
RM-BN8-21.000-H7SA	BN8	21.000	12.90	8	•	•
RM-BN8-22.000-H7SA	BN8	22.000	12.90	8	•	•
RM-BN8-23.000-H7SA	BN8	23.000	12.90	8		•
RM-BN8-24.000-H7SA	BN8	24.000	12.90	8	•	•
RM-BN8-25.000-H7SA	BN8	25.000	12.90	8	•	•
RM-BN9-26.000-H7SA	BN9	26.000	12.90	8	•	•
RM-BN9-27.000-H7SA (1)	BN9	27.000	12.90	8		•
RM-BN9-28.000-H7SA (1)	BN9	28.000	12.90	8		•
RM-BN9-29.000-H7SA (1)	BN9	29.000	12.90	8		•
RM-BN9-30.000-H7SA (1)	BN9	30.000	12.90	8		•
RM-BN9-31.000-H7SA (1)	BN9	31.000	12.90	8		•
RM-BN9-32.000-H7SA (1)	BN9	32.000	12.90	8		•

• For user guide, see pages 316-321

(1) The uncoated fine grain IC08 is available on request

(2) Seat size code

(3) Number of flutes

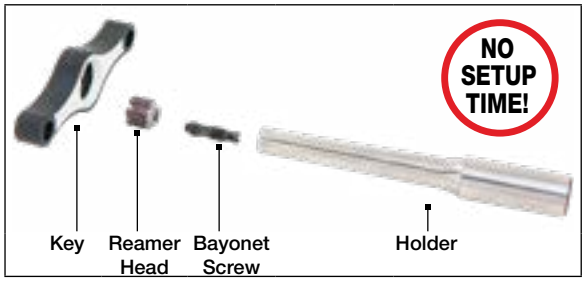
Complementary Grades (on request):

IC30N cermet tipped, recommended for reaming the following materials: non-alloyed (mild) steel,low alloyed steel (<5% of alloying elements), free cutting steel, tempered steel (tensile strength <1100 N/mm²) and nodular iron (GGG40, GGG60, etc.)

ID5 (PCD) recommended for high speed reaming of aluminum (special cases).
RN01 (DLC coating) recommended for reaming the following materials: aluminum alloys (cast, wrought, etc.), brass, bronze and other nonferrous materials.

The BAYO T-REAM Line is Available in 5 Sizes

Each size has its own diameter range and holder.
For example:
The same RM-BN7 holder can hold any head between Ø16.001–20.000 mm



RM-BN9	RM-BN8	RM-BN7	RM-BN6	RM-BN5
				
Ø25.401-32.000 mm	Ø20.001-25.400 mm	Ø16.001-20.000 mm	Ø13.501-16.000 mm	Ø11.500-13.500 mm

Through Hole	Blind Hole
	
	
Left-Hand Flute The left-hand spiral is designed especially for through hole reaming. Due to this design, the chips are being pushed forward immediately after formation.	**Straight Flute** The coolant flow assists the chip evacuation process. It directs the just-formed chips backwards. The chips pass through the straight flutes and are thrown out of the hole, without causing any damage to the reamer or hole surface.

ATTENTION: Cutting tools can break during use.
To avoid injury always use safety precautions
such as gloves, shields and eye protection.

Assembly Instructions (BN5-BN9)

First Assembly

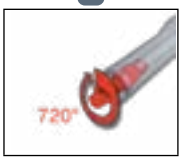
- Clean the toolholder pocket (Fig. 1)
- Clean the reamer head clamping cone
- Insert the clamping screw into the holder and rotate it 2-3 turns in a clockwise direction (Fig. 2)
- Clamp the reaming head on the screw; note, BN8 and BN9 can be assembled only in a specific position relative to the screw (rotate the head until locating the correct position) (Fig. 3)
- Manually rotate the reaming head until it sits firmly in the pocket
- Tighten with the special key (Fig. 4)
- Make sure there is no face gap between the toolholder and the reaming head (Fig. 5)

Indexing

- Release the reaming head with the key, turning in a counterclockwise direction until it rotates freely
- Rotate another one turn by hand
- Remove the reamer head from the tool; the clamping screw should remain inside!!!
- Clean the pocket of the toolholder (Fig. 1)
- Clean the cone on the new reamer head
- Clamp the reaming head on the screw; note, BN8 and BN9 can be assembled only in a specific position relative to the screw (rotate the head until locating the correct position) (Fig. 3)
- Manually rotate the reaming head. In the beginning it should rotate without the screw and then (after 1/6 of a turn) it should engage with the screw. Rotate until it sits firmly in the pocket. If the screw rotates together with the reaming head from the beginning, remove the reaming head and open the screw another one turn.
- Tighten with the special key (Fig. 4)
- Make sure that there is no face gap between the toolholder and the reaming head (Fig. 5)

1

2

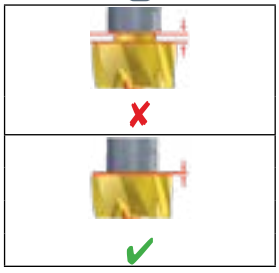


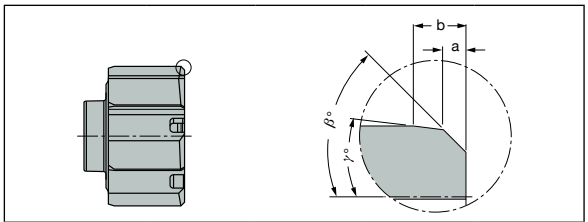
3

4

BN9: 21-23 N*m
BN8: 17-20 N*m
BN7: 13-15 N*m
BN6: 8-10 N*m
BN5: 7-8 N*m

5





Lead Code / Parameter	β°	a [mm]	g°	b [mm]
A	45°	0.5	-	-
B	25°	1.07	-	-
C	45°	0.5	8°	0.75
D	30°	0.5	4°	1.85
E	45°	0.2	-	-
F	90°	-	-	-
G	75°	0.15	-	-
X	Specially Tailored (undesignated)			

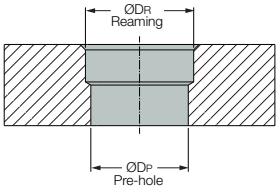
When choosing a reamer, it is important to select a lead geometry that covers the reaming allowance.

Reaming Allowance

Reaming allowance is the stock material which should be removed by reaming. It is recommended to leave different reaming allowances depending on the workpiece material and the pre-hole quality. Pre-hole should be smooth and straight, without deep scratches on it.

Complementary Grades (on request):

IC30N cermet tipped, recommended for reaming the following materials: non-alloyed (mild) steel, low alloyed steel (<5% of alloying elements), free cutting steel, tempered steel (tensile strength <1100 N/mm^2) and nodular iron (GGG40, GGG60, etc.) ID5 (PCD) recommended for high speed reaming of aluminum (special cases). RN01 (DLC coating) recommended for reaming the following materials: aluminum alloys (cast, wrought, etc.), brass, bronze and other nonferrous materials.



Material	Hole Ø mm						
	< 9.5	9.5 - 11.5	11.5 - 13.5	13.5 - 16	16 - 32	>32	
Steel and Cast Iron	0.07-0.10	0.07-0.15	0.10-0.20	0.10-0.30	0.10-0.30	0.20-0.40	mm/Ø
Aluminum and Brass	0.07-0.10	0.10-0.15	0.15-0.25	0.20-0.30	0.20-0.40	0.20-0.50	mm/Ø

Δ - Reaming allowance Δ = ØDR - ØDP

Recommeded Cutting Conditions for BAYO T-REAM High Speed Reaming Heads

ISO	Material	Condition	Material No.(1)	Through Hole				Interrupted Through Hole			
				First Choice		Second Choice		First Choice		Second Choice	
P	Non-alloy steel and cast steel, free cutting steel	Annealed	1	IC908	LB	IC30N	LA	IC908	LB	IC908	SA
		Annealed	2	V_c = 80 - 200		V_c = 90 - 240		V_c = 60 - 120		V_c = 60 - 120	
		Quenched & tempered	3	BN4 - BN6	f_z = 0.08 - 0.21	BN4 - BN6	f_z = 0.08 - 0.21	BN4 - BN6	f_z = 0.06 - 0.18	BN4 - BN6	f_z = 0.05 - 0.15
		Annealed	4								
		Quenched & tempered	5	BN7 - BN9	f_z = 0.12 - 0.27	BN7 - BN9	f_z = 0.12 - 0.27	BN7 - BN9	f_z = 0.09 - 0.21	BN7 - BN9	f_z = 0.07 - 0.16
	Low alloy and cast steel (less than 5% of alloying elements)	Annealed	6	IC908	LB	IC30N	LA	IC908	LB	IC908	SA
			7	V_c = 80 - 200		V_c = 90 - 240		V_c = 60 - 120		V_c = 60 - 120	
		Quenched & tempered	8	BN4 - BN6	f_z = 0.08 - 0.21	BN4 - BN6	f_z = 0.08 - 0.21	BN4 - BN6	f_z = 0.06 - 0.18	BN4 - BN6	f_z = 0.05 - 0.15
			9	BN7 - BN9	f_z = 0.12 - 0.27	BN7 - BN9	f_z = 0.12 - 0.27	BN7 - BN9	f_z = 0.09 - 0.21	BN7 - BN9	f_z = 0.07 - 0.16
	High alloyed steel, cast steel and tool steel	Annealed	10	IC908	LB	IC908	SA	IC908	LB	IC908	SA
				V_c = 20 - 60		V_c = 20 - 60		V_c = 20 - 60		V_c = 20 - 60	
		Quenched & tempered	11	BN4 - BN6	f_z = 0.05 - 0.13	BN4 - BN6	f_z = 0.04 - 0.11	BN4 - BN6	f_z = 0.04 - 0.11	BN4 - BN6	f_z = 0.03 - 0.09
				BN7 - BN9	f_z = 0.07 - 0.17	BN7 - BN9	f_z = 0.06 - 0.14	BN7 - BN9	f_z = 0.05 - 0.14	BN7 - BN9	f_z = 0.04 - 0.11
	Stainless steel	Ferritic / martensitic	12	IC908	LB	IC908	SA	IC908	LB	IC908	SA
				V_c = 20 - 40		V_c = 20 - 40		V_c = 20 - 40		V_c = 20 - 40	
		Martensitic	13	BN4 - BN6	f_z = 0.05 - 0.13	BN4 - BN6	f_z = 0.04 - 0.11	BN4 - BN6	f_z = 0.04 - 0.11	BN4 - BN6	f_z = 0.03 - 0.09
M	Stainless steel	Austentic	14	BN7 - BN9	f_z = 0.07 - 0.17	BN7 - BN9	f_z = 0.06 - 0.14	BN7 - BN9	f_z = 0.05 - 0.14	BN7 - BN9	f_z = 0.04 - 0.11
K	Grey iron (GG)	Ferritic	15	IC908	LB	IC908	SA	IC908	LB	IC908	SA
				V_c = 120 - 220		V_c = 120 - 220		V_c = 80 - 200		V_c = 80 - 200	
		Pearlitic	16	BN4 - BN6	f_z = 0.08 - 0.18	BN4 - BN6	f_z = 0.08 - 0.16	BN4 - BN6	f_z = 0.05 - 0.13	BN4 - BN6	f_z = 0.05 - 0.13
				BN7 - BN9	f_z = 0.10 - 0.24	BN7 - BN9	f_z = 0.10 - 0.22	BN7 - BN9	f_z = 0.07 - 0.17	BN7 - BN9	f_z = 0.07 - 0.17
	Nodular iron (GGG)	Pearlitic / ferritic	17	IC908	SA or LB	IC30N	LA	IC908	LB	IC908	SA
				V_c = 160 - 280		V_c = 160 - 300		V_c = 150 - 250		V_c = 150 - 250	
		Pearlitic / martensitic	18	BN4 - BN6	f_z = 0.11 - 0.20	BN4 - BN6	f_z = 0.11 - 0.20	BN4 - BN6	f_z = 0.06 - 0.15	BN4 - BN6	f_z = 0.06 - 0.15
				BN7 - BN9	f_z = 0.11 - 0.24	BN7 - BN9	f_z = 0.11 - 0.24	BN7 - BN9	f_z = 0.08 - 0.19	BN7 - BN9	f_z = 0.08 - 0.19
	Malleable iron, Nodular iron ferritic / pearlitic	Ferritic	19	IC908	SA or LB	IC30N	LA or SA	IC908	LB	IC908	SA
				V_c = 100 - 220		V_c = 100 - 240		V_c = 100 - 220		V_c = 100 - 220	
		Pearlitic	20	BN4 - BN6	f_z = 0.11 - 0.20	BN4 - BN6	f_z = 0.11 - 0.20	BN4 - BN6	f_z = 0.06 - 0.15	BN4 - BN6	f_z = 0.06 - 0.15
				BN7 - BN9	f_z = 0.11 - 0.24	BN7 - BN9	f_z = 0.11 - 0.24	BN7 - BN9	f_z = 0.08 - 0.20	BN7 - BN9	f_z = 0.08 - 0.19
N	Aluminum wrought alloy	Not cureable	21	RN01	LG or SG	ID5	SG	RN01	LG	ID5	SG
		Cured	22	V_c = 150 - 400		V_c = 200 - 500		V_c = 150 - 350		V_c = 200 - 500	
	Aluminum - cast, alloyed	Not cureable	23								
		Cured	24	BN4 - BN6	f_z = 0.08 - 0.16	BN4 - BN6	f_z = 0.08 - 0.2	BN4 - BN6	f_z = 0.08 - 0.16	BN4 - BN6	f_z = 0.08 - 0.2
		High temperature	25	BN7 - BN9	f_z = 0.10 - 0.20	BN7 - BN9	f_z = 0.11 - 0.24	BN7 - BN9	f_z = 0.10 - 0.20	BN7 - BN9	f_z = 0.11 - 0.24
	Copper alloys Brass, bronze	Free cutting	26	IC30N	SA or SG	IC08	SG or SA	IC08	SG or SA		
				V_c = 180 - 240		V_c = 30 - 100		V_c = 30 - 100			
		Brass	27	BN4 - BN6	f_z = 0.05 - 0.16	BN4 - BN6	f_z = 0.04 - 0.13	BN4 - BN6	f_z = 0.04 - 0.13		
		Electrolitic copper	28	BN7 - BN9	f_z = 0.04 - 0.20	BN7 - BN9	f_z = 0.05 - 0.16	BN7 - BN9	f_z = 0.05 - 0.16		
	Non-metallic	Duroplastics, fiber plastics	29	IC908	SA	IC908	LB	IC908	SA	IC908	LB
				V_c = 25 - 80		V_c = 25 - 80		V_c = 25 - 80		V_c = 25 - 80	
		Hard rubber	30	BN4 - BN6	f_z = 0.05 - 0.10	BN4 - BN6	f_z = 0.05 - 0.12	BN4 - BN6	f_z = 0.05 - 0.10	BN4 - BN6	f_z = 0.05 - 0.12
				BN7 - BN9	f_z = 0.10 - 0.20	BN7 - BN9	f_z = 0.10 - 0.23	BN7 - BN9	f_z = 0.10 - 0.20	BN7 - BN9	f_z = 0.10 - 0.23
S	* High temp. alloys	Annealed	31	IC908	L *	IC908	S*	IC908	L*	IC908	S*
		Cured	32	V_c = 15 - 50		V_c = 15 - 50		V_c = 15 - 50		V_c = 15 - 50	
		Annealed	33								
		Cured	34	BN4 - BN6	f_z = 0.04 - 0.10	BN4 - BN6	f_z = 0.04 - 0.10	BN4 - BN6	f_z = 0.03 - 0.08	BN4 - BN6	f_z = 0.03 - 0.08
		Cast	35								
				BN7 - BN9	f_z = 0.05 - 0.13	BN7 - BN9	f_z = 0.05 - 0.13	BN7 - BN9	f_z = 0.04 - 0.11	BN7 - BN9	f_z = 0.04 - 0.11
H	Hardened steel	Hardened	38	IC908	LB	IC908	SA	IC908	LB	IC908	SA
		Hardened	39	V_c = 25 - 50		V_c = 25 - 50		V_c = 25 - 50		V_c = 25 - 50	
		Cast	40	BN4 - BN6	f_z = 0.06 - 0.15	BN4 - BN6	f_z = 0.05 - 0.13	BN4 - BN6	f_z = 0.06 - 0.15	BN4 - BN6	f_z = 0.05 - 0.13
		Hardened	41	BN7 - BN9	f_z = 0.10 - 0.20	BN7 - BN9	f_z = 0.10 - 0.20	BN7 - BN9	f_z = 0.10 - 0.20	BN7 - BN9	f_z = 0.10 - 0.20

* Standard edge geometries are not suitable for reaming titanium and high temperature alloys. In order to choose a proper geometry, please ask for our recommendations.

- The given cutting data recommendations refer to the short holders (3xD effective reaming overhang). For longer holders, the cutting speed should be reduced proportionally.
- For relatively large leading angles (spot-facing geometries), the feed should be reduced up to 30%.
- All the given cutting data recommendations refer to the machines with spindle through coolant supply.

(1) For workpiece materials list, see pages 495-524

Material No.	Blind Hole				Interrupted Blind Hole				IC08	
	First Choice		Second Choice		First Choice		Second Choice		Through Hole - LB Blind Hole - SA	
1	IC908	SA	IC30N	SA	IC908	SA			V_c = 6 - 10	
2	V_c = 60-160		V_c = 90 - 200		V_c = 60 - 120					
3	BN_4 - BN6	f_z = 0.06 - 0.18	BN_4 - BN6	f_z = 0.06 - 0.18	BN_4 - BN6	f_z = 0.05 - 0.15			BN_4 - BN6	f_z = 0.05 - 0.17
4										
5	BN7 - BN9	f_z = 0.08 - 0.20	BN7 - BN9	f_z = 0.08 - 0.21	BN7 - BN9	f_z = 0.07 - 0.16			BN7 - BN9	f_z = 0.07 - 0.20
6	IC908	SA	IC30N	SA	IC908	SA			V_c = 6 - 10	
7	V_c = 60-160		V_c = 90 - 200		V_c = 60 - 120					
8	BN_4 - BN6	f_z = 0.06 - 0.18	BN_4 - BN6	f_z = 0.06 - 0.18	BN_4 - BN6	f_z = 0.05 - 0.15			BN_4 - BN6	f_z = 0.05 - 0.17
9	BN7 - BN9	f_z = 0.08 - 0.20	BN7 - BN9	f_z = 0.08 - 0.21	BN7 - BN9	f_z = 0.07 - 0.16			BN7 - BN9	f_z = 0.07 - 0.20
10	IC908	SA			IC908	SA			V_c = 6 - 10	
	V_c = 20 - 60				V_c = 20 - 60					
11	BN_4 - BN6	f_z = 0.04 - 0.10			BN_4 - BN6	f_z = 0.03 - 0.08			BN_4 - BN6	f_z = 0.03 - 0.08
	BN7 - BN9	f_z = 0.05 - 0.13			BN7 - BN9	f_z = 0.04 - 0.10			BN7 - BN9	f_z = 0.05 - 0.10
12	IC908	SA			IC908	SA			V_c = 4 - 8	
	V_c = 20 - 40				V_c = 20 - 40					
13	BN_4 - BN6	f_z = 0.04 - 0.10			BN_4 - BN6	f_z = 0.03 - 0.08			BN_4 - BN6	f_z = 0.03 - 0.08
14	BN7 - BN9	f_z = 0.05 - 0.13			BN7 - BN9	f_z = 0.05 - 0.10			BN7 - BN9	f_z = 0.05 - 0.10
15	IC908	SA			IC908	SA			V_c = 8 - 20	
	V_c = 80 - 200				V_c = 60 - 120					
16	BN_4 - BN6	f_z = 0.06 - 0.18			BN_4 - BN6	f_z = 0.05 - 0.13			BN_4 - BN6	f_z = 0.08 - 0.16
	BN7 - BN9	f_z = 0.08 - 0.23			BN7 - BN9	f_z = 0.08 - 0.18			BN7 - BN9	f_z = 0.10 - 0.20
17	IC908	SA	IC30N	SA	IC908	SA			V_c = 9 - 20	
	V_c = 160 - 280		V_c = 160 - 280		V_c = 160 - 240					
18	BN_4 - BN6	f_z = 0.06 - 0.18	BN_4 - BN6	f_z = 0.06 - 0.18	BN_4 - BN6	f_z = 0.06 - 0.16			BN_4 - BN6	f_z = 0.06 - 0.16
	BN7 - BN9	f_z = 0.08 - 0.23	BN7 - BN9	f_z = 0.08 - 0.24	BN7 - BN9	f_z = 0.08 - 0.18			BN7 - BN9	f_z = 0.08 - 0.20
19	IC908	SA	IC30N	SA	IC908	SA			V_c = 10 - 20	
	V_c = 100 - 220		V_c = 100 - 240		V_c = 100 - 220					
20	BN_4 - BN6	f_z = 0.06 - 0.18	BN_4 - BN6	f_z = 0.06 - 0.18	BN_4 - BN6	f_z = 0.05 - 0.15			BN_4 - BN6	f_z = 0.05 - 0.15
	BN7 - BN9	f_z = 0.08 - 0.23	BN7 - BN9	f_z = 0.08 - 0.23	BN7 - BN9	f_z = 0.08 - 0.20			BN7 - BN9	f_z = 0.08 - 0.15
21	RN01	SG or SA	ID5	SG or SA	RN01	SG or SA	ID5	SG or SA	V_c = 10 - 30	
22	V_c = 150 - 400		V_c = 200 - 400		V_c = 150 - 300		V_c = 200 - 400			
23										
24	BN_4 - BN6	f_z = 0.08 - 0.16	BN_4 - BN6	f_z = 0.08 - 0.16	BN_4 - BN6	f_z = 0.07 - 0.15	BN_4 - BN6	f_z = 0.08 - 0.16	BN_4 - BN6	f_z = 0.05 - 0.12
25	BN7 - BN9	f_z = 0.11 - 0.20	BN7 - BN9	f_z = 0.11 - 0.24	BN7 - BN9	f_z = 0.11 - 0.20	BN7 - BN9	f_z = 0.11- 0.24	BN7 - BN9	f_z = 0.08 - 0.15
26	IC30N	SG or SA	IC08	SG or SA	IC08	SG or SA			V_c = 30 - 100	
	V_c = 180 - 240		V_c = 30 - 100		V_c = 30 - 100					
27	BN_4 - BN6	f_z = 0.05 - 0.16	BN_4 - BN6	f_z = 0.04 - 0.13	BN_4 - BN6	f_z = 0.04 - 0.13			BN_4 - BN6	f_z = 0.04 - 0.13
28	BN7 - BN9	f_z = 0.05 - 0.21	BN7 - BN9	f_z = 0.05 - 0.16	BN7 - BN9	f_z = 0.05 - 0.16			BN7 - BN9	f_z = 0.05 - 0.16
29	IC908	SA			IC908	SA			V_c = 10 - 20	
	V_c = 25 - 80				V_c = 25 - 80					
30	BN_4 - BN6	f_z = 0.05 - 0.10			BN_4 - BN6	f_z = 0.05 - 0.10			BN_4 - BN6	f_z = 0.05 - 0.12
	BN7 - BN9	f_z = 0.10 - 0.20			BN7 - BN9	f_z = 0.10 - 0.20			BN7 - BN9	f_z = 0.08 - 0.16
31	IC908	S*			IC908	S*				
32	V_c = 15 - 50				V_c = 15 - 50					
33										
34	BN_4 - BN6	f_z = 0.03 - 0.08			BN_4 - BN6	f_z = 0.03 - 0.08				
35										
	BN7 - BN9	f_z = 0.04 - 0.11			BN7 - BN9	f_z = 0.04 - 0.11				
38	IC908	SA			IC908	SA				
39	V_c = 25 - 50				V_c = 25 - 50					
40	BN_4 - BN6	f_z = 0.05 - 0.13			BN_4 - BN6	f_z = 0.05 - 0.13				
41	BN7 - BN9	f_z = 0.10 - 0.20			BN7 - BN9	f_z = 0.10 - 0.20				

Legend:

Grade	→	**LB**	**IC908**
Cutting speed [m/min]	→	**V_c = 10 - 20**	
BAYO T-REAM head size	→	**f_z = 0.04 - 0.15**	**BN4-BN6**
		f_z = 0.05 - 0.20	**BN7-BN9**

Cutting geometry →

Feed [mm/tooth] →

Problem			Solutions	Cutting Data/ Allowance			Tool; Toolholder						Workpiece	Machine			Machining Process			
				Feed fZ	Spindle speed min^{-1}	Diameter allowance	Geometry angle	Runout maximum 5µm	Wear check / Change insert	Optimize tool length and diameter	Floating chuck GFIS	ADJ chuck FineFit/RC RING	Workpiece fixture / Pressure	Coolant mixture	Coolant pressure	Angle error / Centic error / Axis deviation	Spindle speed on entry	Entry geomerty / Chamfer / Oblique surface at entry	Feed in and out same	Chip evacuation
Hole too large		Vibration		●			●						●	●	●		●	●		
		Runout error						●			●	●								
		Built up edge		●	●	●			●								●			
		Diameter allowance				●														●
Hole too small		Tool wear							●				● ●	● ●	● ●			●		
		Compression of material					●		●				● ●					●	●	
		Compression of clamping				●	●													
		Diameter allowance				●														
Tapered hole		Deformation by clamping				●							● ●							
		Unequal wall thickness				●	●													
		Machine						●		●	●	●				●				
		Chip flow												●	●					●
Hole shows chatter marks		Vibration		●	●	●	●		●	●			●	●	●		●	●		
		Rumout error						●		●	●	●				●				
Insufficient surface		Vibration		●	●		●		●	●			●	●			●	●		
		Built up edge		●	●				●					●	●					
		Runout error						●			●	●								
		Cutting geometry							●	●										●
		Machine											●	●		●				

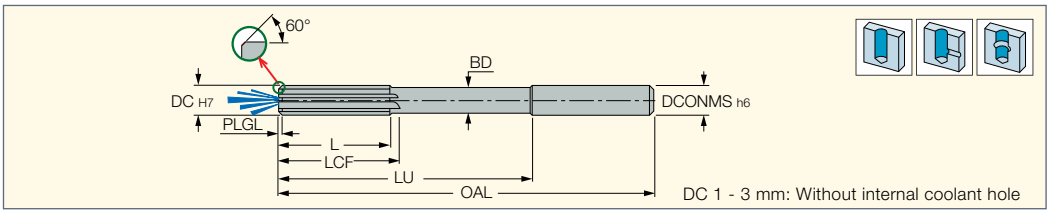
Problem			Solutions	Cutting Data/ Allowance			Tool; Toolholder						Workpiece	Machine			Machining Process			
				Feed fZ	Spindle speed min^{-1}	Diameter allowance	Geometry angle	Runout maximum 5µm	Wear check / Change insert	Optimize tool length and diameter	Floating chuck GFIS	ADJ chuck FineFit/RC RING	Workpiece fixture / Pressure	Coolant mixture	Coolant pressure	Angle error / Centic error / Axis deviation	Spindle speed on entry	Entry geomerty / Chamfer / Oblique surface at entry	Feed in and out same	Chip evacuation
Retraction marks		Built up edge		●	●			●	●	●	●	●		●		●		●		
		Compression of material				●	●		●	●	●	●	●					●	●	
		Compression of clamping																		
Slight defect in shape / noncircular hole		Tool wear				●			●											●
		Chip flow				●								●	●					●
		Machine					●	●	●	●	●	●				●		● ●		●
		Compression of clamping				●							●							

- ● check / optimize
- ● increase / improve
- ● reduce / decrease
- ● apply / use

SOLIDH-REAM

RM-MTR-H7S-CS-C

UOP Solid Carbide Reamers with Straight Flutes, Unequal Pitch and Coolant Holes for High Speed Reaming of Blind Holes



Designation	Dimensions										EVO
	DC	L	PLGL	LCF	BD	LU	OAL	NOF(1)	DCONMS	CSP(2)	
RM-MTR-0100-H7S-CS-C	1.000	6.00	0.100	11.0	0.90	21.0	50.00	3	4.00	0	●
RM-MTR-0150-H7S-CS-C	1.500	9.00	0.150	15.0	1.10	21.0	50.00	3	4.00	0	●
RM-MTR-0200-H7S-CS-C	2.000	12.00	0.150	16.0	1.60	21.0	50.00	4	4.00	0	●
RM-MTR-0250-H7S-CS-C	2.500	12.00	0.200	19.0	2.10	31.0	60.00	4	4.00	0	●
RM-MTR-0300-H7S-CS-C	3.000	12.00	0.250	21.0	2.40	31.0	60.00	4	4.00	0	●
RM-MTR-0350-H7S-CS-C	3.500	12.00	0.250	21.0	2.90	40.0	68.00	4	4.00	1	●
RM-MTR-0400-H7S-CS-C	4.000	12.00	0.400	17.0	3.40	40.0	68.00	4	6.00	1	●
RM-MTR-0450-H7S-CS-C	4.500	12.00	0.400	17.0	3.40	40.0	76.00	4	6.00	1	●
RM-MTR-0500-H7S-CS-C	5.000	12.00	0.400	17.0	3.80	40.0	76.00	4	6.00	1	●
RM-MTR-0550-H7S-CS-C	5.500	12.00	0.400	17.0	4.10	40.0	76.00	4	6.00	1	●
RM-MTR-0600-H7S-CS-C	6.000	12.00	0.400	17.0	4.50	40.0	76.00	4	6.00	1	●
RM-MTR-0650-H7S-CS-C	6.500	15.00	0.400	20.0	5.20	65.0	101.00	6	8.00	1	●
RM-MTR-0700-H7S-CS-C	7.000	15.00	0.400	20.0	5.60	65.0	101.00	6	8.00	1	●
RM-MTR-0750-H7S-CS-C	7.500	15.00	0.400	20.0	6.00	65.0	101.00	6	8.00	1	●
RM-MTR-0800-H7S-CS-C	8.000	15.00	0.400	20.0	6.40	65.0	101.00	6	8.00	1	●
RM-MTR-0850-H7S-CS-C	8.500	18.00	0.400	23.0	6.80	61.0	101.00	6	10.00	1	●
RM-MTR-0900-H7S-CS-C	9.000	18.00	0.400	23.0	7.20	61.0	101.00	6	10.00	1	●
RM-MTR-0950-H7S-CS-C	9.500	18.00	0.400	23.0	7.60	61.0	101.00	6	10.00	1	●
RM-MTR-1000-H7S-CS-C	10.000	18.00	0.500	23.0	8.00	61.0	101.00	6	10.00	1	●
RM-MTR-1050-H7S-CS-C	10.500	18.00	0.500	23.0	8.40	85.0	130.00	6	12.00	1	●
RM-MTR-1100-H7S-CS-C	11.000	18.00	0.500	23.0	8.80	85.0	130.00	6	12.00	1	●
RM-MTR-1150-H7S-CS-C	11.500	18.00	0.500	23.0	9.20	85.0	130.00	6	12.00	1	●
RM-MTR-1200-H7S-CS-C	12.000	18.00	0.500	23.0	9.60	85.0	130.00	6	12.00	1	●

• EVO is a hard submicron IC07 carbide substrate with an ultra-thin silicon based PVD coating, obtained by High Density Plasma (HDP) technology • Hole tolerance: H7 manufacturing tolerance according to DIN 1420

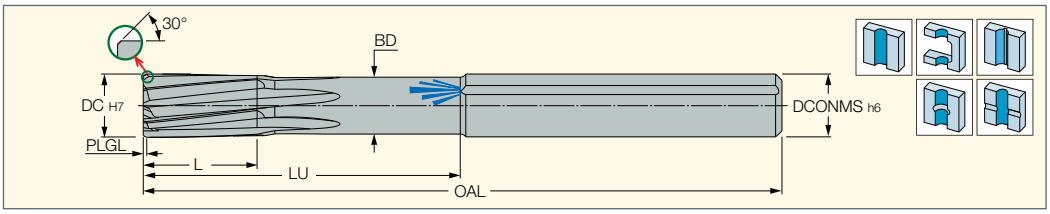
(1) Number of flutes

(2) 0 - Without coolant supply, 1 - With coolant supply

SOLIDH-REAM

RM-MTR-H7N-CS-C

Solid Carbide Reamers with Helical Flutes, Unequal Pitch and Coolant Grooves for High Speed Reaming of Through Holes



