# TABLE OF CONTENTS

# HI-PERFORMANCE TAPS

## (HSS + 5% COBALT)

Hi-Performance taps last longer than conventional taps and are designed to provide maximum machining efficiency for high quality and high volume thread production.

Hi-Performance taps cut faster than conventional taps. Tests over years have proved that Hi-Performance taps have considerably longer life, even when the taps are run comparatively faster.

Hi-Performance taps are the outcome of special tool geometry. engineered to optimize the benefits of premium steel and specialized coatings like TiN, TiCN, TiALN.

Hi-Performance taps are precision ground on CNC thread grinders for consistent and close thread tolerances.

Hi-Performance taps cut down cycle time and frequency of tool change, thereby decreasing the overall cycle time in CNC machines.

# HI-PERFORMANCE THREAD FORMING TAPS

(A DIFFERENT WAY OF PRODUCING INTERNAL THREADS)

These taps are designed for machine tapping in ductile materials. Also known as Cold Forming Taps. Roll Forming Taps or Fluteless Taps. Freecut Tools Hi-Performance Thread Forming Taps have no flutes or cutting edges but have special roll forming lobes with circular lands and short taper leads for through or blind holes. Since the displacement of metal has to be considered, specially calculated pre-tapping drill sizes are necessary.

For tapping depths, more than twice the tap diameter, roll taps with oil grooves are recommended. These grooves provide a passage for the lubricant and also for the escape of air and oil to avoid a piston effect in blind holes.

Please refer to page No. 50 & 51 for detailed descriptions about Thread Forming Taps.

# HI-PERFORMANCE SPIRAL FLUTED TAPS

(FOR BLIND HOLE TAPPING)

Spiral Fluted Taps are designed primarily for machine tapping in blind holes. They are suitable for tapping in soft materials such as aluminium and soft steels, which produces long and stringy chips. The shear action provided by the spiral flutes draws the chip out of the hole, allowing greater depth of threading without chip clogging. Freecut Tools spiral fluted taps are available in low & fast spiral combination. In fast spiral fluted tap ($35^{0}$) thread length is shorter than thread length in other types of taps.

# HI-PERFORMANCE SPIRAL POINTED TAPS

(FOR THROUGH HOLE TAPPING)

Freecut Tools specializes in application taps for various applications. Spiral Point Taps Or Gun Nose Taps with 3-4 threads chamfer is recommended for tapping in through holes. These taps normally push the chips down the hole and are suitable for materials like aluminium, stainless steel, general purpose steel, forged steel etc.

# HI-PERFORMANCE TAPS FOR CAST IRON TAPPING

Freecut Tools has developed application taps for Cast Iron Tapping, having a special geometry and thread tolerance which is suitable for tapping in cast iron and also in short chipping S.G. Iron, These taps have chamfer of 2 thread lengths and can be used for both through holes and blind holes.

# HI-PERFORMANCE NIB/NUT TAPS FOR NUT TAPPING

Freecut Tools Nib Taps are specially made for automatic tapping of nuts in high speed Nut Tapping Machines in materials like stainless steel etc. These taps have appropriate geometry and flute profile which deliver high quality and consistency in threading. They can also be designed to specific tolerances and applications to suit customers' working conditions.

# HI-PERFORMANCE SPECIAL TAPS & THREAD MILLING CUTTERS

In addition to standard range of taps, Freecut Tools also manufactures taps as per drawings, special dimensions & tolerance class on specific request from the customer. Freecut Tools also manufactures Thread Milling Cutters.

# New Developments

## PM Taps

Powder Metallurgy high speed steel grade is a premium steel engineered for high red hardness, high wear & tear resistantant, tool life, heat resistance, toughness, strength and performance under difficult cutting conditions with higher cutting speed for increased productivity and tool life.

APPLICATIONS :

(a) Aluminum : Recommended for all types of aluminum alloys.

(b) Exotic Alloys : Recommended for steel, steel alloy, stainless steel, titanium alloy, nickel, nickel base alloys and other exotic alloys.

(c) Hard Materials : Recommended for harder (32Rc-45Rc) materials including steel alloys, titanium alloys, nickel base high temperature alloys, stainless steels, tool and mold steels.

d) Cast Iron : Recommended for all types of grey, ductile and malleable cast iron, Freecut Tools has started manufacturing high performance taps in superior grade powder metallurgy high speed steel. Freecut Tools is now maintaining stock of superior grade powder metallurgy high speed steel taps in all standard sizes, mainly in metric sizes ranging from 3 mm to 14 mm.

These taps are available in the following varieties :

i. Fluteless Taps for blind & through hole in ductile materials

ii. Spiral Pointed Taps for through hole application

iii. C.I. Taps for Cast Iron applications

iv. Spiral Fluted Taps for blind hole application

We are also manufacturing different varieties in superior powder matellurgy high speed steel for user-specific applications on request.

## Carbide Taps

The structure of carbide is very stable with consistent sub-micro grain particles and hard in nature with character, more resistant to abrasion, pressure, heat and material adhesion. Carbide is more brittle, therefore contributory factors to success or failure may comprise of the following : rigid work piece, rigid tapping avoiding shock or undesirable "float" and vibration. Carbide Taps offer a longer / faster and more consistent performance in specific application.

APPLICATION :

(a) High volume production in materials with abrasive qualities like cast iron, aluminum and silicon alloys (Si > 10%)

(b) Materials which exhibit high wear characteristics or a "closing" nature composites - pure alloys such as tungsten, copper, etc.

(c) Materials hardened above Rc 40. Steels and "exotic" alloys.

Freecut Tools has started the manufacture of carbide taps and at the moment is manufacturing different varieties of carbide taps against specific requests from customers.

# Through Coolant Taps (T.C.H.)

The Performance of taps with through coolant holes is higher than the same taps used with external lubricantion. This kind of taps allows better evacuation of the chip which is transported away from the cutting area itself. Wear on the cutting edge is reduced, since the cooling effect on the cutting zone is higher than the heat generation. T.C.H. taps give excellent performance while tapping deep blind holes up to 3 xD. The advantages of T.C.H. taps over conventional machine taps are increased tool life, reduction in cycle time, cleaner cut threads, accurate dimensions and increased production with more tapped holes per tool resulting in lower machining cost per part. Lubricant can be oil, emulsion or air pressurized with oil mist. Working pressure of not less than 12 - 15 bar is required.

APPLICATION :
T.C.H. taps are used for a variety of challenging applications involving tough, abrasive materials and are available as follows :

(a) Through Coolant taps with Radial holes : For Through Hole Tapping

(b) Through Coolant taps with Axial hole : For Blind Hole Tapping

Freecut Tools has started manufacturing T.C.H. high performance taps in HSS-E and superior HSSE-PM grade (Powder Metallurgy high speed steel). These taps are available in the following varieties:

a. Fluteless Taps for blind & through holes in ductile materials.
b. Spiral Pointed Taps for through hole application.
c. C.I. Taps for Cast Iron applications.
d. Spiral Fluted Taps for Blind hole application.

Freecut Tools at the moment is manufacturing different varieties of T.C.H. taps against specific requests from customers.

# JIS Taps

## Taps Conforming To Japanese Industrial Standard Specification (JIS)

Freecut Tools has launched a new range of high performance taps conforming to JIS Standard for customers using taps as per Japanese Industrial Standard Specifications (JIS). The new Freecut Tools JIS taps are available in cutting as well as cold forming taps with general dimensions in accordance with Japanese Standard.

Recognizing the highest standards followed by Japanese automotive manufacturing, Freecut Tools offers the best option to achieve highest standards in tapping application through its range of JIS taps.

With Freecut Tools expertise and excellence in tapping technology, this new range of high quality taps are available in a variety of geometries and styles that will produce threads in a broad range of materials from steel, stainless steel, cast iron, die cast alluminum, non ferrous materials, titanium, titanium alloys, nickel, nickel base alloys and cobalt base alloys with both short-chipping and long-chipping in through or blind hole applications. Freecut Tools also provides JIS taps ideally suited for producing threads in cast iron, as well as abrasive cast iron with vermicular graphite.

Freecut Tools JIS cold forming taps are ideal for the chipless production of internal threads in blind or through holes which has excellent stability, especially with small thread sizes.

Freecut Tools JIS taps are available in sizes ranging from M2 to M20 in metric sizes and No.4 to 1/2" in fractional sizes in straight flute, spiral point, slow and fast spiral flute, CI and fluteless taps. The JIS taps are also available with advanced coatings to suit material and tapping applications.

Freecut Tools JIS taps are also available with an internal coolant lubricant supply in both Axial and Radial holes as per application on request.

FREECUT

# SELECTION CHART FOR FREECUT TOOLS
# HIGH PERFORMANCE TAPS

# GUIDANCE CHART FOR TAP SELECTION AS PER APPLICATION

● First Choice

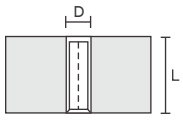
■ Second Choice

## APPLICATION

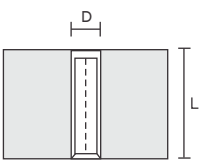
| MATERIAL | | HARDNESS HB | TENSILE STRENGTH N/mm² | SPEED M/Min. | | TYPE OF COOLANT |
|---|---|---|---|---|---|---|
| | | | | BRIGHT | TiN/ TiCN | |
| Steel | Low Alloy Steel, Structural Steel | <200 | <700 | 20 | 40 | Sulphur or chlorinated oil |
| | Plain Carbon Steel, Alloy Steel & Steels With Good Machinability | <250 | <850 | 15 | 32 | Sulphur or chlorinated oil |
| Stainless Steels | Free Machining Stainless Steel Austenitic Ferritic AISI 304, 316, 321 | <250 | <850 | 8 | 12 | Sulphur or chlorinated oil |
| Cast Iron | Grey Cast Iron | <150 | <700 | 15 | 20 | Dry, air jet or soluble oil |
| | Malleable Cast Iron | <200 | <700 | 8 | 15 | Soluble oil or chemical-type coolant |
| Copper & Its Alloys | Soft | <100 | <350 | 12 | 20 | Light base oil |
| | Hard | <200 | <700 | 25 | 40 | Light base oil |
| Brass | Short Chipping | <200 | <700 | 30 | 45 | Soluble oil, light duty oil |
| | Long Chipping | <200 | <700 | 20 | 40 | Soluble oil, light duty oil |
| Bronze | Short Chipping | <300 | <700 | 4 | -- | Soluble oil, light duty oil |
| | Long Chipping | <200 | <700 | 20 | 30 | Soluble oil, light duty oil |
| Aluminium Magnesium | Short Chipping Si<10% | <120 | <400 | 20 | 35 | Water soluble or oil /chemical especially for aluminium |
| | Short Chipping Si>10% | <120 | <400 | 15 | 30 | Water soluble or oil /chemical especially for aluminium |
| | Long Chipping unalloyed | <100 | <350 | 16 | 30 | Oil specially recommended for magnesium |
| | Medium Chipping Si <0.5% | <150 | <500 | 30 | 50 | Oil specially recommended for magnesium |
| Zinc alloys | | | | 20 | 40 | Soluble oil |

## Types of Holes

### THROUGH HOLE

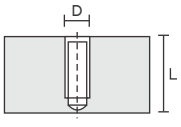



L < or = 1.5 D
Fig. T1

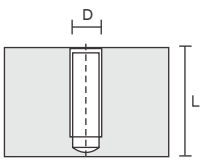



L > 1.5 D < 3 D
Fig. T2

### BLIND HOLE




L < or = 1.5 D
Fig. B1




L >1.5 D <3 D
Fig. B2

| SPIRAL POINT | | | SPIRAL FLUTE 35° | | | SPIRAL FLUTE 15° | | | STRAIGHT FLUTE | | | CAST IRON TAP | | | FLUTELESS | | | FLUTELESS OIL GROOVE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bright | TiN | TiCN/ TiALN | Bright | TiN | TiCN/ TiALN | Bright | TiN | TiCN/ TiALN | A Bright | C Bright | D Bright | Bright | TiN | TiCN/ TiALN | Bright | TiN | TiCN/ TiALN | Bright | TiN | TiCN/ TiALN |

| | Through Hole | | | Blind Hole | | | | | | Through or Blind Hole | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ● | ● | ● | ● | ● | | ■ | ■ | ■ | ■ | ■ | ■ | | | | ● | ● | ● | ● | ● | ● |
| | ● | ● | ● | | | ● | | ● | | ■ | ■ | ■ | | | | ■ | ● | ● | ■ | ● | ● |
| | ■ | ● | ● | | ● | ● | | | | | | | | | | ● | ● | ● | ● | ● | ● |
| | | | | | | | | | | | | | ● | ● | ● | | | | | | |
| | | | | | | | | | | | | | ● | ● | ● | | | | | | |
| | ■ | | ● | ■ | | ● | | | | ■ | ■ | ■ | | | | ● | ● | ● | ● | ● | ● |
| | | | | | | | | | | ■ | ■ | ■ | | | | | | | | | |
| | | ● | | | | | | | | | | | | | | | | | | | |
| | ■ | ● | | | ● | | | | ● | ● | ● | ● | | | | ● | ● | ● | ● | ● | ● |
| | ● | | | | | | | ■ | | | | | | | | | | | | | |
| | ● | | | | | | | ■ | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ |
| | ■ | ■ | ● | ■ | ■ | ■ | | | | ● | ● | ● | | | | | | | | | |
| | ● | | | ● | | | | | | ● | ● | ● | | | | | | | | | |
| | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | ● | ● | ● | ● | ● | ● |
| | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | ● | ● | ● | ● | ● | ● |
| | | | ■ | | | ■ | | | | | | | | | | | ● | ● | | ● | ● |

## How to find the right tap ?

1. Material to be machined
2. Hole type in which tapping is to be done
   Use above chart for tap selection
   (For Ex. :- For short chipping brass)
   Select the hole type as given below
   (For Ex. :- Blind hole)
   Use above chart for the tap selection
   (For Ex. :- For short chipping brass)
   Select the hole type as given below
   (For Ex. :- Blind hole)
3. Thread depth to be produced
   select the hole type as given below
   (For Ex. :- blind hole with L > 1.5 D < 3D)
4. Thread type required
   (For Ex. :- "M" metric type of thread)
5. General tap dimensions required
   (For Ex.:- IS 6175-III)
6. For Thread Forming Tap :

(a) For Fig. TI & BI - Use Fluteless Tap
   (For Ex.:- L< or = 1.5 D)
(b) For Fig. T2 & B2 - Use Fluteless Oil Groove
   (For Ex. :- L < 3D)

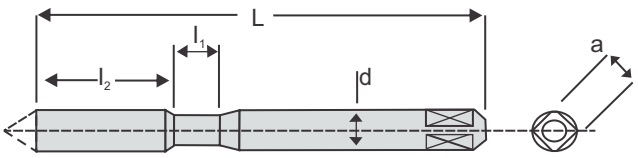
7. For Blind Hole Tapping:

(a) For Fig. B I - Use 15° Spiral Flute
   (For Ex. :- L < or = 1.5 D)
(b) For Ex. :- B2 - Use 35° Spiral Flute
   (For Ex.:- L> 1.5 D < 3 D)

FREECUT

# PRODUCT RANGE

# MC




| | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |
| Standard Tap - HSS | * | * | | * | * | | |
| High Performance Tap - HSS-E | * | * | * | * | * | * | * |
| Type of Hole – Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| Type of Hole – Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

## IS 6175 I & ISO 529

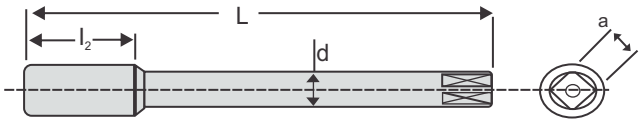
| Size | Pitch | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M1.6 | 0.35 | 41.0 | 5.0 | 8.0 | 2.50 | 2.00 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| M1.8 | 0.35 | 41.0 | 5.0 | 8.0 | 2.50 | 2.00 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| M2 | 0.40 | 41.0 | 5.5 | 8.0 | 2.50 | 2.00 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| M2.2 | 0.45 | 44.5 | 6.0 | 9.5 | 2.80 | 2.24 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| M2.5 | 0.45 | 44.5 | 6.0 | 9.5 | 2.80 | 2.24 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |

## IS 6175 II & ISO 529

| Size | Pitch | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M3 | 0.50 | 48.0 | 7.0 | 11.0 | 3.15 | 2.50 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M3.5 | 0.60 | 50.0 | 7.0 | 13.0 | 3.55 | 2.80 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.70 | 53.0 | 8.0 | 13.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4.5 | 0.75 | 53.0 | 8.0 | 13.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.80 | 58.0 | 9.0 | 16.0 | 5.00 | 4.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 1.00 | 66.0 | 11.0 | 19.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M7 | 1.00 | 66.0 | 11.0 | 19.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 1.25 | 72.0 | 13.0 | 22.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 1.25 | 72.0 | 14.0 | 22.0 | 9.00 | 7.10 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.50 | 80.0 | 15.0 | 24.0 | 10.00 | 8.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |

*: Indicates availability in 6H & 6G tolerance class in ready stock.

# MC



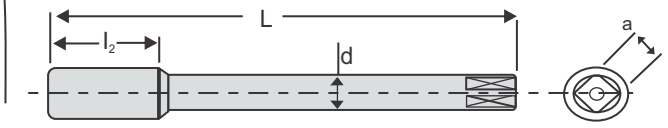

## IS 6175 III & ISO 529

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | Pitch | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M3 | 0.50 | 48.0 | 11.0 | 2.24 | 1.80 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M3.5 | 0.60 | 50.0 | 13.0 | 2.50 | 2.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.70 | 53.0 | 13.0 | 3.15 | 2.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4.5 | 0.75 | 53.0 | 13.0 | 3.55 | 2.80 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.80 | 58.0 | 16.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 1.00 | 66.0 | 19.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M7 | 1.00 | 66.0 | 19.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 1.25 | 72.0 | 22.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 1.25 | 72.0 | 22.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.50 | 80.0 | 24.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 1.50 | 85.0 | 25.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.75 | 89.0 | 29.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| M14 | 2.00 | 95.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 2.00 | 102.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M18 | 2.50 | 112.0 | 37.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M20 | 2.50 | 112.0 | 37.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M22 | 2.50 | 118.0 | 38.0 | 16.00 | 12.50 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M24 | 3.00 | 130.0 | 45.0 | 18.00 | 14.00 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M27 | 3.00 | 135.0 | 45.0 | 20.00 | 16.00 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M30 | 3.50 | 138.0 | 48.0 | 20.00 | 16.00 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M33 | 3.50 | 151.0 | 51.0 | 22.40 | 18.00 | 4 | 6 | 4 | 4 | 4 | - | - |
| M36 | 4.00 | 162.0 | 57.0 | 25.00 | 20.00 | 4 | 6 | 4 | 4 | 4 | - | - |
| M39 | 4.00 | 170.0 | 60.0 | 28.00 | 22.40 | 4 | 6 | 4 | 4 | 4 | - | - |
| M42 | 4.50 | 170.0 | 60.0 | 28.00 | 22.40 | 6 | 6 | 6 | 6 | 6 | - | - |
| M45 | 4.50 | 187.0 | 67.0 | 31.50 | 25.00 | 6 | 6 | 6 | 6 | 6 | - | - |
| M48 | 5.00 | 187.0 | 67.0 | 31.50 | 25.00 | 6 | 6 | 6 | 6 | 6 | - | - |

*: Indicates availability in 6H & 6G tolerance class in ready stock upto M30.

