

RP (BSP) 55° (cylindrical)			
Nom. dia.	Thr. per 1"	Major dia.	Tap-drill
1/16	28	7,723	6,50
1/8	28	9,728	8,50
1/4	19	13,157	11,40
3/8	19	16,662	14,90
1/2	14	20,955	18,60
3/4	14	26,441	24,10
1	11	33,249	30,20
1 1/4	11	41,910	38,90
1 1/2	11	47,803	44,80
2	11	59,614	56,60
2 1/2	11	75,184	72,20
3	11	87,884	84,90

RC (BSPT) 55° (taper)		
Nom. dia.	Thr. per 1"	Tap-drill
1/16	28	6,30
1/8	28	8,30
1/4	19	11,50
3/8	19	14,70
1/2	14	18,20
3/4	14	23,50
1	11	29,70
1 1/4	11	38,50
1 1/2	11	44,50
2	11	56,60
2 1/2	11	71,50
3	11	84,00

Pg 80°					
Nom. dia.	Thr. per 1"	Major dia.	Minor diameter		Tap-drill
			min	max	
Pg 7	20	12,5	11,28	11,43	11,40
Pg 9	18	15,2	13,86	14,01	13,90
Pg 11	18	18,6	17,26	17,41	17,30
Pg 13,5	18	20,4	19,06	19,21	19,10
Pg 16	18	22,5	21,16	21,31	21,20
Pg 21	16	28,3	26,78	27,03	26,80
Pg 29	16	37,0	35,48	35,73	35,50
Pg 36	16	47,0	45,48	45,73	45,50
Pg 42	16	54,0	52,48	52,73	52,50
Pg 48	16	59,3	57,78	58,03	57,80

NPSM / NPSF - Pipe threadtaper 60°			
Nom. dia.	Thr. per 1"	Tapping drill	
		NPT	NTF
1/16	27	6,30	6,30
1/8	27	8,50	8,40
1/4	18	11,10	11,00
3/8	18	14,50	14,30
1/2	14	18,00	17,80
3/4	14	23,20	23,00
1	11 1/2	29,20	29,00
1 1/4	11 1/2	38,00	37,80
1 1/2	11 1/2	44,00	43,80
2	11 1/2	56,40	56,00
2 1/2	8	67,00	66,50
3	8	83,00	82,50

NPSM / NPSF - Pipe thread 60°			
Nom. dia.	Thr. per 1"	Tapping drill	
		NPSM	NPSF
1/16	27		6,30
1/8	27	9,10	8,60
1/4	18	11,90	11,20
3/8	18	15,50	14,70
1/2	14	19,00	18,20
3/4	14	24,50	23,50
1	11 1/2	30,50	29,50
1 1/4	11 1/2	39,50	
1 1/2	11 1/2	45,50	
2	11 1/2	57,50	
2 1/2	8	69,00	
3	8	85,00	

Tap selection

Hand tapping: The hand taps are straight fluted and are in sets of three for coarse threads: First taper, second tap and plug/bottoming tap. For fine threads in sets of two: second taper and plug/bottoming tap.

Machine tapping

Machine tapping taps are made in several designs. For through holes a spiral tap (gun nose tap) is preferred, allowing the material partials/chips to be forced forward. For blind holes spiral fluted taps are suitable. Spiral fluted taps are available in three different angles: 15°, 35° and 45°. A general rule is that the more ductile the material and the deeper the hole, the greater the angle. Taps and dies in standard versions are suited for most material, but special but ground taps and dies are required in some materials, e.g. soft brass and stainless steel. In ductile materials a thread forming tap can be used (not preferred for medical, food or aerospace industries). Tap and die holders are subject to preference for forming of threads. The rigid/synchro method is preferred.

Cutting speeds

The most suitable cutting speed is generally found through experience, but cutting speed can be taken from the table below and afterwards corrected. The ideal cutting speed is influenced by many factors. Some of these are:

- The material
- The length, diameter and pitch of thread.
- The type of tap/die.
- The lubricant/coolant quality and quantity.
- The tap drill diameter.

Also the condition and type of the machine being used is an essential factor. It is therefore important to follow the specific machine instructions. Especially when CNC programming using tension compression it is important to follow the manufacturer's recommendation.

Coolant/lubricant conditions

Correct cooling/lubricant will result in a prolonged life of the tap/die and a better result in thread quality.

The cutting speed depends also upon the temperature of the cutting edge. It is therefore essential to use plenty of lubricant/coolant. Coolant with low EP additives demands lower ranges of cutting speeds. Grease is less suitable.

Inspection of the thread

For inspection of the threads, thread gauges are used: Go / No go plug gauges to verify internal thread and Go / No Go thread ring gauges to verify external thread. When using thread gauges thread diameters, pitch errors and thread angles to a certain degree are verified. Please note that the other errors may still occur e.g. errors in thread shapes an angle.

Tap drill non listed

For non listed metric (M) sizes and UN, the tap drill size can be easily found: Major thread diameter minus pitch equals drill diameter. For forming threads (roll taps): tap drill size is found by subtracting half the pitch from the major diameter. The larger the drilled hole, the easier the cutting of the thread will be, thereby prolonging the life of the tap.

Material	M.P.M
Aluminum, long chip	25-45
Aluminum, short chip	15-25
Brass, long chip	20-25
Brass, short chip	15-20
Copper, long chip	20-25
Copper, short chip	12-15
Cast iron, grey	10-15
Cast iron, malleable	15-25
Steel, 50 ton	12-16
Steel 50-70	6-10
Steel 70+	3-5
Stainless steel, free cutting	10-15
Stainless steel, austenitic	4-8
Stainless steel, ferritic <850	4-8
Stainless steel, ferritic >850	3-5
Zink	20-25
Plastic, termoplastisc	20-30
Plastic, duroplastisc	10-15

BSP ↓	Nominal		Rpm When cutting speed V (m/min) from table is:										
	Inch ↓	mm ↓	4	6	8	10	12	15	20	25	30	45	50
1/8	1/8	3	420	636	850	1060	1270	1590	2120	2750	3180	4770	5300
	5/32	4	320	478	638	800	955	1195	1600	2000	2390	3585	3980
	3/16	5	260	382	510	635	764	955	1270	1590	1910	2865	3180
1/4	1/4	6	212	318	425	535	636	800	1070	1335	1600	2400	2650
	5/16	8	160	240	318	400	478	600	800	1000	1200	1800	1990
	3/8	10	128	190	255	320	382	480	640	800	960	1440	1590
3/8	1/2	12	105	158	212	265	318	400	530	665	800	1200	1325
	9/16	14	90	135	182	230	274	340	460	570	680	1020	1140
	5/8	16	80	120	160	200	240	300	400	500	600	900	990
1/2	1 1/2	18	72	106	142	175	212	265	350	430	530	795	885
	3/4	20	64	96	128	160	190	240	320	400	480	720	795
	5/6	22	60	88	116	145	174	220	290	365	440	660	720
3/4	1	24	52	80	106	134	160	200	268	335	400	600	665
	1 1/8	26	48	74	98	124	146	185	248	310	370	555	612
	1 1/4	28	46	68	90	114	138	170	228	285	340	510	570
1	1 1/2	30	44	64	85	106	128	160	212	270	320	480	530
	1 3/8	32	40	60	80	100	120	150	200	250	300	450	500
	1 1/2	35	36	54	72	90	110	135	180	225	270	405	450
1 1/4	1 1/2	40	32	48	64	80	96	120	160	200	240	360	397
	1 3/4	45	28	42	56	70	85	105	140	175	210	315	350
	2	50	26	38	50	64	76	95	128	160	190	285	320