Designation	Dimensions									EVO
	DC	L	PLGL	BD	LU	OAL	NOF(1)	DCONMS	CSP(2)	
RM-MTR-0100-H7N-CS-C	1.000	6.00	0.200	0.80	21.0	50.00	3	4.00	0	●
RM-MTR-0150-H7N-CS-C	1.500	7.00	0.350	1.10	21.0	50.00	3	4.00	0	●
RM-MTR-0200-H7N-CS-C	2.000	9.00	0.450	1.50	21.0	50.00	4	4.00	0	●
RM-MTR-0250-H7N-CS-C	2.500	12.00	0.550	1.90	31.0	60.00	4	4.00	0	●
RM-MTR-0300-H7N-CS-C	3.000	12.00	0.700	2.20	31.0	60.00	4	4.00	0	●
RM-MTR-0350-H7N-CS-C	3.500	12.00	0.700	2.60	40.0	68.00	4	4.00	0	●
RM-MTR-0400-H7N-CS-C	4.000	12.00	0.700	3.00	40.0	68.00	4	6.00	1	●
RM-MTR-0450-H7N-CS-C	4.500	12.00	0.900	3.40	40.0	76.00	4	6.00	1	●
RM-MTR-0500-H7N-CS-C	5.000	12.00	0.900	3.80	40.0	76.00	4	6.00	1	●
RM-MTR-0550-H7N-CS-C	5.500	12.00	0.900	4.10	40.0	76.00	4	6.00	1	●
RM-MTR-0600-H7N-CS-C	6.000	12.00	0.900	4.50	40.0	76.00	4	6.00	1	●
RM-MTR-0650-H7N-CS-C	6.500	15.00	0.900	5.20	65.0	101.00	6	8.00	1	●
RM-MTR-0700-H7N-CS-C	7.000	15.00	0.900	5.60	65.0	101.00	6	8.00	1	●
RM-MTR-0750-H7N-CS-C	7.500	15.00	0.900	6.00	65.0	101.00	6	8.00	1	●
RM-MTR-0800-H7N-CS-C	8.000	15.00	0.900	6.40	65.0	101.00	6	8.00	1	●
RM-MTR-0850-H7N-CS-C	8.500	18.00	0.950	6.80	61.0	101.00	6	10.00	1	●
RM-MTR-0900-H7N-CS-C	9.000	18.00	0.950	7.20	61.0	101.00	6	10.00	1	●
RM-MTR-0950-H7N-CS-C	9.500	18.00	0.950	7.60	61.0	101.00	6	10.00	1	●
RM-MTR-1000-H7N-CS-C	10.000	18.00	0.950	8.00	61.0	101.00	6	10.00	1	●
RM-MTR-1050-H7N-CS-C	10.500	18.00	1.050	8.40	85.0	130.00	6	12.00	1	●
RM-MTR-1100-H7N-CS-C	11.000	18.00	1.050	8.80	85.0	130.00	6	12.00	1	●
RM-MTR-1150-H7N-CS-C	11.500	18.00	1.050	9.20	85.0	130.00	6	12.00	1	●
RM-MTR-1200-H7N-CS-C	12.000	18.00	1.050	9.60	85.0	130.00	6	12.00	1	●

• EVO is a hard submicron IC07 carbide substrate with an ultra-thin silicon based PVD coating, obtained by High Density Plasma (HDP) technology • Hole tolerance: H7 manufacturing tolerance according to DIN 1420

(1) Number of flutes

(2) 0 - Without coolant supply, 1 - With coolant supply

RM-MTR Cutting Speed Recommendations

ISO	Main Material Group	Material Type	ISCAR Material Group	V_c (m/min)
P	Steel	Non-alloy and alloy steel	1-10	120-250
		High alloy and tool steel	11	70-120
		Ferritic and martensitic stainless steel	12,13	60-120
M	Stainless steel	Austenitic stainless steel	14	60-120
		Duplex and super duplex stainless steel		25-60
K	Cast iron	Grey cast iron	15-16	70-120
		Nodular cast iron	17-18	60-110
		Malleable cast iron	19-20	60-110
N	Non-ferrous metals	Aluminium alloys	21-24	150-300
S	Superalloys and titanium	Fe- based HRSA	31-32	40-80
		Ni- or Co- based HRSA	33-35	25-50
		Titanium or titanium alloys	36-37	30-80
H	Hard materials	Hardened steel and cast iron, chilled cast iron	38,40-41	25-60

Feed Recommendations

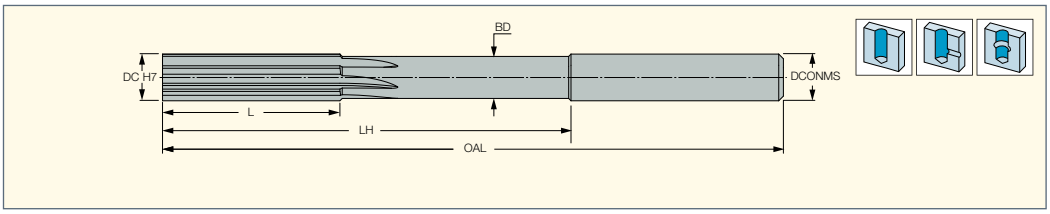
Reamer Diameter mm	Feed mm/rev
1.00-1.50	0.05-0.10
2.00-3.50	0.10-0.20
4.00-5.00	0.10-0.40
5.50-7.50	0.15-0.70
8.00-10.0	0.50-1.40
10.5-12.0	0.80-1.60

Runout max 0.005 mm

SOLIDH-REAM

RM-FCR-H7S-CS-C

DIN 212C Solid Carbide Reamers with Straight Flutes and a Cylindrical Shank for Blind Holes



Designation	Dimensions							IC07
	DC	L	LH	BD	OAL	NOF(1)	DCONMS	
RM-FCR-0300-H7S-CS-C	3.00	15.00	30.0	-	61.00	6	3.00	●
RM-FCR-0320-H7S-CS-C	3.20	18.00	33.0	-	70.00	6	3.20	●
RM-FCR-0350-H7S-CS-C	3.50	18.00	33.0	-	70.00	6	3.50	●
RM-FCR-0400-H7S-CS-C	4.00	19.00	44.0	3.50	75.00	6	4.00	●
RM-FCR-0450-H7S-CS-C	4.50	21.00	46.0	4.00	80.00	6	4.50	●
RM-FCR-0500-H7S-CS-C	5.00	23.00	53.0	4.30	86.00	6	5.00	●
RM-FCR-0550-H7S-CS-C	5.50	26.00	56.0	4.50	93.00	6	5.60	●
RM-FCR-0600-H7S-CS-C	6.00	26.00	56.0	5.00	93.00	6	5.60	●
RM-FCR-0650-H7S-CS-C	6.50	28.00	63.0	5.50	101.00	6	6.30	●
RM-FCR-0700-H7S-CS-C	7.00	31.00	69.0	6.50	109.00	6	7.10	●
RM-FCR-0750-H7S-CS-C	7.50	31.00	69.0	6.50	109.00	6	7.10	●
RM-FCR-0800-H7S-CS-C	8.00	33.00	75.0	7.00	117.00	6	8.00	●
RM-FCR-0850-H7S-CS-C	8.50	33.00	75.0	7.00	117.00	6	8.00	●
RM-FCR-0900-H7S-CS-C	9.00	36.00	81.0	8.00	125.00	6	9.00	●
RM-FCR-0950-H7S-CS-C	9.50	36.00	81.0	8.00	125.00	6	9.00	●
RM-FCR-1000-H7S-CS-C	10.00	38.00	87.0	9.00	133.00	6	10.00	●
RM-FCR-1050-H7S-CS-C	10.50	38.00	87.0	9.00	133.00	6	10.00	●
RM-FCR-1100-H7S-CS-C	11.00	41.00	96.0	9.00	142.00	6	10.00	●
RM-FCR-1200-H7S-CS-C	12.00	44.00	105.0	9.00	151.00	6	10.00	●
RM-FCR-1300-H7S-CS-C	13.00	44.00	105.0	9.00	151.00	6	10.00	●
RM-FCR-1400-H7S-CS-C	14.00	47.00	110.0	11.50	160.00	8	12.50	●
RM-FCR-1500-H7S-CS-C	15.00	50.00	112.0	11.50	162.00	8	12.50	●
RM-FCR-1600-H7S-CS-C	16.00	52.00	120.0	11.50	170.00	8	12.50	●

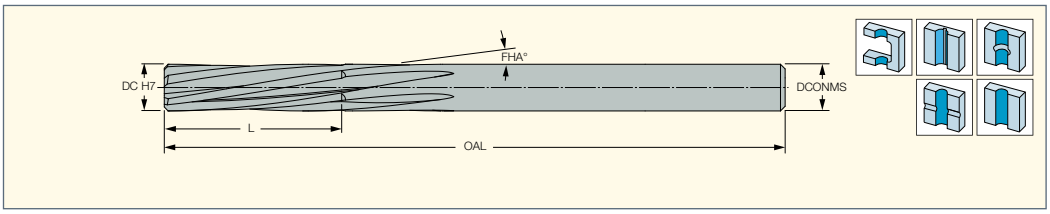
• Hole tolerance: H7 manufacturing tolerance according to DIN1420 • Available grades: IC07 - uncoated, optional: IC907 - TiAlN PVD coated • Special diameters are available on request • For user guide and cutting conditions, see pages 329-332

(1) Number of flutes

SOLIDH-REAM

RM-FCR-H7N-CS-C

DIN 212B Solid Carbide Reamers with Helical Flutes and a Cylindrical Shank for Through Holes



Designation	Dimensions						IC07
	DC	L	OAL	NOF(1)	FHA	DCONMS	
RM-FCR-0300-H7N-CS-C	3.00	15.00	61.00	5	10.0	3.00	●
RM-FCR-0350-H7N-CS-C	3.50	18.00	70.00	5	10.0	3.50	●
RM-FCR-0400-H7N-CS-C	4.00	19.00	75.00	5	10.0	4.00	●
RM-FCR-0450-H7N-CS-C	4.50	21.00	80.00	5	10.0	4.50	●
RM-FCR-0500-H7N-CS-C	5.00	23.00	86.00	5	10.0	5.00	●
RM-FCR-0550-H7N-CS-C	5.50	26.00	93.00	6	10.0	5.50	●
RM-FCR-0600-H7N-CS-C	6.00	26.00	93.00	6	10.0	6.00	●
RM-FCR-0650-H7N-CS-C	6.50	28.00	101.00	6	10.0	6.50	●
RM-FCR-0700-H7N-CS-C	7.00	31.00	109.00	6	10.0	7.00	●
RM-FCR-0750-H7N-CS-C	7.50	33.00	117.00	6	10.0	7.50	●
RM-FCR-0800-H7N-CS-C	8.00	33.00	117.00	6	10.0	8.00	●
RM-FCR-0850-H7N-CS-C	8.50	36.00	125.00	6	10.0	8.50	●
RM-FCR-0900-H7N-CS-C	9.00	36.00	125.00	6	10.0	9.00	●
RM-FCR-0950-H7N-CS-C	9.50	38.00	133.00	6	10.0	9.50	●
RM-FCR-1000-H7N-CS-C	10.00	38.00	133.00	6	10.0	10.00	●
RM-FCR-1050-H7N-CS-C	10.50	41.00	142.00	7	10.0	10.50	●
RM-FCR-1100-H7N-CS-C	11.00	41.00	142.00	7	10.0	11.00	●
RM-FCR-1200-H7N-CS-C	12.00	44.00	151.00	7	10.0	12.00	●
RM-FCR-1300-H7N-CS-C	13.00	44.00	151.00	7	10.0	13.00	●
RM-FCR-1400-H7N-CS-C	14.00	47.00	160.00	7	10.0	14.00	●
RM-FCR-1500-H7N-CS-C	15.00	50.00	162.00	7	10.0	15.00	●
RM-FCR-1600-H7N-CS-C	16.00	52.00	170.00	7	10.0	16.00	●

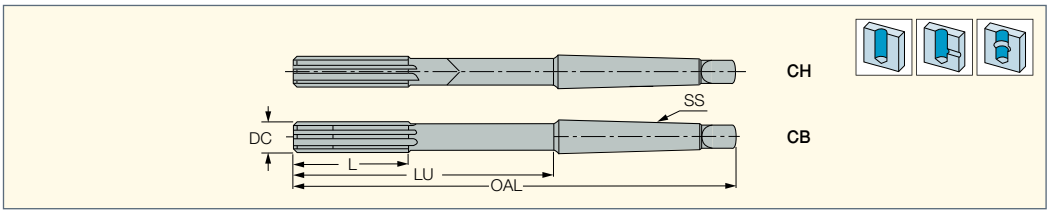
• Hole tolerance: H7 manufacturing tolerance according to DIN1420 • Available grades: IC07 - uncoated, optional: IC907 - TiAlN PVD coated • Special diameters are available on request • For user guide and cutting conditions, see pages 329-332

(1) Number of flutes

SOLIDH-REAM

RM-SHR-H7S-MT

DIN 8094 Solid Carbide Reamers with Straight Flutes and a Morse Taper Shank for Blind Holes



Designation	Dimensions						IC07
	DC	OAL	LU	L	NOF(1)	SS	
RM-SHR-0500-H7S-MT1-CH	5.000	133.00	67.5	23.00	4	MT1	●
RM-SHR-0600-H7S-MT1-CH	6.000	138.00	72.5	26.00	4	MT1	●
RM-SHR-0700-H7S-MT1-CH	7.000	150.00	84.5	31.00	4	MT1	●
RM-SHR-0800-H7S-MT1-CH	8.000	156.00	90.5	33.00	4	MT1	●
RM-SHR-0900-H7S-MT1-CH	9.000	162.00	96.5	36.00	4	MT1	●
RM-SHR-1000-H7S-MT1-CH	10.000	168.00	102.5	38.00	6	MT1	●
RM-SHR-1100-H7S-MT1-CH	11.000	175.00	109.5	41.00	6	MT1	●
RM-SHR-1300-H7S-MT1-CH	13.000	182.00	116.5	44.00	6	MT1	●
RM-SHR-1400-H7S-MT1-CH	14.000	189.00	123.5	47.00	6	MT1	●
RM-SHR-1500-H7S-MT2-CH	15.000	204.00	124.0	50.00	6	MT2	●
RM-SHR-1600-H7S-MT2-CH	16.000	210.00	130.0	52.00	6	MT2	●
RM-SHR-1700-H7S-MT2-CB	17.000	214.00	134.0	54.00	6	MT2	●
RM-SHR-1800-H7S-MT2-CB	18.000	219.00	139.0	56.00	6	MT2	●
RM-SHR-1900-H7S-MT2-CB	19.000	223.00	143.0	58.00	6	MT2	●
RM-SHR-2000-H7S-MT2-CB	20.000	228.00	148.0	60.00	6	MT2	●
RM-SHR-2200-H7S-MT2-CB	22.000	237.00	157.0	64.00	8	MT2	●
RM-SHR-2400-H7S-MT3-CB	24.000	268.00	169.0	68.00	8	MT3	●
RM-SHR-2500-H7S-MT3-CB	25.000	268.00	169.0	68.00	8	MT3	●
RM-SHR-2600-H7S-MT3-CB	26.000	273.00	174.0	70.00	8	MT3	●
RM-SHR-2800-H7S-MT3-CB	28.000	277.00	178.0	71.00	8	MT3	●
RM-SHR-3000-H7S-MT3-CB	30.000	281.00	182.0	73.00	8	MT3	●
RM-SHR-3200-H7S-MT4-CB	32.000	317.00	193.0	77.00	8	MT4	●
RM-SHR-3400-H7S-MT4-CB	34.000	321.00	197.0	78.00	8	MT4	●
RM-SHR-3600-H7S-MT4-CB	36.000	325.00	201.0	79.00	8	MT4	●
RM-SHR-4000-H7S-MT4-CB	40.000	329.00	205.0	81.00	8	MT4	●

• Requires a price and delivery time quotation • Available only upon request • -CH: Brazed solid carbide head • -CB: Brazed solid carbide tips • Hole tolerance: H7 manufacturing tolerance according to DIN 1420 • Available grades: IC07 (uncoated), optional: IC907 (TiAlN PVD coated)

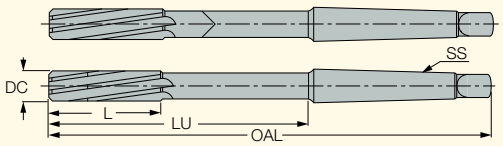
• For user guide and cutting conditions, see pages 329-332

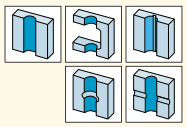
(1) Number of flutes

SOLIDH-REAM

RM-SHR-H7N-MT

DIN 8093 Solid Carbide Reamers with Spiral Flutes and a **Morse Taper** Shank for Through Holes





Designation	Dimensions						IC07
	DC	OAL	LU	L	NOF(1)	SS	
RM-SHR-0500-H7N-MT1-CH	5.000	133.00	67.5	23.00	4	MT1	●
RM-SHR-0600-H7N-MT1-CH	6.000	138.00	72.5	26.00	4	TM1	●
RM-SHR-0700-H7N-MT1-CH	7.000	150.00	84.5	31.00	4	MT1	●
RM-SHR-0800-H7N-MT1-CH	8.000	156.00	90.5	33.00	4	MT1	●
RM-SHR-0900-H7N-MT1-CH	9.000	162.00	96.5	36.00	4	MT1	●
RM-SHR-1000-H7N-MT1-CH	10.000	168.00	102.5	38.00	6	MT1	●
RM-SHR-1100-H7N-MT1-CH	11.000	175.00	109.5	41.00	6	MT1	●
RM-SHR-1200-H7N-MT1-CH	12.000	182.00	116.5	44.00	6	MT1	●
RM-SHR-1300-H7N-MT1-CH	13.000	182.00	116.5	44.00	6	MT1	●
RM-SHR-1400-H7N-MT1-CH	14.000	189.00	123.5	47.00	6	MT1	●
RM-SHR-1500-H7N-MT2-CH	15.000	204.00	124.0	50.00	6	MT2	●
RM-SHR-1600-H7N-MT2-CH	16.000	210.00	130.0	52.00	6	MT2	●
RM-SHR-1800-H7N-MT2-CB	18.000	219.00	139.0	56.00	6	MT2	●
RM-SHR-1900-H7N-MT2-CB	19.000	223.00	143.0	58.00	6	MT2	●
RM-SHR-2000-H7N-MT2-CB	20.000	228.00	148.0	60.00	6	MT2	●
RM-SHR-2200-H7N-MT2-CB	22.000	237.00	157.0	64.00	8	MT2	●
RM-SHR-2500-H7N-MT3-CB	25.000	268.00	169.0	68.00	8	MT3	●
RM-SHR-2600-H7N-MT3-CB	26.000	273.00	174.0	70.00	8	MT3	●
RM-SHR-2800-H7N-MT3-CB	28.000	277.00	178.0	71.00	8	MT3	●
RM-SHR-3000-H7N-MT3-CB	30.000	281.00	182.0	73.00	8	MT3	●
RM-SHR-3200-H7N-MT4-CB	32.000	317.00	193.0	77.00	8	MT4	●
RM-SHR-3400-H7N-MT4-CB	34.000	321.00	197.0	78.00	8	MT4	●
RM-SHR-3500-H7N-MT4-CB	35.000	321.00	197.0	78.00	8	MT4	●
RM-SHR-3600-H7N-MT4-CB	36.000	325.00	201.0	79.00	8	MT4	●
RM-SHR-3800-H7N-MT4-CB	38.000	329.00	205.0	81.00	8	MT4	●

• Requires a price and delivery time quotation • Available only upon request • -CH: Brazed solid carbide head • -CB: Brazed solid carbide tips • Hole tolerance: H7 manufacturing tolerance according to DIN 1420 • Available grades: IC07 (uncoated), optional: IC907 (TiAlN PVD coated)

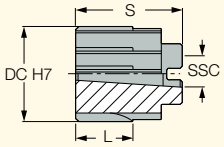
• For user guide and cutting conditions, see pages 329-332

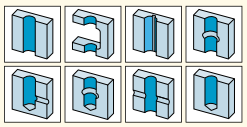
(1) Number of flutes

SOLIDH-REAM

RM-SR-H7S

DIN 8054 Brazed Carbide Tip Shell Reamers with Straight Flutes





1:30 conical connection with brazed tips

Designation	Dimensions DC	S	L	SSC(1)	NOF(2)	IC07
RM-SR25.000H7S-13	25.000	45.00	30.00	13.00	6	●
RM-SR30.000H7S-13	30.000	45.00	30.00	13.00	6	●
RM-SR34.000H7S-13	34.000	45.00	30.00	13.00	8	●
RM-SR35.000H7S-13	35.000	45.00	30.00	13.00	8	●
RM-SR36.000H7S-16	36.000	50.00	30.00	16.00	8	●
RM-SR37.000H7S-16	37.000	50.00	30.00	16.00	8	●
RM-SR38.000H7S-16	38.000	50.00	30.00	16.00	8	●
RM-SR40.000H7S-16	40.000	50.00	30.00	16.00	8	●
RM-SR42.000H7S-16	42.000	50.00	30.00	16.00	8	●
RM-SR44.000H7S-16	44.000	50.00	30.00	16.00	8	●
RM-SR45.000H7S-16	45.000	50.00	30.00	16.00	8	●
RM-SR48.000H7S-19	48.000	56.00	30.00	19.00	10	●
RM-SR50.000H7S-19	50.000	56.00	30.00	19.00	10	●
RM-SR55.000H7S-22	55.000	63.00	30.00	22.00	10	●
RM-SR58.000H7S-22	58.000	63.00	30.00	22.00	10	●
RM-SR60.000H7S-22	60.000	63.00	30.00	22.00	10	●
RM-SR70.000H7S-27	70.000	71.00	30.00	27.00	12	●

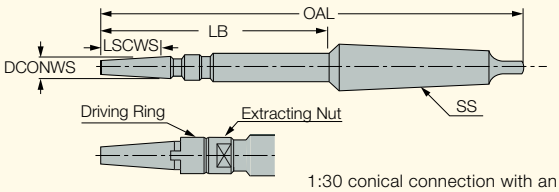
• Available only upon request • Right-hand, H7 manufacturing tolerance according to DIN 1420 • For user guide and cutting conditions, see pages 329-332

(1) Seat size code

SOLIDH-REAM

RM-SRH-Q-MT

DIN 217 Shell Reamer Shanks with a **Morse Taper** Connection



1:30 conical connection with an extraction nut, driving ring and a key.

Designation	DCONWS	DCN(1)	DCX(2)	OAL	LB	LSCWS	SS
RM-SRH Q13-MT3	13.00	25.00	35.00	250.00	149.46	45.00	MT3
RM-SRH Q16-MT3	16.00	36.00	45.00	261.00	160.45	50.00	MT3
RM-SRH Q19-MT3	19.00	48.00	52.00	298.00	173.54	56.00	MT3
RM-SRH Q19-MT4	19.00	48.00	52.00	273.00	174.00	56.00	MT4
RM-SRH Q22-MT3	22.00	55.00	62.00	312.00	187.54	63.00	MT3
RM-SRH Q22-MT4	22.00	55.00	62.00	312.00	188.00	63.00	MT4
RM-SRH Q27-MT4	27.00	65.00	75.00	359.00	198.80	71.00	MT4
RM-SRH Q27-MT5	27.00	65.00	75.00	327.00	200.63	71.00	MT5

• Available only upon request

(1) Minimum insert diameter

(2) Maximum insert diameter

Machining Conditions for Solid Carbide Reamers

Material	Tensile Strength or Brinell Hardness N/mm² bzw. HB	Reamer Diameter mm	Reaming Allowance Relative to Diameter	Feed mm/rev	Cutting Speed m/min
Steel		up to 10	0.04-0.10	0.15-0.25	
	up to 1000	10-25	0.10-0.25	0.20-0.35	6-20
		25-40	0.25-0.40	0.30-0.50	
		up to 10	0.04-0.10	0.12-0.20	
	1000-1400	10-25	0.10-0.25	0.15-0.30	6-15
		25-40	0.25-0.40	0.20-0.40	
Cast steel		up to 10	0.05-0.10	0.15-0.25	
	400-500	10-25	0.10-0.25	0.20-0.40	10-20
		25-40	0.25-0.40	0.30-0.50	
		up to 10	0.04-0.10	0.12-0.20	
	500-700	10-25	0.10-0.25	0.15-0.30	6-15
		25-40	0.25-0.40	0.20-0.40	
Titanium Titanium Alloy		up to 10	0.06-0.12	0.12-0.20	
	500-1300	10-25	0.10-0.25	0.15-0.30	6-15
		25-40	0.25-0.40	0.20-0.40	
Grey cast iron		up to 10	0.06-0.12	0.20-0.30	
	up to 220 HB	10-25	0.10-0.30	0.30-0.45	10-25
		25-40	0.30-0.50	0.40-0.70	
		up to 10	0.06-0.12	0.15-0.25	
	over 220 HB	10-25	0.10-0.30	0.20-0.35	10-20
		25-40	0.30-0.50	0.30-0.50	
Spheroidal graphite Cast iron Malleable cast iron		up to 10	0.06-0.12	0.15-0.25	
		10-25	0.10-0.25	0.20-0.40	8-15
		25-40	0.25-0.40	0.30-0.60	
Aluminum alloy		up to 10	0.06-0.12	0.20-0.30	Si<7% 10-30
	over 80 HB	10-25	0.10-0.30	0.30-0.50	
		25-40	0.30-0.50	0.40-0.70	Si<7% 30-60
Copper		up to 10	0.10-0.20	0.30-0.60	
		10-25	0.20-0.40	0.40-0.80	20-60
		25-40	0.40-0.60	0.50-1.00	
Brass Red bronze Cast bronze		up to 10	0.06-0.12	0.20-0.30	
		10-25	0.10-0.30	0.30-0.50	15-50
		25-40	0.30-0.50	0.40-0.70	
Thermoset polymers		up to 10	0.10-0.25	0.30-0.60	
		10-25	0.20-0.40	0.40-0.80	15-30
		25-40	0.40-0.60	0.50-1.00	

Reamer Manufacturing Tolerances

Nominal Diameter of Reamer D_1 in mm		Reamer Manufacturing Tolerances DIN 1420									
		Admissible maximum and minimum reamer dimensions of nominal diameter d1 in µm for drilling tolerance range									
Over	Up to	A9	A11	B8	B9	B10	B11	C8	C9	C10	C11
1	3	+291	+321	+151	+161	+174	+191	+ 71	+ 81	+ 94	+111
		+282	+300	+146	+152	+160	+170	+ 66	+ 72	+ 80	+ 90
3	6	+295	+333	+155	+165	+180	+203	+ 85	+ 95	+110	+133
		+284	+306	+148	+154	+163	+176	+ 78	+ 84	+ 93	+106
6	10	+310	+356	+168	+180	+199	+226	+ 98	+110	+129	+156
		+297	+324	+160	+167	+178	+194	+ 90	+ 97	+108	+124
10	18	+326	+383	+172	+186	+209	+243	+117	+131	+154	+188
		+310	+344	+162	+170	+184	+204	+107	+115	+129	+149
18	30	+344	+410	+188	+204	+231	+270	+138	+154	+181	+220
		+325	+364	+176	+185	+201	+224	+126	+135	+151	+174
30	40	+362	+446	+203	+222	+255	+206	+153	+172	+205	+256
		+340	+390	+189	+200	+220	+250	+139	+150	+170	+200
40	50	+372	+456	+213	+232	+265	+316	+163	+182	+215	+266
		+350	+400	+199	+210	+230	+260	+149	+160	+180	+210
50	65	+402	+501	+229	+252	+292	+351	+179	+202	+242	+301
		+376	+434	+212	+226	+250	+284	+162	+176	+200	+234
65	80	+422	+521	+239	+262	+302	+361	+189	+212	+252	+311
		+396	+454	+222	+236	+260	+294	+172	+186	+210	+244
80	100	+453	+567	+265	+293	+339	+407	+215	+243	+289	+357
		+422	+490	+246	+262	+290	+330	+196	+212	+240	+280
100	120	+483	+597	+285	+313	+359	+427	+225	+253	+299	+367
		+452	+520	+266	+282	+310	+350	+206	+222	+250	+290
120	140	+545	+672	+313	+345	+396	+472	+253	+285	+336	+412
		+510	+584	+290	+310	+340	+384	+230	+250	+280	+324
140	160	+605	+732	+333	+365	+416	+492	+263	+295	+346	+422
		+570	+644	+310	+330	+360	+404	+240	+260	+290	+334
160	180	+665	+792	+363	+395	+446	+522	+283	+315	+366	+442
		+630	+704	+340	+360	+390	+434	+260	+280	+310	+354

Over	Up to	D8	D9	D10	D11	E7	E8	E9	F6	F7	F8	F9	G6	G7
1	3	+ 31	+ 41	+ 54	+ 71	+ 22	+ 25	+ 35	+ 11	+ 14	+ 17	+ 27	+ 7	+ 10
		+ 26	+ 32	+ 40	+ 50	+ 18	+ 20	+ 26	+ 8	+ 10	+ 12	+ 18	+ 4	+ 6
3	6	+ 45	+ 55	+ 70	+ 93	+ 30	+ 35	+ 45	+ 16	+ 20	+ 25	+ 35	+ 10	+ 14
		+ 38	+ 44	+ 53	+ 66	+ 25	+ 28	+ 34	+ 13	+ 15	+ 18	+ 24	+ 7	+ 9
6	10	+ 58	+ 70	+ 89	+116	+ 37	+ 43	+ 55	+ 20	+ 25	+ 31	+ 43	+ 12	+ 17
		+ 50	+ 57	+ 68	+ 84	+ 31	+ 35	+ 42	+ 16	+ 19	+ 23	+ 30	+ 8	+ 11
10	18	+ 72	+ 86	+109	+143	+ 47	+ 54	+ 68	+ 25	+ 31	+ 38	+ 52	+ 15	+ 21
		+ 62	+ 70	+ 84	+104	+ 40	+ 44	+ 52	+ 21	+ 24	+ 28	+ 36	+ 11	+ 14
18	30	+ 93	+109	+136	+175	+ 57	+ 68	+ 84	+ 31	+ 37	+ 48	+ 64	+ 18	+ 24
		+ 81	+ 90	+106	+129	+ 49	+ 56	+ 65	+ 26	+ 29	+ 36	+ 45	+ 13	+ 16
30	50	+113	+132	+165	+216	+ 71	+ 83	+ 102	+ 38	+ 46	+ 58	+ 77	+ 22	+ 30
		+ 99	+110	+130	+160	+ 62	+ 69	+ 80	+ 32	+ 37	+ 44	+ 55	+ 16	+ 21
50	80	+139	+162	+202	+261	+ 5	+ 99	+122	+ 46	+ 55	+ 69	+ 92	+ 26	+ 35
		+122	+136	+160	+194	+ 74	+ 82	+ 96	+ 39	+ 44	+ 52	+ 66	+ 19	+ 24
80	120	+165	+193	+239	+307	+101	+117	+145	+ 54	+ 65	+ 81	+109	+ 30	+ 41
		+146	+162	+190	+230	+ 88	+ 98	+114	+ 46	+ 52	+ 62	+ 78	+ 22	+ 28
120	180	+198	+230	+281	+357	+119	+138	+170	+ 64	+ 77	+ 96	+ 128	+ 35	+ 48
		+175	+195	+225	+269	+105	+115	+135	+ 55	+ 63	+ 73	+ 93	+ 26	+ 34

Reamer Manufacturing Tolerances (continued)

Nominal Diameter of Reamer D_1 in mm		Reamer Manufacturing Tolerances DIN 1420											
		Admissible maximum and minimum reamer dimensions of nominal diameter d1 in µm for drilling tolerance range											
Over	**Up to**	**R6**	**R7**	**S6**	**S7**	**T6**	**U6**	**U7**	**U10**	**X10**	**X11**	**Z10**	**Z11**
1	3	-11	-12	-15	-16	-19	-19	-20	-24	-26	-29	-32	-35
		-14	-16	-18	-20	-22	-22	-24	-38	-40	-50	-46	-56
3	6	-14	-13	-18	-17	-22	-22	-21	-31	-36	-40	-43	-47
		-17	-18	-21	-22	-25	-25	-26	-48	-53	-67	-60	-56
6	10	-18	-16	-22	-20	-27	-27	-25	-37	-43	-48	-51	-47
		-22	-22	-26	-26	-31	-31	-31	-58	-64	-80	-72	-74
10	14	-22	-19	-27	-24	-32	-32	-29	-44	-51	-57	-61	-56
		-26	-26	-31	-31	-36	-36	-36	-69	-76	-96	-86	-88
14	18	-22	-19	-27	-24	-32	-32	-29	-44	- 56	-62	-71	-67
		-26	-26	-31	-31	-36	-36	-36	-69	- 81	-101	-96	-106
18	24	-26	-24	-33	-31	-39	-39	-37	-54	- 67	-74	-86	-77
		-31	-32	-38	-39	-44	-44	-45	-84	- 97	-120	-116	-116
24	30	-26	-24	-33	-31	-39	-46	-44	-61	- 77	-84	-101	-108
		-31	-32	-38	-39	-44	-51	-52	-69	-107	-130	-131	-154
30	40	-32	-29	-41	-38	-46	-58	-55	-75	- 95	-104	-127	-136
		-38	-38	-47	-47	-52	-64	-64	-110	-130	-160	-162	-192
40	50	-32	-29	-41	-38	-52	-68	-65	-85	-112	-121	-151	-160
		-38	-38	-47	-47	-58	-74	-74	-120	-147	-177	-186	-216
50	65	-38	-35	-50	-47	-63	-84	-81	-105	-140	-151	-190	-201
		-45	-46	-57	-58	-70	-91	-92	-147	-182	-218	-232	-268
65	80	-40	-37	-56	-53	-72	-99	-96	-120	-164	-175	-228	-239
		-47	-48	-63	-64	-79	-106	-107	-162	-206	-242	-170	-306
80	100	-48	-44	-68	-64	-88	-121	-117	-145	-199	-211	-179	-291
		-56	-57	-76	-77	-96	-129	-130	-194	-248	-288	-328	-368
100	120	-51	-47	-76	-72	-101	-141	-139	-165	-231	-243	-331	-343
		-59	-60	-84	-85	-109	-149	-150	-214	-280	-320	-380	-420
120	140	-60	-54	-89	-83	-119	-167	-161	-194	-272	-286	-389	-403
		-69	-68	-98	-97	-128	-176	-175	-250	-328	-374	-445	-491
140	160	-62	-56	-97	-91	-131	-187	-181	-214	-304	-318	-439	-453
		-71	-70	-106	-105	-140	-196	-195	-270	-360	-406	-495	-541