# MC



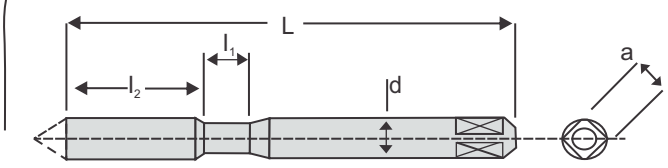


## IS 6175 IV & ISO 2283

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Standard Tap - HSS | | | | | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | | | | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | | | | | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Size | Pitch | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
| M3 | 0.50 | 66.0 | 11.0 | 2.24 | 1.80 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M3.5 | 0.60 | 68.0 | 13.0 | 2.50 | 2.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.70 | 73.0 | 13.0 | 3.15 | 2.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4.5 | 0.75 | 73.0 | 13.0 | 3.55 | 2.80 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.80 | 79.0 | 16.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 1.00 | 89.0 | 19.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M7 | 1.00 | 89.0 | 19.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 1.25 | 97.0 | 22.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 1.25 | 97.0 | 22.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.50 | 108.0 | 24.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 1.50 | 115.0 | 25.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.75 | 119.0 | 29.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| M14 | 2.00 | 127.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 2.00 | 137.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M18 | 2.50 | 149.0 | 37.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M20 | 2.50 | 149.0 | 37.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M22 | 2.50 | 158.0 | 38.0 | 16.00 | 12.50 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M24 | 3.00 | 172.0 | 45.0 | 18.00 | 14.00 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |

* : Indicates availability in 6H & 6G tolerance class in ready stock upto M24.

# MC

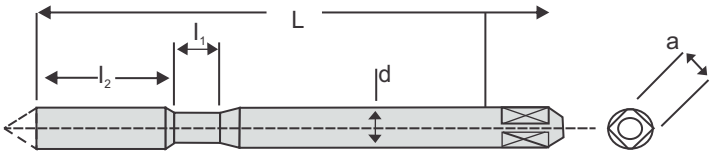




## DIN 371

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | Pitch | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M1.6 | 0.35 | 40.0 | 5.0 | 8.0 | 2.5 | 2.1 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| M2 | 0.40 | 45.0 | - | 8.0 | 2.8 | 2.1 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| M2.5 | 0.45 | 50.0 | - | 9.0 | 2.8 | 2.1 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| M3 | 0.50 | 56.0 | 7.0 | 11.0 | 3.5 | 2.7 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M3.5 | 0.60 | 56.0 | 7.0 | 13.0 | 4.0 | 3.0 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.70 | 63.0 | 8.0 | 13.0 | 4.5 | 3.4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.80 | 70.0 | 9.0 | 16.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 1.00 | 80.0 | 11.0 | 19.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M7 | 1.00 | 80.0 | 11.0 | 19.0 | 7.0 | 5.5 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 1.25 | 90.0 | 13.0 | 22.0 | 8.0 | 6.2 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.50 | 100.0 | 15.0 | 24.0 | 10.0 | 8.0 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |

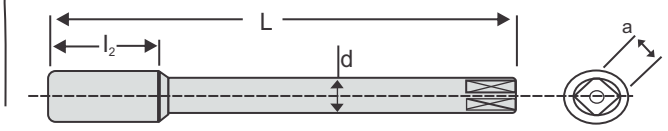



## DIN 371 EXTRA LONG TAP

100 mm long :- in M3 to M8
120 mm long :- in M4 to M12
150 mm long :- in M5 to M12

* : Indicates availability in 6H & 6G tolerance class in ready stock.

# MC



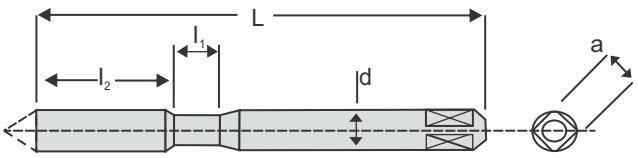


## DIN 376

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High Performance Tap - HSS-E | | | | | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | | | | | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Size | Pitch | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
| M3 | 0.50 | 56.0 | 11.0 | 2.2 | 1.6 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M4 | 0.70 | 63.0 | 13.0 | 2.8 | 2.1 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.80 | 70.0 | 16.0 | 3.5 | 2.7 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 1.00 | 80.0 | 19.0 | 4.5 | 3.4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 1.25 | 90.0 | 22.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.50 | 100.0 | 24.0 | 7.0 | 5.5 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.75 | 110.0 | 29.0 | 9.0 | 7.0 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M14 | 2.00 | 110.0 | 30.0 | 11.0 | 9.0 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 2.00 | 110.0 | 32.0 | 12.0 | 9.0 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |

* : Indicates availability in 6H & 6G tolerance class in ready stock

# MF




## IS 6175 I & ISO 529

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

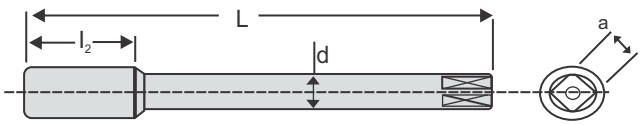
| Size | Pitch | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M2.5 | 0.35 | 44.5 | 6.0 | 9.5 | 2.8 | 2.24 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |

## IS 6175 II & ISO 529

| Size | Pitch | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M3 | 0.35 | 48.0 | 7.0 | 11.0 | 3.15 | 2.50 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M3.5 | 0.35 | 50.0 | 7.0 | 13.0 | 3.55 | 2.80 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.50 | 53.0 | 8.0 | 13.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4.5 | 0.50 | 53.0 | 8.0 | 13.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.50 | 58.0 | 9.0 | 16.0 | 5.00 | 4.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5.5 | 0.50 | 62.0 | 9.0 | 17.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 0.75 | 66.0 | 11.0 | 19.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M7 | 0.75 | 66.0 | 11.0 | 19.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 0.75 | 66.0 | 13.0 | 16.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M8 | 1.00 | 69.0 | 13.0 | 19.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 0.75 | 66.0 | 14.0 | 16.0 | 9.00 | 7.10 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 1.00 | 69.0 | 14.0 | 19.0 | 9.00 | 7.10 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 0.75 | 73.0 | 15.0 | 17.0 | 10.00 | 8.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.00 | 76.0 | 15.0 | 20.0 | 10.00 | 8.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.25 | 76.0 | 15.0 | 20.0 | 10.00 | 8.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |

* : Indicates availability in 6H & 6G tolerance class in ready stock.

# MF



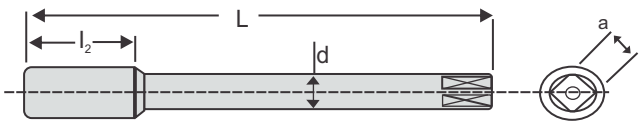

## IS 6175 III & ISO 529

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | Pitch | L | $l_2$ | d | a | | Number of Flutes | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M3 | 0.35 | 48.0 | 11.0 | 2.24 | 1.80 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M3.5 | 0.35 | 50.0 | 13.0 | 2.50 | 2.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.50 | 53.0 | 13.0 | 3.15 | 2.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4.5 | 0.50 | 53.0 | 13.0 | 3.55 | 2.80 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.50 | 58.0 | 16.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5.5 | 0.50 | 62.0 | 17.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 0.75 | 66.0 | 19.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M7 | 0.75 | 66.0 | 19.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 0.75 | 66.0 | 16.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 1.00 | 69.0 | 19.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 0.75 | 66.0 | 16.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 1.00 | 69.0 | 19.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 0.75 | 73.0 | 17.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.00 | 76.0 | 20.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.25 | 76.0 | 20.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 0.75 | 80.0 | 20.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 1.00 | 80.0 | 20.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.00 | 80.0 | 20.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.25 | 84.0 | 24.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.50 | 89.0 | 29.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| M14 | 1.00 | 87.0 | 22.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M14 | 1.25 | 90.0 | 25.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M14 | 1.50 | 95.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M15 | 1.00 | 87.0 | 22.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M15 | 1.50 | 95.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 1.00 | 92.0 | 22.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 1.50 | 102.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M17 | 1.00 | 92.0 | 22.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M17 | 1.50 | 102.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M18 | 1.00 | 97.0 | 22.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M18 | 1.50 | 104.0 | 29.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M18 | 2.00 | 112.0 | 37.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M20 | 1.00 | 102.0 | 27.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M20 | 1.50 | 104.0 | 29.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |

* : Indicates availability in 6H & 6G tolerance class in ready stock upto M20.

# MF



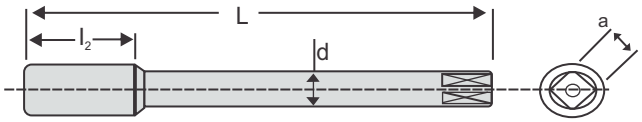

## IS 6175 IV & ISO 2283

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  |  |  |  |  |  |  |
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | Pitch | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M3 | 0.35 | 66.0 | 11.0 | 2.24 | 1.80 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M3.5 | 0.35 | 68.0 | 13.0 | 2.50 | 2.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.50 | 73.0 | 13.0 | 3.15 | 2.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4.5 | 0.50 | 73.0 | 13.0 | 3.55 | 2.80 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.50 | 79.0 | 16.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5.5 | 0.50 | 84.0 | 17.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 0.75 | 89.0 | 19.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M7 | 0.75 | 89.0 | 19.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 0.75 | 91.0 | 16.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M8 | 1.00 | 97.0 | 19.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 0.75 | 94.0 | 16.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 1.00 | 97.0 | 19.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 0.75 | 104.0 | 17.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.00 | 108.0 | 20.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.25 | 108.0 | 20.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 0.75 | 110.0 | 20.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 1.00 | 110.0 | 20.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.00 | 110.0 | 20.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.25 | 119.0 | 24.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.50 | 119.0 | 29.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| M14 | 1.00 | 124.0 | 22.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M14 | 1.25 | 127.0 | 25.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M14 | 1.50 | 127.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M15 | 1.00 | 124.0 | 22.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M15 | 1.50 | 127.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 1.00 | 127.0 | 22.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 1.50 | 137.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M17 | 1.00 | 127.0 | 22.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M17 | 1.50 | 137.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| M18 | 1.00 | 135.0 | 22.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M18 | 1.50 | 142.0 | 29.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M18 | 2.00 | 149.0 | 37.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M20 | 1.00 | 140.0 | 27.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M20 | 1.50 | 142.0 | 29.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M20 | 2.00 | 149.0 | 37.0 | 14.00 | 11.20 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M22 | 1.00 | 149.0 | 29.0 | 16.00 | 12.50 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M22 | 1.50 | 153.0 | 33.0 | 16.00 | 12.50 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M22 | 2.00 | 158.0 | 38.0 | 16.00 | 12.50 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M24 | 1.50 | 172.0 | 35.0 | 18.00 | 14.00 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| M24 | 2.00 | 172.0 | 35.0 | 18.00 | 14.00 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |

* : Indicates availability in 6H & 6G tolerance class in ready stock upto M20.

# MF



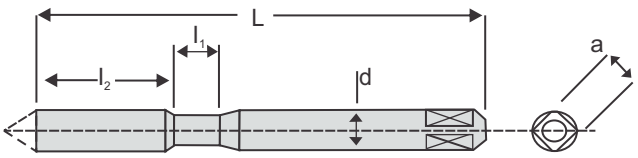

## DIN 374

| | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |
| Standard Tap - HSS | * | * | | * | * | | |
| High Performance Tap - HSS-E | * | * | * | * | * | * | * |
| Type of Hole – Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| Type of Hole – Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | Pitch | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M3 | 0.35 | 56.0 | 9.0 | 2.2 | | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| M3.5 | 0.35 | 56.0 | 10.0 | 2.5 | 2.10 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.35 | 63.0 | 10.0 | 2.8 | 2.10 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4 | 0.50 | 63.0 | 10.0 | 2.8 | 2.10 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M4.5 | 0.50 | 70.0 | 12.0 | 3.5 | 2.70 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.50 | 70.0 | 12.0 | 3.5 | 2.70 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5 | 0.75 | 70.0 | 12.0 | 3.5 | 2.70 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M5.5 | 0.50 | 80.0 | 12.0 | 4.0 | 3.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 0.50 | 80.0 | 14.0 | 4.5 | 3.40 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M6 | 0.75 | 80.0 | 14.0 | 4.5 | 3.40 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M7 | 0.75 | 80.0 | 14.0 | 5.5 | 4.30 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| M8 | 0.50 | 80.0 | 19.0 | 6.0 | 4.90 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M8 | 0.75 | 80.0 | 19.0 | 6.0 | 4.90 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M8 | 1.00 | 90.0 | 22.0 | 6.0 | 4.90 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 0.75 | 80.0 | 19.0 | 7.0 | 5.50 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M9 | 1.00 | 90.0 | 22.0 | 7.0 | 5.50 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 0.75 | 90.0 | 20.0 | 7.0 | 5.50 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.00 | 90.0 | 20.0 | 7.0 | 5.50 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M10 | 1.25 | 100.0 | 24.0 | 7.0 | 5.50 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 0.75 | 90.0 | 20.0 | 8.0 | 6.20 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 1.00 | 90.0 | 20.0 | 8.0 | 6.20 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M11 | 1.25 | 90.0 | 22.0 | 8.0 | 6.20 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 0.75 | 100.0 | 22.0 | 9.0 | 7.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.00 | 100.0 | 22.0 | 9.0 | 7.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M12 | 1.25 | 100.0 | 22.0 | 9.0 | 7.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| M13 | 1.00 | 100.0 | 22.0 | 11.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M13 | 1.50 | 100.0 | 22.0 | 11.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M14 | 0.75 | 100.0 | 22.0 | 11.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M14 | 1.00 | 100.0 | 22.0 | 11.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M14 | 1.25 | 100.0 | 22.0 | 11.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M14 | 1.50 | 100.0 | 22.0 | 11.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M15 | 1.00 | 100.0 | 22.0 | 12.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M15 | 1.50 | 100.0 | 22.0 | 12.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 1.00 | 100.0 | 22.0 | 12.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 1.25 | 100.0 | 22.0 | 12.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| M16 | 1.50 | 100.0 | 22.0 | 12.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |

* : Indicates availability in 6H tolerance class in ready stock.

# UNC




| | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |

## IS 6175 I, BS-949 & ISO 529

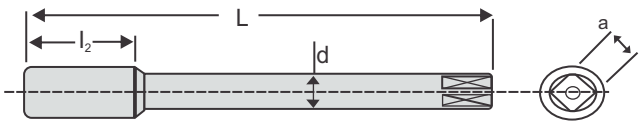
| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Standard Tap - HSS | | | | | | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | | | | | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | | | | | | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Size | TPI | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
| NO.1 | 64 | 41.0 | 5.5 | 8.0 | 2.5 | 2.00 | 3 | 2 | 3 | 3 | 3 | 3 | 4 |
| NO.2 | 56 | 44.5 | 6.0 | 9.5 | 2.8 | 2.24 | 3 | 2 | 3 | 3 | 3 | 3 | 4 |

## IS 6175 II, BS-949 & ISO 529

| Size | TPI | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO.3 | 48 | 44.5 | 6.0 | 9.5 | 2.80 | 2.24 | 3 | 2 | 3 | 3 | 3 | 3 | 4 |
| NO.4 | 40 | 48.0 | 7.0 | 11.0 | 3.15 | 2.50 | 3 | 3 | 3 | 3 | 3 | 3 | 4 |
| NO.5 | 40 | 48.0 | 7.0 | 11.0 | 3.15 | 2.50 | 3 | 3 | 3 | 3 | 3 | 3 | 4 |
| NO.6 | 32 | 50.0 | 7.0 | 13.0 | 3.55 | 2.80 | 3 | 3 | 4 | 3 | 3 | 3 | 4 |
| NO.8 | 32 | 53.0 | 8.0 | 13.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 3 | 4 |
| NO.10 | 24 | 58.0 | 9.0 | 16.0 | 5.00 | 4.00 | 3 | 3 | 4 | 3 | 3 | 3 | 4 |
| NO.12 | 24 | 62.0 | 9.0 | 17.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 3 | 4 |
| 1/4" | 20 | 66.0 | 11.0 | 19.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 3 | 4 |
| 5/16" | 18 | 72.0 | 13.0 | 22.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 3 | 5 |
| 3/8" | 16 | 80.0 | 15.0 | 24.0 | 10.00 | 8.00 | 3 | 3 | 4 | 3 | 3 | 3 | 5 |

* : Indicates availability in 2B tolerance class in ready stock.

