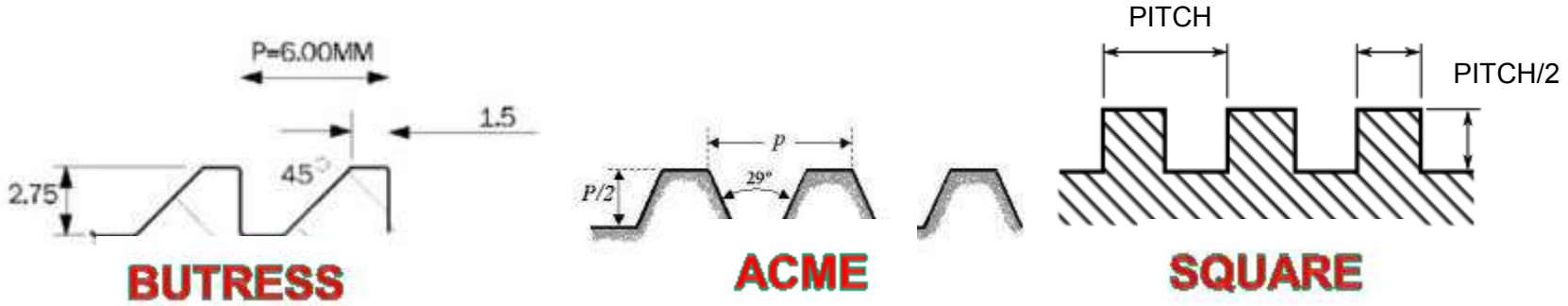
SCREW THREADS AND LOCKING DEVICES

This module is designed to develop your awareness and competence in thread forms and locking devices in accordance with your current training objectives set out in your ROA (record of achievement).

At the end of this input, the trainee will have an understanding of fixings, fasteners and any item with a thread and be able to identify it and satisfactorily complete a test of understanding as verification.

SCREW THREADS AND LOCKING DEVICES

There are many standards for screw threads used on bolts and fastenings. They all have a specific formation and each is very different to the other..



SCREW THREADS

There are several standards (British Standards) of thread available, on site you will usually see only three of these in use.

Unified Thread Form BS1580

ANGLE = 60º

Whitworth Thread Form BS 84

ANGLE = 55º

Metric Thread Form BS 3643

ANGLE = 60º

SCREW THREADS

There are several standards (British Standards) of thread available, on site you will usually see only three of these in use.

Unified Thread Form BS1580

IMPERIAL

Whitworth Thread Form BS84 BSW, BSF, UNC, UNF

Metric BS 3643 **METRIC**

SCREW THREADS

There are several standards (British Standards) of thread available, on site you will usually see only three of these in use.

Unified Thread Form BS1580	**60°**
Whitworth Thread Form BS 84	**55°**
Metric BS 3643	**60°**
British Association - BA	**47.5°**

SCREW THREAD TABLES

IMPERIAL

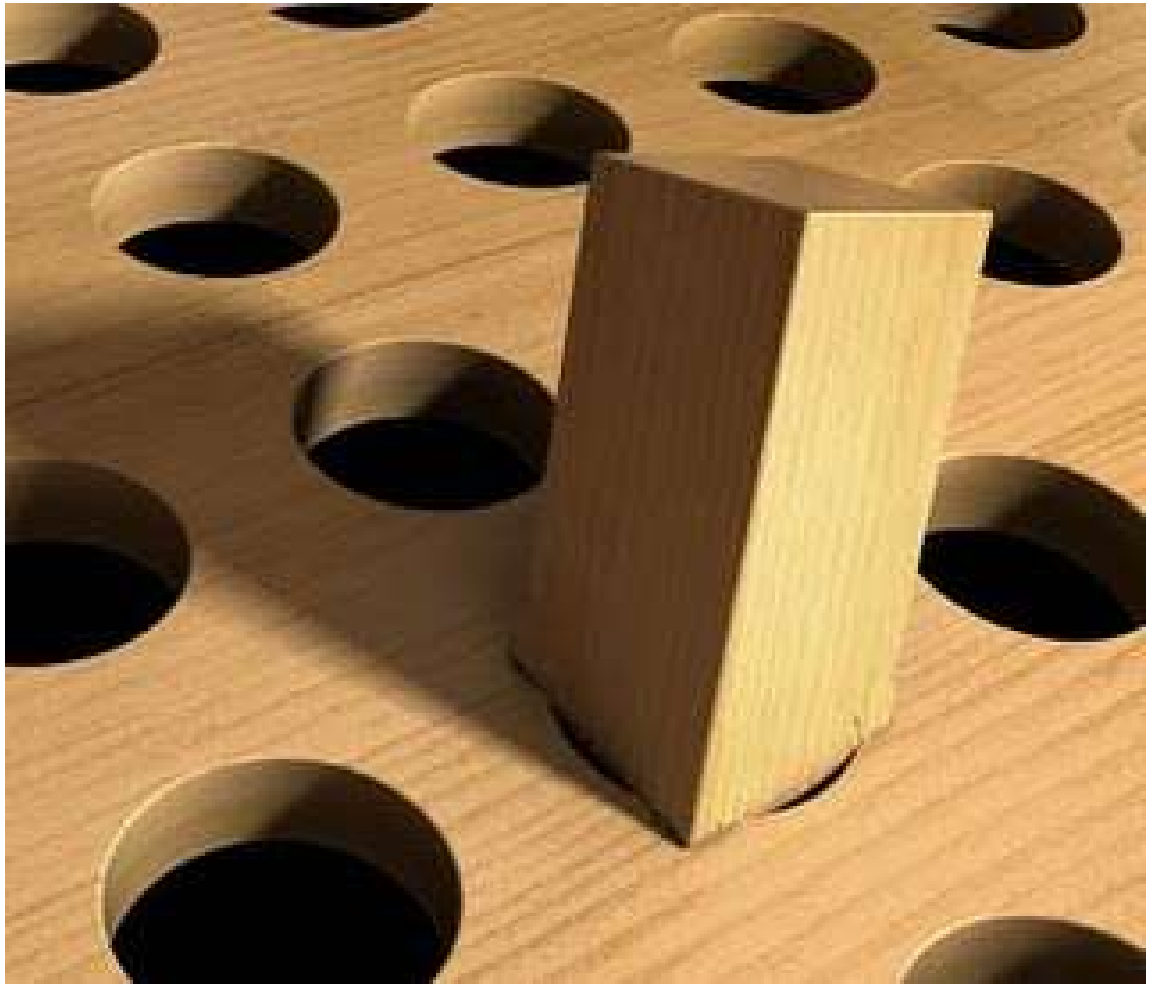
Diameter (Inches)	Threads Per Inch (TPI)			
	BSW	UNC	UNF	BSF
1/8	40	40		
5/32	32	32		
3/16	24	24	32	32
1/4			28	26
5/16			24	22
3/8			24	20
7/16			20	18
1/2	12	13	20	16
5/8			18	14
3/4			16	12
7/8	9	9	14	11
1	8	8	12	10
1-1/8	7	7	12	9
1-1/4	7	7	12	9
1-1/2	6	6	12	8