Over	**Up to**	**H6**	**H7**	**H8**	**H9**	**H10**	**H11**	**H12**	**J6**	**J7**	**J8**	**JS6**	**JS7**	**JS8**	**JS9**
1	3	+5	+8	+11	+21	+34	+51	+85	+1	+2	+3	+2	+3	+4	+8
		+2	+4	+6	+12	+20	+30	+50	-2	-2	-2	-1	-1	-1	-1
3	6	+6	+10	+15	+25	+40	+63	+102	+3	+4	+7	+2	+4	+6	+10
		+3	+5	+8	+14	+23	+30	+60	0	-1	0	-1	-1	-1	-1
6	10	+7	+12	+18	+30	+49	+76	+127	+3	+5	+8	+3	+5	+7	+12
		+3	+6	+10	+17	+28	+44	+74	-1	-1	0	-1	-1	-1	-1
10	16	+9	+15	+22	+36	+59	+93	+153	+4	+7	+10	+3	+6	+9	+15
		+5	+8	+12	+20	+34	+54	+90	0	0	0	-1	-1	-1	-1
18	30	+11	+17	+28	+44	+71	+110	+178	+6	+8	+15	+4	+7	+11	+18
		+6	+9	+16	+25	+41	+64	+104	+1	0	+3	-1	-1	-1	-1
30	50	+13	+21	+33	+52	+85	+136	+212	+7	+10	+18	+5	+8	+13	+21
		+7	+12	+19	+30	+50	+80	+124	+1	+1	+4	-1	-1	-1	-1
50	80	+16	+25	+39	+62	+102	+161	+255	+10	+13	+21	+6	+10	+16	+25
		+9	+14	+22	+36	+60	+94	+150	+3	+2	+4	-1	-1	-1	-1
90	120	+18	+29	+45	+73	+119	+187	+297	+12	+16	+25	+7	+12	+18	+30
		+10	+16	+26	+42	+70	+110	+174	+4	+3	+6	-1	-1	-1	-1
120	180	+21	+34	+53	+85	+136	+212	+360	+14	+20	+31	+8	+16	+72	+35
		+12	+20	+30	+50	+80	+124	+200	+5	+6	+8	-1	0	-1	0

Over	**Up to**	**K6**	**K7**	**K8**	**M6**	**M7**	**M8**	**N6**	**N7**	**N8**	**N9**	**N10**	**N11**	**P6**	**P7**
1	3	-1	-2	-3	-3	-4	-5	-5	-6	-7	-8	-10	-13	-7	-8
		-4	-6	-8	-6	-8	-10	-8	-10	-12	-17	-24	-34	-10	-12
3	6	0	+1	+2	-3	-2	-1	-7	-6	-5	-5	-8	-12	-11	-10
		-3	-4	-5	-6	-7	-8	-10	-11	-12	-16	-25	-39	-14	-15
6	10	0	+2	+2	-5	-3	-3	-9	-7	-7	-6	-9	-14	-14	-12
		-4	-4	-6	-9	-9	-11	-13	-13	-15	-19	-30	-46	-18	-18
10	18	0	+3	+3	-6	-3	-3	-11	-8	-8	-7	-11	-17	-17	-14
		-4	-4	-7	-10	-10	-13	-15	-15	-18	-23	-36	-56	-21	-21
18	30	0	+2	+5	-6	-4	-1	-13	-11	-8	-8	-13	-20	-20	-18
		-5	-6	-7	-11	-12	-13	-18	-19	-20	-27	-43	-66	-25	-26
30	50	0	+3	+6	-7	-4	-1	-15	-12	-9	-10	-15	-24	-24	-21
		-6	-6	-8	-13	-13	-15	-21	-21	-23	-32	-50	-80	-30	-30
50	80	+1	+4	+7	-8	-5	-2	-17	-14	-11	-12	-18	-29	-29	-26
		-6	-7	-10	-15	-16	-19	-24	-25	-28	-38	-60	-96	-36	-37
80	120	0	+4	+7	-10	-6	-3	-20	-16	-13	-14	-21	-33	-34	-30
		-8	-9	-12	-18	-19	-22	-28	-29	-32	-45	-70	-110	-42	-43
120	180	0	+6	+10	-12	-6	-2	-24	-18	-14	-15	-24	-38	-40	-34
		-9	-8	-13	-21	-20	-25	-33	-32	-37	-50	-80	-126	-49	+48

Cutting Speed
The cutting speed has the highest influence on the surface quality of the reamed hole and on the life of the tool. Increasing the cutting speed beyond the optimum speed will cause increased tool wear due to the increased cutting temperature. The increased speed also causes an increase in the built-up edge (material that is welded to the cutting edge). The built-up edge damages the surface finish and shortens the life of the tool. In order to achieve high surface quality and longer tool life, the cutting speed for reaming should be kept relatively low.

Feed Rate
The feed rate directly influences the wear on the cutting edge. As the feed rate is increased, the cutting forces increase almost proportionally. The feed, however, has less influence on the machined surface quality and tool wear than the cutting speed (i.e. the feed can be varied in a relatively wide range without having material influence the quality of the machined hole and the respective tool life). It is therefore recommended to select the highest possible feed in order to shorten reaming times without significantly reducing the tool life.

Reaming Allowance
The reaming allowance (the amount of material to be reamed) also influences the tool life. In order to achieve high tool life, the reaming allowance should be kept at a reasonable minimum considering the process to be performed. If the reaming allowance is too small, it may result in a high dimensional variation (inability to maintain the required tolerances) and a decrease in the machined surface quality. When reaming materials that have surface defects or have been welded or flame cut, the reaming allowance should be increased so these factors do not appear on the reamed surface.

Coolant/Lubrication
The high degree of friction between the tool and the wall being reamed demands the use of a fluid for lubrication and cooling. Using lubrication is more critical for maintaining tolerances than using a coolant. General cutting oils and emulsions may be used. It should be noted that in some cases emulsions will yield a better surface finish than cutting oils. Emulsions are thinner fluids that are able to reach and more uniformly lubricate the cutting edges better than viscous cutting oils (especially when performing deep applications). In order to determine the most suitable lubricant for a particular application, tests should be run on the material to be cut, on a case-to-case basis.

Reaming Prerequisites
In order to achieve high tolerances for reaming applications, there are certain requirements that must be considered.

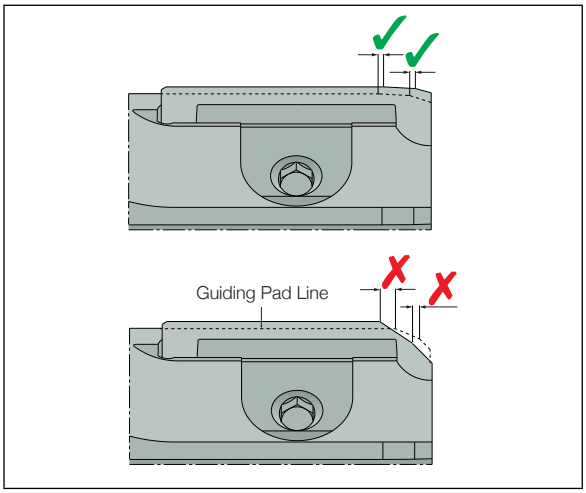
1 Condition of the tool - If the tool is reground, both an exact concentricity and high quality grinding are indispensable.
2 Workpiece material - Axis shifting and warping (i.e. incorrect hole positioning) can only be corrected to a certain degree when reaming. A critical factor is the initial opening in the workpiece. This opening must be even, or if the prepared hole is countersunk, a cone countersink must be used. Failure to properly prepare the initial opening can result in irregular countersinking that leads to the reamer being pushed out of its proper alignment. Ideally, pre-machining should be performed in a chuck to avoid alignment defects.
3 Through holes - For best results, the holes to be reamed should extend completely through the workpiece material. This allows for easy exit of both the cutting fluid and the reamed material. Negative flute reamers are advantageous in through hole reaming.
4 Blind holes - Use straight flute reamers for blind holes.

High Speed Reaming System with Internal Coolant Holes

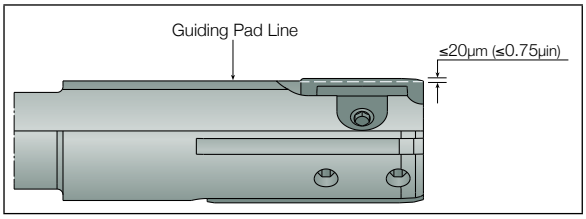
The INDEXH-REAM standard line covers reaming applications of 8-32 mm hole diameters. The indexable cutting insert has two cutting corners with 4 lead angle options and 3 rake angle variations, covering most workpiece material types. The INDEXH-REAM single indexable insert with carbide pads provides a combination of economical and high precision results on a very wide range of materials.

Important

Lead type of the tool (pads) should be compatible with the lead type of the insert. Using an improper insert will damage the tool and the reamed part.



The guiding pads are precisely ground for a specific diameter, and therefore, can only be used for reaming on appropriate hole sizes. The adjustment mechanism is designed for a specific diameter setting and for wear compensation (a few microns only). The same tool can not be used for reaming different diameters.



Tool Designation Code Key

RM	SET	12.000[1]	H6	T	B	C16	s
Reamer	Single-Edged Tool	Hole Diameter	Hole Tolerance				

Hole Type

B	Blind
T	Through

Lead Type[2]

A, B, C, D
(see page 338)
Note: A, C,
D - optional

Shank Type

C	Cylindrical
W	Weldon
F	Flat

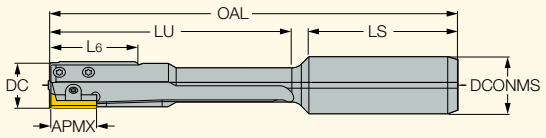
Reamer Length S-Short

(1) To be ordered for each specific diameter and tolerance
(2) Tool lead type - according to insert's lead type

INDEXH-REAM

RM-SET-T-B

Single-Edged Indexable
Reamers for Through Holes



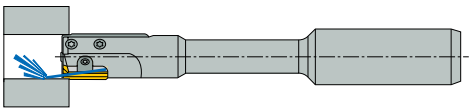
Designation	DC	APMX	L6[1]	LU	LS	OAL	DCONMS	SSC[2]
RM-SET8.000H6T-B-C16S	8.000	15.50	30.00	75.0	45.0	123.50	16.00	1.0
RM-SET9.000H6T-B-C16S	9.000	15.50	30.00	75.0	45.0	123.50	16.00	1.0
RM-SET10.000H6T-B-C16S	10.000	15.50	30.00	75.0	45.0	123.50	16.00	2.0
RM-SET11.000H6T-B-C16S	11.000	15.50	30.00	75.0	45.0	123.50	16.00	2.0
RM-SET12.000H6T-B-C16S	12.000	17.00	30.00	85.0	45.0	135.00	16.00	3.0
RM-SET13.000H6T-B-C16S	13.000	17.00	30.00	85.0	45.0	135.00	16.00	3.0
RM-SET14.000H6T-B-C16S	14.000	17.00	30.00	85.0	45.0	135.00	16.00	3.0
RM-SET15.000H6T-B-C16S	15.000	17.00	30.00	85.0	45.0	135.00	16.00	3.0
RM-SET16.000H6T-B-C20S	16.000	17.00	30.00	110.0	50.0	165.00	20.00	3.0
RM-SET17.000H6T-B-C20S	17.000	17.00	30.00	110.0	50.0	165.00	20.00	3.0
RM-SET18.000H6T-B-C20S	18.000	17.00	30.00	110.0	50.0	165.00	20.00	3.0
RM-SET19.000H6T-B-C20S	19.000	17.00	30.00	110.0	50.0	165.00	20.00	3.0
RM-SET20.000H6T-B-C25S	20.000	17.00	30.00	110.0	56.0	171.00	25.00	3.0
RM-SET21.000H6T-B-C25S	21.000	17.00	30.00	110.0	56.0	171.00	25.00	3.0
RM-SET22.000H6T-B-C25S	22.000	17.00	30.00	130.0	56.0	191.00	25.00	3.0
RM-SET23.000H6T-B-C25S	23.000	17.00	30.00	130.0	56.0	191.00	25.00	3.0
RM-SET24.000H6T-B-C25S	24.000	17.00	30.00	130.0	56.0	191.00	25.00	3.0
RM-SET25.000H6T-B-C25S	25.000	17.00	30.00	130.0	56.0	191.00	25.00	3.0
RM-SET26.000H6T-B-C25S	26.000	22.50	30.00	160.0	56.0	221.00	25.00	4.0
RM-SET27.000H6T-B-C25S	27.000	22.50	30.00	160.0	56.0	221.00	25.00	4.0
RM-SET28.000H6T-B-C25S	28.000	22.50	30.00	160.0	56.0	221.00	25.00	4.0
RM-SET29.000H6T-B-C25S	29.000	22.50	30.00	160.0	56.0	221.00	25.00	4.0
RM-SET30.000H6T-B-C25S	30.000	22.50	30.00	160.0	56.0	221.00	25.00	4.0
RM-SET31.000H6T-B-C25S	31.000	22.50	30.00	160.0	56.0	221.00	25.00	4.0
RM-SET32.000H6T-B-C25S	32.000	22.50	30.00	160.0	56.0	221.00	25.00	4.0

• For spare parts, see page 335 • For user guide and cutting conditions, see pages 338-343

[1] Pad length

[2] Insert size

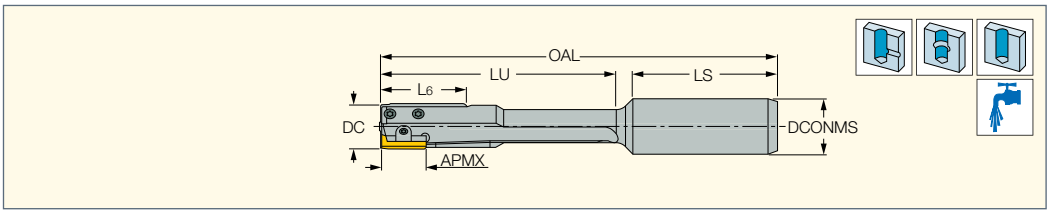
For inserts, see pages: RM-SEI-B (336)



INDEXH-REAM

RM-SET-B-B

Single-Edged Indexable
Reamers for Blind Holes



Designation	DC	APMX	OAL	LS	LU	L6(1)	DCONMS	SSC(2)
RM-SET8.000H6B-B-C16S	8.000	15.50	123.50	45.0	75.0	30.00	16.00	1.0
RM-SET9.000H6B-B-C16S	9.000	15.50	123.50	45.0	75.0	30.00	16.00	1.0
RM-SET10.000H6B-B-C16S	10.000	15.50	123.50	45.0	75.0	30.00	16.00	2.0
RM-SET11.000H6B-B-C16S	11.000	15.50	123.50	45.0	75.0	30.00	16.00	2.0
RM-SET12.000H6B-B-C16S	12.000	17.00	135.00	45.0	85.0	30.00	16.00	3.0
RM-SET13.000H6B-B-C16S	13.000	17.00	135.00	45.0	85.0	30.00	16.00	3.0
RM-SET14.000H6B-B-C16S	14.000	17.00	135.00	45.0	85.0	30.00	16.00	3.0
RM-SET15.000H6B-B-C16S	15.000	17.00	135.00	45.0	85.0	30.00	16.00	3.0
RM-SET16.000H6B-B-C20S	16.000	17.00	165.00	50.0	110.0	30.00	20.00	3.0
RM-SET17.000H6B-B-C20S	17.000	17.00	165.00	50.0	110.0	30.00	20.00	3.0
RM-SET18.000H6B-B-C20S	18.000	17.00	165.00	50.0	110.0	30.00	20.00	3.0
RM-SET19.000H6B-B-C20S	19.000	17.00	165.00	50.0	110.0	30.00	20.00	3.0
RM-SET20.000H6B-B-C25S	20.000	17.00	171.00	56.0	110.0	30.00	25.00	3.0
RM-SET21.000H6B-B-C25S	21.000	17.00	171.00	56.0	110.0	30.00	25.00	3.0
RM-SET22.000H6B-B-C25S	22.000	17.00	191.00	56.0	130.0	30.00	25.00	3.0
RM-SET23.000H6B-B-C25S	23.000	17.00	191.00	56.0	130.0	30.00	25.00	3.0
RM-SET24.000H6B-B-C25S	24.000	17.00	191.00	56.0	130.0	30.00	25.00	3.0
RM-SET25.000H6B-B-C25S	25.000	17.00	191.00	56.0	130.0	30.00	25.00	3.0
RM-SET26.000H6B-B-C25S	26.000	22.50	221.00	56.0	160.0	30.00	25.00	4.0
RM-SET27.000H6B-B-C25S	27.000	22.50	221.00	56.0	160.0	30.00	25.00	4.0
RM-SET28.000H6B-B-C25S	28.000	22.50	221.00	56.0	160.0	30.00	25.00	4.0
RM-SET29.000H6B-B-C25S	29.000	22.50	221.00	56.0	160.0	30.00	25.00	4.0
RM-SET30.000H6B-B-C25S	30.000	22.50	221.00	56.0	160.0	30.00	25.00	4.0
RM-SET31.000H6B-B-C25S	31.000	22.50	221.00	56.0	160.0	30.00	25.00	4.0
RM-SET32.000H6B-B-C25S	32.000	22.50	221.00	56.0	160.0	30.00	25.00	4.0

- For user guide and cutting conditions, see pages 338-343

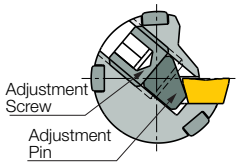
(1) Pad length

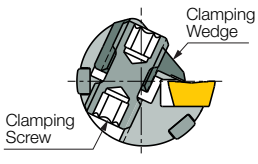
(2) Insert size

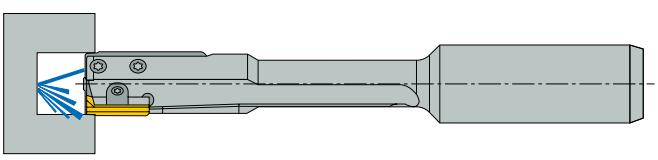
For inserts, see pages: RM-SEI-B (336)

Spare Parts

D [mm]	Clamping Wedge	Clamping Screw	Adjustment Screw	Adjustment Pin	Insert Size
8	WDG-RM-SE-1	SR-CL-RM-SE-1	SR-ADJ-M3x2.5	PIN-ADJ-RM-SE-1	1
9	WDG-RM-SE-1	SR-CL-RM-SE-1	SR-ADJ-M3x3	PIN-ADJ-RM-SE-1	1
10	WDG-RM-SE-2	SR-CL-RM-SE-1	SR-ADJ-M3x3	PIN-ADJ-RM-SE-2	2
11	WDG-RM-SE-2	SR-CL-RM-SE-1	SR-ADJ-M3x4	PIN-ADJ-RM-SE-2	2
12	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x4	PIN-ADJ-RM-SE-3	3
13	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x4	PIN-ADJ-RM-SE-3	3
14	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x4	PIN-ADJ-RM-SE-3	3
15	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x6	PIN-ADJ-RM-SE-3	3
16	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x6	PIN-ADJ-RM-SE-3	3
17	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x8	PIN-ADJ-RM-SE-3	3
18	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x8	PIN-ADJ-RM-SE-3	3
19	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x8	PIN-ADJ-RM-SE-3	3
20	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x10	PIN-ADJ-RM-SE-3	3
21	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x10	PIN-ADJ-RM-SE-3	3
22	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x10	PIN-ADJ-RM-SE-3	3
23	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x10	PIN-ADJ-RM-SE-3	3
24	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x10	PIN-ADJ-RM-SE-3	3
25	WDG-RM-SE-3	SR-CL-RM-SE-3	SR-ADJ-M4x10	PIN-ADJ-RM-SE-3	3
26	WDG-RM-SE-4	SR-CL-RM-SE-4	SR-ADJ-M4x10	PIN-ADJ-RM-SE-4	4
27	WDG-RM-SE-4	SR-CL-RM-SE-4	SR-ADJ-M4x10	PIN-ADJ-RM-SE-4	4
28	WDG-RM-SE-4	SR-CL-RM-SE-4	SR-ADJ-M4x10	PIN-ADJ-RM-SE-4	4
29	WDG-RM-SE-4	SR-CL-RM-SE-4	SR-ADJ-M4x10	PIN-ADJ-RM-SE-4	4
30	WDG-RM-SE-4	SR-CL-RM-SE-4	SR-ADJ-M4x10	PIN-ADJ-RM-SE-4	4
31	WDG-RM-SE-4	SR-CL-RM-SE-4	SR-ADJ-M4x10	PIN-ADJ-RM-SE-4	4
32	WDG-RM-SE-4	SR-CL-RM-SE-4	SR-ADJ-M4x10	PIN-ADJ-RM-SE-4	4





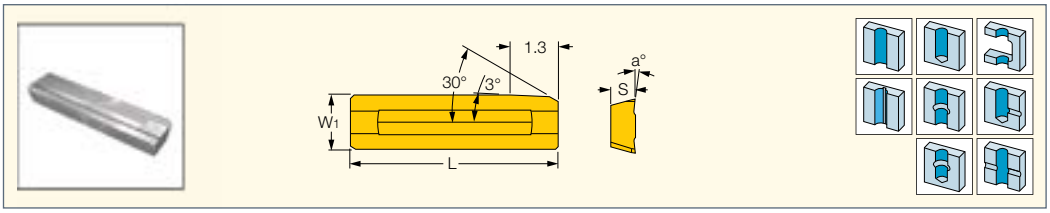


Insert Designation Code Key

RM	SEI	4	B	12	IC907
Reamer	Single Edge Insert	Insert Size	Lead Type A, B, C	Rake Angle	Carbide Grade

INDEXH-REAM

RM-SEI-B
Single-Edged Reaming Inserts for General Applications at High Cutting Speeds

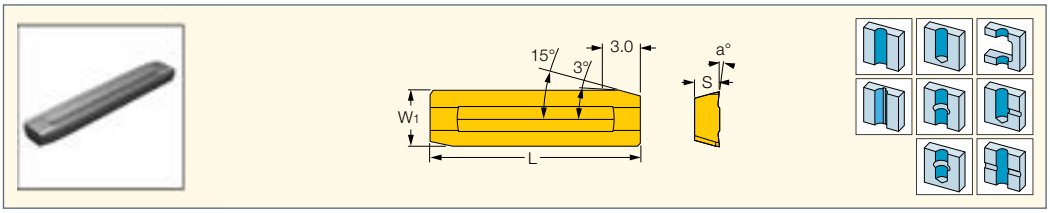


Designation	Dimensions SSC(1)	a°	L	W1	S	Tough ↔ Hard IC30N	IC07	IC507	IC907
RM-SEI-1B-00	1.0	0	15.50	2.80	1.50				•
RM-SEI-1B-06	1.0	6	15.50	2.80	1.50			•	•
RM-SEI-1B-12	1.0	12	15.50	2.80	1.50		•		•
RM-SEI-2B-00	2.0	0	15.50	3.60	1.50				•
RM-SEI-2B-06	2.0	6	15.50	3.60	1.50			•	•
RM-SEI-2B-12	2.0	12	15.50	3.60	1.50		•		•
RM-SEI-3B-00	3.0	0	17.00	4.40	2.00				•
RM-SEI-3B-06	3.0	6	17.00	4.40	2.00			•	•
RM-SEI-3B-12	3.0	12	17.00	4.40	2.00		•		•
RM-SEI-4B-06	4.0	6	22.50	6.60	3.00	•		•	•
RM-SEI-4B-12	4.0	12	22.50	6.60	3.00		•		•

• Lead type of insert should be compatible with lead type of the tool
(1) Insert size
For tools, see pages: RM-SET-B-B (335) • RM-SET-T-B (334)

INDEXH-REAM

RM-SEI-A
Single-Edged Reaming Inserts for High Surface Quality at Low Cutting Conditions

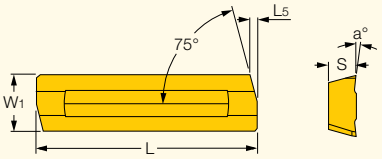


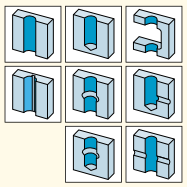
Designation	Dimensions SSC(1)	a°	L	W1	S	Tough ↔ Hard IC507	IC907
RM-SEI-1A-06	1.0	6	15.50	2.80	1.50	•	
RM-SEI-2A-06	2.0	6	15.50	3.60	1.50	•	
RM-SEI-3A-06	3.0	6	15.50	4.40	2.00	•	
RM-SEI-3A-12	3.0	12	17.00	4.40	2.00		•
RM-SEI-4A-06	4.0	6	22.50	6.60	3.00	•	

• Lead type of insert should be compatible with lead type of the tool • Available on request
(1) Insert size

INDEXH-REAM

RM-SEI-C
Single-Edged Reaming Inserts
for Aluminum and Brass



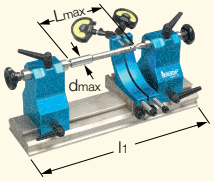


Designation	Dimensions SSC(1)	a°	L	W1	S	PLGL	IC07
RM-SEI-1C-12	1.0	12	15.50	2.80	1.50	0.550	•
RM-SEI-2C-12	2.0	12	15.50	3.60	1.50	0.550	•
RM-SEI-3C-12	3.0	12	17.00	4.40	2.00	0.550	•
RM-SEI-4C-12	4.0	12	22.50	6.60	3.00	0.550	•

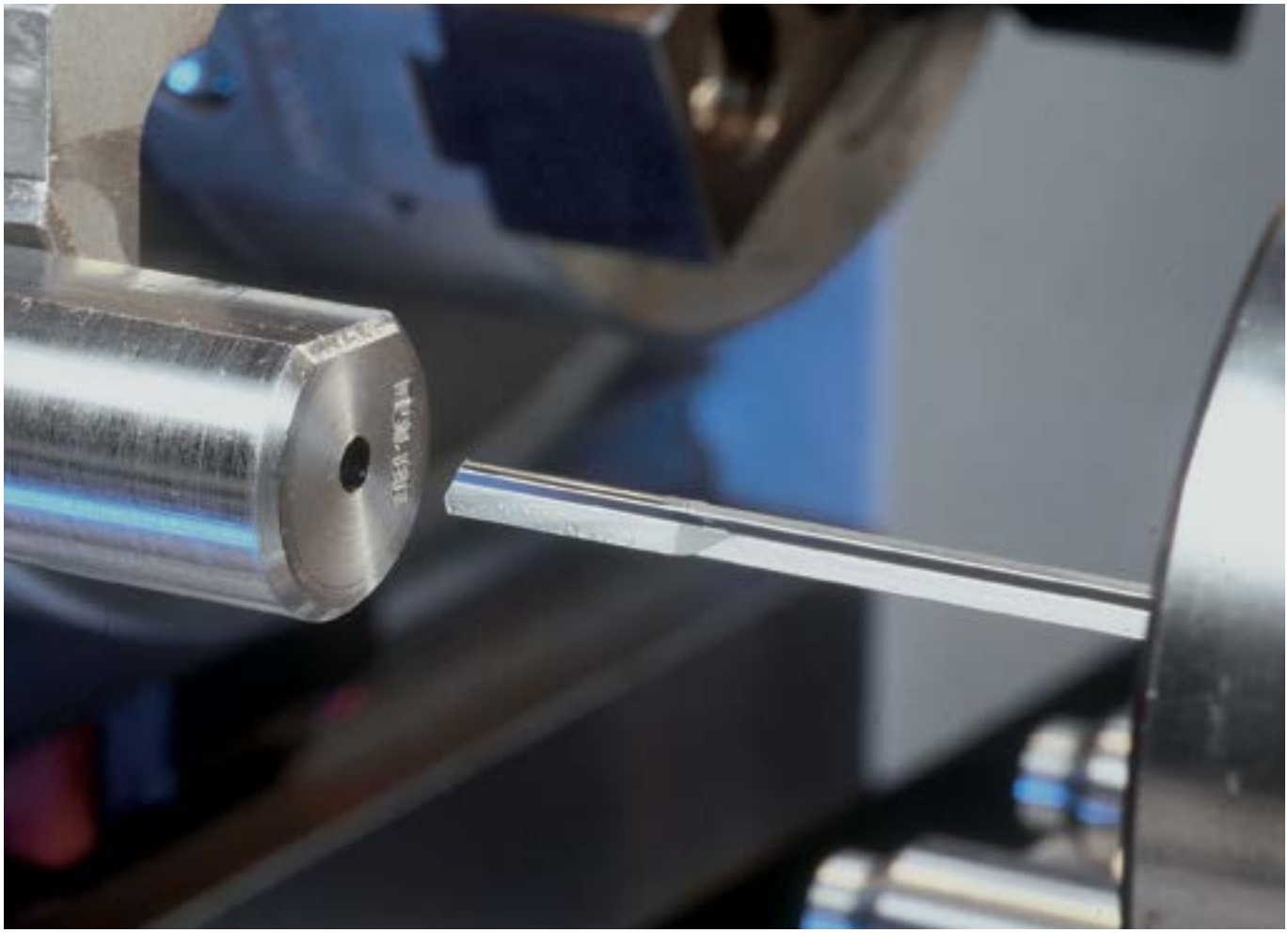
• Lead type of insert should be compatible with lead type of the tool • Available on request
(1) Insert size

Accessories

RM SETTING DEVICE
Reamer Setting Device

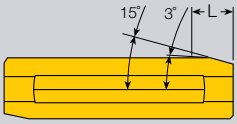
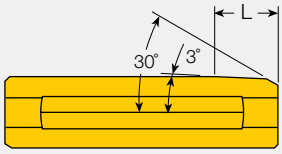
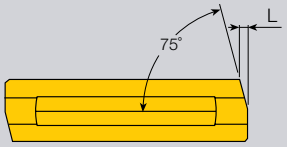
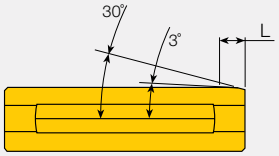


Designation	L max	l1	d max	kg
RM SETTING DEVICE	265.0	450.00	170.0	25.00



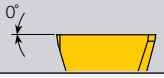
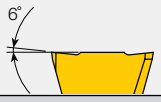
Front Angles and Cutting Geometries

4 standard lead angles are available:

Lead	L [mm]	Use
A	3	Higher surface quality, lower cutting conditions (not recommended for nonferrous materials) 
B	1.3	Universal use, high speed cutting conditions. Can be used on a wide range of materials 
C	0.55	Suitable for aluminum and brass at high cutting speed 
D(1)	0.6	When needed for blind hole - lower feed 

(1) On request

3 standard cutting angles are available:

	Angle [deg.]	Use
00		For cast iron applications
06		General use
12		For stainless steel and aluminum

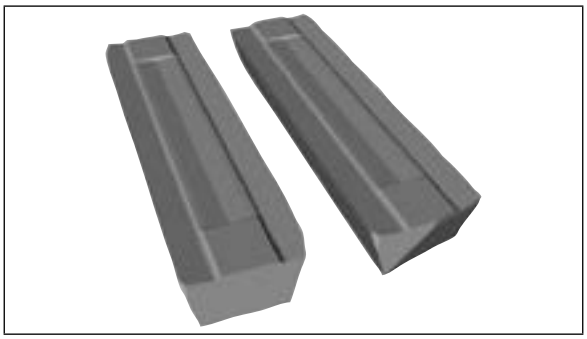
Carbide Grades

IC07 grade is the basic substrate for reaming inserts. It is a very versatile submicron grade. **IC07** features very high fracture toughness and wear resistance, which is required for efficient high speed reaming. An uncoated **IC07** can be used for machining nonferrous (N type material group) applications. Two types of standard coatings are available:

- **IC907** – a TiAlN PVD coating for steel (P) and stainless steel (M) workpiece material groups
- **IC507** - a TiCN+TiN PVD coating for cast iron (K) workpiece material group.