# UNC




## IS 6175 III, BS-949 & ISO 529

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

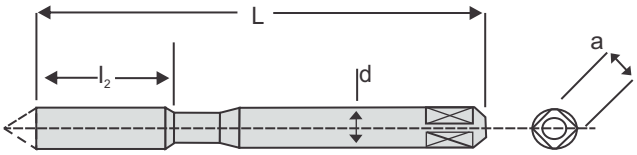
| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/16" | 14 | 85.0 | 25.0 | 8.0 | 6.30 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| 1/2" | 13 | 89.0 | 29.0 | 9.0 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| 9/16" | 12 | 95.0 | 30.0 | 11.2 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| 5/8" | 11 | 102.0 | 32.0 | 12.5 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| 3/4" | 10 | 112.0 | 37.0 | 14.0 | 11.20 | 4 | 3 | 4 | 3 | 3 | 8 | 8 |
| 7/8" | 9 | 118.0 | 38.0 | 16.0 | 12.50 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| 1" | 8 | 130.0 | 45.0 | 18.0 | 14.00 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| 1.1/8" | 7 | 138.0 | 48.0 | 20.0 | 16.00 | 4 | 4 | 6 | 4 | 4 | - | - |
| 1.1/4" | 7 | 151.0 | 51.0 | 22.4 | 18.00 | 4 | 4 | 6 | 4 | 4 | - | - |
| 1.3/8" | 6 | 162.0 | 57.0 | 25.0 | 20.00 | 6 | 4 | 6 | 4 | 4 | - | - |
| 1.1/2" | 6 | 170.0 | 60.0 | 28.0 | 22.40 | 6 | 4 | 6 | 4 | 4 | - | - |
| 1.3/4" | 5 | 187.0 | 67.0 | 31.5 | 25.00 | 6 | 6 | 6 | 6 | 6 | - | - |
| 2" | 4.5 | 200.0 | 70.0 | 35.5 | 28.00 | 6 | 6 | 6 | 6 | 6 | - | - |

## IS 6175 IV, BS-949 & ISO 2283

| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No.5 | 40 | 66.0 | 11.0 | 2.24 | 1.80 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No.6 | 32 | 68.0 | 13.0 | 2.50 | 2.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.8 | 32 | 73.0 | 13.0 | 3.15 | 2.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.10 | 24 | 79.0 | 16.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/4" | 20 | 89.0 | 19.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/16" | 18 | 97.0 | 22.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 3/8" | 16 | 108.0 | 24.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 7/16" | 14 | 115.0 | 25.0 | 8.00 | 6.30 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| 1/2" | 13 | 119.0 | 29.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| 9/16" | 12 | 127.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| 5/8" | 11 | 137.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |
| 3/4" | 10 | 149.0 | 37.0 | 14.00 | 11.20 | 4 | 3 | 4 | 3 | 3 | 6 | 6 |

* : Indicates availability in 2B tolerance class in ready stock upto 1"

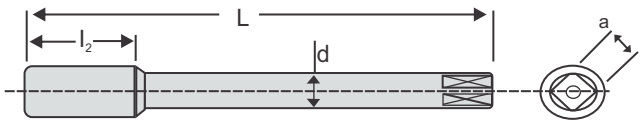
# UNC




## DIN 371

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| High Performance Tap - HSS-E | | | | | | | | |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. 4 | 40 | 50.0 | 10.0 | 3.5 | 2.7 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No. 5 | 40 | 56.0 | 11.0 | 3.5 | 2.7 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No. 6 | 32 | 56.0 | 12.0 | 4.0 | 3.0 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No. 8 | 32 | 63.0 | 13.0 | 4.5 | 3.4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.10 | 24 | 70.0 | 15.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.12 | 24 | 70.0 | 16.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/4" | 20 | 80.0 | 17.0 | 7.0 | 5.5 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/16" | 18 | 90.0 | 20.0 | 8.0 | 6.2 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 3/8" | 16 | 100.0 | 22.0 | 9.0 | 7.0 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |

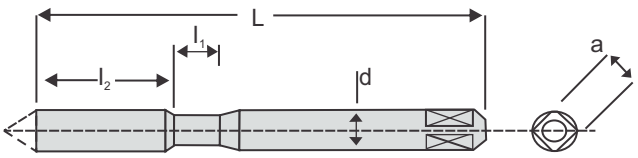



## DIN 376

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| High Performance Tap - HSS-E | | | | | | | | |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No.4 | 40 | 50.0 | 10.0 | 1.8 | | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No.5 | 40 | 56.0 | 11.0 | 2.2 | 1.80 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No.6 | 32 | 56.0 | 12.0 | 2.5 | 2.10 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.8 | 32 | 63.0 | 13.0 | 2.8 | 2.10 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.10 | 24 | 70.0 | 15.0 | 3.5 | 2.70 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.12 | 24 | 70.0 | 16.0 | 3.5 | 2.70 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/4" | 20 | 80.0 | 17.0 | 4.5 | 3.40 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/16" | 18 | 90.0 | 20.0 | 6.0 | 4.90 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 3/8" | 16 | 100.0 | 22.0 | 7.0 | 5.50 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 7/16" | 14 | 100.0 | 22.0 | 8.0 | 6.20 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 1/2" | 13 | 110.0 | 25.0 | 9.0 | 7.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 9/16" | 12 | 110.0 | 26.0 | 11.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| 5/8" | 11 | 110.0 | 27.0 | 12.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| 3/4" | 10 | 125.0 | 30.0 | 14.0 | 11.00 | 4 | 4 | 4 | 4 | 4 | 8 or 6 | 8 or 6 |

# UNF




| | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |
| Standard Tap - HSS | * | * | | * | * | | |
| High Performance Tap - HSS-E | * | * | * | * | * | * | * |
| Type of Hole - Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| Type of Hole - Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

## IS 6175 I, BS-949 & ISO 529

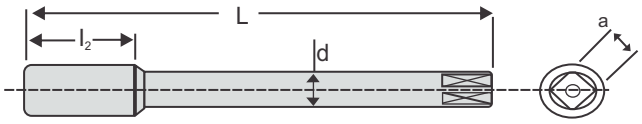
| Size | TPI | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO.1 | 72 | 41.0 | 5.5 | 8.0 | 2.50 | 2.00 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| NO.2 | 64 | 44.5 | 6.0 | 9.5 | 2.8 | 2.24 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |

## IS 6175 II, BS-949 & ISO 529

| Size | TPI | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO.3 | 56 | 44.5 | 6.0 | 9.5 | 2.8 | 2.24 | 3 | 2 | 3 | 3 | 3 | 4 | 4 |
| NO.4 | 48 | 48.0 | 7.0 | 11.0 | 3.15 | 2.50 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| NO.5 | 44 | 48.0 | 7.0 | 11.0 | 3.15 | 2.50 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| NO.6 | 40 | 50.0 | 7.0 | 13.0 | 3.55 | 2.80 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| NO.8 | 36 | 53.0 | 8.0 | 13.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| NO.10 | 32 | 58.0 | 9.0 | 16.0 | 5.00 | 4.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| NO.12 | 28 | 62.0 | 9.0 | 17.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/4" | 28 | 66.0 | 11.0 | 19.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/16" | 24 | 69.0 | 13.0 | 19.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 3/8" | 24 | 76.0 | 15.0 | 20.0 | 10.00 | 8.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |

* : Indicates availability in 2B tolerance class in ready stock.

# UNF




## IS 6175 III, BS-949 & ISO 529

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

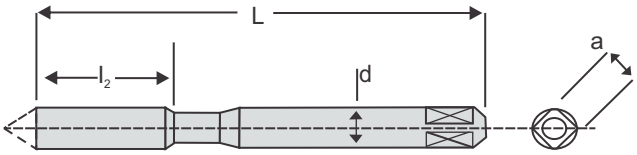
| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/16" | 20 | 82.0 | 22.0 | 8.0 | 6.3 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| 1/2" | 20 | 84.0 | 24.0 | 9.0 | 7.1 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| 9/16" | 18 | 90.0 | 25.0 | 11.2 | 9.0 | 4 | 3 | 4 | 4 | 4 | 6 | 6 |
| 5/8" | 18 | 95.0 | 25.0 | 12.5 | 10.0 | 4 | 3 | 4 | 4 | 4 | 6 | 6 |
| 3/4" | 16 | 104.0 | 29.0 | 14.0 | 11.2 | 4 | 3 | 4 | 4 | 4 | 8 | 8 |
| 7/8" | 14 | 113.0 | 33.0 | 16.0 | 12.5 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| 1" | 12 | 120.0 | 35.0 | 18.0 | 14.0 | 4 | 4 | 4 | 4 | 4 | 8 | 8 |
| 1.1/8" | 12 | 127.0 | 37.0 | 20.0 | 16.0 | 6 | 4 | 6 | 4 | 4 | - | - |
| 1.1/4" | 12 | 137.0 | 37.0 | 22.4 | 18.0 | 6 | 4 | 6 | 4 | 4 | - | - |
| 1.3/8" | 12 | 144.0 | 39.0 | 25.0 | 20.0 | 6 | 4 | 6 | 4 | 4 | - | - |
| 1.1/2" | 12 | 149.0 | 39.0 | 28.0 | 22.4 | 6 | 4 | 6 | 4 | 4 | - | - |

## IS 6175 IV, BS-949 & ISO 2283

| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No.5 | 44 | 66 | 11 | 2.24 | 1.80 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No.6 | 40 | 68 | 13 | 2.50 | 2.00 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.8 | 36 | 73 | 13 | 3.15 | 2.50 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.10 | 32 | 79 | 16 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/4" | 28 | 89 | 19 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/16" | 24 | 97 | 19 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 3/8" | 24 | 108 | 20 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 7/16" | 20 | 110 | 20 | 8.00 | 6.30 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| 1/2" | 20 | 119 | 24 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 5 | 5 |
| 9/16" | 18 | 127 | 25 | 11.20 | 9.00 | 4 | 3 | 4 | 4 | 4 | 6 | 6 |
| 5/8" | 18 | 137 | 32 | 12.50 | 10.00 | 4 | 3 | 4 | 4 | 4 | 6 | 6 |
| 3/4" | 16 | 142 | 29 | 14.00 | 11.20 | 4 | 3 | 4 | 4 | 4 | 6 | 6 |
| 7/8" | 14 | 153 | 33 | 16.00 | 12.50 | 4 | 4 | 4 | 4 | 4 | 6 | 6 |

* : Indicates availability in 2B tolerance class in ready stock upto 1"

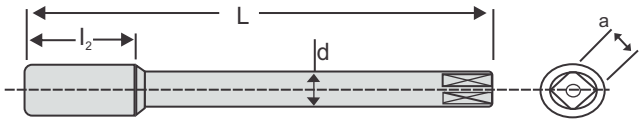
# UNF




## DIN 371

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| High Performance Tap - HSS-E | | | | | | | | |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. 4 | 48 | 50.0 | 10.0 | 3.5 | 2.7 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No. 5 | 44 | 56.0 | 11.0 | 3.5 | 2.7 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No. 6 | 40 | 56.0 | 12.0 | 4.0 | 3.0 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No. 8 | 36 | 63.0 | 13.0 | 4.5 | 3.4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.10 | 32 | 70.0 | 15.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.12 | 28 | 70.0 | 16.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/4" | 28 | 80.0 | 17.0 | 7.0 | 5.5 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/16" | 24 | 90.0 | 17.0 | 8.0 | 6.2 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 3/8" | 24 | 100.0 | 18.0 | 9.0 | 7.0 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |

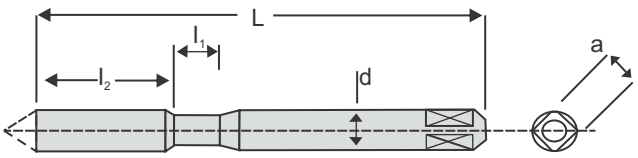



## DIN 376

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| High Performance Tap - HSS-E | | | | | | | | |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No.4 | 48 | 50.0 | 10.0 | 1.8 | | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No.5 | 44 | 56.0 | 11.0 | 2.2 | 1.80 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| No.6 | 40 | 56.0 | 12.0 | 2.5 | 2.10 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.8 | 36 | 63.0 | 13.0 | 2.8 | 2.10 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.10 | 32 | 70.0 | 15.0 | 3.5 | 2.70 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| No.12 | 28 | 70.0 | 16.0 | 3.5 | 2.70 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/4" | 28 | 80.0 | 17.0 | 4.5 | 3.40 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/16" | 24 | 90.0 | 17.0 | 6.0 | 4.90 | 3 | 3 | 4 | 3 | 3 | 4 | 4 |
| 3/8" | 24 | 100.0 | 18.0 | 7.0 | 5.50 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 7/16" | 20 | 100.0 | 22.0 | 8.0 | 6.20 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 1/2" | 20 | 100.0 | 22.0 | 9.0 | 7.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 9/16" | 18 | 100.0 | 22.0 | 11.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 5 | 5 |
| 5/8" | 18 | 100.0 | 22.0 | 12.0 | 9.00 | 3 | 3 | 4 | 3 | 3 | 6 | 6 |
| 3/4" | 16 | 110.0 | 25.0 | 14.0 | 11.00 | 3 | 4 | 4 | 4 | 4 | 6 | 6 |
| 7/8" | 14 | 140.0 | 26.0 | 18.0 | 14.50 | 3 | 4 | 4 | 4 | 4 | 8 | 8 |
| 1" | 12 | 150.0 | 28.0 | 20.0 | 16.00 | 3 | 4 | 4 | 4 | 4 | 8 | 8 |
| 1.1/4" | 12 | 150.0 | 30.0 | 22.0 | 18.00 | 3 | 4 | 6 | 4 | 4 | 8 | 8 |
| 1.1/2" | 12 | 170.0 | 33.0 | 32.0 | 24.00 | 3 | 4 | 6 | 4 | 4 | 8 | 8 |

# BSW



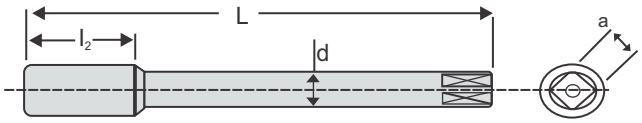

## IS 6175 II, BS-949 & ISO 529

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | TPI | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/8" | 40 | 48.0 | 7.0 | 11.0 | 3.15 | 2.5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 5/32" | 32 | 53.0 | 8.0 | 13.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 3/16" | 24 | 58.0 | 9.0 | 16.0 | 5.00 | 4.0 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 7/32" | 24 | 62.0 | 9.0 | 17.0 | 5.60 | 4.5 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 1/4" | 20 | 66.0 | 11.0 | 19.0 | 6.30 | 5.0 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 9/32" | 20 | 66.0 | 11.0 | 19.0 | 7.10 | 5.6 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 5/16" | 18 | 72.0 | 13.0 | 22.0 | 8.00 | 6.3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 3/8" | 16 | 80.0 | 15.0 | 24.0 | 10.00 | 8.0 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |

* : Indicates availability in ready stock

# BSW




| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

## IS 6175 III, BS-949 & ISO 529

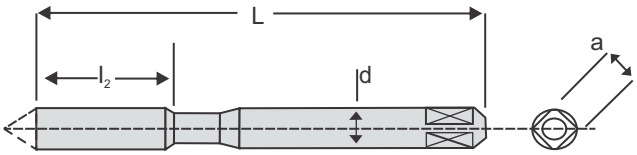
| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/16" | 14 | 85.0 | 25.0 | 8.0 | 6.3 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/2" | 12 | 89.0 | 29.0 | 9.0 | 7.1 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 9/16" | 12 | 95.0 | 30.0 | 11.2 | 9.0 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/8" | 11 | 102.0 | 32.0 | 12.5 | 10.0 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 11/16" | 11 | 112.0 | 37.0 | 14.0 | 11.2 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 3/4" | 10 | 112.0 | 37.0 | 14.0 | 11.2 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 7/8'' | 9 | 118.0 | 38.0 | 16.0 | 12.5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 1" | 8 | 130.0 | 45.0 | 18.0 | 14.0 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 1.1/8" | 7 | 138.0 | 48.0 | 20.0 | 16.0 | 4 | 4 | 6 | 4 | 4 | 4 | 4 |
| 1.1/4" | 7 | 151.0 | 51.0 | 22.4 | 18.0 | 4 | 4 | 6 | 4 | 4 | 4 | 4 |
| 1.3/8" | 6 | 162.0 | 57.0 | 25.0 | 20.0 | 6 | 4 | 6 | 4 | 4 | 6 | 6 |
| 1.1/2" | 6 | 170.0 | 60.0 | 28.0 | 22.4 | 6 | 4 | 6 | 4 | 4 | 6 | 6 |
| 1.5/8" | 5 | 170.0 | 60.0 | 28.0 | 22.4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1.3/4" | 5 | 187.0 | 67.0 | 31.5 | 25.0 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 2" | 4.5 | 200.0 | 70.0 | 35.5 | 28.0 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |

## IS 6175 IV, BS-949 & ISO 2283

| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/16" | 24 | 79 | 16 | 4.0 | 3.2 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 1/4" | 20 | 89 | 19 | 4.5 | 3.6 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 5/16" | 18 | 97 | 22 | 6.3 | 5.0 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 3/8" | 16 | 108 | 24 | 8.0 | 6.3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 7/16" | 14 | 115 | 25 | 8.0 | 6.3 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/2" | 12 | 119 | 29 | 9.0 | 7.1 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 9/16" | 12 | 127 | 30 | 11.2 | 9.0 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/8" | 11 | 137 | 32 | 12.5 | 10.0 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 11/16" | 11 | 149 | 37 | 14.0 | 11.2 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 3/4" | 10 | 149 | 37 | 14.0 | 11.2 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |

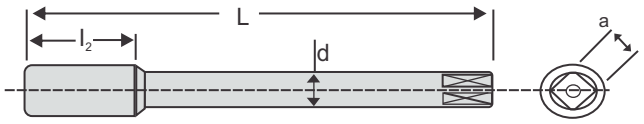
* : Indicates availability in ready stock upto 1"

# BSW




## DIN 371

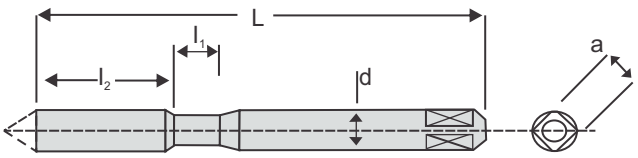

| High Performance Tap - HSS-E | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type of Hole | Through Hole | | | | | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | | No. of Lobes |
| 1/8" | 40 | 56.0 | 11.0 | 3.5 | 2.7 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 5/32" | 32 | 63.0 | 13.0 | 4.5 | 3.4 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 3/16" | 24 | 70.0 | 15.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 1/4" | 20 | 80.0 | 17.0 | 7.0 | 5.5 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 5/16 | 18 | 90.0 | 20.0 | 8.0 | 6.2 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 3/8" | 16 | 100.00 | 22.0 | 9.0 | 7.0 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |




## DIN 376


| High Performance Tap - HSS-E | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type of Hole | Through Hole | | | | | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Size | PTI | L | $l_2$ | d | a | Number of Flutes | | | | | | No. of Lobes |
| 1/4" | 20 | 80.0 | 17.0 | 4.5 | 3.4 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 5/16 | 18 | 90.0 | 20.0 | 6.0 | 4.9 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 3/8" | 16 | 100.0 | 22.0 | 7.0 | 5.5 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 7/16" | 14 | 100.0 | 22.0 | 8.0 | 6.2 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/2" | 12 | 110.0 | 25.0 | 9.0 | 7.0 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 9/16" | 12 | 110.0 | 26.0 | 11.0 | 9.0 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/8" | 11 | 110.0 | 27.0 | 12.0 | 9.0 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 3/4" | 10 | 125.0 | 30.0 | 14.0 | 11.0 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 7/8" | 9 | 140.0 | 32.0 | 18.0 | 14.5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 1" | 8 | 160.0 | 36.0 | 20.0 | 16.0 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 1.1/4 | 7 | 180.0 | 40.0 | 22.0 | 18.0 | 4 | 4 | 6 | 4 | 4 | 4 | 4 |
| 1.3/8" | 6 | 200.0 | 50.0 | 28.0 | 22.0 | 4 | 4 | 6 | 4 | 4 | 4 | 4 |
| 1.1/2" | 6 | 200.0 | 50.0 | 32.0 | 24.0 | 4 | 4 | 6 | 4 | 4 | 4 | 4 |

