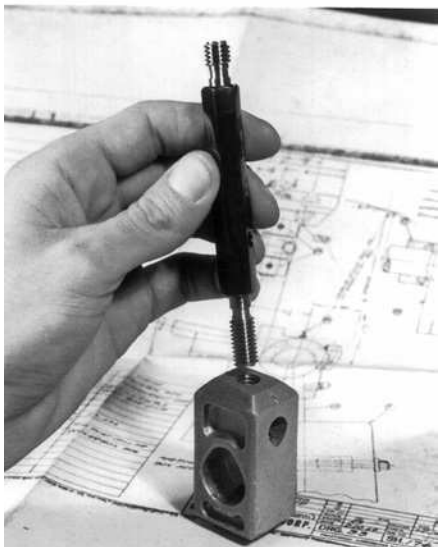
CLASS OF FIT / CLASSES OF THREADS / TAP SIZE

CLASSES OF THREADS AND TAP SIZE: There is a direct relationship between the size of a tap and the size of the thread that it cuts. Size refers to pitch diameter and its relationship to the class of fit required. If two threaded parts are assembled, the looseness or tightness of the fit is determined by contact on the flanks of the threads only. This contact is controlled by the pitch diameters of each part.



CLASSES OF THREAD: When threaded parts are mated, the two parts must assemble with a degree of tightness dictated by the use of the fastener. In addition, the internal thread must be large enough to allow the external thread to enter it for the required length of engagement. A system of thread classes, each representing a comparative degree of tightness, has been established and universally adopted, to provide manufacturers and users of threaded products with a common language of specification. The thread classes designate minimum and maximum pitch diameters for internal and external threads. It is important to remember that classes of thread actually represents manufacturing tolerances. The closer the tolerance required, the higher the cost involved in producing the parts. Therefore, designers and engineers should always try to select the class of thread with the widest permissible tolerance.

TAP SIZE: Due to material variability and machining conditions, taps rarely cut their own size. The thread size produced is usually larger, but can be smaller due to shrinkage. Tap manufacturers realized that to tap a specified class of thread, several different ground thread tap limits would be required. These limits represent small, defined variations in tap size. A numbering system was developed to designate each series of limits, but these limit numbers are not to be confused with the classes of threads. Ground thread tap limits are designated by the letter H (high) above basic pitch diameter, or L (low) below basic pitch diameter, and these numbers establish the tolerance range in relation to basic pitch diameter. As an example, in sizes 1" and smaller, an H1 tap has a tolerance range of from basic to .0005" over basic; an H2 tap from .0005" over basic to .001" over basic, (see **Chart 1A** on this page). In addition, metric threads are also designated in much the same way. The thread tap limits are designated by the letter D (ground, high) above basic pitch diameter, or U (ground, low) below basic pitch diameter. As an example, in sizes M25 and smaller, a D1 tap has a size of .0005" over basic to tap max. P.D.; a D2 tap has a size of .001" over basic to tap max. P.D., (see **Chart 1B**). The Tables on **pages 191-193** list recommended limit numbers for different classes of thread. Several different limit numbers are available for each diameter and pitch combination. Consequently, it is possible to select the "H" or "L" limit, or the "D" or "U" limit most suitable for the required tapping operation. Please contact our Customer Service Dept. for questions regarding tap limits and their relation to classes of fit.

CHART 1A

Pitch Diameter Limits for taps to 1" diameter inclusive:

L1 = Basic to Basic minus 0.0005
H1 = Basic to Basic plus 0.0005
H2 = Basic plus 0.0005 to Basic plus 0.0010
H3 = Basic plus 0.0010 to Basic plus 0.0015
H4 = Basic plus 0.0015 to Basic plus 0.0020
H5 = Basic plus 0.0020 to Basic plus 0.0025
H6 = Basic plus 0.0025 to Basic plus 0.0030

Taps larger than 1" dia. are ground to a 0.0010" tolerance on the pitch diameter and are, for example,

H4 (Basic plus 0.0010" to Basic plus 0.0020").

CHART 1B

Pitch Diameter Limits for taps to 1" diameter inclusive:
(Metric taps generally have more manufacturing tolerance than 0.0005 to the minus side.)

U1 = Basic minus 0.0005 = min. tap P.D.
D1 = Basic plus 0.0005 = max. tap P.D.
D2 = Basic plus 0.0010 = max. tap P.D.
D3 = Basic plus 0.0015 = max. tap P.D.
D4 = Basic plus 0.0020 = max. tap P.D.
D5 = Basic plus 0.0025 = max. tap P.D.
D6 = Basic plus 0.0030 = max. tap P.D.