The following grades can be provided on request:

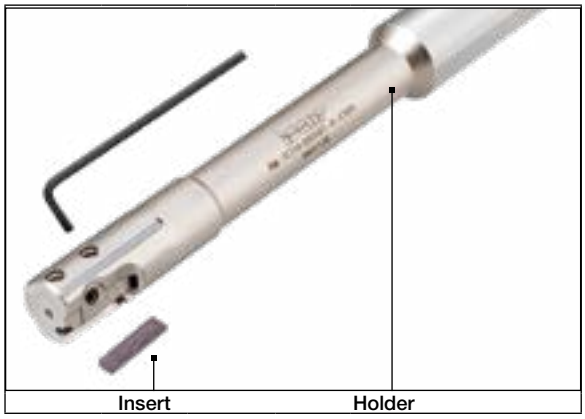
- **PCD** grade for machining aluminum
- **PCBN** grade for machining cast iron
- **IC30N** (cermet) for machining steel



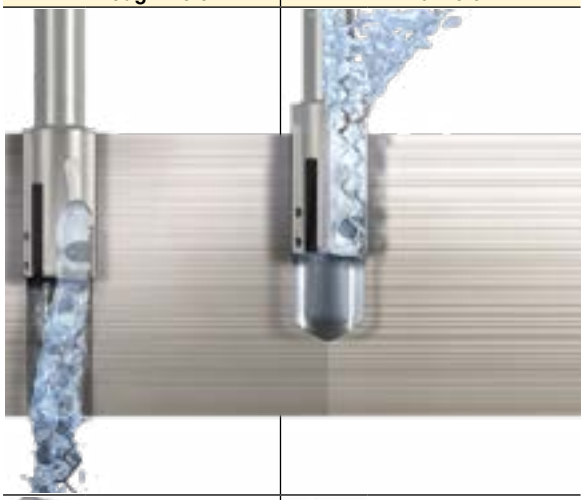
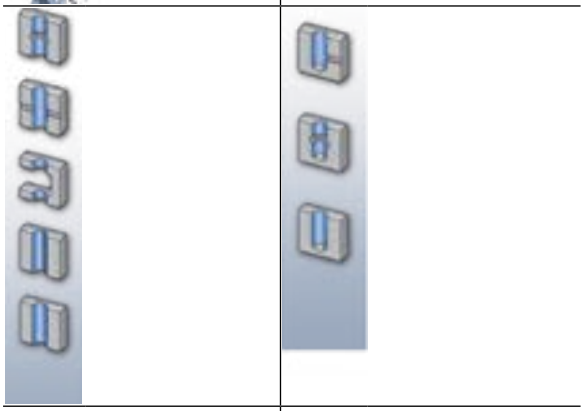
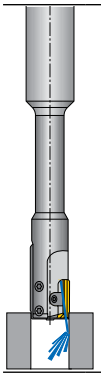
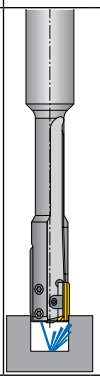
Concept

The INDEXH-REAM Line is available in 4 sizes and features two different holder geometries (short flute and long flute). The holder selection depends on the hole type (through or blind).

RM-SEI-1	RM-SEI-2	RM-SEI-3	RM-SEI-4
			
Ø8.00-9.99 mm (Ø.315-.393")	Ø10.00-11.99 mm (Ø.393-.472")	Ø12.00-25.99 mm (Ø.472-1.024")	Ø26.00-32.00 mm (Ø1.024-1.260")



Applications

Through Hole	Blind Hole
	
	
Through Hole Short Flute Holder. This holder has a lateral coolant outlet located right above the insert. The coolant is pointed directly to the cutting edge to lubricate it and divert the chips forward. Additional coolant outlets are located behind the guiding pads. Their purpose is to reduce high friction that is created between the pads and the reamed surface during machining.	**Blind Hole** Long Flute Holder. This holder has a frontal coolant outlet. The liquid reaches the bottom of the blind hole and evacuates the formed chips. These chips are conveyed backwards through the long chip gullet (flute) of the holder.
	

Setting Procedure

1 Place the reamer between the centering pins of the device.

2 Use the pad as a reference for setting the indicator to zero.

3 Rotate and place the inserts against indicators.

4 Tighten the adjustment screws in a clockwise direction.

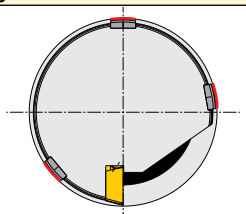
5 Adjust the frontal side of the insert to:
+15 µm (+0.6 µin) on D≤9.99,
+20 µm (+0.8 µin) on D≤10.00

6 Adjust the rear side of insert to:
+5 µm (+0.2 µin) on D≤9.99,
+10 µm (+0.4 µin) on D≤10.00

Back Taper

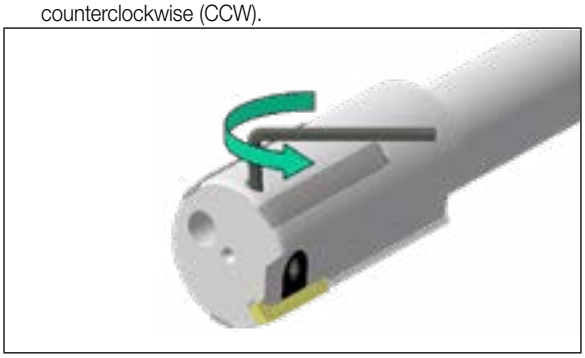
The back taper prevents the reamer from jamming, as well as lowering reaming forces and improving surface quality. Incorrect back taper may cause unstable reaming, accelerated wear and rough surface finish.

High Friction Lubricated Zones

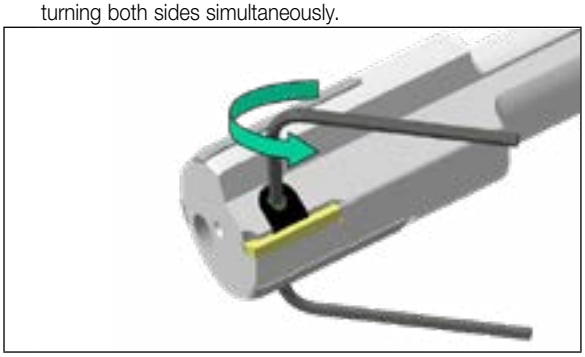


Insert Indexing

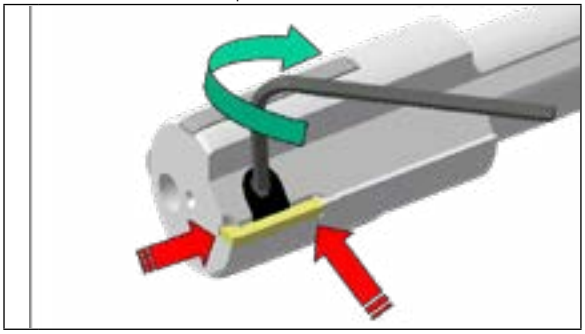
1 Rotate the adjustment screws one turn counterclockwise (CCW).



2 Rotate the clamping screw CCW from the top and/or clockwise (CW) from the bottom, turning both sides simultaneously.



3 Remove the insert. Clean the insert and the pocket. Place the sharp edge on the outer position. Press the insert against the back stopper and the two adjustment pins. Tighten the clamping wedge by rotating the clamping screw CW from the top or CCW from the bottom.



Setting Methods

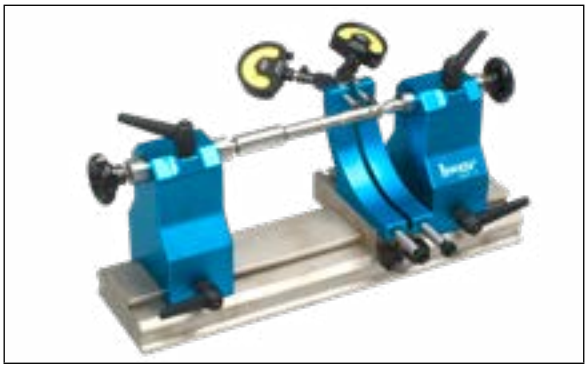
There are two optional setting methods - comparison micrometer and setting device. Comparison micrometer with dial gauge, although a low cost solution and readily available for small workshops, is prone to damaging the cutting edge and therefore not recommended.

Using a Comparison Micrometer
Set the micrometer to the correct diameter using the precision blocks. Adjust the frontal diameter and back taper by turning the adjustment screw clockwise. The frontal diameter should be larger than the rear diameter by approximately 0.015 mm.(0.6 µin).

Using a Setting Device
ISCAR's mechanical setting device enables easy, quick and accurate adjustment. Due to its modular construction, it can be used for standard, special and more complicated reamer adjustments.

Setting Device Located Between Centers

- Shorter setting time
- Modular system
- Higher accuracy
- No risk of damaging the cutting edge



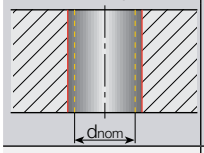
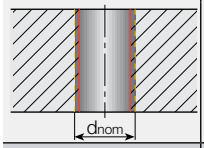
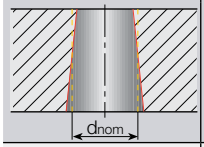
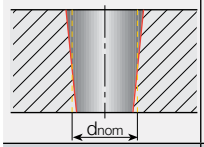
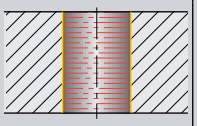
H-REAM Cutting Conditions

The cutting conditions in the table below should be used to start a new application.
Optimal conditions for a specific application should be evaluated by examining the results and changing the machining conditions accordingly.

Material No.	Material	Lead A=15°/3° L3 (reaming allowance = 0.1-0.3)							Lead B=30°/3° L1.3 (reaming allowance = 0.1-0.3)						
		Feed [mm/rev]	Rake [°]	Cutting Speed V_c [m/min]					Feed [mm/rev]	Rake [°]	Cutting Speed V_c [m/min]				
				Carbide	Coated Carbide	Cermet	PCD	CBN			Carbide	Coated Carbide	Cermet	PCD	CBN
1-5	Non-alloy steel and cast steel, free cutting steel	0.1-0.4	6	40-60	60-80	110-160			0.1-0.3	6	60-80	80-120	110-160		
6-9	Low alloy and cast steel (less than 5% of alloying elements)	0.1-0.4	6	20-40	40-60	110-160			0.1-0.3	6	60-80	80-120	110-160		
10-11	High alloyed steel, cast steel and tool steel	0.1-0.4	6	20-40	20-60	20-60			0.1-0.3	6	40-60	40-80	40-80		
12-13	Stainless steel and cast steel	0.1-0.3	12	20-40	40-60	40-60			0.1-0.2	12	40-60	60-80	60-80		
15-16	Grey cast iron (GG)	0.1-0.3	0/6	40-60	60-100			Please ask	0.1-0.3	0/6	60-80	80-120			Please ask
17-18	Nodular cast iron (GGG)	0.1-0.3	0/6	40-60	60-100				0.1-0.3	0/6	60-80	80-120			
19-20	Malleable cast iron	0.1-0.3	0/6	40-60	60-100				0.1-0.3	0/6	60-80	80-120			
21-22	Aluminum wrought alloy						Please ask		0.1-0.3	12	160-200			Please ask	
23-25	Aluminum -cast, alloyed								0.1-0.3	12	160-200				
26-28	Copper alloys								0.1-0.2	0	80-100				
29-30	Non-metallic								0.1-0.3	0	10-70				

Material No.	Material	Lead D=30°/3° L0.6 (reaming allowance = 0.1-0.2)							Lead C=75°/3° L0.55 (reaming allowance = 0.2-0.4)						
		Feed [mm/rev]	Rake [°]	Cutting Speed V_c [m/min]					Feed [mm/rev]	Rake [°]	Cutting Speed V_c [m/min]				
				Carbide	Coated Carbide	Cermet	PCD	CBN			Carbide	Coated Carbide	Cermet	PCD	CBN
1-5	Non-alloy steel and cast steel, free cutting steel	0.05-0.2	6	60-80	80-120	110-160									
6-9	Low alloy and cast steel (less than 5% of alloying elements)	0.05-0.2	6	60-80	80-120	110-160									
10-11	High alloyed steel, cast steel and tool steel and tool steel	0.05-0.2	6	40-60	40-80	40-80									
12-13	Stainless steel and cast steel	0.05-0.2	12	40-60	60-80	60-80									
15-16	Grey cast iron (GG)	0.05-0.2	0/6	60-80	80-120			Please ask							Please ask
17-18	Nodular cast iron (GGG)	0.05-0.2	0/6	60-80	80-120										
19-20	Malleable cast iron	0.05-0.2	0/6	60-80	80-120										
21-22	Aluminum wrought alloy	0.05-0.2	12	110-200			Please ask		0.15-0.3	12	150-250			Please ask	
23-25	Aluminum -cast, alloyed	0.05-0.2	12	180-200					0.15-0.3	12	150-250				
26-28	Copper alloys	0.05-0.2	0	80-100											
29-30	Non-metallic														

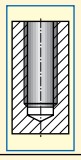
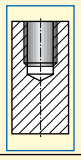
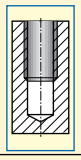
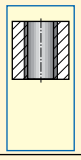
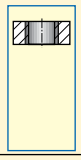
Troubleshooting

Problem	Cause	Solution
Hole too large 	• Reamer or pilot hole not centered • Reamer too large • Cooling / lubrication problems	• Use a floating reamer chuck or correct pilot hole • Check size of reamer and correct if necessary • Change lubricant and increase coolant pressure
Hole too small 	• Worn reamer • Reaming allowance too small • Cooling / lubrication problems	• Replace the reamer • Increase reaming allowance • Change lubricant and increase coolant pressure
Conical hole (larger bottom) 	• Misalignment between pre hole and reamer centers	• Re-align or use a floating reamer chuck
Conical hole (larger entrance) 	• Misalignment between pre-hole and reamer centers • Material jammed between reamer and hole in the upper hole section	• Re-align or use a floating reamer chuck • Secure the tool axially
Poor surface finish 	• Worn reamer • Misalignment between pre-hole and reamer centers • Problems with chip evacuation • Incorrect cutting parameters • Built-up edge	• Replace the tool • Re-align or use a floating reamer chuck • Increase coolant pressure • Change cutting parameters • Change cutting parameters or coolant conditions

Complete Machining Solutions
TAPS

TABLE OF CONTENTS

Tap Selection Guide and Cutting Speed Recommendations

Material No.	Hole Type[4]					Tap Color Code[1]	
						Tool Material[1]	
						Surface Treatment/Coating[2]	
						Flute Hand and Angle	
						Lead According to DIN 2197[3]	
	1	2	3	4	5	Hole Type[4]	
	Material		Condition	Tensile Strength [N/mm²]	Hardness HB	Chip	Coolant
1	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	Ext. Long	T
2		>= 0.25 %C	Annealed	650	190	Medium	T
3		< 0.55 %C	Quench and tempered	850	250	Long	T
4		>= 0.55 %C	Annealed	750	220	Long	T
7				930	275	Long	X
8			Quench and tempered	1000	300	Long	X
9				1200	350	Long	A
10	Non-alloy steel and cast steel, free cutting steel		Annealed	680	200	Long	X
11			Quench and tempered	1100	325	Long	X
12	Stainless steel		Ferritic/Martensitis	680	200	Medium	A
13			Martensitic	820	240	Long	A
14	Stainless steel		Austenitic	600	180	Long	A
15	Grey cast iron (GG)		Ferritic/pearlitic		180	Ext. Short	X
16			Pearlitic		260	Ext. Short	X
17	Cast iron nodular (GGG)		Ferritic		160	Short	X
18			Pearlitic		250	Ext. Short	X
19	Malleable cast iron		Ferritic		130	Short	X
20			Pearlitic		230	Short	X
21	Aluminum-wrought alloy		Not cureable		60	Medium	T
22			Cured		100	Medium	T
23	Aluminum-cast, alloyed	<=12% Si	Not cureable		75	Short	T
24			Cured		90	Short	T
25		>12% Si	High temp.		130	Short	T
26	Copper alloys	>1% Pb	Free cutting		110	Med/Short	T
27			Brass		90	Long	T
28			Electrolitic copper		100	Long	T
29	Non-metalic		Duroplastics, fiber plastics			Short	Z
31	High temp. alloys	Fe based	Annealed		200	Long	A
32			Cured		280	Long	A
33	Super alloys	Ni or Co based	Annealed		250	Long	A
34			Cured		350	Long	A
35			Cast		250	Long	A
36	Titanium and Ti alloys		Alpha+beta alloys cured	400		Med/Short	A
37				1050		Med/Short	A

[1] See page 348
[2] See page 362
[3] See page 363
[4] See page 363

Coolant
A - Cutting oil
T - Oil emulsion
X - Oil or emulsion
Z - Dry or emulsion

W(1)		M		M		M		M		M		M		S		H		N		H		G		F
HSS		HSS-E		HSS-E		HSS-E		HSS-E		HSS-E		HSS-E		HSS-E		HSS-E		HSS-E		HSS-E		HSS-E		HSS-E
-		-		TI		ST		-		TI		ST		ST		-		ST		ST		NI		TI
-		-		-		-		R40°		R40°		R40°		-		-		R40°		R40°		-		-
1\2\3		B		B		B		C		C		C		B		B		C		C		C		C
1-2-3-4-5		4-5		4-5		4-5		1-2-3		1-2-3		1-2-3		4-5		4-5		1-2-3		1-2-3		1-2-3-4-5		1-2-3-4-5
m/min		m/min		m/min		m/min		m/min		m/min		m/min		m/min		m/min		m/min		m/min		m/min		m/min
	•	10-25	••	15-45	•	8-25	••	20-25	••	15-45	•	8-25	••			20-25	••	8-25	•	20-25	••			20-60
	•	10-20	••	12-40	•	10-35	••	15-20	••	12-40	•	10-35	••			15-20	••	10-35	••	15-20	••			20-60
	•	12-18	••	15-25	•	6-12	••	12-18	••	15-25	•	6-12	••			12-18	••			12-18	••			17-55
	•	12-18	••	15-40	•	6-20	••	12-18	••	15-40	•	6-20	••			12-18	••			12-18	••			17-55
	•	10-15	••	5-25	•	4-10	••	10-15	••	5-25	•	4-10	••			10-15	••			10-15	••			
	•	6-10	••	5-25	•	4-10	••	6-10	••	5-25	•	4-10	••			6-10	••			6-10	••			
	•	3-5	••	5-20	•	3-5	••	3-5	••	5-20	•	3-5	••			3-5	••			3-5	••			
	•	10-15	••	20-30	•	7-12	••	10-15	••	20-30	•	7-12	••			10-15	••			10-15	••			10-30
	•	7-13	••	12-25	•	5-10	••	7-13	••	12-25	•	5-10	••			7-13	••			7-13	••			
	•	5-9	••	8-18	•	1-5	•	5-9	••	2-10	•	1-5	•	2-10	•					5-9	••			7-15
	•	4-6	••	8-15	•	1-5	•	4-6	••	2-10	•	1-5	•	2-10	•					4-6	••			
	•	5-9	••	8-15	•	1-4	•	5-9	••	2-10	•	1-4	•	2-10	•					5-9	••			
	•	10-15	••	15-45	••	13-20	•	10-15	••	15-45	••	13-20	•							10-15	••	10-30	•	
	•	8-12	••	10-40	••	21-31	•	8-12	••	10-40	••	21-31	•							8-12	••	10-30	•	
	•	8-12	•	10-25	••	21-31	•	8-12	•	10-25	•	21-31	•							8-12	••	10-40	•	
	•	8-12	••	10-20	••	21-31	•	8-12	••	10-20	••	21-31	•							8-12	••	10-35	•	
	•	10-15	•	15-45	••	13-20	•	10-15	••	15-45	••	13-20	•							10-15	••	10-45	•	
	•	10-15	•	10-40	••	13-20	•	10-15	••	10-40	••	13-20	•							10-15	••	10-40	•	
	•	25-35	•	50-70	•	12-25	••	25-35	•	30-60	•	12-25	••					12-25	••	25-35	••			
	•	25-35	•	50-70	•	12-25	••	25-35	•	30-60	•	12-25	••					12-25	••	25-35	••			
	•	10-15	•	10-40	•	10-25	••	10-15	•	15-40	•	10-25	••					10-25	••	10-15	••			
	•	10-15	•	10-40	•	10-25	••	10-15	•	15-40	•	10-25	••					10-25	••	10-15	••			
	•	10-15	•	10-30	•	10-20	••	10-15	•	15-30	•	10-20	••					10-20	••	10-15	••			
	•	25-35	•	50-70	•	20-40	••	25-35	•	30-65	•	20-40	••					20-40	••	25-35	••			17-40
	•	15-20	•	5-60	•	13-30	••	15-20	•	20-45	•	13-30	••					13-30	••	15-20	••			20-60
	•	15-20	•	5-25	•	10-17	••	15-20	•	15-30	•	10-17	••					10-17	••	15-20	••			20-60
	•	6-10	•	5-25	•	6-13	••	6-10	•	10-20	•	6-13	••					6-13	••	6-10	••			
	•	2-4	••	4-8	•			2-4	•	3-7	••					2-4				2-4	•			
	•	2-4	••	4-8	•			2-4		3-7	••					2-4				2-4	•			
	•	2-4	••	4-8	•			2-4		3-7	••					2-4				2-4	•			
	•	2-4	••	4-8	•			2-4		3-7	••					2-4				2-4	•			
	•	2-4	••	4-8	•			2-4		3-7	••					2-4				2-4	•			
	•	6-10	••					6-10	••							6-10				6-10	•			
	•	6-10	•					6-10	••							6-10				6-10	•			

• Recommended
•• Suitable
(1) Hand Tap

Tap Designation Code Key

TPG	UNC	1/4-20	M	□	HE	Ti

Tap Style

- TPH - Hand Tap
- TPF - Forming Tap
- TPG - Gun Point
- TPS - Spiral Flute
- TPST - Straight Flute

Thread Standard

- M - ISO Metric Coars Thread DIN-13
- MF - ISO Metric Fine Thread DIN-13
- UNF - Unfied Fine Thread
- UNC - Unfied Coarse Thread

D- TPI
D- Pitch

B - Bore for Coolant

(on request)

Tap Color Codes(1)

- M - Multi-Material Application
- W - Steel with Good Machinability Rm<750 N/mm^2
- S - Stainless Steel
- H - Hardened Steel and High Temp./ Super Alloys Rm>750 N/mm^2
- G - Grey Cast Iron
- N - Low Alloy Steel Rm<600 N/mm^2
- A - Aluminum and Aluminum Alloys
- F - Any Material with at least 8~10% Elongation

(1) The tools have a matching colored ring around the shank

Tap Materials

- HS - H.S.S. (M2)
- HE - H.S.S- E 5% Co. HSS (M35)
- PM - Compacted Powder
- HM - Solid Carbide

Coating Types*

- Ni - Nitriding
- Ti - TiN
- TC - TiCN
- TA - TiAlN
- St - Black Oxide

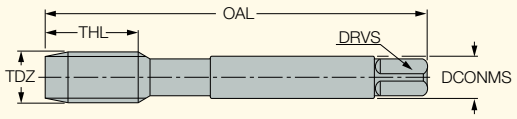
* On request

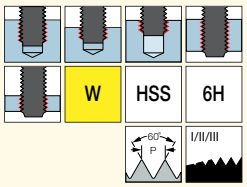
Chamfer Lead According to DIN2197 (specified for each tool family)

- **A** Form A (Chamfer Lead 5-6 Threads)
- **B** Form B (with Gun-Nose and Chamfer Lead 4-5 Threads)
- **C** Form C (Chamfer Lead 2-3 Threads)
- **D** Form D (Chamfer Lead 4-5 Threads)
- **E** Form E (Chamfer Lead 1.5-2 Threads)

TPH M-W (HSS)

DIN 13 HSS Hand Tap Set for
ISO Metric Coarse Threads





Designation	Dimensions									HS
	TDZ	TP[2]	OAL	THL	DCONMS	NOF[3]	DRVS[4]	Pre-hole	Standard	
TPH M-2X0.4-W	M2	0.400	36.00	8.0	2.80	3	2.10	1.60	DIN 352	●
TPH M-2.2X0.45-W	M2.2	0.450	36.00	9.0	2.80	3	2.10	1.75	DIN 352	●
TPH M-2.5X0.45-W	M2.5	0.450	40.00	9.0	2.80	3	2.10	2.05	DIN 352	●
TPH M-2.6X0.45-W [1]	M2.6	0.450	40.00	9.0	2.80	3	2.10	2.10	DIN 352	●
TPH M-3X0.5-W	M3	0.500	40.00	11.0	3.50	3	2.70	2.50	DIN 352	●
TPH M-3.5X0.6-W	M3.5	0.600	45.00	13.0	4.00	3	3.00	2.90	DIN 352	●
TPH M-4X0.7-W	M4	0.700	45.00	13.0	4.50	3	3.40	3.30	DIN 352	●
TPH M-4.5X0.75-W	M4.5	0.750	50.00	16.0	6.00	3	4.90	3.70	DIN 352	●
TPH M-5X0.8-W	M5	0.800	52.00	16.0	6.00	3	4.90	4.20	DIN 352	●
TPH M-5.5X0.9-W	M5.5	0.900	56.00	18.0	6.00	3	4.90	4.60	DIN 352	●
TPH M-6X1.0-W	M6	1.000	56.00	18.0	6.00	3	4.90	5.00	DIN 352	●
TPH M-7X1.0-W	M7	1.000	56.00	18.0	6.00	3	4.90	6.00	DIN 352	●
TPH M-8X1.25-W	M8	1.250	63.00	20.0	6.00	3	4.90	6.80	DIN 352	●
TPH M-9X1.25-W	M9	1.250	63.00	20.0	7.00	4	5.50	7.80	DIN 352	●
TPH M-10X1.5-W	M10	1.500	70.00	22.0	7.00	4	5.50	8.50	DIN 352	●
TPH M-11X1.5-W	M11	1.500	70.00	22.0	8.00	4	6.20	9.50	DIN 352	●
TPH M-12X1.75-W	M12	1.750	80.00	24.0	9.00	4	7.00	10.20	DIN 352	●
TPH M-14X2.0-W	M14	2.000	80.00	26.0	11.00	4	9.00	12.00	DIN 352	●
TPH M-16X2.0-W	M16	2.000	80.00	27.0	12.00	4	9.00	14.00	DIN 352	●
TPH M-18X2.5-W	M18	2.500	95.00	30.0	14.00	4	11.00	15.50	DIN 352	●
TPH M-20X2.5-W	M20	2.500	95.00	32.0	16.00	4	12.00	17.50	DIN 352	●

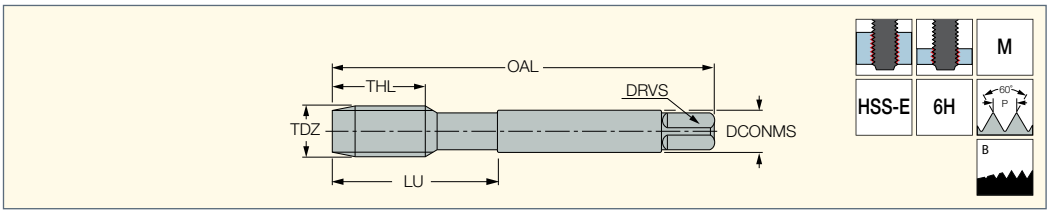
• NOTE: Each set contains 2 or 3 taps • For user guide and cutting conditions, see pages 346-348, 361-382

[1] DIN profile
[2] Thread pitch
[3] Number of flutes
[4] Torque key size

ONETAP

TPG M (HSS)

DIN 13 HSS Gun Point Machine Taps for ISO Metric Coarse Threads for a Wide Range of Materials



Designation	Dimensions										Tough ↔ Hard		
	TDZ	TP(1)	OAL	THL	LU	DCONMS	NOF(2)	DRVS(3)	Pre-hole	Standard	HE	HEST	HETI
TPG M-2X0.4-M	M2	0.400	45.00	8.0	13.0	2.80	3	2.10	1.60	DIN 371	●	●	●
TPG M-2.2X0.45-M	M2.2	0.450	45.00	8.0	13.0	2.80	3	2.10	1.75	DIN 371	●	●	●
TPG M-2.3X0.4-M	M2.3	0.400	45.00	8.0	13.0	2.80	3	2.10	1.90	DIN 371	●	●	●
TPG M-2.5X0.45-M	M2.5	0.450	50.00	9.0	15.0	2.80	3	2.10	2.05	DIN 371	●	●	●
TPG M-2.6X0.45-M	M2.6	0.450	50.00	9.0	15.0	2.80	3	2.10	2.10	DIN 371	●	●	●
TPG M-3X0.5-M	M3	0.500	56.00	11.0	18.0	3.50	3	2.70	2.50	DIN 371	●	●	●
TPG M-3.5X0.6-M	M3.5	0.600	56.00	12.0	20.0	4.00	3	3.00	2.90	DIN 371	●	●	●
TPG M-4X0.7-M	M4	0.700	63.00	13.0	21.0	4.50	3	3.40	3.30	DIN 371	●	●	●
TPG M-4.5X0.75-M	M4.5	0.750	70.00	14.0	25.0	6.00	3	4.90	3.70	DIN 371	●	●	●
TPG M-5X0.8-M	M5	0.800	70.00	15.0	25.0	6.00	3	4.90	4.20	DIN 371	●	●	●
TPG M-6X1.0-M	M6	1.000	80.00	17.0	30.0	6.00	3	4.90	5.00	DIN 371	●	●	●
TPG M-7X1.0-M	M7	1.000	80.00	17.0	30.0	7.00	3	5.50	6.00	DIN 371	●	●	●
TPG M-8X1.25-M	M8	1.250	90.00	20.0	35.0	8.00	3	6.20	6.80	DIN 371	●	●	●
TPG M-9X1.25-M	M9	1.250	90.00	20.0	35.0	9.00	3	7.00	7.80	DIN 371	●	●	●
TPG M-10X1.5-M	M10	1.500	100.00	22.0	39.0	10.00	3	8.00	8.50	DIN 371	●	●	●
TPG M-11X1.5-M	M11	1.500	100.00	22.0	-	8.00	3	6.20	9.50	DIN 376	●	●	●
TPG M-12X1.75-M	M12	1.750	110.00	24.0	-	9.00	3	7.00	10.20	DIN 376	●	●	●
TPG M-14X2.0-M	M14	2.000	110.00	26.0	-	11.00	3	9.00	12.00	DIN 376	●	●	●
TPG M-16X2.0-M	M16	2.000	110.00	27.0	-	12.00	3	9.00	14.00	DIN 376	●	●	●
TPG M-18X2.5-M	M18	2.500	125.00	30.0	-	14.00	4	11.00	15.50	DIN 376	●	●	●
TPG M-20X2.5-M	M20	2.500	140.00	32.0	-	16.00	4	12.00	17.50	DIN 376	●	●	●
TPG M-22X2.5-M	M22	2.500	140.00	32.0	-	18.00	4	14.50	19.50	DIN 376	●	●	●
TPG M-24X3.0-M	M24	3.000	160.00	34.0	-	18.00	4	14.50	21.00	DIN 376	●	●	●
TPG M-27X3.0-M	M27	3.000	160.00	36.0	-	20.00	4	16.00	24.00	DIN 376	●	●	●
TPG M-30X3.5-M	M30	3.500	180.00	40.0	-	22.00	4	18.00	26.50	DIN 376	●	●	●

• For user guide and cutting conditions, see pages 346-348, 361-382

(1) Thread pitch

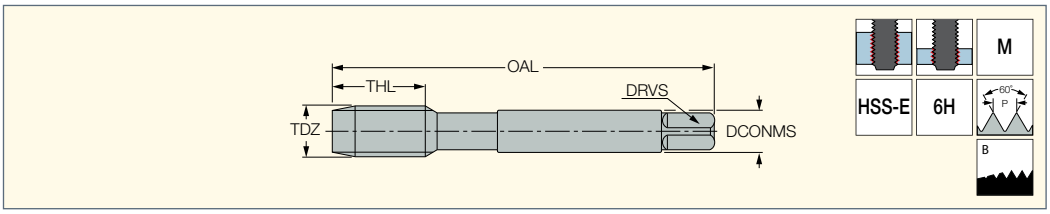
(2) Number of flutes

(3) Torque key size

ONETAP

TPG MF (HSS)

DIN 13 HSS Gun Point Machine Taps for ISO Metric Fine Threads for a Wide Range of Materials