# BSF



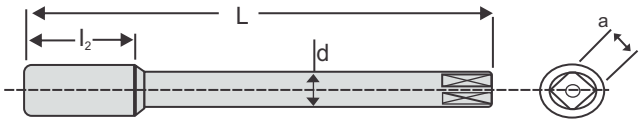

## IS 6175 II, BS-949 & ISO 529

| | | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|---|
| | |  | | | | | | |
| Standard Tap - HSS | | * | * | | * | * | | |
| High Performance Tap - HSS-E | | * | * | * | * | * | * | * |
| Type of Hole | Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| | Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

| Size | TPI | L | $l_1$ | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/16" | 32 | 58.0 | 9.0 | 16.0 | 5.00 | 4.00 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 7/32" | 28 | 62.0 | 9.0 | 17.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 1/4" | 26 | 66.0 | 11.0 | 19.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 9/32 | 26 | 66.0 | 11.0 | 19.0 | 7.10 | 5.60 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 5/16" | 22 | 72.0 | 13.0 | 22.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 3/8" | 20 | 80.0 | 15.0 | 24.0 | 10.00 | 8.00 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |

* : Indicates availability in ready stock

# BSF




| | STRAIGHT FLUTE | SPIRAL POINT | CAST IRON | SPIRAL FLUTE 15° | SPIRAL FLUTE 35° | FLUTELESS | FLUTELESS OIL GROOVE |
|---|---|---|---|---|---|---|---|
| |  | | | | | | |
| Standard Tap - HSS | * | * | | * | * | | |
| High Performance Tap - HSS-E | * | * | * | * | * | * | * |
| Type of Hole – Through Hole | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| Type of Hole – Blind Hole | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

## IS 6175 III, BS-949 & ISO 529

| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/16" | 18 | 85.0 | 25.0 | 8.0 | 6.30 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/2" | 16 | 89.0 | 29.0 | 9.0 | 7.10 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 9/16" | 16 | 95.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| 5/8" | 14 | 102.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| 11/16" | 14 | 112.0 | 37.0 | 14.00 | 11.20 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| 3/4" | 12 | 112.0 | 37.0 | 14.00 | 11.20 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| 7/8'' | 11 | 118.0 | 38.0 | 16.00 | 12.50 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 1" | 10 | 130.0 | 45.0 | 18.00 | 14.00 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 1.1/8" | 9 | 138.0 | 48.0 | 20.00 | 16.00 | 6 | 4 | 6 | 6 | 6 | 6 | 6 |
| 1.1/4" | 9 | 151.0 | 51.0 | 22.40 | 18.00 | 6 | 4 | 6 | 6 | 6 | 6 | 6 |
| 1.3/8" | 8 | 162.0 | 57.0 | 25.00 | 20.00 | 6 | 4 | 6 | 6 | 6 | 6 | 6 |
| 1.1/2" | 8 | 170.0 | 60.0 | 28.00 | 22.40 | 6 | 4 | 6 | 6 | 6 | 6 | 6 |
| 1.5/8" | 8 | 170.0 | 60.0 | 28.00 | 22.40 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1.3/4" | 7 | 187.0 | 67.0 | 31.50 | 25.00 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 2" | 7 | 200.0 | 70.0 | 35.50 | 28.00 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |

## IS 6175 IV, BS-949 & ISO 2283

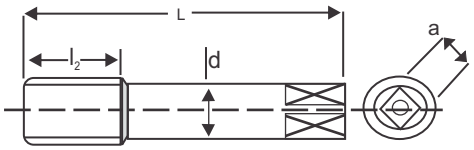
| Size | TPI | L | $l_2$ | d | a | Number of Flutes | | | | | No. of Lobes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/16" | 32 | 79.0 | 16.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 7/32" | 28 | 84.0 | 17.0 | 4.00 | 3.15 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 1/4" | 26 | 89.0 | 19.0 | 4.50 | 3.55 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 9/32" | 26 | 89.0 | 19.0 | 5.60 | 4.50 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 5/16" | 22 | 97.0 | 22.0 | 6.30 | 5.00 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 3/8" | 20 | 108.0 | 24.0 | 8.00 | 6.30 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| 7/16" | 18 | 115.0 | 25.0 | 8.00 | 6.30 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 1/2" | 16 | 119.0 | 29.0 | 9.00 | 7.10 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 9/16" | 16 | 127.0 | 30.0 | 11.20 | 9.00 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 5/8" | 14 | 137.0 | 32.0 | 12.50 | 10.00 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 11/16" | 14 | 149.0 | 37.0 | 14.00 | 11.20 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| 3/4" | 12 | 149.0 | 37.0 | 14.00 | 11.20 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |

* : Indicates availability in ready stock upto 3/4".

# NPS / NPSF

## BS 949 & ANSI

Type of Thread : ISO Inch NPS/NPSF Thread
Standard Tap - HSS
High Performance Tap - HSS - E



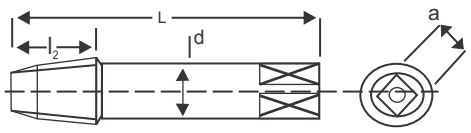

| Size | TPI | L | $l_2$ | d | a | No. of Flutes | STD |
|---|---|---|---|---|---|---|---|
| 1/16" | 27 | 53.98 | 17.46 | 7.92 | 5.94 | 4 | ANSI |
| 1/16" | 27 | 53.98 | 17.46 | 8.07 | 6.04 | 4 | BS949 |
| 1/8" | 27 | 53.98 | 19.05 | 11.10 | 8.33 | 4 | ANSI |
| 1/8" | 27 | 53.98 | 19.05 | 8.07 | 6.04 | 4 | Bs949 |
| 1/4" | 18 | 61.91 | 26.99 | 14.28 | 10.69 | 4 | ANSI |
| 1/4" | 18 | 61.91 | 26.99 | 10.89 | 8.17 | 4 | BS949 |
| 3/8" | 18 | 65.09 | 26.99 | 17.78 | 13.48 | 4 | ANSI |
| 3/8" | 18 | 65.09 | 26.99 | 13.76 | 10.31 | 4 | BS949 |
| 1/2" | 14 | 79.38 | 34.93 | 17.45 | 13.08 | 4 | ANSI |
| 3/4" | 14 | 82.55 | 34.93 | 23.01 | 17.24 | 4 | ANSI |
| 1" | 11.5 | 95.25 | 44.45 | 28.57 | 21.41 | 6 | ANSI |
| 1 ¼" | 11.5 | 101.60 | 44.45 | 33.32 | 24.99 | 6 | ANSI |
| 1 ½" | 11.5 | 107.95 | 44.45 | 38.10 | 28.57 | 6 | ANSI |
| 2" | 11.5 | 114.30 | 44.45 | 47.62 | 35.71 | 6 | ANSI |

*Extra Long 6" NPS/NPSF taps in the range : 1/8" to 3/4" are available in HSS.

# NPT / NPTF

## BS 949 & ANSI

Type of Thread : ISO Inch NPS/NPSF Thread
Standard Tap - HSS
High Performance Tap - HSS - E




| Size | TPI | L | $l_2$ | d | a | No. of Flutes | STD |
|---|---|---|---|---|---|---|---|
| 1/16" | 27 | 53.98 | 17.46 | 7.92 | 5.94 | 4 | ANSI |
| 1/16" | 27 | 53.98 | 17.46 | 8.07 | 6.04 | 4 | BS949 |
| 1/8" | 27 | 53.98 | 19.05 | 11.10 | 8.33 | 4 | ANSI |
| 1/8" | 27 | 53.98 | 19.05 | 8.07 | 6.04 | 4 | Bs949 |
| 1/4" | 18 | 61.91 | 26.99 | 14.28 | 10.69 | 4 | ANSI |
| 1/4" | 18 | 61.91 | 26.99 | 10.89 | 8.17 | 4 | BS949 |
| 3/8" | 18 | 65.09 | 26.99 | 17.78 | 13.48 | 4 | ANSI |
| 3/8" | 18 | 65.09 | 26.99 | 13.76 | 10.31 | 4 | BS949 |
| 1/2" | 14 | 79.38 | 34.93 | 17.45 | 13.08 | 4 | ANSI |
| 3/4" | 14 | 82.55 | 34.93 | 23.01 | 17.24 | 5 | ANSI |
| 1" | 11.5 | 95.25 | 44.45 | 28.57 | 21.41 | 5 | ANSI |
| 1 ¼" | 11.5 | 101.60 | 44.45 | 33.32 | 24.99 | 5 | ANSI |
| 1 ½" | 11.5 | 107.95 | 44.45 | 38.10 | 28.57 | 7 | ANSI |
| 2" | 11.5 | 114.30 | 44.45 | 47.62 | 35.71 | 7 | ANSI |
| 2 ½" | 8 | 139.70 | 65.09 | 57.15 | 42.85 | 8 | ANSI |
| 3" | 8 | 152.40 | 66.68 | 66.67 | 49.98 | 8 | ANSI |
| 3 ½" | 8 | 165.10 | 68.26 | 71.42 | 53.54 | 8 | ANSI |
| 4" | 8 | 171.45 | 69.85 | 76.20 | 57.15 | 10 | ANSI |

*Extra Long 6" NPT taps in the range : 1/8" to 3/4" are available in HSS & HSS - E.

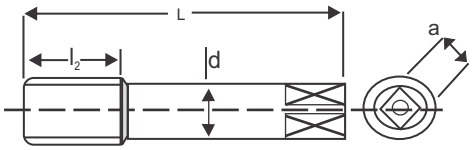
*NPT taps are available in low ($15^0$) & Fast ($35^0$) Spiral Flute in the range : 1/8" to 3/4" conforming to DIN Standard in HSS-E.

*Interrupted NPT Taps in the range : 1/4" to 1" are available in HSS & HSS-E.

# BSP / BSPT

## BS 949

Type of Thread : ISO Inch BSP / BSPT Thread
Standard Tap - HSS
High Performance Tap - HSS - E




| Size | TPI | L | $l_2$ | d | a | No. of Flutes | No. of Lobes |
|---|---|---|---|---|---|---|---|
| 1/8" | 28 | 53.97 | 7.93 | 8.07 | 6.04 | 4 | 4 |
| 1/4" | 19 | 61.91 | 11.11 | 10.89 | 8.17 | 4 | 6 |
| 3/8" | 19 | 65.09 | 12.70 | 13.77 | 10.31 | 4 | 6 |
| 1/2" | 14 | 79.37 | 15.87 | 17.45 | 13.08 | 4 | 8 |
| 5/8" | 14 | 80.96 | 17.46 | 20.32 | 15.24 | 4 | 8 |
| 3/4" | 14 | 82.55 | 17.46 | 23.01 | 17.24 | 4 | 8 |
| 1" | 11 | 95.25 | 20.60 | 28.57 | 21.40 | 4 | 8 |
| 1 ¼" | 11 | 101.60 | 23.80 | 33.32 | 24.99 | 6 | - |
| 1 ½" | 11 | 107.95 | 25.40 | 38.10 | 28.57 | 6 | - |
| 2" | 11 | 114.30 | 28.57 | 47.62 | 35.70 | 6 | - |

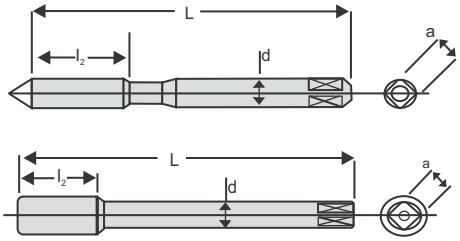
*Extra Long 6" BSP taps in the range : 1/16" to 3/4" are available in HSS.

*BSP taps are available in low ($15^0$) & Fast ($35^0$) Spiral Flute in the range : 1/8" to 3/4" conforming to ISO & BS-949 standard in HSS-E.

*BSP taps with special geometry for cast iron and marked as "CI" are available in the range : 1/8" to 3/4" conforming to ISO standard in HSS-E.

*BSPT taps with special geometry for cast iron and marked as "CI" are available in the range : 1.8" to 3/4" conforming to BS-949 standard in HSS-E.

# HELICOIL STI TAP




## ISO 2

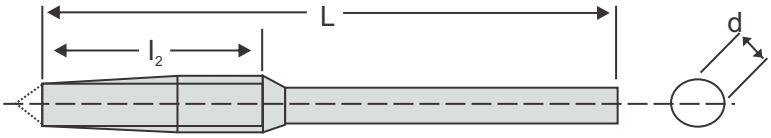
Type of Thread : ISO 2 STI Thread.
Standard Tap - HSS
High Performance Tap - HSS - E

| Size | TPI | L | $l_2$ | d | a | No. of Flutes | No. of Lobes |
|---|---|---|---|---|---|---|---|
| M 2 | 0.40 | 44.5 | 9.5 | 2.8 | 2.24 | 3 | 4 |
| M 2.5 | 0.45 | 48.0 | 11.0 | 3.15 | 2.50 | 3 | 4 |
| M 3 | 0.50 | 53.0 | 13.0 | 4.0 | 3.15 | 3 | 4 |
| M 3.5 | 0.60 | 53.0 | 13.0 | 4.5 | 3.55 | 3 | 4 |
| M 4 | 0.70 | 58.0 | 16.0 | 5.0 | 4.00 | 3 | 4 |
| M 5 | 0.80 | 66.0 | 19.0 | 6.3 | 5.00 | 3 | 4 |
| M 6 | 1.00 | 72.0 | 22.0 | 8.0 | 6.30 | 3 | 4 |
| M 7 | 1.00 | 72.0 | 22.0 | 9.0 | 7.10 | 3 | 5 |
| M 8 | 1.25 | 80.0 | 24.0 | 10.0 | 8.00 | 3 | 5 |
| M 8 | 1.00 | 80.0 | 24.0 | 10.0 | 8.00 | 3 | 5 |
| M 9 | 1.25 | 85.0 | 25.0 | 8.0 | 6.30 | 3 | 5 |
| M 10 | 1.50 | 89.0 | 29.0 | 9.0 | 7.10 | 3 | 5 |
| M 10 | 1.25 | 85.0 | 25.0 | 8.0 | 6.30 | 3 | 5 |
| M 10 | 1.00 | 85.0 | 25.0 | 8.0 | 6.30 | 3 | 5 |
| M 11 | 1.50 | 89.0 | 29.0 | 9.0 | 7.10 | 3 | 6 |
| M 12 | 1.75 | 95.0 | 30.0 | 11.2 | 9.00 | 3 | 6 |
| M 12 | 1.50 | 95.0 | 30.0 | 11.2 | 9.00 | 3 | 6 |
| M 12 | 1.25 | 95.0 | 30.0 | 11.2 | 9.00 | 3 | 6 |
| M 12 | 1.00 | 95.0 | 30.0 | 11.2 | 9.00 | 3 | 6 |
| M 14 | 2.00 | 102.0 | 32.0 | 12.5 | 10.00 | 4 | 6 |
| M 14 | 1.50 | 102.0 | 32.0 | 12.5 | 10.00 | 4 | 6 |
| M 14 | 1.25 | 102.0 | 32.0 | 12.5 | 10.00 | 4 | 6 |
| M 14 | 1.00 | 102.0 | 32.0 | 12.5 | 10.00 | 4 | 6 |
| M 16 | 2.00 | 112.0 | 37.0 | 14.0 | 11.20 | 4 | 8 |
| M 16 | 1.50 | 104.0 | 29.0 | 14.0 | 11.20 | 4 | 8 |
| M 18 | 2.50 | 118.0 | 38.0 | 16.0 | 12.50 | 4 | 8 |
| M 18 | 2.00 | 104.0 | 29.0 | 14.0 | 11.20 | 4 | 8 |
| M 18 | 1.50 | 104.0 | 29.0 | 14.0 | 11.20 | 4 | 8 |
| M 20 | 2.50 | 118.0 | 38.0 | 16.0 | 12.50 | 4 | 8 |
| M 20 | 2.00 | 113.0 | 33.0 | 16.0 | 12.50 | 4 | 8 |
| M 20 | 1.50 | 113.0 | 33.0 | 16.0 | 12.50 | 4 | 8 |
| M 22 | 2.50 | 130.0 | 45.0 | 18.0 | 14.00 | 4 | 8 |
| M 22 | 2.00 | 120.0 | 35.0 | 18.0 | 14.00 | 4 | 8 |
| M 22 | 1.50 | 120.0 | 35.0 | 18.0 | 14.00 | 4 | 8 |
| M 24 | 3.00 | 138.0 | 48.0 | 20.0 | 16.00 | 4 | 8 |
| M 24 | 2.00 | 127.0 | 37.0 | 20.0 | 16.00 | 4 | 8 |
| M 24 | 1.50 | 120.0 | 35.0 | 18.0 | 14.00 | 4 | 8 |

*Helicoil STI taps are available as Hand tap in the range : M2 to M24 in HSS & HSS-E.
*Helicoil STI taps are available as Fluteless tap in the range : M3 to M16 in HSS-E.

# NIB TAP

High Performance Tap - HSS-E




| Size | Pitch | L | $L_2$ | d | No. of Flutes |
|---|---|---|---|---|---|
| M3 | 0.50 | 60 | 13 | 2.30 | 3 |
| M4 | 0.70 | 60 - 65 | 18 | 3.00 | 3 |
| M5 | 0.80 | 65- 70 | 20 | 3.80 | 3 |
| M6 | 1.00 | 70 - 75 | 25 | 4.50 | 3 |
| M7 | 1.00 | 70 - 75 | 25 | 5.50 | 3 - 5 |
| M8 | 1.00 | 77 | 25 | 6.40 | 3 - 5 |
| M8 | 1.25 | 77 - 90 | 32 | 6.05 | 3 - 5 |
| M10 | 1.00 | 90 - 95 | 25 | 8.40 | 3 - 5 |
| M10 | 1.25 | 90 - 95 | 32 | 8.10 | 3 - 5 |
| M10 | 1.50 | 90 - 95 | 38 | 7.80 | 3 - 5 |
| M12 | 1.25 | 102 | 32 | 10.10 | 3 - 5 |
| M12 | 1.50 | 102 | 38 | 9.80 | 3 - 5 |
| M12 | 1.75 | 102 | 44 | 9.50 | 3 - 5 |
| M14 | 1.00 | 114 | 25 | 12.30 | 3 - 5 |
| M14 | 1.50 | 114 | 38 | 11.80 | 3 - 5 |
| M14 | 2.00 | 114 | 50 | 11.20 | 3 - 5 |
| M16 | 1.00 | 127 | 25 | 14.30 | 3 - 5 |
| M16 | 1.50 | 127 | 38 | 13.80 | 3 - 5 |
| M16 | 2.00 | 127 | 50 | 13.10 | 3 - 5 |

Thread Forms : Metric Coarse, Metric Fine, UNC, UNF are standard. Other thread forms like BSW, BSF, BSP etc. are against special orders.

