# THREADING INFORMATION & HAND TAPS

## Taps: Uses, Styles, Surface Treatments & Trouble Sources

A tap removes material from a pre-drilled or punched hole. The result of this cutting action produces threads within the drilled hole. These threads are used in conjunction with screws or bolts to hold two pieces of material together.

The cutting edges at the front of a tap remove material from the workpiece. This material is known as chips. The chips are stored in the grooves and pushed forward in front of the tap or are drawn up along the grooves, removing the chips and cutting fluids from the hole.

### How to Read a Tap Size

Example - ¼-20NC
The ¼ represents the diameter of the thread in inches. The 20 represents the number of threads per inch or TPI. Standard taps are either standard course series threads NC (¼-20), or fine series threads NF (¼-28) or extra fine series NEF (¼-32). There are a number of other standard tap designations such as NPT or NPTF for tapered threads. Special taps are usually designated NS indicating a special thread size.

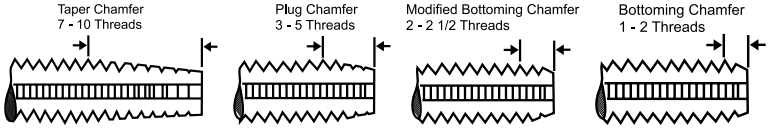
### What are H Limits

Example - ¼-20 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 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-inch increments for taps through 1″ diameter. Sizes over 1″ diameter are separated by .001-inch 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.

### Styles of Taps

**Hand** - Taps are the most versatile taps for hand use or for tapping under power. Hand taps are popular for use in general machine tapping, or CNC tapping. They are also appropriate for tapping the vast majority of materials in through or blind holed conditions.
**Spiral Point** - Taps shoot the chips ahead of the cutting action, thus reducing loading and clogging in the flutes. Sometimes referred to as a Gun® tap which is a registered trademark of Greenfield Industries.
**Spiral Flute** – Taps draw chips out of a tapped hole where chip disposal is a problem.
**Thread Forming** – Taps do not cut threads, rather they form threads, eliminating the problem of chip disposal
**Pipe** – General purpose pipe taps are appropriate for threading a wide variety of materials both ferrous and non-ferrous. Ground thread pipe taps are standard in American Standard Pipe Form (NPT) and American Standard Dryseal Pipe Form (NPTF). NPT threads require the use of a “sealer” like Teflon® tape or pipe compound. Dryseal taps are used to tap fittings, which will give a pressure tight joint without the use of a sealer.

### Hand Tap Chamfers




**Taper** – (7-10 pitches)
Has the longest standard chamfer ensuring easier starting and requires less tapping torque because of more working teeth.
**Plug** – (3-5 pitches)
The most common chamfer for use by hand or machine through or blind holes. The most efficient chamfer available.
**Modified Bottoming** (2-2½ pitches)
This short chamfer allows for threading close to the bottom of blind holes. Due to the slightly longer chamfer and more working teeth, this chamfer is more efficient than a bottoming chamfer.
**Bottoming** (1-2 pitches)
Use for threading close to the bottom of blind holes. The least efficient standard chamfer available.

### Surface Treatments:

**TiN (Titanium Nitride)**: Provides extreme hardness and heat resistance allowing tools coated with TiN to run at higher speeds. Excellent for general-purpose use, TiN provides higher lubricity for freer chip flow, reduced buildup, edge formation and chipping. Use caution on non-ferrous materials because of a tendency to gall.
**TiCN (Titanium Carbonitride)**: Harder and more wear resistant than TiN under conditions of moderate cutting temperatures. TiCN can provide the users the ability to run the job at higher spindle speeds. Use caution on non-ferrous materials because of a tendency to gall.
**Steam Oxide**: Treatment applied to the tap to prevent galling, welding and loading during the threading operation. This treatment increases lubricity and works well in low carbon steels, stainless steels, and ferrous (iron based) metals.
**elektraLube**: An OSG exclusive, extremely thin deposit of ductile solid lubricant placed on the surface of a finished tap, which under working pressure results in a very smooth burnished surface. Reduces torque and helps prevent welding, loading, and galling between the tap and the workpiece.
**Blue Diamond**: A Reiff & Nestor exclusive, specially treated electrochemical surface designed to eliminate surface welding when tapping soft, stringy materials.
**Chrome:** A bright chrome-plating process developed to increase tap life and impart and antigalling surface.
**Nitride**: Recommended where abrasive or wearing conditions exist. It may be used for ferrous, non-ferrous or non-metallic materials.

### Common Trouble Source 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: welding to materials being tapped, loading, breakage of taps, poor thread finish and low tap wear life.