Designation	Dimensions									Tough ↔ Hard		
	TDZ	TP(1)	OAL	THL	DCONMS	NOF(2)	DRVS(3)	Pre-hole	Standard	HE	HEST	HETI
TPG MF-4X0.5-M	M4	0.500	63.00	10.0	2.80	3	2.10	3.50	DIN 374	●	●	●
TPG MF-5X0.5-M	M5	0.500	70.00	11.0	3.50	3	2.70	4.50	DIN 374	●	●	●
TPG MF-6X0.75-M	M6	0.750	80.00	13.0	4.50	3	3.40	5.20	DIN 374	●	●	●
TPG MF-6X0.5-M	M6	0.500	80.00	13.0	4.50	3	3.40	5.50	DIN 374	●	●	●
TPG MF-7X0.75-M	M7	0.750	80.00	14.0	5.50	3	4.30	6.20	DIN 374	●	●	●
TPG MF-8X1.0-M	M8	1.000	90.00	17.0	6.00	3	4.90	7.00	DIN 374	●	●	●
TPG MF-8X0.75-M	M8	0.750	80.00	14.0	6.00	3	4.90	7.20	DIN 374	●	●	●
TPG MF-10X1.25-M	M10	1.250	100.00	22.0	7.00	3	5.50	8.80	DIN 374	●	●	●
TPG MF-10X1.0-M	M10	1.000	90.00	18.0	7.00	3	5.50	9.00	DIN 374	●	●	●
TPG MF-10X0.75-M	M10	0.750	90.00	18.0	7.00	3	5.50	9.20	DIN 374	●	●	●
TPG MF-12X1.5-M	M12	1.500	100.00	22.0	9.00	3	7.00	10.50	DIN 374	●	●	●
TPG MF-12X1.25-M	M12	1.250	100.00	22.0	9.00	3	7.00	10.80	DIN 374	●	●	●
TPG MF-12X1.0-M	M12	1.000	100.00	18.0	9.00	3	7.00	11.00	DIN 374	●	●	●
TPG MF-14X1.5-M	M14	1.500	100.00	22.0	11.00	3	9.00	12.50	DIN 374	●	●	●
TPG MF-14X1.25-M	M14	1.250	100.00	22.0	11.00	3	9.00	12.80	DIN 374	●	●	●
TPG MF-14X1.0-M	M14	1.000	100.00	18.0	11.00	3	9.00	13.00	DIN 374	●	●	●
TPG MF-16X1.5-M	M16	1.500	100.00	22.0	12.00	3	9.00	14.50	DIN 374	●		●
TPG MF-16X1.0-M	M16	1.000	100.00	18.0	12.00	3	9.00	15.00	DIN 374	●	●	●
TPG MF-18X1.5-M	M18	1.500	110.00	25.0	14.00	4	11.00	16.50	DIN 374	●	●	●
TPG MF-18X1.0-M	M18	1.000	110.00	20.0	14.00	4	11.00	17.00	DIN 374	●	●	●
TPG MF-20X1.5-M	M20	1.500	125.00	25.0	16.00	4	12.00	18.50	DIN 374	●	●	
TPG MF-20X1.0-M	M20	1.000	125.00	20.0	16.00	4	12.00	19.00	DIN 374	●	●	●
TPG MF-22X1.5-M	M22	1.500	125.00	25.0	18.00	4	14.50	20.50	DIN 374	●	●	●
TPG MF-22X1.0-M	M22	1.000	125.00	20.0	18.00	4	14.50	21.00	DIN 374	●	●	●
TPG MF-24X2.0-M	M24	2.000	140.00	27.0	18.00	4	14.50	22.00	DIN 374	●	●	●
TPG MF-24X1.5-M	M24	1.500	140.00	27.0	18.00	4	14.50	22.50	DIN 374	●	●	●
TPG MF-26X1.5-M	M26	1.500	140.00	28.0	18.00	4	14.50	24.50	DIN 374	●	●	●
TPG MF-27X2.0-M	M27	2.000	140.00	28.0	20.00	4	16.00	25.00	DIN 374	●	●	●
TPG MF-27X1.5-M	M27	1.500	140.00	28.0	20.00	4	16.00	25.50	DIN 374	●	●	●
TPG MF-28X1.5-M	M28	1.500	140.00	28.0	20.00	4	16.00	26.50	DIN 374	●	●	●
TPG MF-30X2.0-M	M30	2.000	150.00	30.0	22.00	4	18.00	28.00	DIN 374	●	●	●
TPG MF-30X1.5-M	M30	1.500	150.00	30.0	22.00	4	18.00	28.50	DIN 374	●	●	●

• For user guide and cutting conditions, see pages 346-348, 361-382

(1) Thread pitch

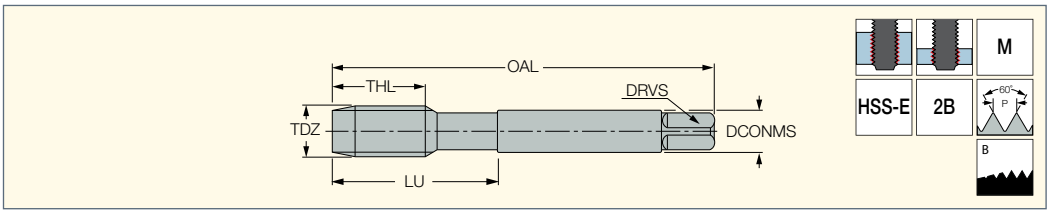
(2) Number of flutes

(3) Torque key size

ONETAP

TPG UNC (HSS)

HSS Gun Point Machine Taps for Unified Coarse Threads for a Wide Range of Materials



Designation	Dimensions										Tough ↔ Hard		
	TDZ	TPI[1]	OAL	THL	LU	DCONMS	NOF[2]	DRVS[3]	Pre-hole	Standard	HE	HEST	HETI
TPG UNC-#4-40-M	#4	40.0	56.00	11.0	18.0	3.50	3	2.70	2.30	DIN 371	•	•	•
TPG UNC-#5-40-M	#5	40.0	56.00	11.0	18.0	3.50	3	2.70	2.60	DIN 371	•	•	•
TPG UNC-#6-32-M	#6	32.0	56.00	12.0	20.0	4.00	3	3.00	2.85	DIN 371	•	•	•
TPG UNC-#8-32-M	#8	32.0	63.00	13.0	21.0	4.50	3	3.40	3.50	DIN 371	•		•
TPG UNC-#10-24-M	#10	24.0	70.00	15.0	25.0	6.00	3	4.90	3.90	DIN 371	•	•	•
TPG UNC-#12-24-M	#12	24.0	80.00	16.0	30.0	6.00	3	4.90	4.50	DIN 371	•	•	•
TPG UNC-1/4-20-M	1/4"	20.0	80.00	17.0	30.0	7.00	3	5.50	5.20	DIN 371	•	•	•
TPG UNC-5/16-18-M	5/16"	18.0	90.00	20.0	35.0	8.00	3	6.20	6.60	DIN 371	•	•	•
TPG UNC-3/8-16-M	3/8"	16.0	100.00	22.0	39.0	9.00	3	7.00	8.00	DIN 371	•	•	•
TPG UNC-7/16-14-M	7/16"	14.0	100.00	22.0	-	8.00	3	6.20	9.40	DIN 376	•	•	•
TPG UNC-1/2-13-M	1/2"	13.0	110.00	25.0	-	9.00	3	7.00	10.75	DIN 376	•	•	•
TPG UNC-9/16-12-M	9/16"	12.0	110.00	26.0	-	11.00	3	9.00	12.25	DIN 376	•	•	•
TPG UNC-5/8-11-M	5/8"	11.0	110.00	27.0	-	12.00	3	9.00	13.50	DIN 376	•	•	•
TPG UNC-3/4-10-M	3/4"	10.0	125.00	30.0	-	14.00	4	11.00	16.50	DIN 376	•	•	•
TPG UNC-7/8-9-M	7/8"	9.0	140.00	32.0	-	18.00	4	14.50	19.50	DIN 376	•	•	•
TPG UNC-1-8-M	1"	8.0	160.00	36.0	-	20.00	4	16.00	22.25	DIN 376	•	•	•

• For user guide and cutting conditions, see pages 346-348, 361-382

[1] Threads per inch

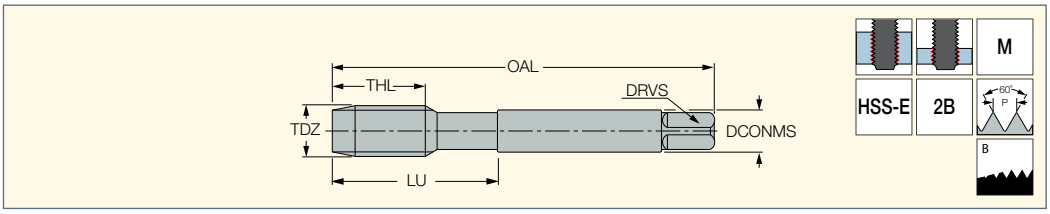
[2] Number of flutes

[3] Torque key size

ONETAP

TPG UNF (HSS)

HSS Gun Point Machine Taps for Unified Fine Threads for a Wide Range of Materials



Designation	Dimensions										Tough ↔ Hard		
	TDZ	TPI[1]	OAL	THL	LU	DCONMS	NOF[2]	DRVS[3]	Pre-hole	Standard	HE	HEST	HETI
TPG UNF-#4-48-M	#4	48.0	56.00	11.0	18.0	3.50	3	2.70	2.40	DIN 371	•	•	•
TPG UNF-#5-44-M	#5	44.0	56.00	11.0	18.0	3.50	3	2.70	2.70	DIN 371	•	•	•
TPG UNF-#6-40-M	#6	40.0	56.00	12.0	20.0	4.00	3	3.00	3.00	DIN 371	•	•	•
TPG UNF-#8-36-M	#8	36.0	63.00	13.0	21.0	4.50	3	3.40	3.50	DIN 371	•	•	•
TPG UNF-#10-32-M	#10	32.0	70.00	15.0	25.0	6.00	3	4.90	4.10	DIN 371	•	•	•
TPG UNF-#12-28-M	#12	28.0	80.00	16.0	30.0	6.00	3	4.90	4.70	DIN 371	•	•	•
TPG UNF-1/4-28-M	1/4"	28.0	80.00	17.0	30.0	7.00	3	5.50	5.50	DIN 371	•	•	•
TPG UNF-5/16-24-M	5/16"	24.0	90.00	17.0	35.0	8.00	3	6.20	6.90	DIN 371	•	•	•
TPG UNF-3/8-24-M	3/8"	24.0	100.00	18.0	39.0	9.00	3	7.00	8.50	DIN 371	•	•	•
TPG UNF-7/16-20-M	7/16"	20.0	100.00	22.0	-	8.00	3	6.20	9.90	DIN 374	•	•	•
TPG UNF-1/2-20-M	1/2"	20.0	100.00	22.0	-	9.00	3	7.00	11.50	DIN 374	•	•	•
TPG UNF-9/16-18-M	9/16"	18.0	100.00	22.0	-	11.00	3	9.00	12.90	DIN 374	•	•	•
TPG UNF-5/8-18-M	5/8"	18.0	100.00	22.0	-	12.00	3	9.00	14.50	DIN 374	•	•	•
TPG UNF-3/4-16-M	3/4"	16.0	110.00	25.0	-	14.00	4	11.00	17.50	DIN 374	•	•	•
TPG UNF-7/8-14-M	7/8"	14.0	125.00	26.0	-	18.00	4	14.50	20.50	DIN 374	•	•	•
TPG UNF-1-12-M	1"	12.0	140.00	28.0	-	20.00	4	16.00	23.25	DIN 374	•	•	•

• For user guide and cutting conditions, see pages 346-348, 361-382

[1] Threads per inch

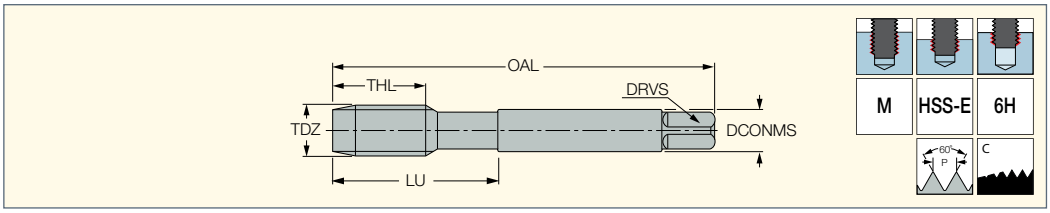
[2] Number of flutes

[3] Torque key size

ONETAP

TPS M (HSS)

DIN 13 HSS Spiral Flute Machine Taps for Metric Coarse Threads for a Wide Range of Materials



Designation	Dimensions											Tough ↔ Hard		
	TDZ	TP[1]	OAL	THL	LU	DCONMS	NOF[2]	DRVS[3]	Pre-hole	Standard	CSP[4]	HE	HEST	HETI
TPS M-2X0.4-M	M2	0.400	45.00	8.0	13.0	2.80	3	2.10	1.60	DIN 371	0	●	●	●
TPS M-2.2X0.45-M	M2.2	0.450	45.00	8.0	13.0	2.80	3	2.10	1.75	DIN 371	0	●	●	●
TPS M-2.3X0.4-M	M2.3	0.400	45.00	8.0	13.0	2.80	3	2.10	1.90	DIN 371	0	●	●	●
TPS M-2.5X0.45-M	M2.5	0.450	50.00	9.0	15.0	2.80	3	2.10	2.05	DIN 371	0	●	●	●
TPS M-2.6X0.45-M	M2.6	0.450	50.00	9.0	15.0	2.80	3	2.10	2.10	DIN 371	0	●	●	●
TPS M-3X0.5-M	M3	0.500	56.00	6.0	18.0	3.50	3	2.70	2.50	DIN 371	0	●	●	●
TPS M-3.5X0.6-M	M3.5	0.600	56.00	7.0	20.0	4.00	3	3.00	2.90	DIN 371	0	●	●	●
TPS M-4X0.7-M	M4	0.700	63.00	7.0	21.0	4.50	3	3.40	3.30	DIN 371	0	●	●	●
TPS M-4.5X0.75-M	M4.5	0.750	70.00	8.0	25.0	6.00	3	4.90	3.70	DIN 371	0	●	●	●
TPS M-5X0.8-M	M5	0.800	70.00	8.0	25.0	6.00	3	4.90	4.20	DIN 371	0	●	●	●
TPS M-6X1.0-M	M6	1.000	80.00	10.0	30.0	6.00	3	4.90	5.00	DIN 371	0	●	●	●
TPS M-7X1.0-M	M7	1.000	80.00	10.0	30.0	7.00	3	5.50	6.00	DIN 371	0	●	●	●
TPS M-8X1.25-M	M8	1.250	90.00	13.0	35.0	8.00	3	6.20	6.80	DIN 371	0	●	●	●
TPS M-9X1.25-M	M9	1.250	90.00	13.0	35.0	9.00	3	7.00	7.80	DIN 371	0	●	●	●
TPS M-10X1.5-M	M10	1.500	100.00	15.0	39.0	10.00	3	8.00	8.50	DIN 371	0	●	●	●
TPS M-11X1.5-M	M11	1.500	100.00	17.0	-	8.00	3	6.20	9.50	DIN 376	0	●	●	●
TPS M-12X1.75-M	M12	1.750	110.00	18.0	-	9.00	3	7.00	10.20	DIN 376	0	●	●	●
TPS M-14X2.0-M	M14	2.000	110.00	20.0	-	11.00	3	9.00	12.00	DIN 376	0	●	●	●
TPS M-16X2.0-M	M16	2.000	110.00	20.0	-	12.00	3	9.00	14.00	DIN 376	0	●	●	●
TPS M-16X2.0-M-B	M16	2.000	110.00	20.0	-	12.00	3	9.00	14.00	DIN 376	1	●		
TPS M-18X2.5-M	M18	2.500	125.00	25.0	-	14.00	4	11.00	15.50	DIN 376	0	●	●	●
TPS M-18X2.5-M-B	M18	2.500	125.00	25.0	-	14.00	4	11.00	15.50	DIN 376	1	●		
TPS M-20X2.5-M	M20	2.500	140.00	25.0	-	16.00	4	12.00	17.50	DIN 376	0	●	●	●
TPS M-20X2.5-M-B	M20	2.500	140.00	25.0	-	16.00	4	12.00	17.50	DIN 376	1	●		
TPS M-22X2.5-M	M22	2.500	140.00	25.0	-	18.00	4	14.50	19.50	DIN 376	0	●	●	●
TPS M-22X2.5-M-B	M22	2.500	140.00	25.0	-	18.00	4	14.50	19.50	DIN 376	1	●		
TPS M-24X3.0-M	M24	3.000	160.00	30.0	-	18.00	4	14.50	21.00	DIN 376	0	●	●	●
TPS M-24X3.0-M-B	M24	3.000	160.00	30.0	-	18.00	4	14.50	21.00	DIN 376	1	●		
TPS M-27X3.0-M	M27	3.000	160.00	30.0	-	20.00	4	16.00	24.00	DIN 376	0	●	●	●
TPS M-30X3.5-M	M30	3.500	180.00	35.0	-	22.00	4	18.00	26.50	DIN 376	0	●	●	●
TPS M-30X3.5-M-B	M30	3.500	180.00	35.0	-	22.00	4	18.00	26.50	DIN 376	1	●		

• For user guide and cutting conditions, see pages 346-348, 361-382

[1] Thread pitch

[2] Number of flutes

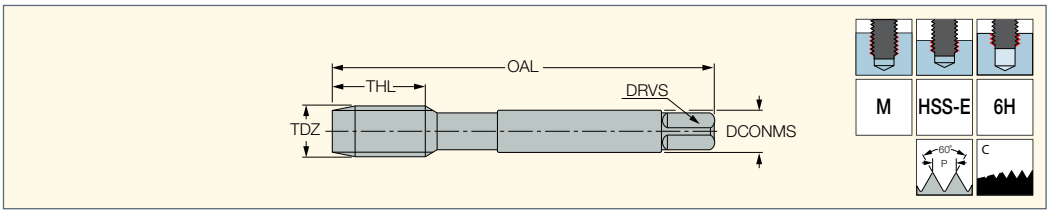
[3] Torque key size

[4] 0 - Without coolant supply, 1 - With coolant supply

ONETAP

TPS MF (HSS)

DIN 13 HSS Spiral Flute Machine Taps for Metric Fine Threads for a Wide Range of Materials



Designation	Dimensions									Tough ↔ Hard		
	TDZ	TP(1)	OAL	THL	DCONMS	NOF(2)	DRVS(3)	Pre-hole	Standard	HE	HEST	HETI
TPS MF-4X0.5-M	M4	0.500	63.00	5.0	2.80	3	2.10	3.50	DIN 374	•	•	•
TPS MF-5X0.5-M	M5	0.500	70.00	5.0	3.50	3	2.70	4.50	DIN 374	•	•	•
TPS MF-6X0.75-M	M6	0.750	80.00	8.0	4.50	3	3.40	5.20	DIN 374	•	•	•
TPS MF-6X0.5-M	M6	0.500	80.00	5.0	4.50	3	3.40	5.50	DIN 374	•	•	•
TPS MF-7X0.75-M	M7	0.750	80.00	10.0	5.50	3	4.30	6.20	DIN 374	•	•	•
TPS MF-8X1.0-M	M8	1.000	90.00	10.0	6.00	3	4.90	7.00	DIN 374	•	•	•
TPS MF-8X0.75-M	M8	0.750	80.00	8.0	6.00	3	4.90	7.20	DIN 374	•	•	•
TPS MF-10X1.25-M	M10	1.250	100.00	16.0	7.00	3	5.50	8.80	DIN 374	•	•	•
TPS MF-10X1.0-M	M10	1.000	90.00	10.0	7.00	3	5.50	9.00	DIN 374	•	•	•
TPS MF-10X0.75-M	M10	0.750	90.00	10.0	7.00	3	5.50	9.20	DIN 374	•	•	•
TPS MF-12X1.5-M	M12	1.500	100.00	15.0	9.00	3	7.00	10.50	DIN 374	•	•	•
TPS MF-12X1.25-M	M12	1.250	100.00	15.0	9.00	3	7.00	10.80	DIN 374	•	•	•
TPS MF-12X1.0-M	M12	1.000	100.00	11.0	9.00	3	7.00	11.00	DIN 374	•	•	•
TPS MF-14X1.5-M	M14	1.500	100.00	15.0	11.00	3	9.00	12.50	DIN 374	•	•	•
TPS MF-14X1.25-M	M14	1.250	100.00	15.0	11.00	3	9.00	12.80	DIN 374	•	•	•
TPS MF-14X1.0-M	M14	1.000	100.00	11.0	11.00	3	9.00	13.00	DIN 374	•	•	•
TPS MF-16X1.5-M	M16	1.500	100.00	15.0	12.00	3	9.00	14.50	DIN 374	•	•	•
TPS MF-16X1.0-M	M16	1.000	100.00	12.0	12.00	3	9.00	15.00	DIN 374	•	•	•
TPS MF-18X1.5-M	M18	1.500	110.00	17.0	14.00	4	11.00	16.50	DIN 374	•	•	•
TPS MF-18X1.0-M	M18	1.000	110.00	13.0	14.00	4	11.00	17.00	DIN 374	•	•	•
TPS MF-20X1.5-M	M20	1.500	125.00	17.0	16.00	4	12.00	18.50	DIN 374	•	•	•
TPS MF-20X1.0-M	M20	1.000	125.00	14.0	16.00	4	12.00	19.00	DIN 374	•	•	•
TPS MF-22X1.5-M	M22	1.500	125.00	17.0	18.00	4	14.50	20.50	DIN 374	•	•	•
TPS MF-22X1.0-M	M22	1.000	125.00	14.0	18.00	4	14.50	21.00	DIN 374	•	•	•
TPS MF-24X2.0-M	M24	2.000	140.00	20.0	18.00	4	14.50	22.00	DIN 374	•	•	•
TPS MF-24X1.5-M	M24	1.500	140.00	20.0	18.00	4	14.50	22.50	DIN 374	•	•	•
TPS MF-26X1.5-M	M26	1.500	140.00	20.0	18.00	4	14.50	24.50	DIN 374	•	•	•
TPS MF-27X2.0-M	M27	2.000	140.00	20.0	20.00	4	16.00	25.00	DIN 374	•	•	•
TPS MF-27X1.5-M	M27	1.500	140.00	20.0	20.00	4	16.00	25.50	DIN 374	•	•	•
TPS MF-28X1.5-M	M28	1.500	140.00	20.0	20.00	4	16.00	26.50	DIN 374	•	•	•
TPS MF-30X2.0-M	M30	2.000	150.00	22.0	22.00	4	18.00	28.00	DIN 374	•	•	•
TPS MF-30X1.5-M	M30	1.500	150.00	22.0	22.00	4	18.00	28.50	DIN 374	•	•	•

• For user guide and cutting conditions, see pages 346-348, 361-382

(1) Thread pitch

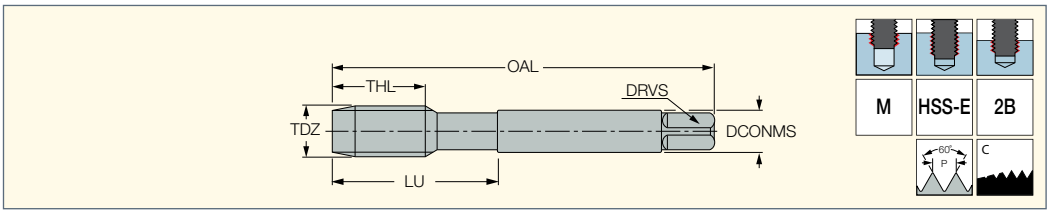
(2) Number of flutes

(3) Torque key size

ONETAP

TPS UNC (HSS)

HSS Spiral Flute Machine Taps for Unified Coarse Threads for a Wide Range of Materials



Designation	Dimensions										Tough ↔ Hard		
	TDZ	TPI[1]	OAL	THL	LU	DCONMS	NOF[2]	DRVS[3]	Pre-hole	Standard	HE	HEST	HETI
TPS UNC-#4-40-M	#4	40.0	56.00	6.0	18.0	3.50	3	2.70	2.30	DIN 371	•	•	•
TPS UNC-#5-40-M	#5	40.0	56.00	7.0	18.0	3.50	3	2.70	2.60	DIN 371	•	•	•
TPS UNC-#6-32-M	#6	32.0	56.00	7.0	20.0	4.00	3	3.00	2.85	DIN 371	•	•	•
TPS UNC-#8-32-M	#8	32.0	63.00	8.0	21.0	4.50	3	3.40	3.50	DIN 371	•	•	•
TPS UNC-#10-24-M	#10	24.0	70.00	10.0	25.0	6.00	3	4.90	3.90	DIN 371	•	•	•
TPS UNC-#12-24-M	#12	24.0	80.00	10.0	30.0	6.00	3	4.90	4.50	DIN 371	•	•	•
TPS UNC-1/4-20-M	1/4"	20.0	80.00	13.0	30.0	7.00	3	5.50	5.20	DIN 371	•	•	•
TPS UNC-5/16-18-M	5/16"	18.0	90.00	14.0	35.0	8.00	3	6.20	6.60	DIN 371	•	•	•
TPS UNC-3/8-16-M	3/8"	16.0	100.00	16.0	39.0	9.00	3	7.00	8.00	DIN 371	•	•	•
TPS UNC-7/16-14-M	7/16"	14.0	100.00	17.0	-	8.00	3	6.20	9.40	DIN 376	•	•	•
TPS UNC-1/2-13-M	1/2"	13.0	110.00	20.0	-	9.00	3	7.00	10.75	DIN 376	•	•	•
TPS UNC-9/16-12-M	9/16"	12.0	110.00	20.0	-	11.00	3	9.00	12.25	DIN 376	•	•	•
TPS UNC-5/8-11-M	5/8"	11.0	110.00	22.0	-	12.00	3	9.00	13.50	DIN 376	•	•	•
TPS UNC-3/4-10-M	3/4"	10.0	125.00	25.0	-	14.00	4	11.00	16.50	DIN 376		•	•
TPS UNC-7/8-9-M	7/8"	9.0	140.00	27.0	-	18.00	4	14.50	19.50	DIN 376	•	•	•
TPS UNC-1-8-M	1"	8.0	160.00	30.0	-	20.00	4	16.00	22.25	DIN 376	•	•	•

• For user guide and cutting conditions, see pages 346-348, 361-382

(1) Threads per inch

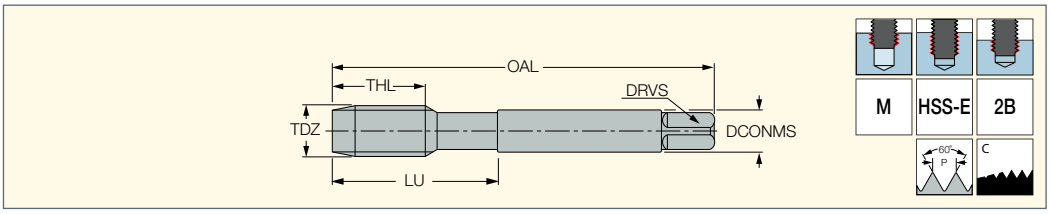
(2) Number of flutes

(3) Torque key size

ONETAP

TPS UNF (HSS)

HSS Spiral Flute Machine Taps for Unified Fine Threads for a Wide Range of Materials



Designation	Dimensions										Tough ↔ Hard		
	TDZ	TPI[1]	OAL	THL	LU	DCONMS	NOF[2]	DRVS[3]	Pre-hole	Standard	HE	HEST	HETI
TPS UNF-#4-48-M	#4	48.0	56.00	6.0	18.0	3.50	3	2.70	2.40	DIN 371	•	•	•
TPS UNF-#5-44-M	#5	44.0	56.00	7.0	18.0	3.50	3	2.70	2.70	DIN 371	•	•	•
TPS UNF-#6-40-M	#6	40.0	56.00	7.0	20.0	4.00	3	3.00	3.00	DIN 371	•	•	•
TPS UNF-#8-36-M	#8	36.0	63.00	8.0	21.0	4.50	3	3.40	3.50	DIN 371	•	•	•
TPS UNF-#10-32-M	#10	32.0	70.00	10.0	25.0	6.00	3	4.90	4.10	DIN 371	•	•	•
TPS UNF-#12-28-M	#12	28.0	80.00	10.0	30.0	6.00	3	4.90	4.70	DIN 371	•	•	•
TPS UNF-1/4-28-M	1/4"	28.0	80.00	10.0	30.0	7.00	3	5.50	5.50	DIN 371	•	•	•
TPS UNF-5/16-24-M	5/16"	24.0	90.00	10.0	35.0	8.00	3	6.20	6.90	DIN 371	•	•	•
TPS UNF-3/8-24-M	3/8"	24.0	100.00	10.0	39.0	9.00	3	7.00	8.50	DIN 371	•	•	•
TPS UNF-7/16-20-M	7/16"	20.0	100.00	13.0	-	8.00	3	6.20	9.90	DIN 374	•	•	•
TPS UNF-1/2-20-M	1/2"	20.0	100.00	13.0	-	9.00	3	7.00	11.50	DIN 374		•	•
TPS UNF-9/16-18-M	9/16"	18.0	100.00	15.0	-	11.00	3	9.00	12.90	DIN 374	•	•	•
TPS UNF-5/8-18-M	5/8"	18.0	100.00	15.0	-	12.00	3	9.00	14.50	DIN 374	•	•	•
TPS UNF-3/4-16-M	3/4"	16.0	110.00	17.0	-	14.00	4	11.00	17.50	DIN 374	•	•	•
TPS UNF-7/8-14-M	7/8"	14.0	125.00	17.0	-	18.00	4	14.50	20.50	DIN 374	•	•	•
TPS UNF-1-12-M	1"	12.0	140.00	20.0	-	20.00	4	16.00	23.25	DIN 374	•	•	•

• For user guide and cutting conditions, see pages 346-348, 361-382

(1) Threads per inch

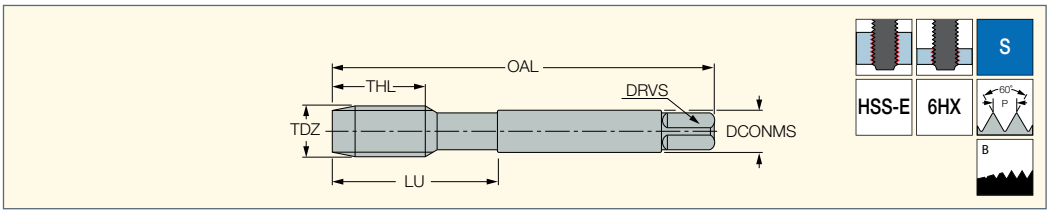
(2) Number of flutes

(3) Torque key size

HSS TAPS

TPG M-S (HSS)

HSS Gun Point Machine Taps According to DIN 13 for ISO Metric Coarse Threads on Steel with Good Machinability



Designation	Dimensions									HEST
	TDZ	TP(1)	OAL	THL	LU	DCONMS	NOF(2)	DRVS(3)	Pre-hole	
TPG M-2.2X0.45-S	M2.2	0.450	45.00	8.0	-	2.80	3	2.10	1.75	●
TPG M-2.3X0.4-S	M2.3	0.400	45.00	8.0	-	2.80	3	2.10	1.90	●
TPG M-2.5X0.45-S	M2.5	0.450	50.00	9.0	-	2.80	3	2.10	2.05	●
TPG M-2.6X0.45-S	M2.6	0.450	50.00	9.0	-	2.80	3	2.10	2.10	●
TPG M-3X0.5-S	M3	0.500	56.00	11.0	18.0	3.50	3	2.70	2.50	●
TPG M-3.5X0.6-S	M3.5	0.600	56.00	12.0	20.0	4.00	3	3.00	2.90	●
TPG M-4X0.7-S	M4	0.700	63.00	13.0	21.0	4.50	3	3.40	3.30	●
TPG M-4.5X0.75-S	M4.5	0.750	70.00	14.0	25.0	6.00	3	4.90	3.70	●
TPG M-5X0.8-S	M5	0.800	70.00	15.0	25.0	6.00	3	4.90	4.20	●
TPG M-6X1.0-S	M6	1.000	80.00	17.0	30.0	6.00	3	4.90	5.00	●
TPG M-8X1.25-S	M8	1.250	90.00	20.0	35.0	8.00	3	6.20	6.80	●
TPG M-10X1.5-S	M10	1.500	100.00	22.0	39.0	10.00	3	8.00	8.50	●
TPG M-11X1.5-S	M11	1.500	100.00	22.0	-	8.00	3	6.20	9.50	●
TPG M-12X1.75-S	M12	1.750	110.00	24.0	-	9.00	4	7.00	10.20	●
TPG M-16X2.0-S	M16	2.000	110.00	27.0	-	12.00	4	9.00	14.00	●
TPG M-18X2.5-S	M18	2.500	125.00	30.0	-	14.00	4	11.00	15.50	●
TPG M-20X2.5-S	M20	2.500	140.00	32.0	-	16.00	4	12.00	17.50	●

• For user guide and cutting conditions, see pages 346-348, 361-382

(1) Thread pitch

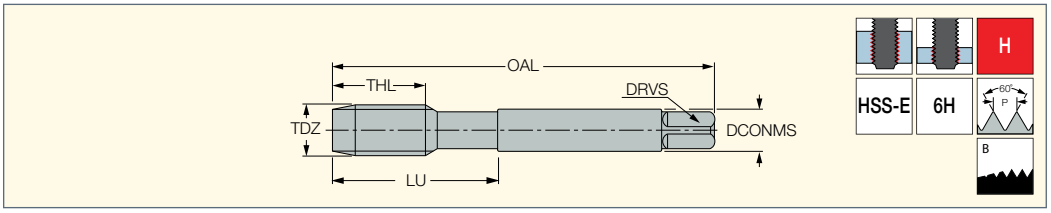
(2) Number of flutes

(3) Torque key size

HSS TAPS

TPG M-H (HSS)

DIN 13 HSS Gun Point Machine Taps for ISO Metric Coarse Threads for Hardened Steel and H.T.A.