Range : Metric sizes from 3 mm to 25 mm
Fractional sizes from 1/8" to 1"

FREECUT

# TECHNICAL INFORMATION & GUIDELINES

# NOMENCLATURE OF THREAD SYMBOLS

| S.N | THREAD SYMBOLS | KIND OF THREADS |
|---|---|---|
| 1 | MC | METRIC SCREW THREADS, COARSE SERIES |
| 2 | MF | METRIC SCREW THREADS, FINE SERIES |
| 3 | UNC | UNIFIED THREAD, COARSE SERIES |
| 4 | UNF | UNIFIED THREADS, FINE SERIES |
| 5 | BSW | BRITISH STANDARDS WITHWORTH COARSE THREADS |
| 6 | BSF | BRITISH STANDARD FINE THREADS |
| 7 | BSP | BRITISH STANDARD PIPE PARALLEL THREADS |
| 8 | BSPT | BRITISH STANDARD PIPE TAPER THREADS |
| 9 | NPT | AMERICAN STANDARD TAPER PIPE THREADS FOR GENERAL USE |
| 10 | NPTF | DRYSEAL AMERICAN STANDARD TAPER PIPE THREADS |
| 11 | NPS | AMERICAN STANDARD STRAIGHTT PIPE THREADS |
| 12 | NPSF | DRYSEAL AMERICAN STANDARD FUEL INTERNAL STRAIGHT PIPE THREADS |

# STEEL FOR TAPS

The steel extensively used for production of taps is HSS-M2. For high performance taps, the steel normally used is M35 which is marked HSS-E. For critical application, Emkay Tools is also using powder metallurgical grades (ASP-2030 & ASP 2052) and the taps made from these grades are marked PM. The above steel used by Emkay Tools in manufacture of thread cutting tools is procured from the best sources in the industry, carefully selected and subjected to rigorous mettallurgical tests throughout heat treatment ensuring a continuously high standard product which satisfies performance demanded by automobile, aerospace and other engineering industries. The high speed steel generally used in the manufacture of Emkay Tools thread cutting tools are as follows.

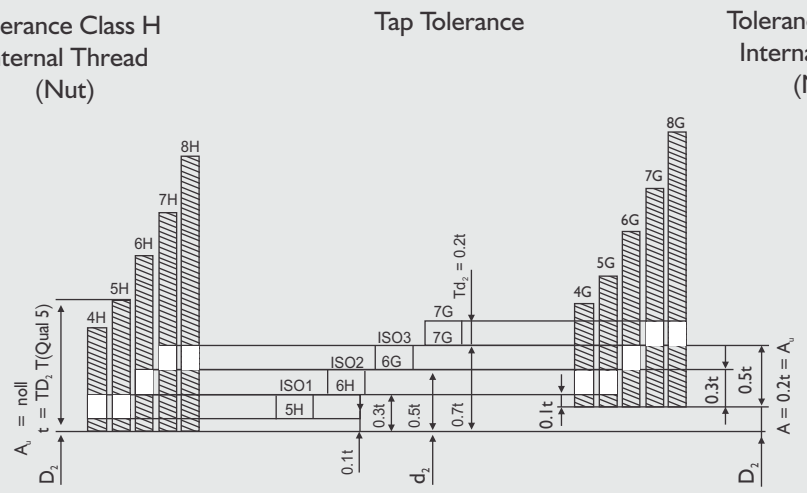
| Grades | Chemical Composition Analysis, % | | | | | | Characteristics and Applications |
|---|---|---|---|---|---|---|---|
| | C | Cr | Mo | W | Co | V | |
| M2 | 0.90 | 4.2 | 5.0 | 6.4 | - | 1.8 | Grade for general applications. |
| M35 | 0.93 | 4.2 | 5.0 | 6.4 | 4.8 | 1.8 | Grade for high performance taps. |
| ASP 2030 | 1.28 | 4.2 | 5.0 | 6.4 | 8.5 | 3.1 | PM grade with high cobalt percentage for high performance taps. |
| ASP 2052 | 1.6 | 4.8 | 2.0 | 10.5 | 8.0 | 5.0 | PM grade with high cobalt & high tungsten percentage for high performance taps. |
| M9V | 1.2 | 4.2 | 8.5 | 3.5 | - | 2.7 | Grade with high wear resistance for general applications. |

# SURFACE COATING

Certain tap applications where additional surface treatment can add appreciably to the life of the tap even while operating at much higher parameters. Listed below are the surface treatments currently available with us:

| Coating Composition | Micro Hardness (HV) | Coefficient Of Friction Against steel (Dry) | Maximum Working Temp. in °C | Coating Colour | Purpose | Primary Application |
|---|---|---|---|---|---|---|
| Titanium Nitride(TiN) | 2300 | 0.4 | 600 | Gold Yellow | To rest abrasion and chip welding. Versatile standard coating. | Unalloyed steel, steel < 1000 N/mm$^2$ |
| Titanium Carbonitride (TiCN) | 3000 | 0.4 | 400 | Blue Grey | High wear resistance. enhanced toughness and high hardness. | Unalloyed steel,steel < 1000 N/mm$^2$, steel >1000 N/mm$^2$,steel 45 HRC, Aluminum cast alloys, nickel alloys, brass bronze |
| Multilayer Titanium Aluminum Nitride-TiALN (FUTURA NANO) | 3300 | 0.3- 0.35 | 900 | Violet Grey | High hot hadness and high oxidation resistance. | Cast iron, nickel alloys |
| DLC | 2500 | 0.1- 0.2 | 350 | **Black** | Very good anti-adhesion properties, low-coefficient of friction and good wear resistance. | Aluminum wrought alloys, Aluminum cast alloys, copper, brass bronze |
| TiALN+WC/C | 3000 | 0.15 - 0.20 | 800 | **Dark Grey** | Properties of temperature resistance (TiALN) combined with sliding and lubrication properties (WC/C). | Steel < 1000 N/mm$^2$, steel < 1000 N/mm$^2$, steel 45 HRC, stainless steel, cast iron, brass, titanium, titanium alloys, bronze |
| ALCrN (ALCRONA PRO) | 3200 | 0.35 | 1100 | Bright Grey | Very high oxidation resistance and hot hardness. | Cast iron |

# TOLERANCES FOR SCREWING TAPS & CLASS OF FIT FOR ISO METRIC THREADS




| Tolerance Class Tap | | | Tolerance Class Internal Thread | | | | |
|---|---|---|---|---|---|---|---|
| ISO | DIN | ANSI BS | | | | | |
| ISO1 | 4H | 3B | 4H | 5H | | | |
| ISO2 | 6H | 2B | 4G | 5G | 6H | | |
| ISO3 | 6G | 1B | | | 6G | 7H | 8H |
| - | 7G | - | | | | 7G | 8G |

## CLASS OF FIT FOR AMERICAN THREADS

(UNC, UNF, NC, NF)

Screw threads are designated by the following classes of fits :-

(a) 1A, 2A and 3A for external threads (bolt).

(b) 1B, 2B and 3B for internal threads (nut).

Application:

1A and 1B : Fit giving easy and quick assembly even when these threads are dirty or bruised. It is as good as free fit.

2A and 2B : Suited for the vast majority of commercial fasteners, general application etc. It is as good as medium fit.

3A and 3B : No allowance is provided for. This is used when requiring tolerance is closer than 2A and 2B. As good as close fit.

## CLASS OF FIT FOR BRITISH THREADS

(BSW, BSF, BA)

Screw threads are designated by the following classes of fits:

Zone 1 Zone 2 Zone 3 Zone 4

Application :

Zone 4 :- They are for the nut taps. This is freer than Zone 3.

Zone 3 :- For easier and quick assembly, it is a good as free fit.

Zone 2 :- Suited for a vast majority of commercial fasteners,

general applications etc. It is as good as medium fit.

Zone 1 :- No allowance is provided for. This is used when requiring

tolerance closer than Zone 2. As good as close fit.

# DRILL SELECTION CHART

(FOR THREAD CUTTING AND THREAD FORMING TAP - Metric and Unified Threads)

| ISO METRIC COARSE THREAD | | | |
|---|---|---|---|
| Tap Size (mm) | Pitch in mm | Drill Size | |
| | | Thread cutting | Thread forming |
| M1.6 | 0.35 | 1.25 | 1.45 |
| M1.7 | 0.35 | 1.35 | 1.55 |
| M1.8 | 0.35 | 1.45 | 1.65 |
| M2 | 0.40 | 1.60 | 1.82 |
| M2.2 | 0.45 | 1.75 | 2.00 |
| M2.3 | 0.45 | 1.90 | 2.10 |
| M2.5 | 0.45 | 2.05 | 2.30 |
| M2.6 | 0.45 | 2.10 | 2.40 |
| M3 | 0.50 | 2.50 | 2.80 |
| M3.5 | 0.60 | 2.90 | 3.25 |
| M4 | 0.70 | 3.30 | 3.70 |
| M5 | 0.80 | 4.20 | 4.65 |
| M6 | 1.00 | 5.00 | 5.55 |
| M7 | 1.00 | 6.00 | 6.55 |
| M8 | 1.25 | 6.80 | 7.40 |
| M9 | 1.25 | 7.80 | 8.40 |
| M10 | 1.50 | 8.50 | 9.30 |
| M12 | 1.75 | 10.30 | 11.20 |
| M14 | 2.00 | 12.00 | 13.10 |
| M16 | 2.00 | 14.00 | 15.10 |
| M18 | 2.50 | 15.50 | 16.90 |
| M20 | 2.50 | 17.50 | 18.90 |
| M22 | 2.50 | 19.50 | 20.89 |
| M24 | 3.00 | 21.00 | 22.67 |
| M27 | 3.00 | 24.00 | 25.67 |
| M30 | 3.50 | 26.50 | 28.45 |
| M33 | 3.50 | 29.50 | 31.45 |
| M36 | 4.00 | 32.00 | 34.23 |
| M39 | 4.00 | 35.00 | 37.23 |
| M42 | 4.50 | 37.50 | 40.01 |
| M45 | 4.50 | 40.50 | 43.01 |
| | | | |
| | | | |

| ISO METRIC FINE THREAD | | | |
|---|---|---|---|
| Tap Size (mm) | Pitch in mm | Drill Size | |
| | | Thread cutting | Thread forming |
| M3 | 0.35 | 2.65 | 2.85 |
| M3.5 | 0.35 | 3.20 | 3.30 |
| M4 | 0.50 | 3.50 | 3.80 |
| M5 | 0.50 | 4.50 | 4.80 |
| M6 | 0.50 | 5.50 | 5.80 |
| M7 | 0.75 | 6.30 | 6.70 |
| M8 | 0.50 | 7.50 | 7.80 |
| M8 | 1.00 | 7.00 | 7.55 |
| M9 | 1.00 | 8.00 | 8.55 |
| M10 | 0.75 | 9.30 | 9.65 |
| M10 | 1.00 | 9.00 | 9.55 |
| M10 | 1.25 | 8.80 | 9.40 |
| M12 | 1.00 | 11.00 | 11.55 |
| M12 | 1.25 | 10.80 | 11.40 |
| M12 | 1.50 | 10.50 | 11.30 |
| M14 | 1.00 | 13.00 | 13.55 |
| M14 | 1.50 | 12.50 | 13.30 |
| M16 | 1.00 | 15.00 | 15.55 |
| M16 | 1.50 | 14.50 | 15.30 |
| M18 | 1.00 | 17.00 | 17.55 |
| M18 | 1.50 | 16.50 | 17.30 |
| M20 | 1.50 | 18.50 | 19.30 |
| M22 | 1.50 | 20.50 | 21.33 |
| M24 | 1.00 | 23.00 | 23.55 |
| M24 | 1.50 | 22.50 | 23.33 |
| M25 | 1.00 | 24.00 | 24.55 |
| M26 | 1.50 | 24.50 | 25.33 |
| M27 | 1.50 | 25.50 | 26.33 |
| M28 | 1.50 | 26.50 | 27.33 |
| M30 | 1.50 | 28.50 | 29.33 |
| M33 | 2.00 | 31.00 | 32.10 |
| M35 | 1.50 | 33.50 | 34.33 |
| M36 | 3.00 | 33.00 | 34.67 |

| UNIFIED COARSE THREAD | | | |
|---|---|---|---|
| Tap Size (mm) | TPI | Drill Size | |
| | | Thread cutting | Thread forming |
| No.2 | 56 | 1.80 | 1.97 |
| No.3 | 48 | 2.10 | 2.26 |
| No.4 | 40 | 2.35 | 2.55 |
| No.5 | 40 | 2.65 | 2.87 |
| No.6 | 32 | 2.85 | 3.15 |
| No.8 | 32 | 3.50 | 3.80 |
| No.10 | 24 | 3.90 | 4.30 |
| No.12 | 24 | 4.50 | 5.00 |
| 1/4" | 20 | 5.10 | 5.75 |
| 5/16" | 18 | 6.60 | 7.25 |
| 3/8" | 16 | 8.00 | 8.75 |
| 7/16" | 14 | 9.40 | 10.20 |
| 1/2" | 13 | 10.80 | 11.70 |
| 9/16" | 12 | 12.20 | 13.30 |
| 5/8" | 11 | 13.50 | 14.80 |
| 3/4" | 10 | 16.50 | 18.00 |
| 7/8" | 9 | 19.50 | |
| 1" | 8 | 22.50 | |
| 1.1/8" | 7 | 25.00 | |
| 1.1/4" | 7 | 28.00 | |
| 1.3/8" | 6 | 30.50 | |
| 1.1/2" | 6 | 34.00 | |
| | | | |
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| UNIFIED FINE THREAD | | | |
|---|---|---|---|
| Tap Size (mm) | TPI | Drill Size | |
| | | Thread cutting | Thread forming |
| No.2 | 64 | 1.90 | 2.00 |
| No.3 | 56 | 2.10 | 2.30 |
| No.4 | 48 | 2.40 | 2.60 |
| No.5 | 44 | 2.70 | 2.90 |
| No.6 | 40 | 2.95 | 3.20 |
| No.8 | 36 | 3.50 | 3.85 |
| No.10 | 32 | 4.10 | 4.45 |
| No.12 | 28 | 4.70 | 5.05 |
| 1/4" | 28 | 5.50 | 5.90 |
| 5/16" | 24 | 6.90 | 7.45 |
| 3/8" | 24 | 8.50 | 9.00 |
| 7/16" | 20 | 9.90 | 10.50 |
| 1/2" | 20 | 11.50 | 12.10 |
| 9/16" | 18 | 12.90 | 13.60 |
| 5/8" | 18 | 14.50 | 15.20 |
| 3/4" | 16 | 17.50 | 18.30 |
| 7/8" | 14 | 20.50 | 21.40 |
| 1" | 12 | 23.50 | 24.40 |
| 1.1/8" | 12 | 26.50 | |
| 1.1/4" | 12 | 29.50 | |
| 1.3/8" | 12 | 33.00 | |
| 1.1/2" | 12 | 36.00 | |
| | | | |
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Note :- Drill sizes are in mm. For other sizes not in above table, calculate as per given formula (In Metric System)

1) Drill Size for Cutting Tap = Tap Size - Pitch

2) Drill Size for Fluteless Tap = Basic Tap OD - (0.0068 x 65 x Pitch) in mm.

# DRILL SELECTION CHART

(For Withworth and Pipe Threads)

| BSW THREAD | | |
|---|---|---|
| Tap Size | TPI | Drill Size |
| | | Thread cutting |
| 1/16" | 60 | 1.20 |
| 3/32" | 48 | 1.90 |
| 1/8" | 40 | 2.50 |
| 5/32" | 32 | 3.20 |
| 3/16" | 24 | 3.60 |
| 7/32" | 24 | 4.50 |
| 1/4" | 20 | 5.10 |
| 9/32" | 20 | 5.80 |
| 5/16" | 18 | 6.50 |
| 3/8" | 16 | 7.90 |
| 7/16" | 14 | 9.30 |
| 1/2" | 12 | 10.50 |
| 9/16" | 12 | 12.10 |
| 5/8" | 11 | 13.50 |
| 11/16" | 11 | 15.10 |
| 3/4" | 10 | 16.25 |
| 7/8" | 9 | 19.25 |
| 15/16" | 9 | 20.60 |
| 1" | 8 | 22.00 |
| 1.1/8" | 7 | 24.75 |
| 1.1/4" | 7 | 28.00 |
| 1.3/8" | 6 | 30.10 |
| 1.1/2" | 6 | 33.50 |
| 1.5/8" | 5 | 35.70 |
| 1.3/4" | 5 | 39.00 |

| BSF THREAD | | |
|---|---|---|
| Tap Size | TPI | Drill Size |
| | | Thread cutting |
| 3/16" | 32 | 4 |
| 7/32" | 28 | 4.6 |
| 1/4" | 26 | 5.3 |
| 9/32" | 26 | 6 |
| 5/16" | 22 | 6.8 |
| 3/8" | 20 | 8.3 |
| 7/16" | 18 | 9.7 |
| 1/2" | 16 | 11.1 |
| 9/16" | 16 | 12.7 |
| 5/8" | 14 | 14 |
| 11/16" | 14 | 15.5 |
| 3/4" | 12 | 16.75 |
| 7/8" | 11 | 19.75 |
| 15/16" | 11 | 21.5 |
| 1" | 10 | 22.75 |
| 1.1/8" | 9 | 25.5 |
| 1.1/4" | 9 | 28.5 |
| 1.3/8" | 8 | 31.5 |
| 1.1/2" | 8 | 34.5 |
| 1.5/8" | 8 | 37.7 |

| BSP THREAD | | | |
|---|---|---|---|
| Tap Size | TPI | Drill Size | |
| | | Thread cutting | Thread forming |
| 1/8" | 28 | 8.80 | 9.30 |
| 1/4" | 19 | 11.80 | 12.50 |
| 3/8" | 19 | 15.25 | 16.00 |
| 1/2" | 14 | 19.00 | 20.10 |
| 5/8" | 14 | 21.00 | 22.10 |
| 3/4" | 14 | 24.50 | 25.50 |
| 7/8" | 14 | 28.00 | 29.20 |
| 1" | 11 | 30.50 | 32.10 |
| 1.1/4" | 11 | 39.50 | |
| 1.1/2" | 11 | 45.00 | |
| 1.3/4" | 11 | 51.00 | |
| 2" | 11 | 57.00 | |
| 2.1/4" | 11 | 63.00 | |
| 2.1/2" | 11 | 72.50 | |
| 2.3/4" | 11 | 79.00 | |
| 3" | 11 | 85.50 | |

| BSPT THREAD | | |
|---|---|---|
| Tap Size | TPI | Drill Size |
| | | Thread cutting |
| 1/8" | 28 | 8.40 |
| 1/4" | 19 | 11.20 |
| 3/8" | 19 | 14.75 |
| 1/2" | 14 | 18.25 |
| 5/8" | 14 | 20.25 |
| 3/4" | 14 | 23.75 |
| 7/8" | 14 | 27.50 |
| 1" | 11 | 30.00 |
| 1.1/8" | 11 | 34.50 |
| 1.1/4" | 11 | 38.50 |
| 1.3/8" | 11 | 41.00 |
| 1.1/2" | 11 | 44.50 |
| 1.3/4" | 11 | 50.00 |
| 2" | 11 | 56.00 |
| 2.1/4" | 11 | 62.00 |
| 2.1/2" | 11 | 71.50 |
| 2.3/4" | 11 | 78.00 |
| 3" | 11 | 84.00 |

| NPT / NPTF THREAD | | | |
|---|---|---|---|
| Tap Size | TPI | Drill Size | |
| | | NPT | NPTF |
| 1.1/6" | 27 | 6.30 | 6.20 |
| 1/8" | 27 | 8.50 | 8.40 |
| 1/4" | 18 | 11.00 | 10.90 |
| 3/8" | 18 | 14.50 | 14.25 |
| 1/2" | 14 | 18.00 | 17.75 |
| 3/4" | 14 | 23.00 | 23.00 |
| 1" | 11.1/2 | 29.00 | 29.00 |
| 1.1/4" | 11.1/2 | 38.00 | 37.75 |
| 1.1/2" | 11.1/2 | 44.00 | 43.75 |
| 2" | 11.1/2 | 56.00 | 55.75 |
| 2.1/2" | 8 | 67.00 | 66.50 |
| 3" | 8 | 83.00 | 82.50 |

| NPS / NPSF THREAD | | | |
|---|---|---|---|
| Tap Size | TPI | Drill Size | |
| | | NPS | NPSF |
| 1/8" | 27 | 9.10 | 8.70 |
| 1/4" | 18 | 12.00 | 11.30 |
| 3/8" | 18 | 15.50 | 14.75 |
| 1/2" | 14 | 19.00 | 18.25 |
| 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 | |

Note :- Drill sizes are in mm.

