

INTRODUCTION TO TAPS

Enco Introduction to Taps - Cont'd

TAP STANDARDS

ANSI - American National Standards Institute

Sets industry standards and product guidelines to insure conformity and to maintain the highest product standards

DIN - Deutsche Industrienorm

German standards organization responsible for setting industrial standards of products European equivalent of ANSI

EXPLANATION of H LIMITS

Example - 1/4-20 NC H3

In addition to the nominal size and pitch of a tap, there is another important dimensional factor to be considered in selecting a ground thread tap. This is the H limit of the pitch diameter of a tap. H means (high) above basic pitch diameter. These tap limits have been established to provide a choice in the selection of the tap size best suited to produce the class of thread desired. The difference in size from one H limit to the next is 0.0005" increments for taps through 1" diameter. Sizes over 1" diameter are separated by .001" diameter increments. If the threads in the part are too loose, smaller numbers such as H1 or H2 are used. If the threads are too tight, the H limit number is increased. Proper selection of the H limit number ensures that the threads are within the tolerance required by the part print. Best rule of thumb: always select the largest "H" limit possible to achieve proper class of fit and maximum tool life.

H1 basic to basic plus .0005"

H2 basic plus .0005" - .0010"

H3 basic plus .0010" - .0015"

H4 basic plus .0015" - .0020"

H5 basic plus .0020" - .0025"

H4 basic plus .0025" - .0030"

CLASS of FIT

Unified system that relates standard screw thread classes to specific tap tolerance limits.

Class A - External

Class B - Internal

Class 1A & 1B - For frequent quick assembly, loose assembly

Class 2A & 2B - Fit is medium loose to eliminate seizure in assembly. Used for screws, bolts and nuts.

Class 3A & 3B - Accuracy of thread is required, gages are used to ensure a tight fit.

COMMON TROUBLE SOURCES in TAPPING

- Using wrong style or designated tap for the job Using dull tap
- Workpiece material too hard or soft for the tap being used
- Over-packing of chips in the flutes
- Improper pre-tapped hole conditions (Size, depth, straightness, roundness, glazed or work-hardened surface, chips in the bottom)
- Misalignment of the tap and the prepared hole
- Lack of/or improper lubrication and application

Signs that the above are occurring may be: welding of materials being tapped, loading, chipping and breakage of taps, poor thread finish and low tap wear life.

CALCULATING PERCENTAGE of THREAD

% of Full Thread = Threads per Inch x (Major Dia. / Selected Drill Dia.) / .01299

CALCULATING TAP DRILL SIZES

For Cutting Taps

Tap Drill Size = Tap Basic Major Diameter - Pitch

Drill Size = Major Diameter - [(0.01299 x desired % of thread) / Threads per Inch]

Drill Size (mm) = Major Diameter / (desired % of thread x pitch (mm) / 76.98)

For Forming Taps

Tap Drill Size = Major Diameter / (Pitch / 2)

Drill Size = Major Diameter - [(0.0068 x desired % of thread) / Threads per Inch]

Drill Size (mm) = Major Diameter / (desired % of thread x pitch (mm) / 147.06)

TECHNICAL INFO

Inch - Tap & Drill Chart 75% Thread

Thread Size	Drill Size	Thread Size	Drill Size	Thread Size	Drill Size	Thread Size	Drill Size
0-80	3/64	5-44	38	1/4-28	3	9/16-18	33/64
1-64	53	6-32	36	5/16-18	F	5/8-11	17/32
1-72	53	6-40	33	9/16-24	I	5/8-18	37/64
2-56	50	8-32	29	3/8-16	5/16	3/4-10	21/32
2-64	50	8-36	29	3/8-24	Q	3/4-16	11/16
3-48	47	10-24	25	7/16-14	U	7/8-9	49/64
3-56	46	10-32	21	7/16-20	W	7/8-14	13/16
4-40	43	12-24	17	1/2-13	27/64	1-8	7/8
4-48	42	12-28	15	1/2-20	29/64	1-12	59/64
5-40	39	1/4-20	7	9/16-12	31/64	1-14	15/16

Metric - Tap & Drill Size 70-75% Thread

Thread Size	Drill Size	Thread Size	Drill Size	Thread Size	Drill Size
M1.6 x .35	1.25	M4.5 x .75	3.75	M12 x 1.75	Y
M2 x 0.4	1.6	M5 x .8	4.2	M14 x 2	12
M2.5 x .45	2.05	M6 x 1	5	M16 x 2	14
M3 x .5	2.5	M7 x 1	6	M18 x 2.5	15.5
M3 x .6	2.9	M8 x 1.25	6.75	M20 x 2.5	17.5
M4 x .7	3.3	M10 x 1.5	8.5		

Inch - Tap Thread Length

Thread Size	Thread Length	Thread Size	Thread Length	Thread Size	Thread Length
0	5/16	12	15/16	3/4	2
1	3/8	1/4	1	7/8	2 1/32
2	7/16	5/16	1 1/8	1	2 1/2
3	1/2	3/8	1 1/4	1 1/8	2 9/16
4	9/16	7/16	1 7/16	1 1/4	2 9/16
5	5/8	1/2	1 21/32	1 3/8	3
6	11/16	9/16	1 21/32	1 1/2	3
8	3/4	5/8	1 13/16		
10	7/8	11/16	1 13/16		

Metric - Tap Thread Length

Thread Size	Thread Length	Thread Size	Thread Length	Thread Size	Thread Length
M1.6 x .35	5/16	M5 x .8	7/8	M16 x 2	1 13/16
M2 x 0.4	7/16	M6 x 1	1	M18 x 2.5	1 13/16
M2.5 x .45	1/2	M7 x 1	1 1/8	M20 x 2.5	2
M3 x .5	5/8	M8 x 1.25	1 1/8	M24 x 3	2 3/32
M3.5 x .6	11/16	M10 x 1.5	1 1/4	M30 x 3.5	2 9/16
M4 x .7	3/4	M12 x 1.75	1 21/32	M36 x 4	3
M4.5 x .75	7/8	M14 x 2	1 21/32		