Designation	Dimensions									HE
	TDZ	TP(1)	OAL	THL	LU	DCONMS	NOF(2)	DRVS(3)	Pre-hole	
TPG M-2X0.4-H	M2	0.400	45.00	8.0	-	2.80	3	2.10	1.60	●
TPG M-2.3X0.4-H	M2.3	0.400	45.00	8.0	-	2.80	3	2.10	1.90	●
TPG M-2.5X0.45-H	M2.5	0.450	50.00	9.0	-	2.80	3	2.10	2.05	●
TPG M-2.6X0.45-H	M2.6	0.450	50.00	9.0	-	2.80	3	2.10	2.10	●
TPG M-3X0.5-H	M3	0.500	56.00	11.0	18.0	3.50	3	2.70	2.50	●
TPG M-3.5X0.6-H	M3.5	0.600	56.00	12.0	20.0	4.00	3	3.00	2.90	●
TPG M-4X0.7-H	M4	0.700	63.00	13.0	21.0	4.50	3	3.40	3.30	●
TPG M-4.5X0.75-H	M4.5	0.750	70.00	14.0	25.0	6.00	3	4.90	3.70	●
TPG M-5X0.8-H	M5	0.800	70.00	15.0	25.0	6.00	3	4.90	4.20	●
TPG M-6X1.0-H	M6	1.000	80.00	17.0	30.0	6.00	3	4.90	5.00	●
TPG M-7X1.0-H	M7	1.000	80.00	17.0	30.0	7.00	3	5.50	6.00	●
TPG M-8X1.25-H	M8	1.250	90.00	20.0	35.0	8.00	3	6.20	6.80	●
TPG M-10X1.5-H	M10	1.500	100.00	22.0	39.0	10.00	3	8.00	8.50	●
TPG M-11X1.5-H	M11	1.500	100.00	22.0	-	8.00	3	6.20	9.50	●
TPG M-12X1.75-H	M12	1.750	110.00	24.0	-	9.00	3	7.00	10.20	●
TPG M-14X2.0-H	M14	2.000	110.00	26.0	-	11.00	3	9.00	12.00	●
TPG M-16X2.0-H	M16	2.000	110.00	27.0	-	12.00	3	9.00	14.00	●
TPG M-18X2.5-H	M18	2.500	125.00	30.0	-	14.00	4	11.00	15.50	●
TPG M-20X2.5-H	M20	2.500	140.00	32.0	-	16.00	4	12.00	17.50	●

• For user guide and cutting conditions, see pages 346-348, 361-382

(1) Thread pitch

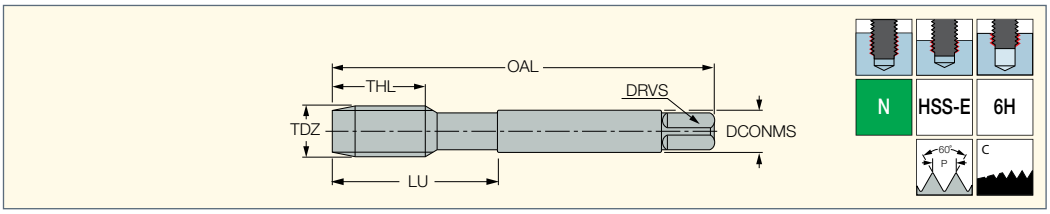
(2) Number of flutes

(3) Torque key size

HSS TAPS

TPS M-N (HSS)

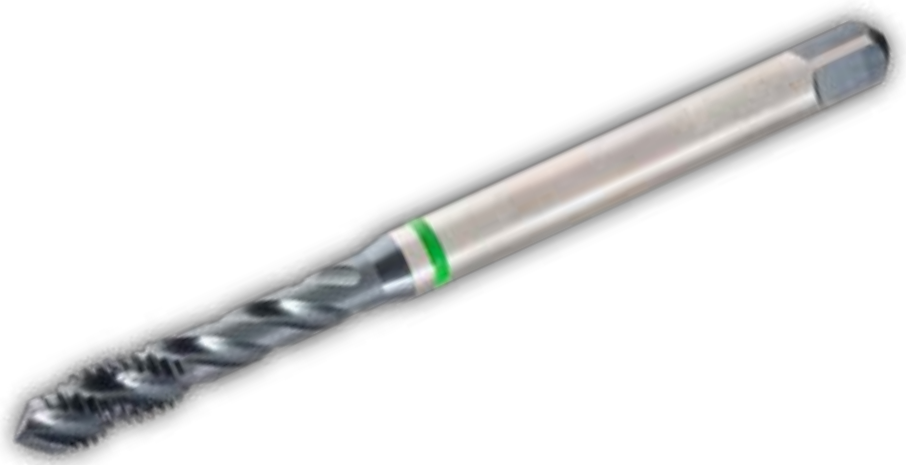
DIN 13 HSS R.H. 40° Spiral Flute Machine Taps for ISO Metric Coarse Threads for Low Alloyed Steel



Designation	Dimensions											HEST
	TDZ	TP[2]	OAL	THL	LU	DCONMS	NOF[3]	DRVS[4]	Pre-hole	FHA	Standard	
TPS M-2X0.4-N	M2	0.400	45.00	8.0	-	2.80	3	2.10	1.60	40.0	DIN 371	●
TPS M-2.2X0.45-N	M2.2	0.450	45.00	8.0	-	2.80	3	2.10	1.75	40.0	DIN 371	●
TPS M-2.3X0.4-N [1]	M2.3	0.400	45.00	8.0	-	2.80	3	2.10	1.90	40.0	DIN 371	●
TPS M-2.5X0.45-N	M2.5	0.450	50.00	9.0	-	2.80	3	2.10	2.05	40.0	DIN 371	●
TPS M-3X0.5-N	M3	0.500	56.00	6.0	18.0	3.50	3	2.70	2.50	40.0	DIN 371	●
TPS M-3.5X0.6-N	M3.5	0.600	56.00	7.0	20.0	4.00	3	3.00	2.90	40.0	DIN 371	●
TPS M-4X0.7-N	M4	0.700	63.00	7.0	21.0	4.50	3	3.40	3.30	40.0	DIN 371	●
TPS M-4.5X0.75-N	M4.5	0.750	70.00	8.0	25.0	6.00	3	4.90	3.70	40.0	DIN 371	●
TPS M-5X0.8-N	M5	0.800	70.00	8.0	25.0	6.00	3	4.90	4.20	40.0	DIN 371	●
TPS M-6X1.0-N	M6	1.000	80.00	10.0	30.0	6.00	3	4.90	5.00	40.0	DIN 371	●
TPS M-7X1.0-N	M7	1.000	80.00	10.0	30.0	7.00	3	5.50	6.00	40.0	DIN 371	●
TPS M-8X1.25-N	M8	1.250	90.00	13.0	35.0	8.00	3	6.20	6.80	40.0	DIN 371	●
TPS M-9X1.25-N	M9	1.250	90.00	13.0	35.0	9.00	3	7.00	7.80	40.0	DIN 371	●
TPS M-10X1.5-N	M10	1.500	100.00	15.0	39.0	10.00	3	8.00	8.50	40.0	DIN 371	●
TPS M-11X1.5-N	M11	1.500	100.00	17.0	-	8.00	3	6.20	9.50	40.0	DIN 376	●
TPS M-12X1.75-N	M12	1.750	110.00	18.0	-	9.00	3	7.00	10.20	40.0	DIN 376	●
TPS M-14X2.0-N	M14	2.000	110.00	20.0	-	11.00	3	9.00	12.00	40.0	DIN 376	●
TPS M-16X2.0-N	M16	2.000	110.00	20.0	-	12.00	3	9.00	14.00	40.0	DIN 376	●
TPS M-18X2.5-N	M18	2.500	125.00	25.0	-	14.00	4	11.00	15.50	40.0	DIN 376	●
TPS M-20X2.5-N	M20	2.500	140.00	25.0	-	16.00	4	12.00	17.50	40.0	DIN 376	●

• For user guide and cutting conditions, see pages 346-348, 361-382

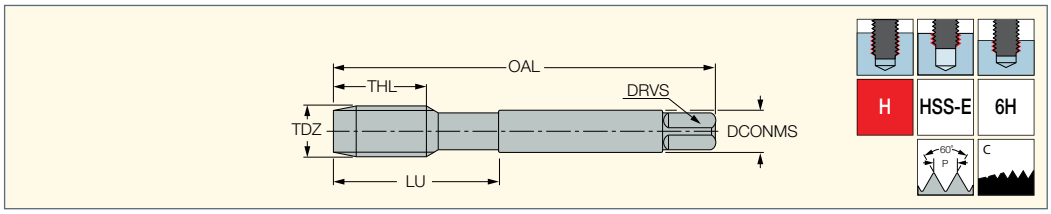
[1] DIN profile
[2] Thread pitch
[3] Number of flutes
[4] Torque key size



HSS TAPS

TPS M-H (HSS)

DIN 13 HSS Right-Hand 40° Spiral Flute Machine Taps for ISO Metric Coarse Threads for H.T.A.



Designation	Dimensions										HEST
	TDZ	TP[2]	OAL	THL	LU	DCONMS	NOF[3]	DRVS[4]	Pre-hole	FHA	
TPS M-2X0.4-H	M2	0.400	45.00	8.0	-	2.80	3	2.10	1.60	40.0	●
TPS M-2.2X0.45-H	M2.2	0.450	45.00	8.0	-	2.80	3	2.10	1.75	40.0	●
TPS M-2.5X0.45-H	M2.5	0.450	50.00	9.0	-	2.80	3	2.10	2.05	40.0	●
TPS M-2.6X0.45-H [1]	M2.6	0.450	50.00	9.0	-	2.80	3	2.10	2.10	40.0	●
TPS M-3X0.5-H	M3	0.500	56.00	6.0	18.0	3.50	3	2.70	2.50	40.0	●
TPS M-3.5X0.6-H	M3.5	0.600	56.00	7.0	20.0	4.00	3	3.00	2.90	40.0	●
TPS M-4X0.7-H	M4	0.700	63.00	7.0	21.0	4.50	3	3.40	3.30	40.0	●
TPS M-4.5X0.75-H	M4.5	0.750	70.00	8.0	25.0	6.00	3	4.90	3.70	40.0	●
TPS M-5X0.8-H	M5	0.800	70.00	8.0	25.0	6.00	3	4.90	4.20	40.0	●
TPS M-6X1.0-H	M6	1.000	80.00	10.0	30.0	6.00	3	4.90	5.00	40.0	●
TPS M-7X1.0-H	M7	1.000	80.00	10.0	30.0	7.00	3	5.50	6.00	40.0	●
TPS M-8X1.25-H	M8	1.250	90.00	13.0	35.0	8.00	3	6.20	6.80	40.0	●
TPS M-9X1.25-H	M9	1.250	90.00	13.0	35.0	9.00	3	7.00	7.80	40.0	●
TPS M-10X1.5-H	M10	1.500	100.00	15.0	39.0	10.00	3	8.00	8.50	40.0	●
TPS M-11X1.5-H	M11	1.500	100.00	17.0	-	8.00	3	6.20	9.50	40.0	●
TPS M-12X1.75-H	M12	1.750	110.00	18.0	-	9.00	3	7.00	10.20	40.0	●
TPS M-14X2.0-H	M14	2.000	110.00	20.0	-	11.00	3	9.00	12.00	40.0	●
TPS M-16X2.0-H	M16	2.000	110.00	20.0	-	12.00	3	9.00	14.00	40.0	●
TPS M-18X2.5-H	M18	2.500	125.00	25.0	-	14.00	4	11.00	15.50	40.0	●
TPS M-20X2.5-H	M20	2.500	140.00	25.0	-	16.00	4	12.00	17.50	40.0	●

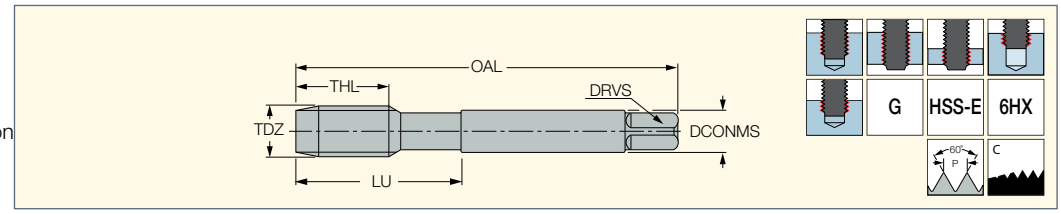
• For user guide and cutting conditions, see pages 346-348, 361-382

[1] DIN profile
[2] Thread pitch
[3] Number of flutes
[4] Torque key size

HSS TAPS

TPST M-G (HSS)

DIN 13 HSS Straight Flute
Machine Taps for ISO Metric
Coarse Threads for Grey Cast Iron



Designation	Dimensions									HENI
	TDZ	TP[2]	OAL	THL	LU	DCONMS	NOF[3]	DRVS[4]	Pre-hole	
TPST M-2.2X0.45-G	M2.2	0.450	45.00	8.0	-	2.80	3	2.10	1.75	●
TPST M-2.3X0.4-G [1]	M2.3	0.400	45.00	8.0	-	2.80	3	2.10	1.90	●
TPST M-2.5X0.45-G	M2.5	0.450	50.00	9.0	-	2.80	3	2.10	2.05	●
TPST M-2.6X0.45-G [1]	M2.6	0.450	50.00	9.0	-	2.80	3	2.10	2.10	●
TPST M-3.5X0.6-G	M3.5	0.600	56.00	12.0	20.0	4.00	3	3.00	2.90	●
TPST M-4X0.7-G	M4	0.700	63.00	13.0	21.0	4.50	3	3.40	3.30	●
TPST M-4.5X0.75-G	M4.5	0.750	70.00	14.0	25.0	6.00	3	4.90	3.70	●
TPST M-5X0.8-G	M5	0.800	70.00	15.0	25.0	6.00	4	4.90	4.20	●
TPST M-6X1.0-G	M6	1.000	80.00	17.0	30.0	6.00	4	4.90	5.00	●
TPST M-8X1.25-G	M8	1.250	90.00	20.0	35.0	8.00	4	6.20	6.80	●
TPST M-9X1.25-G	M9	1.250	90.00	20.0	35.0	9.00	4	7.00	7.80	●
TPST M-10X1.5-G	M10	1.500	100.00	22.0	39.0	10.00	4	8.00	8.50	●
TPST M-11X1.5-G	M11	1.500	100.00	22.0	-	8.00	4	6.20	9.50	●
TPST M-12X1.75-G	M12	1.750	110.00	24.0	-	9.00	4	7.00	10.20	●
TPST M-14X2.0-G	M14	2.000	110.00	26.0	-	11.00	4	9.00	12.00	●
TPST M-16X2.0-G	M16	2.000	110.00	27.0	-	12.00	4	9.00	14.00	●
TPST M-18X2.5-G	M18	2.500	125.00	30.0	-	14.00	4	11.00	15.50	●
TPST M-20X2.5-G	M20	2.500	140.00	32.0	-	16.00	4	12.00	17.50	●

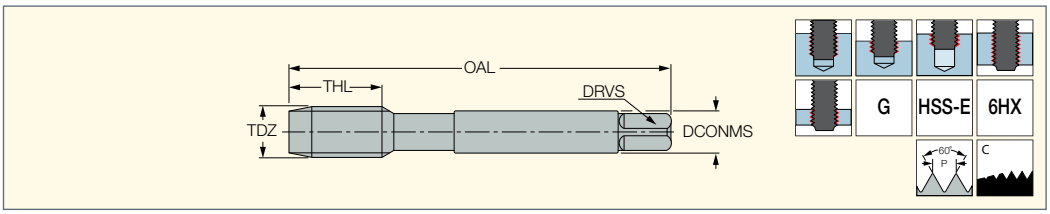
• For user guide and cutting conditions, see pages 346-348, 361-382

[1] DIN profile
[2] Thread pitch
[3] Number of flutes
[4] Torque key size

HSS TAPS

TPST MF-G (HSS)

DIN 13 HSS Straight Flute
Machine Taps for ISO Metric
Fine Threads for Grey Cast Iron



Designation	Dimensions								HENI
	TDZ	TP[1]	OAL	THL	DCONMS	NOF[2]	DRVS[3]	Pre-hole	
TPST MF-10X1.0-G	M10	1.000	90.00	18.0	7.00	3	5.50	9.00	●
TPST MF-10X1.25-G	M10	1.250	100.00	22.0	7.00	3	5.50	8.80	●
TPST MF-12X1.25-G	M12	1.250	100.00	22.0	9.00	3	7.00	10.80	●
TPST MF-14X1.5-G	M14	1.500	100.00	22.0	11.00	3	9.00	12.50	●
TPST MF-16X1.5-G	M16	1.500	100.00	22.0	12.00	4	9.00	14.50	●
TPST MF-22X1.5-G	M22	1.500	125.00	25.0	18.00	4	14.50	20.50	●

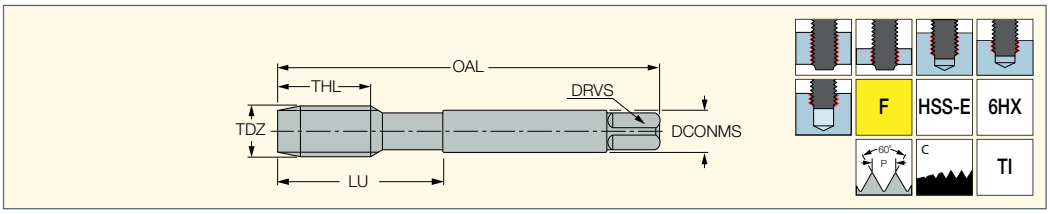
• For user guide and cutting conditions, see pages 346-348, 361-382

[1] Thread pitch
[2] Number of flutes
[3] Torque key size

HSS TAPS

TPF M-F (HSS)

DIN 13 HSS Cold Forming Machine Taps for ISO Metric Coarse Threads



Designation	Dimensions										HETI
	TDZ	TP[2]	OAL	THL	LU	DCONMS	NOF[3]	DRVS[4]	Pre-hole	Standard	
TPF M-2X0.4-F	M2	0.400	45.00	8.0	-	2.80	5	2.10	1.83	DIN 371	●
TPF M-2.2X0.45-F	M2.2	0.450	45.00	8.0	-	2.80	5	2.10	2.00	DIN 371	●
TPF M-2.3X0.4-F [1]	M2.3	0.400	45.00	8.0	-	2.80	5	2.10	2.10	DIN 371	●
TPF M-2.5X0.45-F	M2.5	0.450	50.00	9.0	-	2.80	5	2.10	2.30	DIN 371	●
TPF M-3X0.5-F	M3	0.500	56.00	11.0	18.0	3.50	5	2.70	2.80	DIN 371	●
TPF M-3.5X0.6-F	M3.5	0.600	56.00	12.0	20.0	4.00	5	3.00	3.25	DIN 371	●
TPF M-4X0.7-F	M4	0.700	63.00	13.0	21.0	4.50	5	3.40	3.70	DIN 371	●
TPF M-4.5X0.75-F	M4.5	0.750	70.00	14.0	25.0	6.00	5	4.90	4.15	DIN 371	●
TPF M-5X0.8-F	M5	0.800	70.00	15.0	25.0	6.00	5	4.90	4.65	DIN 371	●
TPF M-6X1.0-F	M6	1.000	80.00	17.0	30.0	6.00	5	4.90	5.55	DIN 371	●
TPF M-7X1.0-F	M7	1.000	80.00	17.0	30.0	7.00	5	5.50	6.55	DIN 371	●
TPF M-8X1.25-F	M8	1.250	90.00	20.0	35.0	8.00	5	6.20	7.40	DIN 371	●
TPF M-9X1.25-F	M9	1.250	90.00	20.0	35.0	9.00	5	7.00	8.40	DIN 371	●
TPF M-10X1.5-F	M10	1.500	100.00	22.0	39.0	10.00	5	8.00	9.30	DIN 371	●
TPF M-11X1.5-F	M11	1.500	100.00	22.0	-	8.00	5	6.20	10.30	DIN 376	●
TPF M-12X1.75-F	M12	1.750	110.00	24.0	-	9.00	5	7.00	11.20	DIN 376	●
TPF M-14X2.0-F	M14	2.000	110.00	26.0	-	11.00	5	9.00	13.00	DIN 376	●
TPF M-16X2.0-F	M16	2.000	110.00	27.0	-	12.00	6	9.00	15.00	DIN 376	●
TPF M-18X2.5-F	M18	2.500	125.00	30.0	-	14.00	6	11.00	16.80	DIN 376	●
TPF M-20X2.5-F	M20	2.500	140.00	32.0	-	16.00	6	12.00	18.80	DIN 376	●

• For user guide and cutting conditions, see pages 346-348,361-382

(1) DIN profile

(2) Thread pitch

(3) Number of flutes

(4) Torque key size

USER GUIDE CONTENTS

Tap Surface Treatments and Coating Types

The high speed steels we use grant high wear resistance and toughness. For machining certain materials, various surface treatments are an advantage.

Steam Tempered (ST)
The steam tempered is a Fe3O4 oxide coating which reduces the friction between the tool and workpiece and prevents cold welding.

Nitriding (NI)
Recommended surface treatment for machining hard wear/abrasive materials such as grey cast iron, aluminum alloys with high silicon percentage (more than 10%).

TiN Coating (TI)
The TiN coating has a hardness of approximately 2,300 HV and is temperature resistant up to approximately 600°C. This is an excellent golden colored coating for general applications.

TiCN-COATING – TiCN
TiCN takes place of TiN when the conditions require the coating to have a different hardness and toughness. The TiCN brings an advantage to machining very difficult steels or cutting interrupted bores. The TiCN-coating has a hardness of approx. 3,000 HV, but is temperature resistant up to approx. 400° only. That means TiCN needs excellent cooling for long service life. Color: Blue-grey coefficient of friction against steel : 0.4

TiAlN-COATING – TiAlN
This is a special coating for machining abrasive materials such as: grey cast iron, alu-alloys with silicon, fiber reinforced plastics, etc., or machining under high temperatures, which means with insufficient cooling, or high speeds ≥ 600m/min. TiAlN has a hardness of approx. 3,000 HV and is temperature resistant up to approx. 800°. Color: Violet-grey coefficient of friction against steel : 0.4

Hardslick-COATING – Hardslick
Hardslick combines in a novel way the advantages of an extremely hard, thermally stable TiAlN-coating with the sliding and lubricating properties of an outer WC/C (Tungsten carbide/carbon) coating. The hardslick coating has a hardness of approx. 3,000 HV and is temperature-resistant up to approx. 800°. Color: Violet-grey coefficient of friction against steel : 0.2

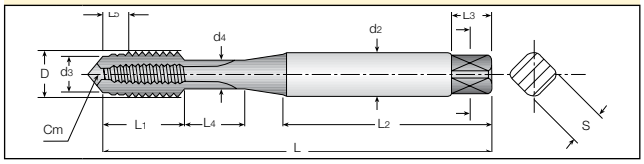
Tolerances According to DIN EN 22857
For taps with ISO metric threads.
The following chart gives a comparison between the new standard DIN EN 22857 and the withdrawn standard DIN 802 part 1. An important change is the re-classification from tap tolerance to tap application class.

Application class for taps to DIN EN 22857		Tolerance class to withdrawn standard DIN 802 part 1	Allotment of the tolerance zones of the nut thread to be cut				
Class 1	ISO 1	4H	4H	5H	-	-	-
Class 2	ISO 2	6H	5G	5G	6H	-	-
Class 3	ISO 3	6G	-	-	6G	7H	8H
-	-	7G	-	-	-	7G	8G

A suitable transition period is to be expected.
Codes for tolerance classes 7G/8G and <X> tolerance zones have yet to be standardized within DIN EN 22857, and the values from DIN 802 part will remain valid.

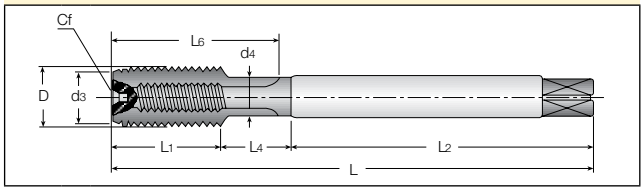
Tap Nomenclature and Standards

DIN 371



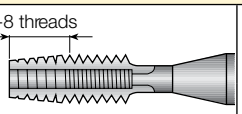
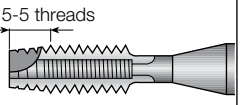
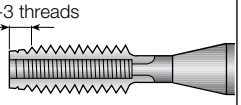
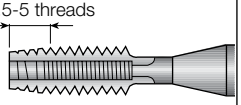
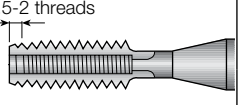
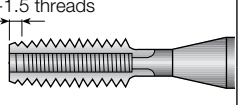
D - Major diameter
d2 - Shank diameter
d3 - Chamfer diameter
d4 - Neck diameter

DIN 376

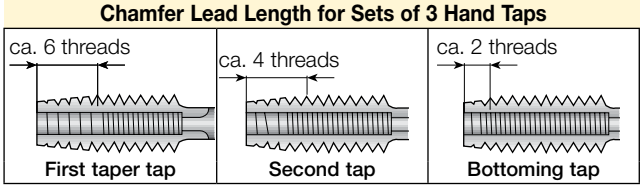


L - Total length
L - Total length
L1 - Thread length
L2 - Shank length
L3 - Square length
L4 - Neck length
L5 - Chamfer length
L6 - Flute length
S - Square size
Cm - Center male
Cf - Center female

Chamfer Lead Forms According to DIN 2197

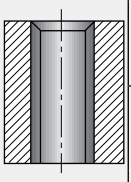
A	6-8 threads 	**Form A** Long, 6-8 threads for short through holes.
B	3.5-5 threads 	**Form B** Medium, 3.5-5 threads, with spiral point for all through holes and deep tapping holes.
C	2-3 threads 	**Form C** Long, 2-3 threads for blind holes and generally for aluminum grey cast iron and brass.
D	3.5-5 threads 	**Form D** Medium, 3.5-5 threads for through and blind holes with sufficient runout.
E	1.5-2 threads 	**Form E** Extremely short, 1.5-2 threads for blind holes with little runout depth. Avoid use if possible.
F	1-1.5 threads 	**Form F** Extremely short, 1-1.5 threads for blind holes with little runout depth. Avoid use if possible.

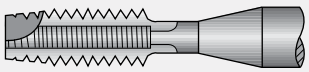
Chamfer Lead Length for Sets of 3 Hand Taps



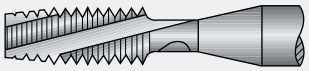
Tap Styles for Hole Types

Throughole

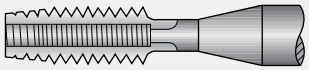




1 Straight fluted tap with spiral point

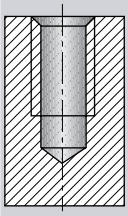


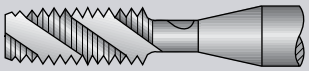
2 Left-hand spiral fluted tap



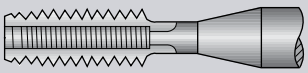
3 Straight fluted tap with long chamfer lead

Blind hole



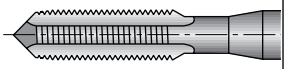
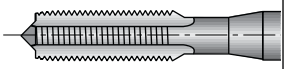
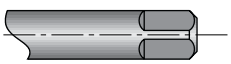
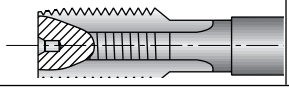
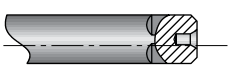


1 Right-hand spiral fluted tap



2 Straight fluted tap with short chamfer lead

Front and End Configurations According to DIN2197

Front End	Shank End
1 External Center 	4 External Center 
2 Stepped External Center 	5 Chamfer 
3 Internal Center 	6 Internal Center 

Thread Dia. Range (mm)	Front End	Shank End	Tap Standard
≤Ø6	1	4 5	DIN352
Ø7	1 2	4 5 6	DIN371
≥Ø8	1 2 3	5 6	DIN376

Pre-Tapping Hole Sizes

ISO Metric Threads Coarse Pitch			
M	Pitch mm	Max Core Dia.mm	Drill Size mm
1	0.25	0.785	0.75
1.1	0.25	0.885	0.85
1.2	0.25	0.985	0.95
1.4	0.30	1.160	1.10
1.6	0.35	1.321	1.25
1.7	0.35	1.346	1.30
1.8	0.35	1.521	1.45
2	0.40	1.679	1.60
2.2	0.45	1.838	1.75
2.3	0.40	1.920	1.90
2.5	0.45	2.138	2.05
2.6	0.45	2.176	2.10
3	0.50	2.599	2.50
3.5	0.60	3.010	2.90
4	0.70	3.422	3.30
4,5	0.75	3.878	3.70
5	0.80	4.334	4.20
6	1.00	5.153	5.00
7	1.00	6.153	6.00
8	1.25	6.912	6.80
9	1,25	7.912	7.80
10	1.50	8.676	8.50
11	1.50	9.676	9.50
12	1.75	10.441	10.20
14	2.00	12.210	12.00
16	2.00	14.210	14.00
18	2.50	15.744	15.50
20	2.50	17.744	17.50
22	2.50	19.744	19.50
24	3.00	21.252	21.00
27	3.00	24.252	24.00
30	3.50	26.771	26.50
33	3.50	29.771	29.50
36	4.00	32.270	32.00
39	4.00	35.270	35.00
42	4.50	37.799	37.50
45	4.50	40.799	40.50
48	5.00	43.297	43.00
52	5.00	47.297	47.00
56	5.50	50.796	50.50
60	5.50	54.796	54.50
64	6.00	58.305	58.00
68	6.00	62.305	62.00

ISO Metric Threads Fine Pitch			
MF	Pitch mm	Max Core Dia.mm	Drill Size mm
2.5	0.35	2.221	2.15
3	0.35	2.271	2.65
3.5	0.35	3.221	3.15
4	0.50	3.599	3.50
4.5	0.50	4.099	4.00
5	0.50	4.599	4.50
5.5	0.50	5.099	5.00
6	0.75	5.378	5.20
7	0.75	6.378	6.20
8	0.75	7.378	7.20
8	1.00	7.153	7.00
9	0.75	8.378	8.20
9	1.00	8.153	8.00
10	0.75	9.378	9.20
10	1.00	9.153	9.00
10	1.25	8.912	8.80
11	0.75	10.378	10.20
11	1.00	10.153	10.00
12	1.00	11.153	11.00
12	1,25	10.912	10.80
12	1,50	10.676	10.50
14	1,00	13.153	13.00
14	1,25	12.912	12.80
14	1.50	12.676	12.50
15	1.00	14.153	14.00
15	1.50	13.676	13.50
16	1.00	15.153	15.00
16	1.50	14.676	14.50
17	1.00	16.153	16.00
17	1.50	15.676	15.50
18	1.00	17.153	17.00
18	1.50	16.676	16.50
18	2.00	16.210	16.00
20	1.00	19.153	19.00
20	1.50	18.676	18.50
20	2.00	18.210	18.00
22	1,00	21.153	21.00
22	1.50	20.676	20.50
22	2.00	20.210	20.00
24	1.00	23.153	23.00
24	1,50	22.676	22.50
24	2,00	22.210	22.00
25	1.00	24.153	24.00
25	1.50	23.676	23.50

ISO Metric Threads Fine Pitch			
MF	Pitch mm	Max Core Dia.mm	Drill Size mm
25	2.00	23.210	23.00
26	1.50	24.676	24.50
27	1.00	26.153	26.00
27	1.50	25.676	25.50
27	2.00	25.210	25.00
28	1.00	27.153	27.00
28	1.50	26.676	26.50
28	2.00	26.210	26.00
30	1.00	29.153	29.00
30	1.50	28.676	28.50
30	2.00	28.210	28.00
30	3.00	27.252	27.00
32	1.50	30.675	30.50
32	2.00	30.210	30.00
33	1.50	31.676	31.50
33	2.00	31.210	31.00
33	3.00	30.252	30.00
35	1.50	33.676	33.50
36	1.50	34.676	34.50
36	2.00	34.210	34.00
36	3.00	33.252	33.00
38	1.50	36.676	36.50
39	1.50	37.676	37.50
39	2.00	37.210	37.00
39	3.00	36.252	36.00
40	1,50	38.676	38.50
40	2.00	38.210	38.00
40	3,00	37.252	37.00
42	1,50	40.676	40.50
42	2,00	40.210	40.00
42	3,00	39.252	39.00
45	1.50	43.676	43.50
45	2.00	43.210	43.00
45	3.00	42.252	42.00
48	1.50	46.676	46.50
48	2.00	46.210	46.00
48	3.00	45.252	45.00
50	1.50	48.676	48.50
50	2.00	48.210	48.00
50	3.00	47.252	47.00
52	1.50	50.676	50.50
52	2.00	50.210	50.00
52	3.00	49.252	49.00