# CUTTING SPEED

| FORMULA | Rpm = $\frac{1000 \times \text{cutting speed (M/min)}}{3.14 \times \text{major dia.}}$ <br> Rpm = $\frac{96.98 \times \text{cutting speed (F/min)}}{\text{major dia.}}$ |
|---|---|

## Conversion table from M/min to RPM

| Meters/Min | | 5 | 8 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet/Min | | 16.4 | 26.2 | 32.8 | 49.2 | 65.6 | 82.0 | 98.4 | 131.2 | 164.0 | 196.9 | 229.7 | 262.5 | 295.3 | 328.1 | 360.9 | 492.1 |
| Tool Diameter | | PERIPHERAL CUTTING SPEED | | | | | | | | | | | | | | | |
| mm | Inches | | | | | | | | | | | | | | | | |
| 1.00 | | 1591 | 2545 | 3182 | 4773 | 6364 | 7955 | 9545 | 12727 | 15909 | 19091 | 22273 | 25455 | 28636 | 31818 | 35000 | 47727 |
| 1.50 | | 1061 | 1697 | 2121 | 3182 | 4242 | 5303 | 6364 | 8485 | 10606 | 12727 | 14848 | 16970 | 19091 | 21212 | 23333 | 31818 |
| 2.00 | | 795 | 1273 | 1591 | 2386 | 3182 | 3977 | 4773 | 6364 | 7955 | 9545 | 11136 | 12727 | 14318 | 15909 | 17500 | 23864 |
| 2.50 | | 636 | 1018 | 1273 | 1909 | 2545 | 3182 | 3818 | 5091 | 6364 | 7636 | 8909 | 10182 | 11455 | 12727 | 14000 | 19091 |
| 3.00 | | 530 | 848 | 1061 | 1591 | 2121 | 2652 | 3182 | 4242 | 5303 | 6364 | 7424 | 8485 | 9545 | 10606 | 11667 | 15909 |
| 3.18 | 1/8 | 500 | 800 | 1001 | 1501 | 2001 | 2501 | 3002 | 4002 | 5003 | 6003 | 7004 | 8005 | 9005 | 10006 | 11006 | 15009 |
| 3.50 | | 455 | 727 | 909 | 1364 | 1818 | 2273 | 2727 | 3636 | 4545 | 5455 | 6364 | 7273 | 8182 | 9091 | 10000 | 13636 |
| 4.00 | | 398 | 636 | 795 | 1193 | 1591 | 1989 | 2386 | 3182 | 3977 | 4773 | 5568 | 6364 | 7159 | 7955 | 8750 | 11932 |
| 4.50 | | 354 | 566 | 707 | 1061 | 1414 | 1768 | 2121 | 2828 | 3535 | 4242 | 4949 | 5657 | 6364 | 7071 | 7778 | 10606 |
| 4.76 | 3/16 | 334 | 535 | 668 | 1003 | 1337 | 1671 | 2005 | 2674 | 3342 | 4011 | 4679 | 5348 | 6016 | 6684 | 7353 | 10027 |
| 5.00 | | 318 | 509 | 636 | 955 | 1273 | 1591 | 1909 | 2545 | 3182 | 3818 | 4455 | 5091 | 5727 | 6364 | 7000 | 9545 |
| 6.00 | | 265 | 424 | 530 | 795 | 1061 | 1326 | 1591 | 2121 | 2652 | 3182 | 3712 | 4242 | 4773 | 5303 | 5833 | 7955 |
| 6.35 | 1/4 | 251 | 401 | 501 | 752 | 1002 | 1253 | 1503 | 2004 | 2505 | 3006 | 3508 | 4009 | 4510 | 5011 | 5512 | 7516 |
| 7.00 | | 227 | 364 | 455 | 682 | 909 | 1136 | 1364 | 1818 | 2273 | 2727 | 3182 | 3636 | 4091 | 4545 | 5000 | 6818 |
| 7.94 | 5/16 | 200 | 321 | 401 | 601 | 801 | 1002 | 1202 | 1603 | 2004 | 2404 | 2805 | 3206 | 3607 | 4007 | 4408 | 6011 |
| 8.00 | | 199 | 318 | 398 | 597 | 795 | 994 | 1193 | 1591 | 1989 | 2386 | 2784 | 3182 | 3580 | 3977 | 4375 | 5966 |
| 9.00 | | 177 | 283 | 354 | 530 | 707 | 884 | 1061 | 1414 | 1768 | 2121 | 2475 | 2828 | 3182 | 3535 | 3889 | 5303 |
| 9.53 | 3/8 | 167 | 267 | 334 | 501 | 668 | 835 | 1002 | 1336 | 1669 | 2003 | 2337 | 2671 | 3005 | 3339 | 3673 | 5008 |
| 10.00 | | 159 | 255 | 318 | 477 | 636 | 795 | 955 | 1273 | 1591 | 1909 | 2227 | 2545 | 2864 | 3182 | 3500 | 4773 |
| 11.00 | | 145 | 231 | 289 | 434 | 579 | 723 | 868 | 1157 | 1446 | 1736 | 2025 | 2314 | 2603 | 2893 | 3182 | 4339 |
| 11.11 | 7/16 | 143 | 229 | 286 | 430 | 573 | 716 | 859 | 1146 | 1432 | 1718 | 2005 | 2291 | 2578 | 2864 | 3150 | 4296 |

# CUTTING SPEED Cont.

## Conversion table from M/min to RPM

| Meters/Min | | 5 | 8 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Feet/Min | | 16.4 | 26.2 | 32.8 | 49.2 | 65.6 | 82.0 | 98.4 | 131.2 | 164.0 | 196.9 | 229.7 | 262.5 | 295.3 | 328.1 | 360.9 | 492.1 |
| Tool Diameter | | PERIPHERAL CUTTING SPEED | | | | | | | | | | | | | | | |
| mm | Inches | | | | | | | | | | | | | | | | |
| 12.00 | | 133 | 212 | 265 | 398 | 530 | 663 | 795 | 1061 | 1326 | 1591 | 1856 | 2121 | 2386 | 2652 | 2917 | 3977 |
| 12.70 | 1/2 | 125 | 200 | 251 | 376 | 501 | 626 | 752 | 1002 | 1253 | 1503 | 1754 | 2004 | 2255 | 2505 | 2756 | 3758 |
| 13.00 | | 122 | 196 | 245 | 367 | 490 | 612 | 734 | 979 | 1224 | 1469 | 1713 | 1958 | 2203 | 2448 | 2692 | 3671 |
| 14.00 | | 114 | 182 | 227 | 341 | 455 | 568 | 682 | 909 | 1136 | 1364 | 1591 | 1818 | 2045 | 2273 | 2500 | 3409 |
| 14.29 | 9/16 | 111 | 178 | 223 | 334 | 445 | 557 | 668 | 891 | 1113 | 1336 | 1559 | 1781 | 2004 | 2227 | 2449 | 3340 |
| 15.00 | | 106 | 170 | 212 | 318 | 424 | 530 | 636 | 848 | 1061 | 1273 | 1485 | 1697 | 1909 | 2121 | 2333 | 3182 |
| 15.88 | 5/8 | 100 | 160 | 200 | 301 | 401 | 501 | 601 | 801 | 1002 | 1202 | 1403 | 1603 | 1803 | 2004 | 2204 | 3006 |
| 16.00 | | 99 | 159 | 199 | 298 | 398 | 497 | 597 | 795 | 994 | 1193 | 1392 | 1591 | 1790 | 1989 | 2188 | 2983 |
| 17.00 | | 94 | 150 | 187 | 281 | 374 | 468 | 562 | 749 | 936 | 1123 | 1310 | 1497 | 1684 | 1872 | 2059 | 2807 |
| 17.46 | 11/16 | 91 | 146 | 182 | 273 | 364 | 456 | 547 | 729 | 911 | 1093 | 1276 | 1458 | 1640 | 1822 | 2005 | 2734 |
| 18.00 | | 88 | 141 | 177 | 265 | 354 | 442 | 530 | 707 | 884 | 1061 | 1237 | 1414 | 1591 | 1768 | 1944 | 2652 |
| 19.05 | 3/4 | 84 | 134 | 167 | 251 | 334 | 418 | 501 | 668 | 835 | 1002 | 1169 | 1336 | 1503 | 1670 | 1837 | 2505 |
| 20.00 | | 80 | 127 | 159 | 239 | 318 | 398 | 477 | 636 | 795 | 955 | 1114 | 1273 | 1432 | 1591 | 1750 | 2386 |
| 22.00 | | 72 | 116 | 145 | 217 | 289 | 362 | 434 | 579 | 723 | 868 | 1012 | 1157 | 1302 | 1446 | 1591 | 2169 |
| 22.22 | 7/8 | 72 | 115 | 143 | 215 | 286 | 358 | 430 | 573 | 716 | 859 | 1002 | 1146 | 1289 | 1432 | 1575 | 2148 |
| 24.00 | | 66 | 106 | 133 | 199 | 265 | 331 | 398 | 530 | 663 | 795 | 928 | 1061 | 1193 | 1326 | 1458 | 1989 |
| 25.00 | | 64 | 102 | 127 | 191 | 255 | 318 | 382 | 509 | 636 | 764 | 891 | 1018 | 1145 | 1273 | 1400 | 1909 |
| 25.40 | 1 | 63 | 100 | 125 | 188 | 251 | 313 | 376 | 501 | 626 | 752 | 877 | 1002 | 1127 | 1253 | 1378 | 1879 |
| 27.00 | | 59 | 94 | 118 | 177 | 236 | 295 | 354 | 471 | 589 | 707 | 825 | 943 | 1061 | 1178 | 1296 | 1768 |
| 30.00 | | 53 | 85 | 106 | 159 | 212 | 265 | 318 | 424 | 530 | 636 | 742 | 848 | 955 | 1061 | 1167 | 1591 |
| 32.00 | | 50 | 80 | 99 | 149 | 199 | 249 | 298 | 398 | 497 | 597 | 696 | 795 | 895 | 994 | 1094 | 1491 |
| 34.00 | | 47 | 75 | 94 | 140 | 187 | 234 | 281 | 374 | 468 | 562 | 655 | 749 | 842 | 936 | 1029 | 1404 |
| 36.00 | | 44 | 71 | 88 | 133 | 177 | 221 | 265 | 354 | 442 | 530 | 619 | 707 | 795 | 884 | 972 | 1326 |
| 38.00 | | 42 | 67 | 84 | 126 | 167 | 209 | 251 | 335 | 419 | 502 | 586 | 670 | 754 | 837 | 921 | 1256 |
| 40.00 | | 40 | 64 | 80 | 119 | 159 | 199 | 239 | 318 | 398 | 477 | 557 | 636 | 716 | 795 | 875 | 1193 |
| 45.00 | | 35 | 57 | 71 | 106 | 141 | 177 | 212 | 283 | 354 | 424 | 495 | 566 | 636 | 707 | 778 | 1061 |
| 50.00 | | 32 | 51 | 64 | 95 | 127 | 159 | 191 | 255 | 318 | 382 | 445 | 509 | 573 | 636 | 700 | 955 |

# LUBRICANTS FOR TAPPING

**Effect of lubricants on the Cutting Process :-**

Heat is generated as a result of the machining operation done in cutting metals. This heat reduces the hardness of the cutting tools. By means of cutting fluids, the impact of the heat thus generated during machining is reduced and the friction between the tool and chips produced in the workpiece is also reduced.

The advantages of using the correct cutting fluid area :

1. Longer tool life.
2. Greater Production.
3. Better size control.
4. Smoother and more accurate finish.
5. Avoids frequent resharpening of tap.
6. More efficient removal of chips.

The best cutting fluid is the one that possesses good lubricating properties in addition to its cooling properties.

Unfortunately, many tap users do not appreciate the important role played by fluids in the tapping operations. The users of tap can take advantage of the services and the recommendations offered by our Application Engineers.

# General Suggestions Concerning Do's & Don'ts For Tapping

## 1. For better thread tolerance control, finish & maximize tap performance :-

a) The spindle of the tapping machines and the tapping head should be free from run out and play. A simple check should ensure that the spindle is running true.

b) It is common practice to use a FLOATING HOLDER, which allows the tap to align itself with the drilled hole.

c) Never tap through a BUSHING because the crest of the tap might get damaged due to contact with the bushing.

d) Countersinking the hole prior to tapping will facilitate easy entry of the tap, especially in the case of bottoming tap. Countersinking is also helpful when tapping with a fluteless tap.

e) Care should be taken during reversal of the tap as most of the time, the problem occurs during tap reversal. To some extent the problem can be sorted out by adjusting the feed control and speed while reversing. The tap should not come out with a jerk, this may damage the threads or may affect its finish.

f) Tapping Holders : Many tapping problems can be eliminated by going for a good reversible tapping attachment which should have features like Torque Control, Self Feed, Auto reverse, Axial Cushioning effect, Radial Float and it should be light in weight.

## 2. While tapping in punched holes in sheet metals, it often causes bending or loading and the tap may break. When the hole is punched, the metal is flayed out and this will affect while the tap is being reversed.

## 3. Check list when using Roll Forming Taps :-

a) Proper selection of the correct drill size for pre-tapped holes.

b) Countersink or chamfer the hole to avoid the possible deposit of displaced burs at the mouth of the holes.

c) Use a cutting oil (sulpurized or chlorinated) instead of a coolant.

d) Coolant concentration in range of 7-9 % (Emulsion Oil) gives better thread finish, closer tolerance threads along with increased tap life.

e) Surface coated taps are advisable for best result and higher productivity.

f) For tapping speed, please get our advice depending upon your application.

g) Torque requirement for Roll Forming Tap is higher than those for Thread Cutting Taps and hence suitable machines should be selected.

h) While using multi-spindle tapping machine, please check if enough torque is available.

i) For short blind holes, caution must be exercised so that the tap does not hit the bottom which can result in breakage of tap or chipping-off of threads.

## 4. Before tapping check the following :-

a) Check the alignment of the drilled hole and tap.

b) Check the coolant nozzle positioning in reference to location of drilled hole in the components where tapping is to be done while machine tapping.

c) Use of correct coolant oil as per material of component to be tapped. In case of machine tapping ensure ample quantity of coolant with right pressure is available for wet tapping. Please get our advice depending upon your application.

d) Check whether the tap selected is suitable for the required application. Please get our advice depending upon your application.

e) Proper clamping of component.

f) Check size of drilled hole. Refer to our Drill Selection Chart for guidance.

g) Selection of Proper feed & speed as per material for machine tapping. Please get our advice depending upon your application.

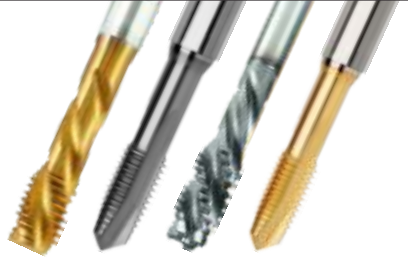
h) Proper countersink / chamfer is provided in the drilled hole which needs to be tapped.

i) Ensure tap is secured properly & firmly without any run-out.

j) Ensure spindle is free from run out in the machine used for tapping.

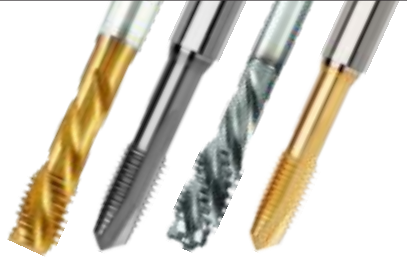
k) Tap holding device is secured properly with no play.

# TAP TROUBLE SHOOTING



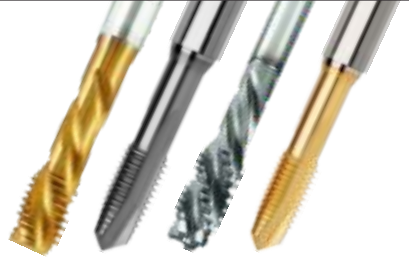
| Problem | Possible Cause | Solution |
|---|---|---|
| **Oversize thread produced** | Incorrect tap or tap geometry | Use correct tap for the material to be machined.<br>Use our selection chart.<br>Use taps with longer chamfer.<br>Check tap and guage tolerances. |
| | Chip packing | Use spiral point or spiral fluted taps.<br>Reduce number of lutes to provide extra chip room.<br>Use large hole size.<br>If tapping a blind hole, allow a deeper hole where applicable or shorten the thread length required in the tapped hole of the component.<br>Use a proper lubricant. |
| | Pretapping hole size is too small | Use our Drill Chart for cutting or fluteless taps as the case may be. |
| | Cold welding at the flank of the tap | Use new tap.<br>Use coated tap.<br>Optimize lubrication.<br>Reduce tapping speed. |
| | Lead of tap or Rake angle of tap not correct | Regrind tap to correct geometry. |
| | Cutting speed too high | Reduce cutting speed. |
| | Lubrication or coolant supply insufficient | Ensure sufficient, suitable coolant supply and proper concentration of coolant. |
| | Operating conditions | Apply proper tapping speed.<br>Correct the alignment of tap and drill hole.<br>Avoid free cutting of either the tap or work piece.<br>Use proper tapping machine with suitable power. |
| **Tap breakage** | Pretapping hole size is too small | Use our Drill Chart for cutting or fluteless taps as the case may be. |
| | Chamfer overloaded. | Increase number of threads of chamfer lead. |
| | Tap hits bottom of tapping size hole. | Check the hole depth, apply tension / compression tap chuck. |
| | Work hardening material | Use coated tap. |
| | Lack of or incorrect countersink on the mouth of the hole | Provide proper countersink. |
| | Wrong alignment of tap with hole | Check the alignment of tap & drill hole. |
| | Lack of lubricant or use of wrong type | Improve the lubricant supply and use a right type. |
| | Incorrect tap, tap geometry not suitable for the application | Use the selection chart. |
| | Excessive tapping torque | Use a bigger drill size.<br>Try to shorten thread length.<br>Increase cutting angle.<br>Apply a tap with more thread relief and reduced land width.<br>Use spiral pointed or spiral fluted taps as the case may be. |
| | Tool condition | Do not leave section on the reground flutes where tapping wear still remains. Regrind tool more frequently. |

# TAP TROUBLE SHOOTING



| Problem | Possible Cause | Solution |
|---|---|---|
| **Undersize thread** | Tolerance on tap does not correspond to gauge tolerance | Use correct tap for required tolerance. |
| | Incorrect tap | Use correct tap for the material to be machined.<br>Use oversize taps for cutting materials such as copper alloy. aluminium alloys and cast iron.<br>Use oversized taps for cutting tubings which have "Spring Back" action after tapping. |
| | Tap does not cut accurately | Avoid axial forces during the cutting process. |
| | Machine spindle is axially too rigid | Use tension / compression chuck. |
| | Left over chips | Increase cutting performance to avoid any left over chips in the hole. Remove the left over chips from the hole for gauge checking. |
| **Oversized internal diameter** | Hole size | Use minimum hole size. |
| | Galling | Avoid tapered hole by the use of proper chamfered taps.<br>Check core sharpness of taps.<br>Use coated taps.<br>Use proper cutting lubricants.<br>Ensure proper cutting angles in accordance with the material being. apped. |
| **Thread axially miscut** | Spiral - fluted taps, if applied with too much pressure for initial tapping | spiral tap requires only light pressure for initial tapping.<br>The tap should be applied within the tension/compression range. |
| | Spiral pointed taps if applied with too low pressure | Taps with spiral point or left hand spiral require higher axial pressure.<br>Ensure tap operates within the tension compression range. |
| **Torn thread or rough in tapped components** | Incorrect rake angle (usually too small) | Re-sharpen the angle. |
| | Pretapping hole size is too small | Use our drill chart for cutting or fluteless taps as the case may be. |
| | Chips clogging between the flutes | Use a tap with lesser number of flutes. |
| | Broken threads on taps | Use a new tap. |
| | Improper re-sharpening of taps | Re-sharpen the tap or use a new tap. |
| | Lack of lubricant, or use of wrong type | Use right lubricant with sufficient supply. |
| | Chamfer too short | Increase chamfer length. |
| | Galling | Use thread relieved taps. Reduced land width.<br>Use surface treated taps. Use proper cutting lubricant.<br>Reduced tapping speed.<br>Obtain proper alignment between tap and work piece. |
| **Chipping** | Incorrect tap selection | Use a different kind of high speed steel tap. Increase chamfer length.<br>Use spiral flute or spiral point taps as per application |
| | Operating conditions | Apply proper tapping speed. Apply proper lubricant.<br>Use larger drill hole. |

# TAP TROUBLE SHOOTING



| Problem | Possible Cause | Solution |
|---|---|---|
| **Overheating of tap** | Excessive land width | Use correct tap. |
| | Lack of lubricant, or use of wrong type | Use proper lubricant with sufficient quantity. |
| | Dull tap | Use new tap or re-sharpen the tap. |
| | Excessive flank contact, pitch diameter relief required | Use correct tap |
| | Excessive tapping speed | Apply the proper tapping speed |
| **Thread surface finish not good** | Cutting edge geometry not suitable for the application | Use correct tap for the material to be machined. |
| | Cutting speed too high | Reduce cutting speed. |
| | Insufficient coolant (concentration and supply) | Ensure right type of coolant with required concentration in ample quantity is provided while tapping. |
| | Chip congestion | Use suitable tap type. |
| | Pretapping hole size is too small | Use our Drill Chart for cutting or fluteless taps as the case may be. |
| | Built-up edge | Apply coated taps. |
| | Cold welding | Improve coolant supply and increase concentration of coolant if soluble coolant is used. |
| **on reversal** | Tap cutting too tightly | Increase rake angle. |
| | Tap galling | Face angle on back of land should be increased. |
| | Chip wedged between flutes | Use tap with lesser number of flutes<br>Increase flow of lubricants<br>Use correct tap as per application |
| **Tap sticking or binding** | Pretapping hole size is too small | Use our Drill Chart for cutting or fluteless tap as the case may be |
| | Tap lands too wide | Use correct tap. |
| | Incorrect cutting face angle | Use correct geometry tap. |
| | Lack of lubricant or use of wrong type | Use proper lubricant with sufficient quantity. |
| **Cutting face breakdown** | Incorrect cutting face angle | Use correct geometry as per application |
| **Tap Life Insufficient** | Surface hardening of pretapped hole | Check drill for wear |
| | Incorrect tap selection | Use specially designed taps for tapping for heat treated materials. Change to a type of high speed steel tap containing vanadium. Use coated taps. Increase chamfer length. |
| | Operating conditions | Reduce tapping speed. Use proper cutting lubricants.<br>Use larger hole size |
| | Tools condition | Grind proper cutting angle. Avoid hardness reduction from grinding process. |
| | Chip congestion | Use correct tap. |

# GUIDE TO THREAD FORMING TAP

(A different way to producing internal threads)

Also known as "Cold Forming Tap" or "Roll Forming Tap". Thread forming tap produces internal threads by an action similar to thread rolling, a novel method of threads by displacement of material rather than by chip removal. These taps have neither flutes nor cutting edges and they are just like a screw. In the end view and cross section, the major and minor diameters follow a contour. The fluteless taps are "screwed" in the pre-drilled work piece with proper feed rate and the thread profile is gradually press formed (please refer to figure).

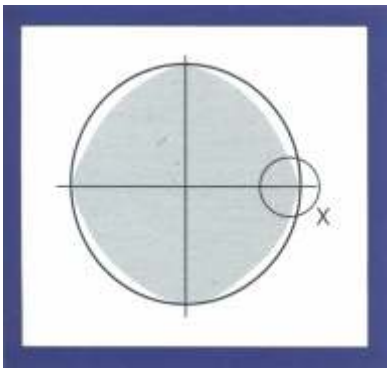



Fig. 1


Fig. 2


Fig. 3

It is a chipless technology and any material having ductility co-effiecient of 10% or less (tensile strength less than 1000 N/mn$^2$) can be machined perfectly.

## A) ADVANCED OVER CONVENTIONAL THREAD CUTTING TAPS:

1. No chips are produces since threads are produced by cold forming process and hence the chance of tap breakage is minimized. (Chip entrapment/clogging has been identified as the major cause for tap breakage and poor quality of threads).
2. Easier blind hole tapping because there are no chips to clog or jam at the bottom of the hole, which consequently eliminate tap breakage.
3. Strong threads because the grain fibers are not cut but a thread is formed by displacement of material (Refer Fig, 2). The pull test or torque tension tests demonstrate that the threads produced by roll form taps are stronger (by an average of 35$ more than threads produced by thread cutting taps.)
4. Better control of tapped hole size (thread cutting taps may cut over size holes due to excessive downward pressure).
5. Better surface finish and absolute accuracy of the thread is guaranteed because of the cold forming.
6. No threads pitch errors. Thread cutting taps may cause tearing of threads, which may cause a pitch error while reversing.
7. Faster tapping speed and increased productivity (Tapping speed can be more than those recommended for cutting taps).
8. Increased tool life due to strong core area.
9. Consistency in tapped hole sizes from the first to the last due to continuous forming action and accurate lead.
10. Plating failures are reduced because there is no chip to stick at the bottom of blind holes or on the threads.
11. The tap has greater rigidity and better strength (Core portion) because there are no flutes and there is less risk of breakage, especially in small sizes resulting in reduction in cost per tapped hole and increased production.
12. Application in wide range of materials like aluminium, steel, stainless steel, copper (soft), brass (long chipping), magnesium, zinc alloys etc.

## B) EQUIPMENT :

Conventional tapping equipment can be used. Roll forming taps work very well in NC and CNC machines, drill machines, lathes, lead screw tapping equipment and on many standard tapping heads.

## C) OIL GROOVES :

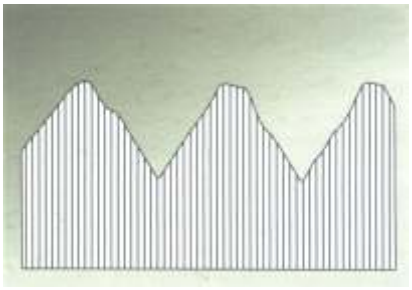
For tapping depths more than two times the tap diameter, roll taps with oil grooves are recommended. These grooves provide a passage for the lubricant and also for the escape of air and oil to avoid a piston effect in blind holes.

## D) HOLE SIZE :

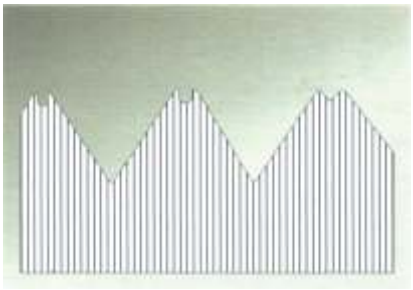
The pretapping hole size required for forming the taps is larger in conventional tapping. Accurate pretapping hole is desirable while tapping with fluteless taps. This size depends on the forming property of the material, desired depth of the thread, stripping strength requirement etc. For the conventional thread cutting tap, the hole size is identical to minor dia of the tapped internal thread. But in case of fluteless tap, the hole size is calculated as per following formula:

HOLE SIZE = BASIC TAP OD - (0.0068 X 65 X Pitch) in mm.

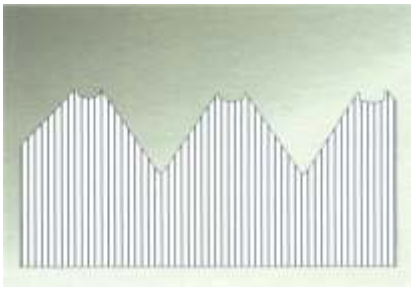
The general formula for determining the hole size has been given above but if necessary, fine tuning may be required after performing some actual trials etc., We are giving below profiles of threads formed by M10 x 1.5 fluteless taps with different hole size.



Ø 9.10



Ø 9.20



Ø 9.40

**E) TORQUE :**

The torque requirements for forming taps are more than those for cutting taps. The actual torque experienced will vary with the materials to be formed and some experiments may be required, if torque is a limiting factor.

**F) THREAD FORMS :**

Metric Coarse, Metric Fine, UNC, UNF are in our standard manufacturing range. Other thread forms like BSW, BSF, BSP etc. are against orders.

**G) RANGE :**

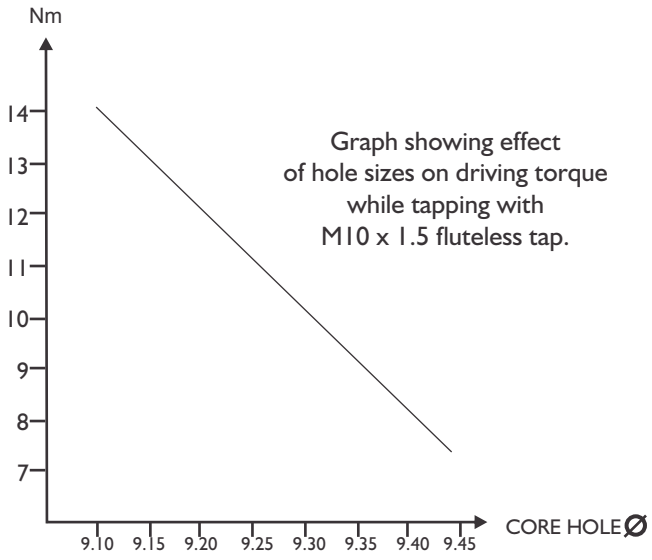
1.6 mm to 24 mm in Metric sizes and 1/8" to 1" in fractional sizes.

**H) COATINGS :**

Surface coatings like TiN, TiCN, TiALN etc. are available to improve the tools life and suit different work material applications.

**I) LUBRICATION :**

Proper lubrication is very important in thread forming with flueless taps. Lubrication prevents material from building up on the high points of the thread flanks and ensures that the torque during thread forming process does not increase. Therefore, continuous flow of lubricant is necessary. Oils having presence of graphite such as those used in rolling processes should be preferred.




Graph showing effect of hole sizes on driving torque while tapping with M10 x 1.5 fluteless tap.

**J) CHECKLIST WHEN USING ROLL FORM TAPS :**

1. Proper selection of correct drill size for pretapped holes.
2. Countersink or chamfer the hole to avoid possible deposit of displaced burs at the mouth of the holes.
3. Use a cutting oil (sulphurized or chlorinated) than a coolant.
4. Surface coating of taps is advisable for best result and higher productivity.
5. Tapping speed - Please get our advice, depending upon your application.
6. Torque requirement for roll form tap is higher than those for thread cutting taps and hence suitable machines should be selected.
7. While using multi-spindle tapping machines, please check if enough torque is available.
8. For short blind holes, caution has to be exercised that the tap does not hit at the bottom and break or chips off.

# TYPES OF TAP

## HAND TAPS

These are straight flute general purpose tools which can be used for both machine or hand tapping. They are generally the most economical tool for use on production runs, but are best on materials that produce chips or where the swarf breaks readily. Where deep holes are to be tapped, in materials which produce stringly swarf, other types of taps may be needed, especially for coarse threads.

Hand taps can be supplied in sets of three; bottom, second and taper leads, or individually.

**BOTTOM TAPS** : have chamfer (lead) of 1-2 threads, the angle of the lead being around 18 degrees per side. They are used to produce threads close to the bottom of blind holes.

**SECOND TAPS** : have a lead of 3-5 threads at 8 degrees per side. They are the most popular and can be used for through holes, or blind holes where the thread does not need to go right to the bottom.

**TAPER TAPS** : have a lead of 7-10 threads at 5 degrees per side. The taper lead distributes the cutting force over a large area, and the taper shape helps the thread to start. They can therefore be used to start a thread prior to use of second or bottom leads, or for through holes.

**IMPORTANT NOTE ON TERMINOLOGY** : In the U.K. bottom taps are often referred to as 'plugs'. In North America second taps are often referred to as 'plugs;! This can easily lead to confusion. To avoid problems when ordering it is best to use the terms bottom, second and taper.
Another variation is that second taps are sometimes referred to as 'intermediate'. and taper taps can be called 'firsts.'

## MACHINE TAPS

Machine taps are so called because they are designed to be run at higher speeds, and need less cutting power than hand taps.

**SPIRAL POINT** : Also known as 'gun nose' or 'bull nose' or chipdriver. These taps are dimensionally the same as a hand tap, second, but have the cutting face ground back relative to the axis of the tap for the lead portion. This gives the flute a better cutting action, requiring less power, and pushes the cut material forward, allowing free flow of coolant along the flutes to the cutting edge. The flutes are not ground as deeply as for hand taps, giving the tap greater strength. It can therefore be run at higher speeds.

Spiral point taps are ideal for machine tapping of through holes or hand holes where there is enough clearance beyond the threaded portion to accommodate the swarf.

**SPIRAL FLUTE** : These taps are used to produce a thread close to the bottom of a blind hole and therefore have a very short lead. The right hand spiral cut of the flutes acts to force the swarf away from the cutting teeth to the rear of the flutes and out of the hole. They are better on materials which form long continues stringy swarf, rather than chips. They are also better to tap a thread in a hole where there is a break in the material, e.g. another hole, as the spiral fluting helps the tap to pick up on the other side.

Spiral flute taps can have slow or fast helix angles. Slow spirals are used for non ferrous materials and fast spirals for most other materials. We supply fast spiral as standard.

**FLUTELESS** : Otherwise known as 'Roll', 'Forming' or Polygon taps. Used for the chipless production of threads in ductile materials such as copper, aluminium or soft brass. As the name implies they do not have flutes but lobes, which contact the work piece to form the thread by extrusion. They are operated at high speeds and are better at maintaining size. As long as all of the correct operating criteria are met, i.e. speed, hole size and lubrication, they have a longer life and less breakages than with other types of machine taps. Because they produce no chips they are very suitable for blind hole tapping

Fluteless taps require different drill sizes and higher operating speeds than conventional taps, see later. They also produce stronger threads.

## LONG SHANK TAPS

**MACHINE NUT (BS 949)** : These taps were designed for tapping nuts on machines and have a long thread, shank and square length. The shank diameter is reduced below the thread minor diameter to enable the tap to run through the work piece. This was originally to allow nuts to collect on the shank. For nut production, taper leads were used to distribute the cutting action, but these taps are now generally used as long reach and are supplied also in bottom and second leads.

**DIN 376 and 374** : These are European standard taps that are dimensionally different to the standard ISO 529 UK types. They are generally longer and have reduced shanks as do Nut Taps.
Basically DIN 376 are for standard course threads and DIN 374 for fine threads. A third type DIN 371 is available. These have bigger shanks, so are not really classed as long reach. All of these taps are available in the same types as ISO 529, see previous pages.

**DIN 376 STRAIGHT FLUTE**

**DIN 376 SPIRAL POINT (nitrided)**

**DIN 376 SPIRAL FLUTE**

## PIPE TAPS

We supply BSP, BSPT and ANP taps to BS 949.

## OTHER TYPES

There are many other types of tap available, such as interrupted thread, series, tandem etc, but these are normally for special applications. We would advise you on enquiry should you require anything other than the standard forms listed here. We do stock some taps other than normal standards, as you can see below :-

**TRAPEZODIAL TAP**

## SURFACE COATINGS

While selecting the correct type of tap for a job, the material to be tapped should also be considered. This may determine the surface coating that should be applied to the tap in order to extend its life.

Most taps are supplied with no surface treatment. They are referred to as 'Bright Finish'. These taps are mainly for use on non-ferrous materials or steels that do not cold weld. Bright finish taps are therefore suitable for all hand operations, where speeds are too low for cold welding to occur and for most machine operations.