Pre-Tapping Hole Sizes - Forming Taps

Recommended Tap Drill Size		
M	Pitch mm	Drill Size mm
1	0.25	0.9
1.1	0.25	1
1.2	0.25	1.1
1.4	0.3	1.28
1.6	0.35	1.47
1.7	0.35	1.57
1.8	0.35	1.67
2	0.4	1.85
2.2	0.45	2.03
2.3	0.4	2.15
2.5	0.45	2.33
2.6	0.45	2.43
3	0.5	2.8
3.5	0.6	3.25
4	0.7	3.7
4.5	0.75	4.2
5	0.8	4.65
6	1	5.55
7	1	6.55
8	1.25	6.6
9	1.25	7.45
10	1.5	8.45
11	1.5	9.35
12	1.75	11.25
14	2	13.1
16	2	15.1
18	2.5	16.85
20	2.5	18.85
22	2.5	20.85
24	3	22.65
27	3	25.65
30	3.5	28.4
33	3.5	31.4
36	4	34.15
39	4	37.15
42	4.5	39.9
45	4.5	42.9
48	5	45.65

Recommended Tap Drill Size		
MF	Pitch mm	Drill Size mm
2.5	0.35	2.37
2.6	0.35	2.47
3	0.35	2.88
3.5	0.35	3.38
4	0.5	3.8
5	0.5	4.8
6	0.5	5.8
6	0.75	5.7
7	0.75	6.7
8	0.75	7.7
8	1	7.6
9	0.75	8.7
9	1	8.6
10	0.75	9.7
10	1	9.6
10	1.25	9.45
11	1	10.6
12	1	11.6
12	1.25	11.45
12	1.5	11.35
14	1	13.6
14	1.25	13.45
14	1.5	13.35
15	1	14.6
15	1.5	14.35
16	1	15.6
16	1.5	15.35
18	4	17.6
18	1.5	17.35
18	2	17.1
20	1	19.6
20	1.5	19.35
20	2	19.1
24	2	23.1
30	2	29.1
36	3	34.65
42	4	40.15
48	3	46.65

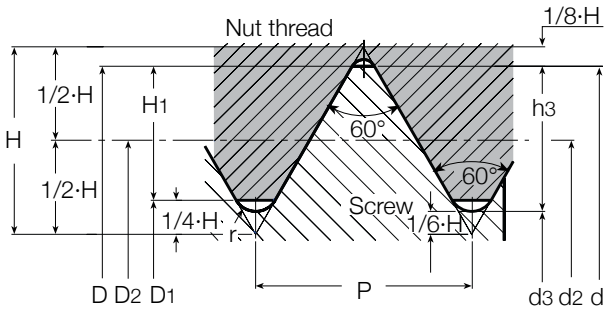
Pre-Tapping Hole Sizes - General Taps

American Unified Coarse Threads			
UNC	T.P.I	Max. Core Dia. inch	Drill Size mm
#1	64	1.585	1.5
#2	56	1.872	1.8
#3	48	2.146	2.1
#4	40	2.385	2.3
#5	40	2.697	2.6
#6	32	2.896	2.85
#8	32	3.528	3.5
#10	24	3.95	3.9
#12	24	4.59	4.5
1/4"	20	5.25	5.2
5/16"	18	6.68	6.6
3/8"	16	8.082	8
7/16"	14	9.441	9.4
1/2"	13	10.881	10.75
9/16"	12	12.301	12.25
5/8"	11	13.693	13.5
3/4"	10	16.624	16.5
7/8"	9	19.52	19.5
1"	8	22.344	22.25
1*1/8"	7	25.082	25
1*1/4"	7	28.258	28.25
1*3/8"	6	30.851	30.75
1*1/2"	6	34.026	34
1*3/4"	5	39.56	39.5
2"	4.5	45.367	45.25

American Unified Fine Threads			
UNF	T.P.I	Max. Core Dia. inch	Drill Size mm
#0	80	1.306	1.3
#1	72	1.613	1.6
#2	64	1.913	1.9
#3	56	2.197	2.1
#4	48	2.459	2.4
#5	44	2.741	2.7
#6	40	3.012	3
#8	36	3.597	3.5
#10	32	4.168	4.1
#12	28	4.717	4.7
1/4"	28	5.563	5.5
5/16"	24	6.995	6.9
3/8"	24	8.565	8.5
7/16"	20	9.947	9.9
1/2"	20	11.524	11.5
9/16"	18	12.969	12.9
5/8"	18	14.554	14.5
3/4"	16	17.546	17.5
7/8"	14	20.493	20.5
1"	12	23.363	23.25
1*1/8"	12	26.538	26.5
1*1/4"	12	29.713	29.5
1*3/8"	12	32.888	32.7
1*1/2"	12	36.063	36

ISO Metric Thread
Nominal Dimensions According to UNI 4535-64

Tap flank diameter production tolerances for ISO 6H Nut threads limit dimensions - nut threads ISO 6H



Coarse Pitch Threads Dimensions in mm

$H = 0.86603P$

$H_1 = \frac{5}{8} H = 0.54127P$

$h_3 = \frac{17}{24} H = 0.61343P$

$d_2 = D_2 = d - \frac{3}{4} H = d - 0.64952P$

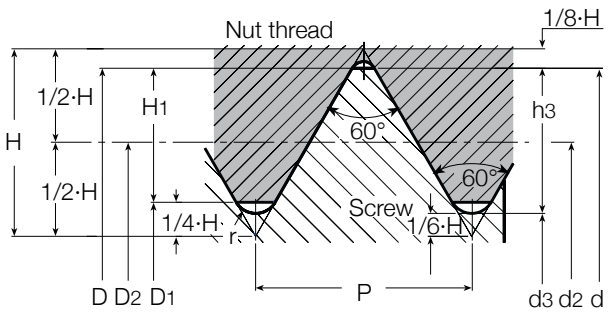
$d_3 = d - 2h_3 = d - 1.22687P$

$r = \frac{H}{6} = 0.14434P$

Nominal Dia. d=D	Pitch P	Flank Dia. d2=D2	Minor Diameter		Thread Depth		Radius r	Flank Dia. Tap Tolerance 6H d2		Flank Dia. Tap Tolerance 6H	
			Screw d3	Nut D1	Screw h3	Nut H1		Min.	Max.	Min.	Max.
M1.6	0.35	1.373	1.171	1.221	0.215	0.189	0.051	1.393	1.407	1.373	1.458
M1.8	0.35	1.573	1.371	1.421	0.215	0.189	0.051	1.593	1.607	1.573	1.658
M2	0.4	1.740	1.509	1.567	0.245	0.217	0.058	1.761	1.776	1.740	1.830
M2.2	0.45	1.908	1.648	1.713	0.276	0.244	0.065	1.931	1.946	1.908	2.003
M2.5	0.45	2.208	1.948	2.013	0.276	0.244	0.065	2.231	2.246	2.208	2.303
M3	0.5	2.675	2.387	2.459	0.307	0.271	0.072	2.699	2.715	2.675	2.775
M3.5	0.6	3.110	2.764	2.850	0.368	0.325	0.087	3.137	3.155	3.110	3.222
M4	0.7	3.545	3.141	3.242	0.429	0.379	0.101	3.574	3.593	3.545	3.663
M4.5	0.75	4.013	3.580	3.688	0.460	0.406	0.108	4.042	4.061	4.013	4.131
M5	0.8	4.480	4.019	4.134	0.491	0.433	0.115	4.510	4.530	4.480	4.605
M6	1	5.350	4.773	4.917	0.613	0.541	0.144	5.385	5.409	5.350	5.500
M7	1	6.350	5.773	5.917	0.613	0.541	0.144	6.385	6.409	6.350	6.500
M8	1.25	7.188	6.466	6.647	0.767	0.677	0.180	7.226	7.251	7.188	7.348
M9	1.25	8.188	7.466	7.647	0.767	0.677	0.180	8.226	8.251	8.188	8.348
M10	1.5	9.026	8.160	8.376	0.920	0.812	0.217	9.068	9.096	9.026	9.206
M11	1.5	10.026	9.160	9.376	0.920	0.812	0.217	10.068	10.096	10.026	10.206
M12	1.75	10.863	9.853	10.106	1.074	0.947	0.253	10.911	10.943	10.863	11.063
M14	2	12.701	11.546	11.835	1.227	1.083	0.289	12.752	12.786	12.701	12.913
M16	2	14.701	13.546	13.835	1.227	1.083	0.289	14.752	14.786	14.701	14.913
M18	2.5	16.376	14.933	15.294	1.534	1.353	0.361	16.430	16.466	16.376	16.600
M20	2.5	18.376	16.933	17.294	1.534	1.353	0.361	18.430	18.466	18.376	18.600
M22	2.5	20.376	18.933	19.294	1.534	1.353	0.361	20.430	20.466	20.376	20.600
M24	3	22.051	20.319	20.752	1.840	1.624	0.433	22.115	22.157	22.051	22.316
M27	3	25.051	23.319	23.752	1.840	1.624	0.433	25.115	25.157	25.051	25.316
M30	3.5	27.727	25.706	26.211	2.147	1.894	0.505	27.794	27.839	27.727	28.007
M33	3.5	30.727	28.706	29.211	2.147	1.894	0.505	30.794	30.839	30.727	31.007
M36	4	33.402	31.093	31.670	2.454	2.165	0.577	33.473	33.520	33.402	33.702
M39	4	36.402	34.093	34.670	2.454	2.165	0.577	36.473	36.520	36.402	36.702
M42	4.5	39.077	36.479	37.129	2.760	2.436	0.650	39.152	39.202	39.077	39.392
M45	4.5	42.077	39.479	40.129	2.760	2.436	0.650	42.152	42.202	42.077	42.392
M48	5	44.752	41.866	42.587	3.067	2.706	0.722	44.832	44.885	44.752	45.087
M52	5	48.752	45.866	46.587	3.067	2.706	0.722	48.832	48.885	48.752	49.087
M56	5.5	52.428	49.252	50.046	3.374	2.977	0.794	52.512	52.568	52.428	52.783
M60	5.5	56.428	53.252	54.046	3.374	2.977	0.794	56.512	56.568	56.428	56.783
M64	6	60.103	56.639	57.505	3.681	3.248	0.866	60.193	60.253	60.103	60.478
M68	6	64.103	60.639	61.505	3.681	3.248	0.866	64.193	64.253	64.103	64.478
Metric Thread MA (old UNI 159 profile)								**Nut Tolerance SH8**			
M1.7	0.35	1.473	1.246	1.246	0.227	0.227	0.040	1.493	1,507	1.473	1.529
M2.3	0.4	2.040	1.780	1.780	0.260	0.260	0.040	2.061	2.076	2.040	2.120
M2.6	0.45	2.308	2.016	2.016	0.292	0.292	0.050	2.331	2.346	2.308	2.388

ISO Metric Fine Thread
Nominal Dimensions According to UNI 4535-64

Tap flank diameter production tolerances for ISO 6H Nut threads limit dimensions - nut threads ISO 6H



Coarse Pitch Threads Dimensions in mm

$H = 0.86603P$

$H_1 = \frac{5}{8} H = 0.54127P$

$h_3 = \frac{17}{24} H = 0.61343P$

$d_2 = D_2 = d - \frac{3}{4} H = d - 0.64952P$

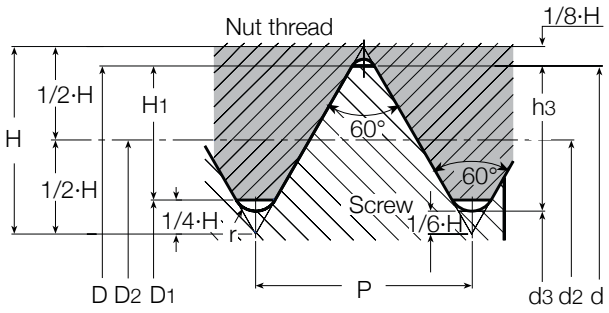
$d_3 = d - 2h_3 = d - 1.22687P$

$r = \frac{H}{6} = 0.14434P$

Nominal Dia. d=D	Pitch P	Flank Dia. d2=D2	Minor Diameter		Thread Depth		Radius r	Flank Dia. Tap Tolerance 6H d2		Flank Dia. Tap Tolerance 6H	
			Screw d3	Nut D1	Screw h3	Nut H1		Min.	Max.	Min.	Max.
M 2	0.25	1.838	1.693	1.729	0.153	0.135	0.036	1.844	1.856	1.838	1.886
M 2.5	0.35	2.273	2.701	2.121	0.215	0.189	0.051	2.293	2.307	2.273	2.358
M 3	0.35	2.773	2.571	2.621	0.215	0.189	0.051	2.794	2.809	2.773	2.863
M 3.5	0.35	3.273	3.071	3.121	0.215	0.189	0.051	3.294	3.309	3.273	3.363
M 4	0.5	3.675	3.387	3.459	0.307	0.271	0.072	3.699	3.715	3.675	3.775
M 4.5	0.5	4.175	3.887	3.959	0.307	0.271	0.072	4.199	4.215	4.175	4.275
M 5	0.5	4.675	4.387	4.459	0.307	0.271	0.072	4.699	4.715	4.675	4.775
M 5.5	0.5	5.175	4.887	4.959	0.307	0.271	0.072	5.199	5.215	5.175	5.275
M 6	0.5	5.675	5.387	5.459	0.307	0.271	0.072	5.702	5.72	5.675	5.787
M 6	0.75	5.513	5.08	5.188	0.46	0.406	0.108	5.545	5.566	5.513	5.645
M 7	0.75	6.513	6.08	6.188	0.46	0.406	0.108	6.545	6.566	6.513	6.645
M 8	0.5	7.675	7.387	7.459	0.307	0.271	0.072	7.702	7.72	7.675	7.787
M 8	0.75	7.513	7.08	7.188	0.46	0.406	0.108	7.545	7.566	7.513	7.645
M 8	1	7.35	6.773	6.917	0.613	0.541	0.144	7.835	7.409	7.35	7.5
M 9	0.75	8.513	8.08	8.188	0.46	0.406	0.108	8.545	8.566	8.513	8.645
M 9	1	8.35	7.773	7.917	0.613	0.541	0.144	8.385	8.409	8.35	8.5
M 10	0.5	9.675	9.387	9.459	0.307	0.271	0.072	9.702	9.72	9.675	9.787
M 10	0.75	9.513	9.08	9.188	0.46	0.406	0.108	9.545	9.566	9.513	9.645
M 10	1	9.35	8.773	8.917	0.613	0.541	0.144	9.385	9.409	9.35	9.5
M 10	1.25	9.188	8.466	8.647	0.767	0.677	0.18	9.226	9.251	9.188	9.348
M 11	0.75	10.513	10.08	10.188	0.46	0.406	0.108	10.545	10.566	10.513	10.645
M 11	1	10.35	9.773	9.917	0.613	0.541	0.144	10.385	10.409	10.35	10.5
M 12	0.75	11.513	11.08	11.188	0.46	0.406	0.108	11.547	11.569	11.513	11.653
M 12	1	11.35	10.773	10.917	0.613	0.541	0.144	11.388	11.413	11.35	11.51
M 12	1.25	11.188	10.466	10.647	0.767	0.677	0.18	11.23	11.258	11.188	11.368
M 12	1.5	11.026	10.16	10.376	0.92	0.812	0.217	11.071	11.101	11.026	11.216
M 13	1	12.35	11.773	11.917	0.613	0.541	0.144	12.388	12.413	12.35	12.51
M 14	1	13.35	12.773	12.917	0.613	0.541	0.144	13.388	13.413	13.35	13.51
M 14	1.25	13.188	12.466	12.647	0.767	0.677	0.18	13.23	13.258	13.188	13.368
M 14	1.5	13.026	12.16	12.376	0.92	0.812	0.217	13.071	13.101	13.026	13.216
M 15	1	14.35	13.773	13.917	0.613	0.541	0.144	14.388	14.413	14.35	14.51
M 15	1.5	14.026	13.16	13.376	0.92	0.812	0.217	14.071	14.101	14.026	14.216
M 16	1	15.35	14.773	14.917	0.613	0.541	0.144	15.388	15.413	15.35	15.51
M 16	1.25	15.188	14.466	14.647	0.767	0.677	0.18	15.23	15.258	15.188	15.368
M 16	1.5	15.026	14.16	14.376	0.92	0.812	0.217	15.071	15.101	15.026	15.216
M 17	1	16.35	15.773	15.917	0.613	0.541	0.144	16.388	16.413	16.35	16.51
M 17	1.5	16.026	15.16	15.376	0.92	0.812	0.217	16.071	16.101	16.026	16.216
M 18	1	17.350	16.773	16.917	0.613	0.541	0.144	17.388	17.413	17.35	17.51
M 18	1.5	17.026	16.16	16.376	0.92	0.812	0.217	17.071	17.101	17.026	17.216
M 18	2	16.701	15.546	15.835	1.227	1.083	0.289	16.752	16.786	16.701	16.913

ISO Metric Fine Thread
Nominal Dimensions According to UNI 4535-64

Tap flank diameter production tolerances for ISO 6H Nut threads limit dimensions - nut threads ISO 6H



Coarse Pitch Threads Dimensions in mm

$H = 0.86603P$

$H_1 = \frac{5}{8} H = 0.54127P$

$h_3 = \frac{17}{24} H = 0.61343P$

$d_2 = D_2 = d - \frac{3}{4} H = d - 0.64952P$

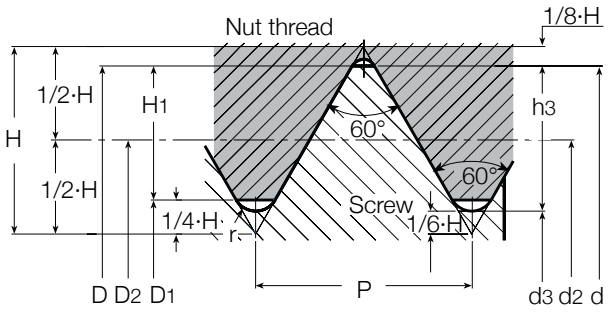
$d_3 = d - 2h_3 = d - 1.22687P$

$r = \frac{H}{6} = 0.14434P$

Nominal Dia. d=D	Pitch P	Flank Dia. d2=D2	Minor Diameter		Thread Depth		Radius r	Flank Dia. Tap Tolerance 6H d2		Flank Dia. Tap Tolerance 6H	
			Screw d3	Nut D1	Screw h3	Nut H1		Min.	Max.	Min.	Max.
M 20	1	19.35	18.773	18.917	0.613	0.541	0.144	19.388	19.413	19.35	19.51
M 20	1.5	19.026	18.16	18.376	0.92	0.812	0.217	19.071	19.101	19.026	19.216
M 20	2	18.701	17.546	17.835	1.227	1.083	0.289	18.752	18.786	18.701	18.913
M 22	1	21.35	20.773	20.917	0.613	0.541	0.144	21.388	21.413	21.35	21.51
M 22	1.5	21.026	20.16	20.376	0.92	0.812	0.217	21.071	21.101	21.026	21.216
M 22	2	20.701	19.546	19.835	1.227	1.083	0.289	20.752	20.786	20.701	20.913
M 24	1	23.350	22.773	22.917	0.613	0.541	0.144	23.390	23.416	23.350	23.520
M 24	1.5	23.026	22.160	22.376	0.920	0.812	0.217	23.074	23.106	23.026	23.226
M 24	2	22.701	21.546	21.835	1.227	1.083	0.289	22.754	22.791	22.701	22.925
M 25	1	24.350	23.773	23.917	0.613	0.541	0.144	24.390	24.416	24.350	24.520
M 25	1.5	24.026	23.160	23.376	0.920	0.812	0.217	24.074	24.106	24.026	24.226
M 25	2	23.701	22.546	22.835	1.227	1.083	0.289	23.754	23.791	23.701	23.925
M 26	1	25.350	24.773	24.917	0.613	0.541	0.144	25.390	25.416	25.350	25.520
M 26	1.5	25.026	24.160	24.376	0.920	0.812	0.217	25.074	25.106	25.026	25.226
M 26	2	24.701	23.546	23.835	1.227	1.083	0.289	24.754	24.791	24.701	24.925
M 27	1	26.350	25.773	25.917	0.613	0.541	0.144	26.390	26.416	26.350	26.520
M 27	1.5	26.026	25.160	25.376	0.920	0.812	0.217	26.074	26.106	26.026	26.226
M 27	2	25.701	24.546	24.835	1.227	1.083	0.289	25.754	25.791	25.701	25.925
M 28	1	27.350	26.773	26.917	0.613	0.541	0.144	27.390	27.416	27.350	27.520
M 28	1.5	27.026	26.160	26.376	0.920	0.812	0.217	27.074	27.106	27.026	27.226
M 28	2	26.701	25.546	25.835	1.227	1.083	0.289	26.754	26.791	26.701	26.925
M 30	1	29.350	28.773	28.917	0.613	0.541	0.144	29.390	29.416	29.350	29.520
M 30	1.5	29.026	28.160	28.376	0.920	0.812	0.217	29.074	29.106	29.026	29.226
M 30	2	28.701	27.546	27.835	1.227	1.083	0.289	28.754	28.791	28.701	28.925
M 30	3	28.051	26.319	26.752	1.840	1.624	0.433	28.115	28.157	28.051	28.316
M 32	1.5	31.026	30.160	30.376	0.920	0.812	0.217	31.074	31.106	31.026	31.226
M 32	2	30.701	29.546	29.835	1.227	1.083	0.289	30.754	30.791	30.701	30.925
M 33	1.5	32.026	31.160	31.376	0.920	0.812	0.217	32.074	32.106	32.026	32.226
M 33	2	31.701	30.546	30.835	1.227	1.083	0.289	31.754	31.791	31.701	31.925
M 33	3	31.051	29.319	29.752	1.840	1.624	0.433	31.115	31.157	31.051	31.316
M 35	1.5	34.026	33.160	33.376	0.920	0.812	0.217	34.074	34.106	34.026	34.226
M 35	2	33.701	32.546	32.835	1.227	1.083	0.289	33.754	33.791	33.701	33.925
M 36	1.5	35.026	34.160	34.376	0.920	0.812	0.217	35.074	35.106	35.026	35.226
M 36	2	34.701	33.546	33.835	1.227	1.083	0.289	34.754	34.791	34.701	34.925
M 36	3	34.051	32.319	32.752	1.840	1.624	0.433	34.115	34.157	34.051	34.316
M 38	1.5	37.026	36.160	36.376	0.920	0.812	0.217	37.074	37.106	37.026	37.226
M 39	1.5	38.026	37.160	37.376	0.920	0.812	0.217	38.074	38.106	38.026	38.226
M 39	2	37.701	36.546	36.835	1.227	1.083	0.289	37.754	37.791	37.701	37.925
M 39	3	37.051	35.319	35.752	1.840	1.624	0.433	37.115	37.157	37.051	37.316
M 40	1.5	39.026	38.160	38.376	0.920	0.812	0.217	39.074	39.106	39.026	39.226

ISO Metric Fine Thread
Nominal Dimensions According to UNI 4535-64

Tap flank diameter production tolerances for ISO 6H Nut threads limit dimensions - nut threads ISO 6H



Coarse Pitch Threads Dimensions in mm

$H = 0.86603P$

$H_1 = \frac{5}{8} H = 0.54127P$

$h_3 = \frac{17}{24} H = 0.61343P$

$d_2 = D_2 = d - \frac{3}{4} H = d - 0.64952P$

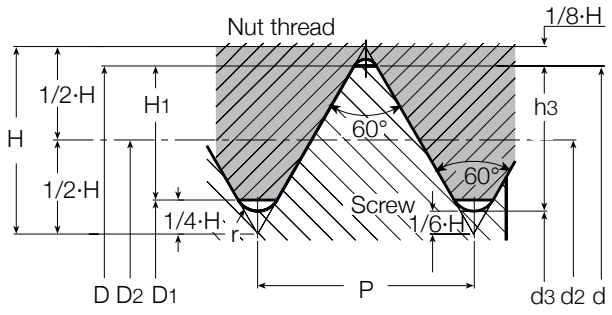
$d_3 = d - 2h_3 = d - 1.22687P$

$r = \frac{H}{6} = 0.14434P$

Nominal Dia. d=D	Pitch P	Flank Dia. d2=D2	Minor Diameter		Thread Depth		Radius r	Flank Dia. Tap Tolerance 6H d2		Flank Dia. Tap Tolerance 6H	
			Screw d3	Nut D1	Screw h3	Nut H1		Min.	Max.	Min.	Max.
M 40	2	38.701	37.546	37.835	1.227	1.083	0.289	38.754	38.791	38.701	38.925
M 40	3	38.051	36.319	36.752	1.840	1.624	0.433	38.115	38.157	38.051	38.316
M 42	1.5	41.026	40.160	40.376	0.920	0.812	0.217	41.074	41.106	41.026	41.226
M 42	2	40.701	39.546	39.835	1.227	1.083	0.289	40.754	40.791	40.701	40.925
M 42	3	40.051	38.319	38.752	1.840	1.624	0.433	40.115	40.157	40.051	40.316
M 45	1.5	44.026	43.160	43.376	0.920	0.812	0.217	44.074	44.106	44.026	44.226
M 45	2	43.701	42.546	42.835	1.227	1.083	0.289	43.754	43.791	43.701	43.925
M 45	3	43.051	41.319	41.752	1.840	1.624	0.433	43.115	43.157	43.051	43.316
M 48	1.5	47.026	46.160	46.376	0.920	0.812	0.217	47.077	47.111	47.026	47.238
M 48	2	46.701	45.546	45.835	1.227	1.083	0.289	46.758	46.796	46.701	46.937
M 48	3	46.051	44.319	44.752	1.840	1.624	0.433	46.118	46.163	46.051	46.331
M 50	1.5	49.026	48.160	48.376	0.920	0.812	0.217	49.077	49.111	49.026	49.238
M 50	2	48.701	47.546	47.835	1.227	1.083	0.289	48.758	48.796	48.701	48.937
M 50	3	48.051	46.319	46.752	1.840	1.624	0.433	48.118	48.163	48.051	48.331
M 52	1.5	51.026	50.160	50.376	0.920	0.812	0.217	51.077	51.111	51.026	51.238
M 52	2	50.701	49.546	49.835	1.227	1.083	0.289	50.758	50.796	50.701	50.937
M 52	3	50.051	48.319	48.752	1.840	1.624	0.433	50.118	50.163	50.051	50.331
M 55	1.5	54.026	53.160	53.376	0.920	0.812	0.217	54.077	54.111	54.026	54.238
M 55	2	53.701	52.546	52.835	1.227	1.083	0.289	53.758	53.796	53.701	53.937
M 55	3	53.051	51.319	51.752	1.840	1.624	0.433	53.118	53.163	53.051	53.331
M 56	1.5	55.026	54.160	54.376	0.920	0.812	0.217	55.077	55.111	55.026	55.238
M 56	2	54.701	53.546	53.835	1.227	1.083	0.289	54.758	54.796	54.701	54.937
M 56	3	54.051	52.319	52.752	1.840	1.624	0.433	54.118	54.163	54.051	54.331
M 58	1.5	57.026	56.160	56.376	0.920	0.812	0.217	57.077	57.111	57.026	57.238
M 58	2	56.701	55.546	55.835	1.227	1.083	0.289	56.758	56.796	56.701	56.937
M 58	3	56.051	54.319	54.752	1.840	1.624	0.433	56.118	56.163	56.051	56.331
M 60	1.5	59.026	58.160	58.376	0.920	0.812	0.217	59.077	59.111	59.026	59.238
M 60	2	58.701	57.546	57.835	1.227	1.083	0.289	58.758	58.796	58.701	58.937
M 60	3	58.051	56.319	56.752	1.840	1.624	0.433	58.118	58.163	58.051	58.331
Metric thread MA (old UNI 160 Profile)								**Nut Tolerance SH8**			
M 2,3	0.25	2.138	1.976	1.976	0.162	0.162	0.03	2.144	2.156	2.138	2.194
M 2,6	0.35	2.373	2.146	2.146	0.227	0.227	0.04	2.393	2.407	2.373	2.429

UNIFIED Coarse Thread
Nominal Dimensions According to ANSI B1.1

Tap flank diameter production tolerances for ISO 2B
Nut threads limit dimensions - nut threads ANSI B1.1, 2B-3B



Coarse Pitch Threads Dimensions in mm

$H = 0.86603P$

$H_1 = \frac{5}{8} H = 0.54127P$

$h_3 = \frac{17}{24} H = 0.61343P$

$d_2 = D_2 = d - \frac{3}{4} H = d - 0.64952P$

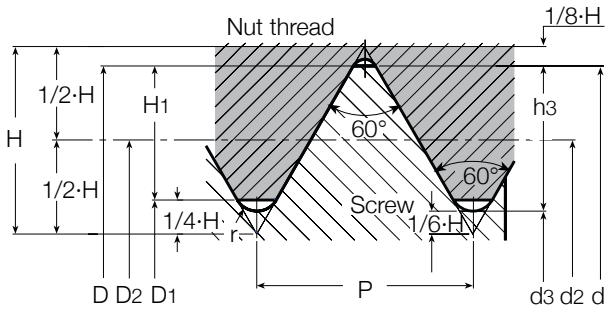
$d_3 = d - 2h_3 = d - 1.22687P$

$r = \frac{H}{6} = 0.14434P$

Nominal T.P.I Dia.		Pitch P	External Dia. d=D	Flank Dia. d2=D2	Minor diameter		Pitch diameter Tap tolerance 2B		Pitch diameter Nut tolerance		
					Nut D1	Screw h3	Min.	Max.	max. 2B/3B	max. 2B	max. 3B
UNC#1	64	0.397	1.854	1.598	1.425	1.367	1.610	1.623	1.598	1.664	1.646
UNC# 2	64	0.454	2.184	1.890	1.694	1.628	1.902	1.915	1.890	1.961	1.943
UNC#3	48	0.529	2.515	2.172	1.941	1.864	2.184	2.197	2.172	2.248	2.228
UNC# 4	40	0.635	2.845	2.433	2.156	2.065	2.446	2.459	2.433	2.517	2.494
UNC# 5	40	0.635	3.175	2.764	2.487	2.395	2.776	2.789	2.764	2.847	2.827
UNC# 6	32	0.794	3.505	2.990	2.647	2.532	3.105	3.028	2.990	3.084	3.058
UNC# 8	32	0.794	4.166	3.650	3.307	3.193	3.675	3.688	3.650	3.746	3.721
UNC# 10	24	1.058	4.826	4.138	3.680	3.528	4.163	4.176	4.138	4.247	4.219
UNC# 12	24	1.058	5.486	4.798	4.341	4.188	4.823	4.836	4.798	4.910	4.882
UNC 1/4"	20	1.270	6.350	5.524	4.976	4.793	5.575	5.588	5.524	5.646	5.616
UNC 5/16"	18	1.411	7.938	7.021	6.411	6.205	7.071	7.084	7.021	7.155	7.120
UNC 3/8"	16	1.588	9.525	8.494	7.805	7.577	8.545	8.557	8.494	8.639	8.603
UNC 7/16"	14	1.814	11.112	9.934	9.149	8.887	9.985	9.997	9.934	10.089	10.051
UNC 1/2"	13	1.954	12.700	11.430	10.584	10.302	11.481	11.494	11.430	11.595	11.552
UNC 9/16"	12	2.117	14.288	12.913	11.996	11.692	12.964	12.977	12.913	13.086	13.043
UNC 5/8"	11	2.309	15.875	14.376	13.376	13.043	14.427	14.440	14.376	14.559	14.514
UNC 3/4"	10	2.540	19.050	17.399	16.229	15.933	17.450	17.463	17.399	17.595	17.544
UNC 7/8"	9	2.822	22.225	20.391	19.169	18.763	20.455	20.467	20.391	20.599	20.546
UNC 1"	8	3.175	25.400	23.338	21.963	21.504	23.401	23.414	23.338	23.561	23.505
UNC 1 1/8"	7	3.629	28.575	26.218	24.648	24.122	26.294	26.319	26.218	26.457	26.398
UNC 1 1/4"	7	3.629	31.750	29.393	27.823	27.297	29.469	29.494	29.393	29.637	29.576
UNC 1 3/8"	6	4.233	34.925	32.174	30.343	29.731	32.250	32.276	32.174	32.438	32.372
UNC 1 1/2"	6	4.233	38.100	35.349	33.518	32.906	35.425	35.451	35.349	35.616	35.550
UNC 1 3/4"	5	5.080	44.450	41.151	38.951	38.217	41.241	41.266	41.151	41.445	41.372
UNC 2"	4 1/2	5.644	50.800	47.135	44.689	43.876	47.235	47.260	47.135	47.450	47.371
UNC 2 1/4"	4 1/2	5.644	57.150	53.485	51.039	50.226			53.485	53.805	53.726
UNC 2 1/2"	4	6.350	63.500	59.375	56.627	55.710			59.375	59.718	59.632
UNC 2 3/4"	4	6.350	69.850	65.725	62.977	62.060			65.725	66.073	65.987
UNC 3"	4	6.350	76.200	72.075	69.327	68.410			72.075	72.428	72.339
UNC 3 1/4"	4	6.350	82.550	78.425	75.677	74.760			78.425	78.783	78.694
UNC 3 1/2"	4	6.350	88.900	84.775	82.027	81.110			84.775	85.183	85.049
UNC 3 3/4"	4	6.350	95.250	91.125	88.377	87.460			91.125	91.493	91.402
UNC 4"	4	6.350	101.600	97.475	94.727	93.810			97.475	97.848	97.757