**STEAM TEMPERING & NITRIDING**
Nitriding hardens the tap's surface skin and gives a grey/black appearance. It extends tap life when used on abrasive materials such as Copper, Aluminium alloys and Plastics, but it can make the tap brittle and more prone to breakage. Steam Tempering gives a blue / black finish. It causes minute imperfections on the surface of the tap. These cause the tapping lubricant to be retained more readily, reducing friction and the possibility of cold welding. This helps the tap to cope with both mild and stainless steels.

Both above processes are normally only required for Spiral point and spiral flute taps when the work piece material requires them. These taps are known as 'Steam tempered and nitrided' and have a blue/black finish.

titanium nitrided taps.

# SPECIAL THREAD TAPS

We offer special inch and metric HSS taps in a wide range of styles & tapes;

**Straight flute, spiral flute and spiral point geometry.**

- Shipment within 24-48 hours on most items.
- Available in bright finish.
- Coated taps are available with longer delivery time.
- Manufactured in the USA.
- Visit our website for more information.

**Some of the Special Taps we offer include :**

6mm x 1.0
D3 2 FL.
Spiral point

1/4 - 18 NPTF
Interrupted Thread
5 FL. Taper Pipe x 6"

5/16-24 NF
H7 4 FL.
Bottoming Tap

#8-32 NC
+.005 2 FL.
Spiral point for Plating

1/2-28 NEF
H3 4 FL.
Plug Tap

1" -8 NC
H4 3 FL.
Spiral Point

8mm x 1.25
D3 2FL.
Spiral Point

#4-40 NC
L.H. Spiral Point

#8-36 NF
Form Tap

1/8" - 27 NPT/F
Taper Pipe Tap
Spiral Flute

3/4" - 20 NEF
L.H. Hand Tap

2"-4-1/2 NC
Hand Tap

# MULTI - PURPOSE TAPS

**For Stainless Steel and other applications**

Ultimate extra life taps for tougher jobs

HSS -M4 hi-Vanadium Steel
Ground Thread
Steam Oxide Finish
DIN Flute - ANSI Shank

**Features:**

- Specially designed for a wide range of materials.
- Steam oxide tempered surface finish.
- Ground thread.
- High wear resistant.
- Suitable for high strength steels, tool steels and stainless steels.
- For threading up to HRC 40 hardened material.
- With thread relief to suit specific applications.
- 2B class of fit.

## SPIRAL POINTED TAPS

HIGH-VANADIUM STEEL

## SPIRAL FLUTED TAPS

48° SIRAL 8° - 10° HOOK

### PLUG CHAMFER

NEW!

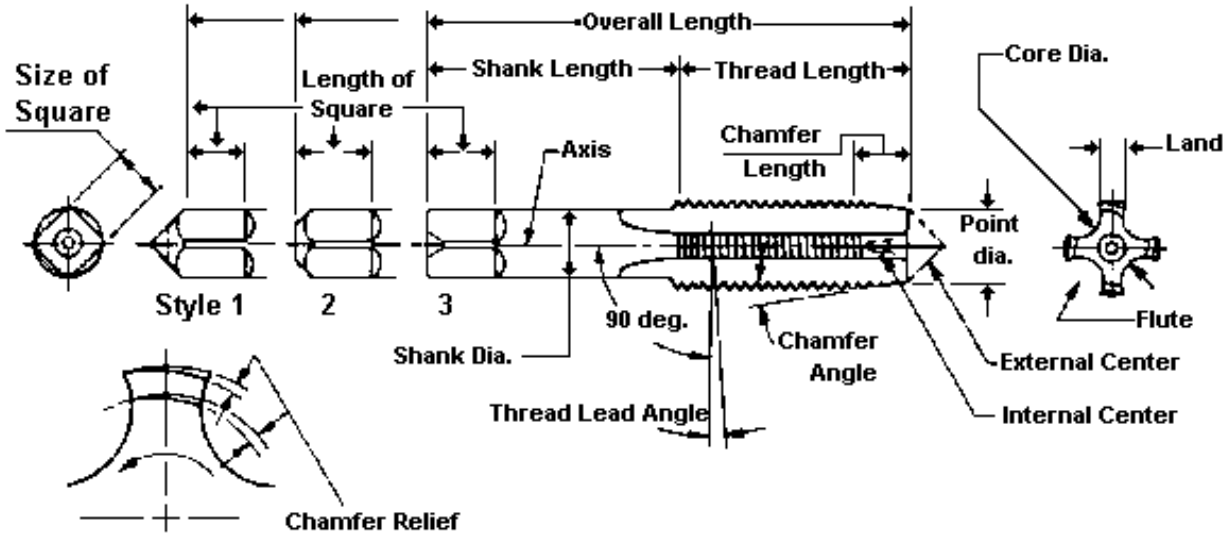
| TAP SIZE | TPI | No. OF FLUTES | GRIND LIMITS | STOCK # |
|---|---|---|---|---|
| **MACHINE SCREW SIZES** | | | | |
| 4 | 40 | 2 | H2 | HPMP90107 |
| 6 | 32 | 2 | H3 | HPMP90111 |
| 6 | 40 | 2 | H2 | HPMP90112 |
| 8 | 32 | 3 | H3 | HPMP90113 |
| 10 | 24 | 3 | H3 | HPMP90115 |
| 10 | 32 | 3 | H3 | HPMP90116 |
| **FRACTIONAL** | | | | |
| 1/4" | 20 | 3 | H5 | HPMP90130 |
| 1/4" | 28 | 3 | H4 | HPMP90131 |
| 5/16" | 18 | 3 | H5 | HPMP90132 |
| 5/16"' | 24 | 3 | H4 | HPMP90133 |
| 3/8" | 16 | 3 | H5 | HPMP90134 |
| 3/8" | 24 | 3 | H4 | HPMP90135 |
| 7/16" | 14 | 3 | H5 | HPMP90136 |
| 7/16" | 20 | 3 | H5 | HPMP90137 |
| 1/2" | 13 | 3 | H5 | HPMP90138 |
| 1/2" | 20 | 3 | H5 | HPMP90139 |
| 5/8" | 11 | 4 | H6 | HPMP90142 |
| 5/8" | 18 | 4 | H5 | HPMP90143 |
| 3/4" | 10 | 4 | H6 | HPMP90146 |
| 3/4" | 16 | 4 | H5 | HPMP90147 |
| 7/8" | 9 | 4 | H6 | HPMP90149 |
| 7/8" | 14 | 4 | H6 | HPMP90150 |
| 1" | 8 | 4 | H6 | HPMP90153 |
| 1" | 12 | 4 | H6 | HPMP90154 |

### SEMI-BOTTOMING STYLE 2-2-1/2 THREAD CHAMFER

NEW!

| TAP SIZE | TPI | No. OF FLUTES | GRIND LIMITS | STOCK # |
|---|---|---|---|---|
| **MACHINE SCREW SIZES** | | | | |
| 4 | 40 | 3 | H2 | HPMP70907 |
| 6 | 32 | 3 | H3 | HPMP70911 |
| 8 | 32 | 3 | H3 | HPMP70913 |
| 10 | 24 | 3 | H3 | HPMP70915 |
| 10 | 32 | 3 | H3 | HPMP70916 |
| **FRACTIONAL** | | | | |
| 1/4" | 20 | 3 | H5 | HPMP70930 |
| 1/4" | 28 | 3 | H4 | HPMP70931 |
| 5/16" | 18 | 3 | H5 | HPMP70932 |
| 5/16" | 24 | 3 | H4 | HPMP70933 |
| 3/8" | 16 | 3 | H5 | HPMP70934 |
| 3/8" | 24 | 3 | H4 | HPMP70935 |
| 7/16" | 14 | 3 | H5 | HPMP70936 |
| 7/16" | 20 | 3 | H5 | HPMP70937 |
| 1/2" | 13 | 3 | H5 | HPMP70938 |
| 1/2" | 20 | 3 | H5 | HPMP70939 |
| 5/8" | 11 | 3 | H6 | HPMP70942 |
| 5/8" | 18 | 3 | H5 | HPMP70943 |
| 3/4" | 10 | 3 | H6 | HPMP70946 |
| 3/4" | 16 | 3 | H5 | HPMP70947 |
| 7/8" | 9 | 4 | H6 | HPMP70949 |
| 7/8" | 14 | 4 | H6 | HPMP70950 |
| 1" | 8 | 4 | H6 | HPMP70953 |
| 1" | 12 | 4 | H6 | HPMP70954 |

# TAP TERMINOLOGY




## CLASSES OF FIT AND TOLERANCES

The various standards of taps give certain allowances or tolerances for manufacture. Taps are generally manufactured to take advantage of these tolerances, so that as they wear their life is extended. The closest tolerances are applied to Class 1 taps and the most generous to Class 3. Standard, off the shelf taps are manufactured to class 2, which applies to all taps listed in this catalogue, Classes 1 and 3 can be manufactured to order.

**Classes of fit apply to all thread forms :-**

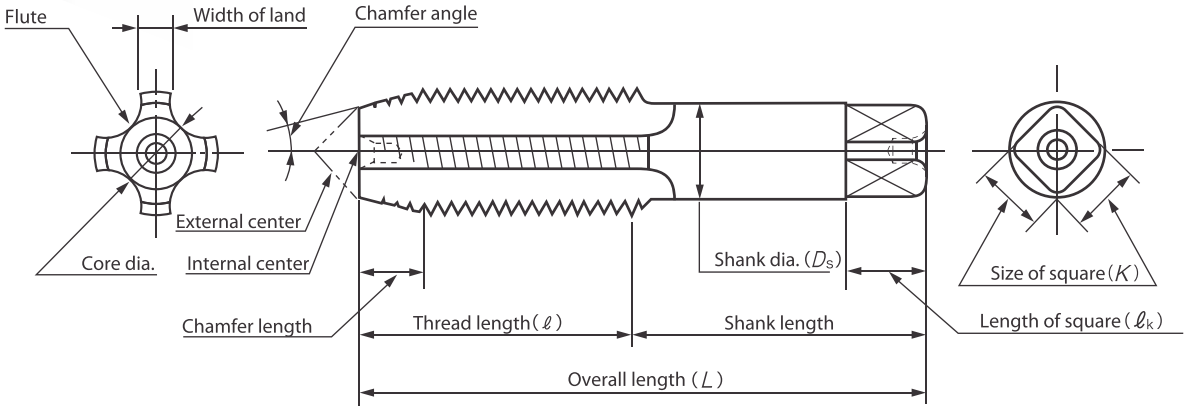
**CLASS 1** Produces tapped holes of 4H and 5H fit for Metric threads, 3B fit for American Unified threads and Close fit for Whitworth and BA threads.

**CLASS 2** Produces tapped holes of 6H, 4G and 5G for metric threads, 2B for Unified threads and Medium fit for Whitworth and BA threads.

**CLASS 3** Produces tapped holes of 7H, 8H and 6G for Metric threads, 1B for Unified threads and Free fit for Whitworth and BA threads.

Information on tolerances and fits for individual threads is available on request.

# Tap Terminology




**Angle of Thread :** The angle Included between the flanks of the thread, measured in an axial plane.

**Back Taper :** A slight axial relief of the tap that makes the pitch diameter of the thread near the shank slightly smaller than the pitch diameter of the thread near the chamfered end.

**Basic :** The theoretical or nominal standard size from which all variations are made.

**Chamfer :** The tapering of the threads at the front end of each land. Done by cutting away and relieving the crest of the first few teeths, which distributes the cutting action over several teeths. When the tapering amounts to 7 to 10 threads, the tap is called a "taper" tap; 3 to 5 threads is called a "plug" tap; and 1 to 2 threads is called a "bottoming" tap.

**Chamfer Relief :** The gradual decrease in height of the lands from cutting edge to heel on the chamfered portion. Provides clearance for the cutting action as the tap advances.

**Crest :** The top surface joining the two flanks of a thread. The crest of an external thread is at its major diameter.

**Cutting Face :** The leading side of the land in the direction of rotation for cutting, on which the chip impinges.

**Dryseal :** A pipe threaded fuel connection designed for use where the assembled product must withstand high fluid or gas pressures without the use of a sealing compound. Suitable for both external and internal applications.

**Flutes :** Longitudinal channels formed in a tap to create cutting edges on the thread profile. Provides chip spaces and cutting fluid passages.

Height of Thread : The distance between the crest and the base of a thread, measured normal to the axis.

**Helical Flute :** A flute with uniform axial lead and constant helix in a helical path around the axis of a cylindrical tap.

**Hook Face :** A concave cutting face. Usually specified either as chordal hook or tangenital hook.

**Chordal Hook Angle :** The angle between the chord passing through the root and crest of a thread at the cutting face and a radial line through the crest at the cutting edge.

**Tangential Hook Angle :** The angle between a line tangent to a hook cutting face at the cutting edge and a radial line to the same point.

Interrupted Thread : A tap with an odd number of lands. Every other tooth along the thread helix is removed.

**Lead :** The distance a screw thread advances axially in one complete turn. On a single lead screw or tap, the lead and pitch are identical. On a double lead screw or tap, the lead is twice the pitch, and so on for higher lead screws or taps.

**Pitch :** The distance from any point on a screw or tap thread to a corresponding point on the next thread, measured parallel to the axis. The pitch equals on divided by the number of threads per inch.

**Pitch Diameter :** On straight threads, the pitch diameter is the diameter of an imaginary coaxial cylinder. The surface of this cylinder would pass through the threads and the width of the spaces cut by the surface of the cylinder equal. On taper threads, the pitch diameter is the diameter at a given distance from a reference plane perpendicular to the axis of an imaginary coaxial cone. The surface of this cone would pass through the thread profile at points which would make the width of the threads and the width of the spaces cut by the surface of the cone equal.

**Rake :** Deviation of a straight cutting face of the tooth from a radial line. Positive rake means the crest of the cutting face is angularly advanced ahead of the balance of the face of the tooth. Negative rake means the crest of the cutting face is angularly behind the balance of the face of the tooth. Zero rake means the cutting face is directly on the center line.

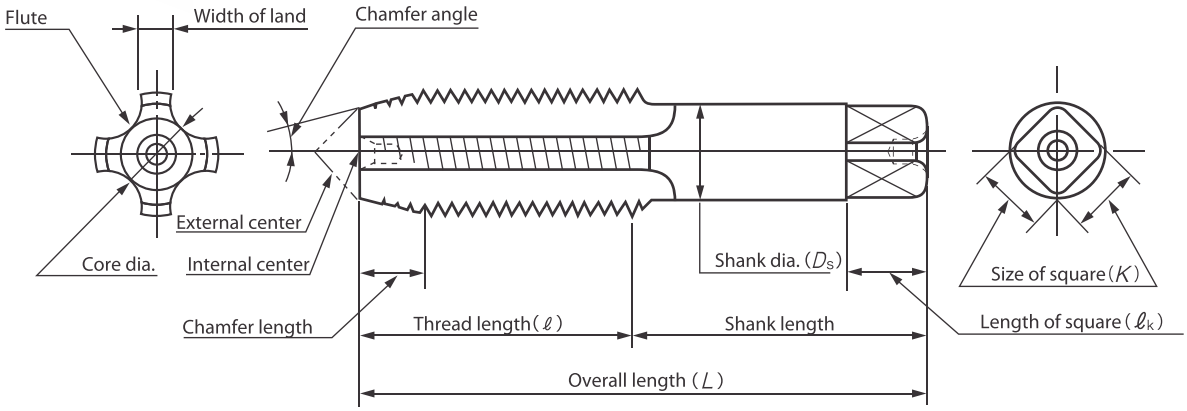
**Root :** The bottom surface joining the flanks of two adjacent threads. The root of an external thread is at its minor diameter. The root of an internal thread is at its major diameter.

**Spiral Point :** A supplemental angular fluting cut in the cutting face of the land at the chamfer end. Slightly longer than the chamfer on the tap and the opposite hand to that of rotation. Also known as a "Chip driver".

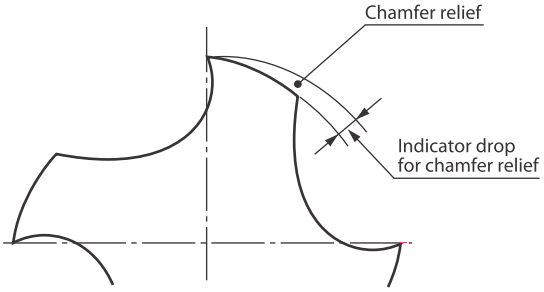
**Threads Per inch :** The number of threads in one inch of length.

**Thread relief :** The clearance produced by removing metal from behind the cutting edge. When the thread angle is relieved from the heel to the cutting edge, it is called an "eccentric" relief. When the thread angle is relieved from the heel to a portion of the land width only, it is called a "con-eccentric" relief.

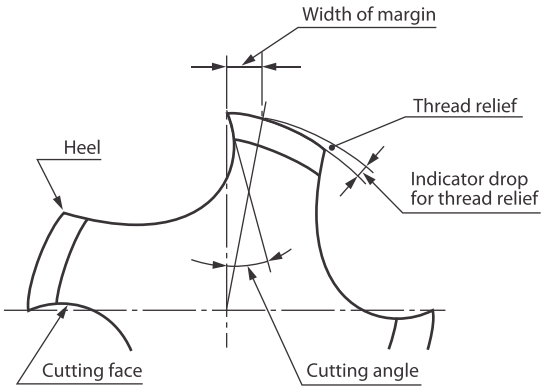
# TAP TERMINOLOGY




## ■Chamfer relief

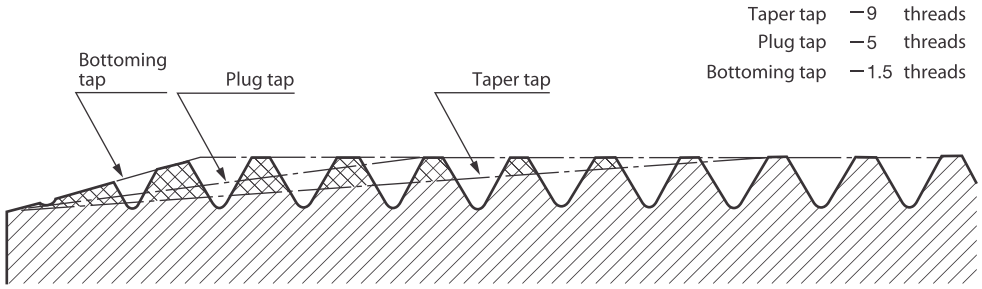



## ■Thread relief and cutting angle




Edge angle, including chamfer relief, thread relief, cutting angle and others, as well as heat treatment, have important functions affecting workpiece shape, tool life, surface finish of internal screw thread, and so on.

## ■Chamfer of hand tap




In general, tap chamfer is the most important part of taps to create internal thread. The function of full thread part of taps is to make a guidance.