UNIFIED Fine Thread
Nominal Dimensions According to ANSI B1.1

Tap flank diameter production tolerances for ISO 2B
Nut threads limit dimensions - nut threads ANSI B1.1, 2B-3B



Coarse Pitch Threads Dimensions in mm

$H = 0.86603P$

$H_1 = \frac{5}{8} H = 0.54127P$

$h_3 = \frac{17}{24} H = 0.61343P$

$d_2 = D_2 = d - \frac{3}{4} H = d - 0.64952P$

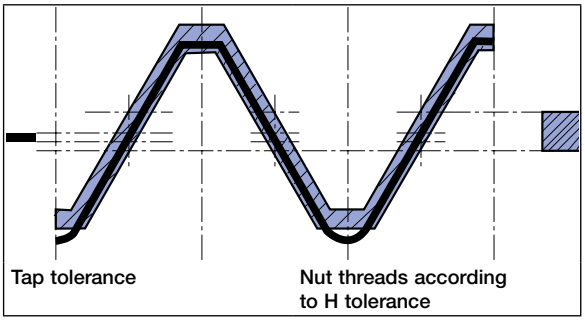
$d_3 = d - 2h_3 = d - 1.22687P$

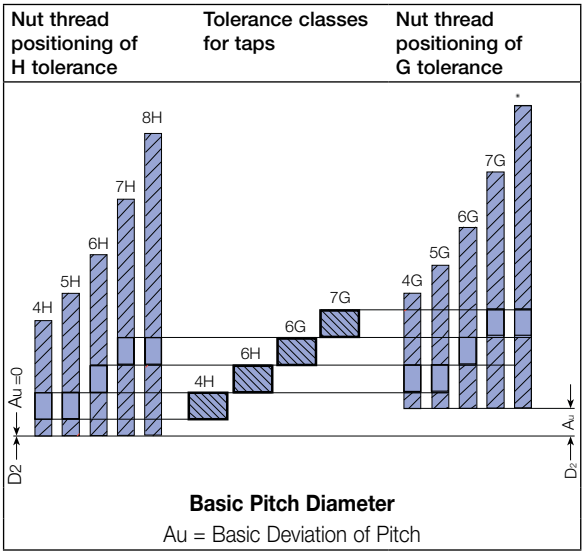
$r = \frac{H}{6} = 0.14434P$

Nominal T.P.I Dia.		Pitch P	External Dia. d=D	Flank Dia. d2=D2	Minor diameter		Pitch diameter Tap tolerance 2B		Pitch diameter Nut tolerance		
					Nut D1	Screw h3	Min.	Max.	max. 2B/3B	max. 2B	max. 3B
UNF#0	80	0.318	1.524	1.318	1.181	1.135	1.331	1.344	1.318	1.377	1.361
UNF#1	72	0.353	1.854	1.626	1.473	1.422	1.638	1.651	1.626	1.689	1.674
UNF#2	64	0.397	2.184	1.928	1.755	1.697	1.941	1.953	1.928	1.996	1.979
UNF#3	56	0.454	2.515	2.220	2.024	1.958	2.233	2.245	2.220	2.291	2.273
UNF#4	48	0.529	2.845	2.502	2.271	2.195	2.515	2.527	2.502	2.581	2.560
UNF#5	44	0.577	3.175	2.799	2.550	2.466	2.812	2.824	2.799	2.880	2.860
UNF#6	40	0.635	3.505	3.094	2.817	2.725	3.108	3.119	3.094	3.180	3.157
UNF#8	36	0.706	4.166	3.708	3.401	3.299	3.721	3.734	3.708	3.800	3.777
UNF#10	32	0.794	4.826	4.310	3.967	3.853	4.336	4.348	4.310	4.409	4.384
UNF#12	28	0.907	5.486	4.897	4.503	4.374	4.923	4.935	4.897	5.004	4.976
UNF 1/4"	28	0.907	6.350	5.761	5.367	5.237	5.799	5.812	5.761	5.870	5.842
UNF 5/16"	24	1.058	7.938	7.249	6.792	6.640	7.287	7.300	7.249	7.371	7.341
UNF 3/8"	24	1.058	9.525	8.837	8.379	8.227	8.875	8.887	8.837	8.961	8.931
UNF 7/16"	20	1.270	11.112	10.287	9.738	9.555	10.338	10.351	10.287	10.424	10.391
UNF 1/2"	20	1.270	12.700	11.874	11.326	11.143	11.925	11.938	11.874	12.017	11.981
UNF 9/16"	18	1.411	14.288	13.371	12.761	12.555	13.421	13.434	13.371	13.520	13.482
UNF 5/8"	18	1.411	15.875	14.958	14.348	14.143	15.009	15.022	14.958	15.110	15.072
UNF 3/4"	16	1.588	19.050	18.019	17.330	17.102	18.070	18.082	18.019	18.184	18.143
UNF 7/8"	14	1.814	22.225	21.046	20.262	20.000	21.110	21.123	21.046	21.224	21.181
UNF 1"	12	2.117	25.400	24.026	23.109	22.804	24.089	24.102	24.026	24.219	24.171
UNF 1*1/8"	12	2.117	28.575	27.201	26.284	25.979	27.252	27.277	27.201	27.339	27.351
UNF 1*1/4"	12	2.117	31.750	30.376	29.459	29.154	30.427	30.452	30.376	30.579	30.528
UNF 1*3/8"	12	2.117	34.925	33.551	32.634	32.329	33.602	33.627	33.551	33.759	33.706
UNF 1*1/2"	12	2.117	38.100	36.726	35.809	35.504	36.777	36.802	36.726	36.937	36.886

Tap Tolerances

Tolerance classes of taps and tolerance positions for screw threads as per ISO metric standard.





Basic Pitch Diameter

Au = Basic Deviation of Pitch

For Optimum Tapping Conditions, Reduced Machining Times and Increased Tap Life

Selection of the Most Suitable Tap

As a general rule, materials with deformation capability of at least 10% can be cold-formed. To decide on the most suitable tap, please refer to the tap recommendation table on page 346.

Pre-Tapping Holes

Check that the holes are within the prescribed size range depending on the application (see table on page 364) The holes should be clean and swarf-free.

Lubrication

Frequently the lubricant content of the coolant used for general machining is too low for tapping.

- If it is not possible to increase the lubricant content, following are some possible solutions:
- A separate lubricating unit can be connected to the machine control to deliver the required quantity of concentrated emulsion into the core hole or onto the tap.Tapping in separate operations allows the use of the ideal tapping lubricant.

Tapping Speeds

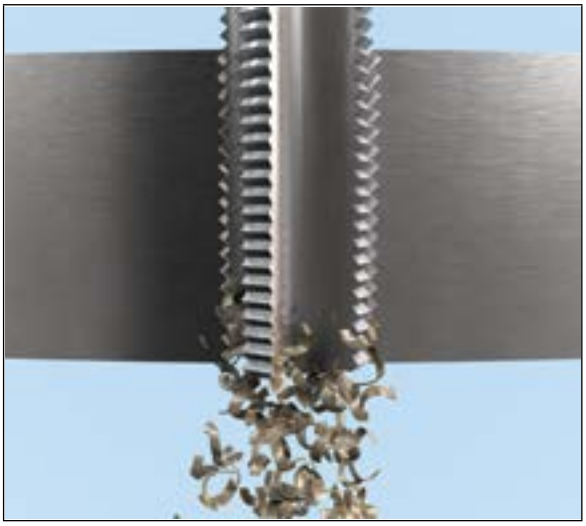
The tapping speed has a great influence on chip flow and the life of the tap. It is worthwhile to establish the ideal speed by tapping trials. For recommended initial values, see table on page 346. In addition, the following should be taken into consideration: characteristics of the material, machine and clamping method.

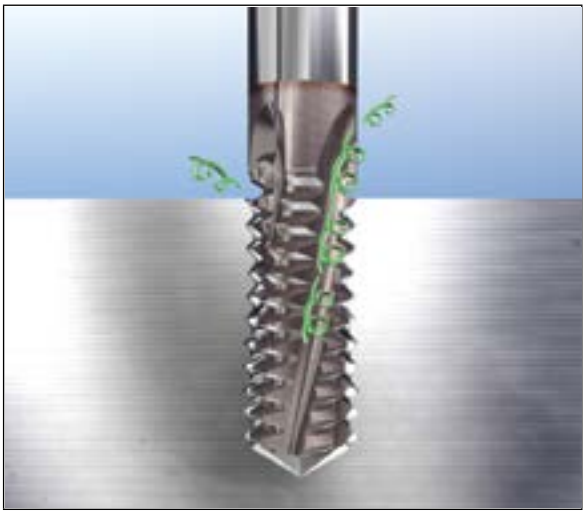
Effects of Unsuitable Tapping Speed

- forced tapping
- tap lead chipping caused by overloaded cutting tooth
- torn threads
- unsatisfactory tap life
- rejected threads

Chip Explusion

Tap selection is also influenced by the type of hole being threaded. Through hole tapping usually requires a tap that pushes the chips out in front of the cutting edge and through the other end of the hole. A bottom hole tap must pull chips up and out of the hole.





Tap Jamming

Some possible causes of tap jamming are:

- unsuitable tap
- tap with incorrect cutting geometry
- unsuitable coolant for material
- insufficient coolant
- axial pressure (pull or push) on the tap
- core hole too small
- breaks in walls of core hole
- speed too high or too low
- swarf trapped in the hole
- incorrect alignment of tap and core hole
- tap eccentricity

Results of Tap Jamming

- torn threads
- short tap life
- rejected threads
- tap breakage
- scrap workpieces

Tap Mounting

The tap must be mounted on the axis of the core hole. On non-synchronized machines (feed/speed) we recommend using a tapping spindle. (**ISCAR GTI**, **GTIN** collets, see pages 381-382)

Tapping Heads

As a rule, with non-synchronized machine spindles (feed/ speed), the feed rate should be programmed approximately 5-10% lower than the thread pitch. In these cases, a tapping chuck must be used which will compensate the difference between the feed rate and the thread pitch. It is important that the tension spring in the axial compensation is set to a minimum pressure to avoid axially loading the tap. The compression spring should be tensioned so the tap starts to cut by compressing the spring up to one-half pitch.

Important

Verify that the correct speed has been selected. Ensure that ample lubricating coolant is being used. Machine and equipment stability are essential for optimal performance and results.

Forming Taps

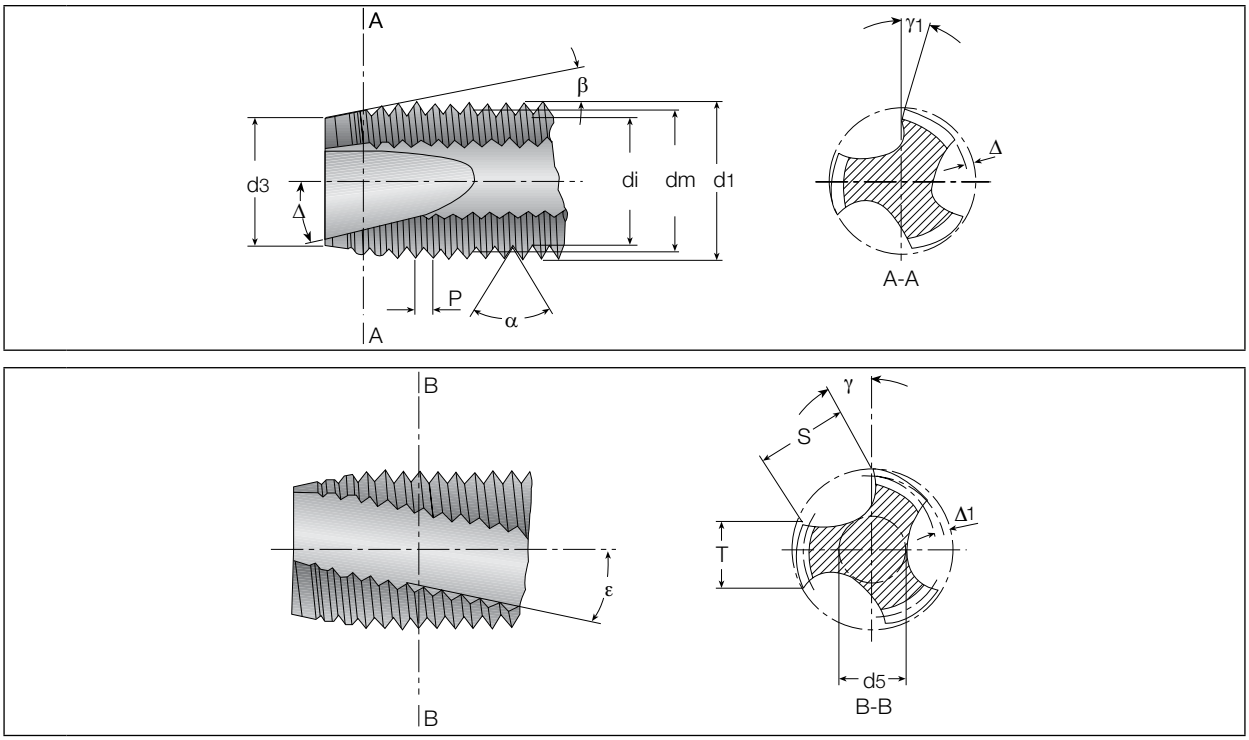
Forming taps (roll forming or cold forming) produce threads by deforming the material near the hole walls rather than by cutting the material. This method often works well in ductile materials. However, in brittle materials it often results in unsatisfactory threads.

Torque requirements for forming taps are considerably higher than for cutting taps. When forming taps are used, chuck capacity must be decreased by 25%. Forming taps do not produce chips.

Troubleshooting

Problem	Cause	Solution
Tapped hole oversized	Incorrect tap (cutting geometry unsuitable for application)	Use tap selected from the relevant material group
	Faulty alignment	Ensure that the tap is correctly aligned with the core hole axis
	Tap jamming	Improve lubrication and direction of coolant Adjust cutting speed
	Incorrectly reground tap (lead tip is not concentric)	Regrind tap
Stripped threads	Incorrect tap (cutting geometry incorrect for application)	Use a tap from the relevant material group
	Spindle speed and feed rate are not synchronized	Check feed rate programming and/or pitch of leading spindle. Use a tapping spindle with axial float (**GTI**/**GTIN**)
	Insufficient starting pressure exerted on tap (causes peeling)	Increase starting pressure
Bell mouthed tapped hole	Incorrect starting pressure	Use a tapping spindle with axial float (**GTI**/**GTIN**)
Unsatisfactory thread surface finish	Incorrect tap (cutting geometry unsuitable for application)	Select tap for the relevant material group
	The tap is blunt	Replace or regrind tap
	Tap badly re-ground	Regrind tap. Check that cutting geometry is suitable for material
	Incorrect lubricant, concentration or quantity	Ensure the use of a suitable coolant and an ample supply
Partial tap chipping	Swarf jamming	Check cutting speed. Use alternative tap
	Tap has jammed against bottom of pre-hole	Check hole and thread depths. Drill a deeper pre-hole
	Tap incorrectly reground (lead-in diameter too short, therefore too few cutting teeth)	Ensure that correct dimensions are maintained when regrinding
	Irregular workpiece material structure	Adjust cutting speed. Improve lubricant quality of coolant
Partial tap chipping	Swarf jamming	Check cutting speed. Use alternative tap
	Tap has jammed against bottom of pre-hole	Check hole and thread depths. Drill a deeper pre-hole
	Tap incorrectly reground (lead-in diameter too short, therefore too few cutting teeth)	Ensure that correct dimensions are maintained when regrinding
	Irregular workpiece material structure	Adjust cutting speed. Improve lubricant quality of coolant
Excessive tap wear	Incorrect cutting speed	Adjust cutting speed to suit workpiece material
	Coolant lacking in lubricating qualities and/or quantity	Ensure the use of a suitable coolant and an ample supply. Check that the coolant is reaching the cutting zone
	Surface of the pre-hole is compacted	Check pre-hole drilling conditions (drill carefully to reduce risk of surface compacting). Check drill cutting edges
Tap breakage	Incorrect tap in use (cutting geometry unsuitable for application)	Use tap from the relevant material group
	Centering error	Ensure that axes of tap and pre-hole are aligned
	Blunt tap	regrind tap
	Tap has reached bottom of pre-hole	Use tapping spindle with axial float and slipping clutch (**GTI**/**GTIN**)
	Pre-hole too small	Check for correct pre-hole size, see pages 364-365

Tap Nomenclature (Regrinding)



d1	Major diameter
dm	Flank diameter
di	Minor diameter
d3	Chamfer diameter
P	Pitch
a	Flank angle
ß	Chamfer angle
j	Gun nose angle
ϒ	Gun nose front rake angle
Δ	Chamfer relief
Δ 1	Pitch diameter relief on the land
ϒ1	Rake angle
T	Width of land
S	Flute width
d5	Web thickness
ε	Angle of spiral flute

Regrinding

Regrinding

Tap regrinding takes place in two steps:

1 regrinding of relieved chamfer
2 regrinding of flutes (see picture 1)

Regrinding of Relieved Chamfer

It is recommended that the resharpening be executed either on specific tap regrinding machines or on conventional resharpening machines equipped with an auxiliary device to generate the circular back relief. Picture 2 shows regrinding done with the cylindrical surface of a grinding wheel. Before regrinding, verify that the tap, fixed between points or on the pincer, runs concentrical. Also ensure that angle B is in the correct order to keep the same number of threads on chamfer.

Resharpening of Flutes

The rake angle g is obtained by moving the tap axis, in relation to the regrinding surface, of an amount X to be calculated with the formula: X = 1/2 d1 sin (ϒ)
(see picture 3).
(d1 =tap major diameter)

Example:

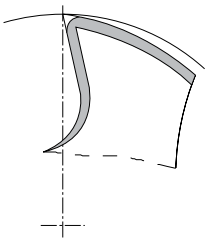
Tap 10 X 1,5 to cut on steel strength = 600 N/mm²

d1 = 10 mm ; ϒ = 15° ;
sin (ϒ) = 0,25882;

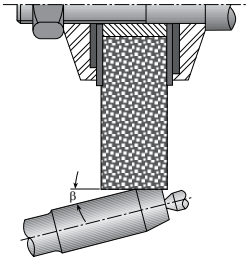
$$X = \frac{0.25885}{2} \text{ x10 ; X=1.29 mm}$$

On all taps with spiral flutes, it is possible to find the pitch of the spiral in reference to the lead screw necessary for resharpening. In case of using taps equipped with a deburring tool, it is necessary to extend the flutes according to the supplier's recommendation. As the wear on a tap is mainly on the chamfer area, for taps with a gun nose, regrinding the flutes can be done on the front area only (see picture 4).
In cases where the thread flanks are worn (in addition to the active edges), regrinding as described above is impractical. In this case restoration is done, by cutting the chamfer away (thus creating a shorter tap) and then reproducing the chamfer with same angle and relief.
(see picture 5)
In the absence of special regrinding machines, such restoration is advisable for regrinding taps with spiral flutes. This is because regrinding the flutes becomes unnecessary.

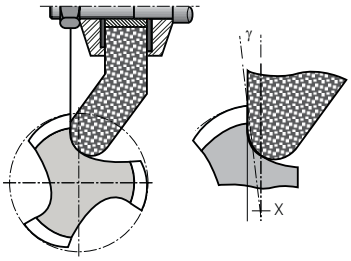
Picture 1



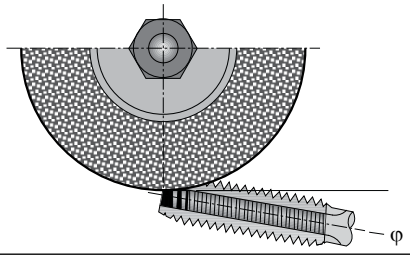
Picture 2



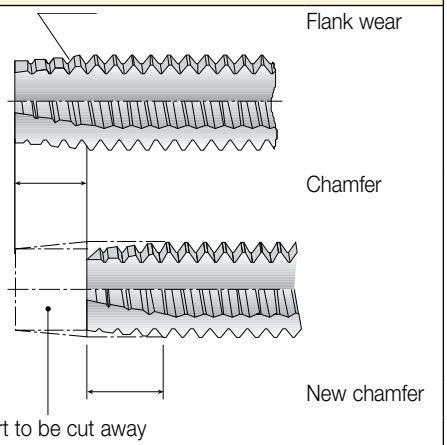
Picture 3



Picture 4



Picture 5



General Recommendations (Regrinding)

Maintenance
It is important to periodically regrind the worn tap. This is to avoid permanent damage or even tool breakage.

The Grinding Wheels
The structure and grain of grinding wheels must be appropriate for the tap to be resharpened.

Taps for Cast Iron
Taps used on cast iron can rarely be resharpened, as it is very abrasive and tends to wear the flank in such a way that it becomes grossly out of tolerance.

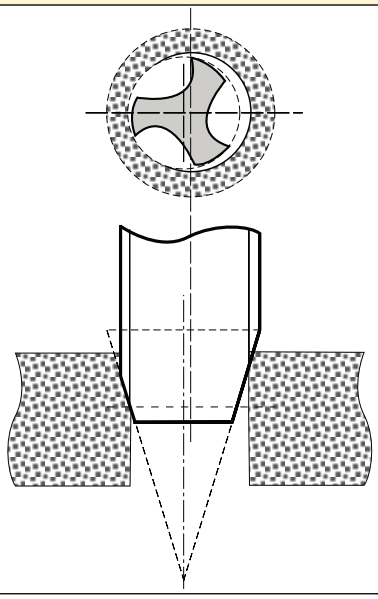
Taps for Aluminun
After regrinding it is advisable to remove the steel burrs with a wire brush.

Tap Inspection
It is important to inspect the tap after regrinding to ensure that all of the dimensions and angles have remained according to its specifications.

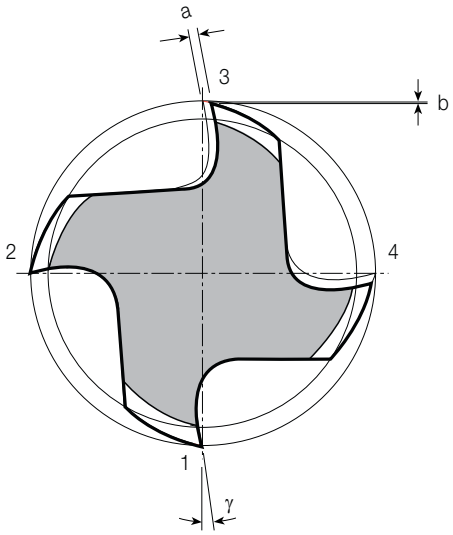
Controls (tests)
Once the tap is resharpened, it is always best to test it to correctly obtain the same threads as when the tap was new.

- The chamfer must be perfectly on axis in order to avoid the effects of picture 6. The cutters must have correct divisions.
- The results of resharpening with an incorrect division is shown in picture 7.
- The length and number of threads in chamfer must be precisely identical to those of the new tap.

Picture 6



Picture 7



Incorrect division-cutters not concentric

Test Report Form

Company _____ **Department** _____

Address _____ **Phone** _____

_____

Tool

Description of the tap being used at present Thread diameter and pitch

_____

Make _____ Type _____

Class of tolerance

☐ Right-hand cutting ☐ Left-hand cutting _____

☐ Fluteless ☐ Right-hand spiral flutes _____ degrees _____

☐ Straight flutes ☐ Left-hand spiral flutes _____ degrees _____

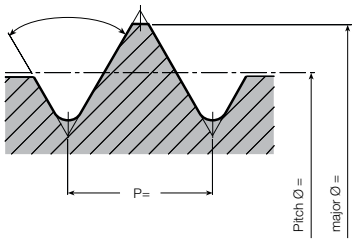
☐ Spiral point ☐ Length of chamfer _____ mm _____

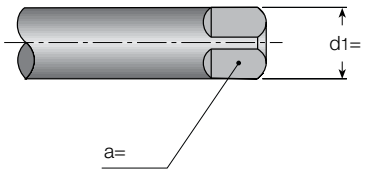
Additional information for special pitches or thread forms

Major diameter _____

Pitch diameter _____ Flank angle _____ degrees _____

Minor diameter _____





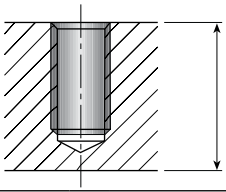
Hole

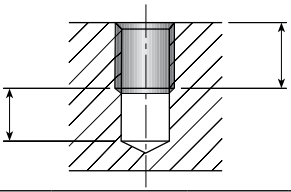
Tap drill diameter _____ Length of hole _____

☐ Through hold Depth of full thread _____

☐ Blind hole

Special requirements or unusual characteristics of the threaded product _____





Unusual characteristics of the threaded product or of the tapping method. _____

ie. counterbore, tapping on an angle, etc. _____

Test Report Form

Tapping speed	_____ m/min _____ RPM
Lubricant	☐ none ☐ Emulsion _____ % ☐ Cutting oil ☐ Other _____ ☐ Under pressure ☐ Vaporization _____
Machine	Type _____ ☐ Horizontal Tapping ☐ Vertical Tapping
Driving	☐ Tap revolvers Number of spindles _____ ☐ Workpiece revolvers
Feed	☐ Without ☐ Power ☐ CNC _____ %
Toolholder	☐ Rigid ☐ Floating ☐ Safety clutch Make _____ Type _____
Material to be tapped	Material no. or designation _____ Composition, if known _____ Tensile strength or hardness _____ N/mm^2 _____ HB _____ HRc Chip form ☐ Short ☐ Long ☐ Annealed steel ☐ Hardened steel ☐ Heat treated steel

More details: _____

Contact person _____

Date _____ Signature _____

Thread Standards

Cylindrical Threads	
UNC	Unified coarse thread series
UNF	Unified fine thread series
UNEF	Unified extra-fine thread series
UN	Constant pitch series - threads with constant pitch of T.P.I. 4, 6, 8, 12, 16, 20, 28, 32
UNS	Selected combinations - threads with special dia. - pitch combinations
UNJ	Unified threads with constant pitch with radius on minor diameter from 0.15011 pitch to 0.18042 pitch
UNJC	Unified coarse thread with radius on minor diameter from 0.15011 pitch to 0.18042 pitch
UNJEF	Unified extra-fine thread with radius on minor diameter from 0.15011 pitch to 0.18042 pitch
UNJF	Unified fine threads with radius on minor diameter from 0.15011 pitch to 0.18042 pitch

Pipe Cylindrical Threads	
NPS	Cylindrical threads for pipe
NPSC	American Standard for pipe coupling
NPSF	American Standard for internal threads on pipe, dryseal
NPSH	American Standard for cylindrical threads for pipes, joints and nipples
NPSI	American Standard for internal cylindrical threads on pipe (dryseal)
NPSL	American Standard for cylindrical threads on pipes for nuts
NPSM	American Standard for cylindrical threads on pipes for mechanical joints
NGO	American National pipe threads for gas exhaust
NGS	American National pipe threads for gas

Taper Pipe Threads	
ANPT	Taper pipe threads for Army, Navy and Airforce
F-PTE	Taper pipe fine threads (dryseal)

Taper Pipe Threads	
NPT	Taper pipe threads
NPTF	Taper pipe threads (dryseal)
NPTR	Taper pipe threads for railway equipment
PTF-SAE SHORT	Taper pipe short threads (dryseal)-SAE
PTF-SPL SHORT	Taper pipe special threads (dryseal)-SAE
PTF-SPL EXTRA SHORT	Extra short special threads (dryseal)-SAE
SPL-PTF	Special taper pipe dryseal threads
NGT	National American taper pipe threads
SGT	Special taper pipe threads
API	American Petroleum Institute taper pipe threads

Trapezoidal and Saw Tooth Threads	
ACME-C ACME	Self-centering threads
ACME-G ACME	Generical application
STUB-ACME	ACME Flat threads with reduced thread depth
60º STUB-ACME	ACME Flat threads with 60º flank angle
N BUTT	American National Saw tooth threads

British Standard	
BSW	Whitworth British Standard coarse pitch
BSF	Whitworth British Standard fine pitch
WHIT	Whitworth Standard special pitch
R	British Standard external threading for taper pipe (dryseal) (already BSP-Tr)
Rc	British Standard internal threading taper thread for pipe (BSP-Tr)
Rp	British Standard cylindrical thread for pipe (already BSP.PI)
BA	British Standard Association threads
BSC	British Standard threads for bicycles
CEI	British Standard for bicycles

GTI / GTIN - Tapping Attachment

Compact tapping collet with tension and compression floating mechanism for ER32 collet chucks.
A tapping collet for standard and rigid tapping operations.
The **GTIN** ER32 collet makes tap removal and replacement easy, quick and reliable.
Designed for stationary and rotating applications, the **GTIN** ER32 collets are economical and efficient due to the ability to use existing ER32 collet chucks (with various shank sizes and types).

Applications:

The **GTIN** ER32 tapping collet is designed especially for CNC mill/turn centers, for regular and rigid tapping.

Advantages:

Quick tap change with a front clamping nut

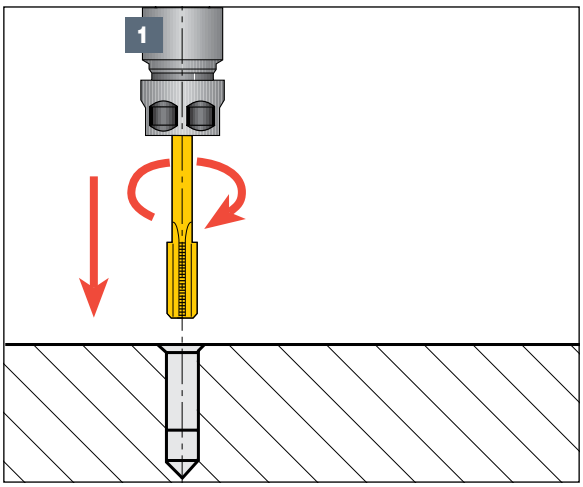
- Compact design for minimal clearance between the turret and chuck
- Fits every type of stationary and rotating ER32 collet chuck
- Positive tap drive with internal square driver
- Compensates for machine feed and tap pitch variance, resulting in greater thread accuracy
- Floating mechanism compensates for misalignment between tap and workpiece
- High accuracy due to tension and compression mechanism
- Available for all tap shank standards (DIN, ISO, ANSI, JIS)
- Tapping range M1-M16 (#0 to 5/8″)
- Saves setup time by quick tap changing without removing **GTIN** from the machine
- Optimal for machines which have limited space between the turret and workpiece

GTI / GTIN - Tapping Attachment

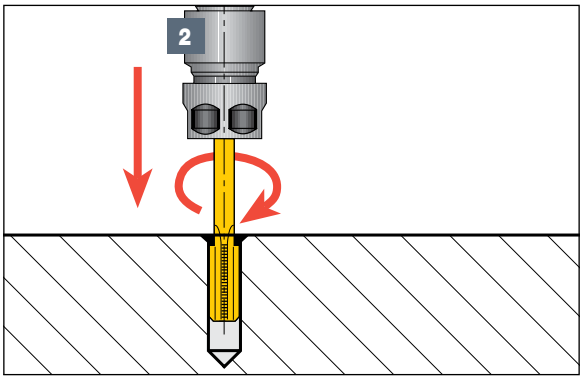
Operation

For through- and blind-hole tapping:

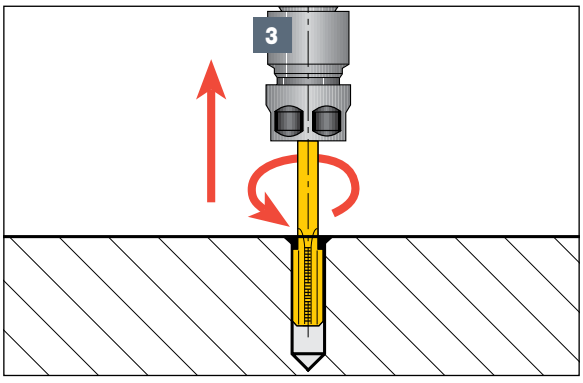
1 Enter feed rate according to thread pitch (or 1-2 % lower). Set spindle to starting point with 0.08 mm clearance.



2 Start spindle forward with right hand rotation until reaching desired depth.



3 Stop feed and rotation and reverse to starting point.



Description:

Short tap chucks for ER collets.

Application:

Axial float/tension/compression type for CNC milling machines and lathes with reversing motors and rigid tapping.

Features:

- Compensates for machine feed and tap pitch variance
- Floating mechanism compensates for misalignment between tap and workpiece
- Right- and left-hand tapping

Advantages:

- Practical and efficient tap holding by the ER spring collet without using jaw drive
- Compact design for minimal clearance applications
- Heavy duty design for high torque drive ensures the same accuracy as the tap itself