METRIC

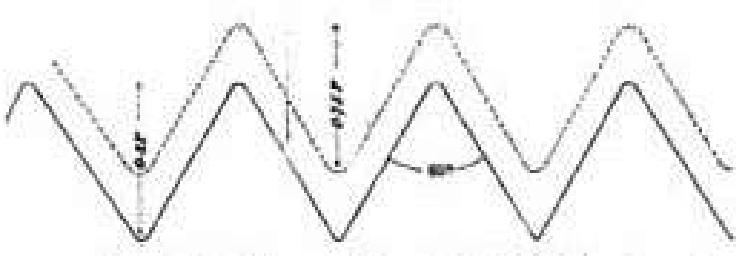
Unless otherwise stated, Anzor's metric fasteners are Coarse Standard

Metric Diameter	Pitch = P (mm) Coarse Standard	Fine Standard
M2	0.40	
M2.5	0.45	
M3	0.50	0.35
M4	0.70	0.50
M5	0.80	0.75
M6	1.00	0.75
M8	1.25	0.50,1.00
M10	1.50	1.00,1.25
M12	1.75	1.00,1.25,1.50
M14	2.00	1.50
M16	2.00	1.50
M18	2.50	1.50
M20	2.50	1.50,2.00
M22	2.50	1.50
M24	3.00	1.50,2.00
M27	3.00	1.50,2.00
M30	3.50	1.50,2.00
M33	3.50	2.00
M36	4.00	1.50,2.00
M39	4.00	1.50,2.00
M42	4.50	2.00

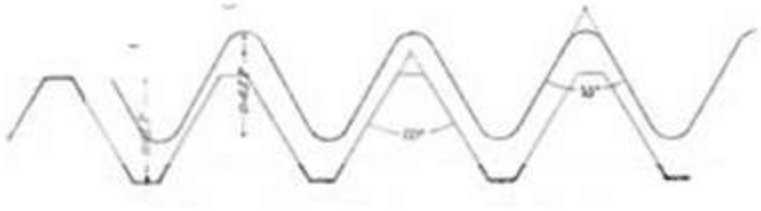
SCREW THREAD MISMATCH



SCREW THREAD MISMATCH



CORRECT THREAD



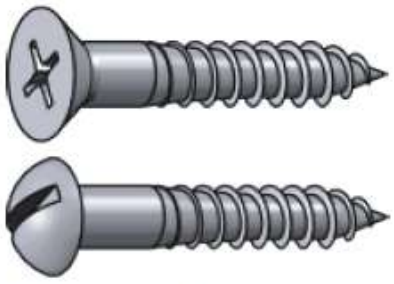
MISMATCHED THREAD

½” WHITWORTH+ ½” UNC

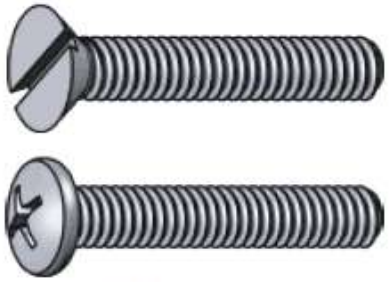
FASTENERS AND LOCKING DEVICES - SCREWS

WOOD SCREWS MACHINE SCREWS SHEET METAL SCREWS

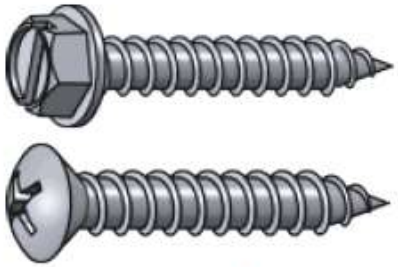
SELF DRILLING SCREWS



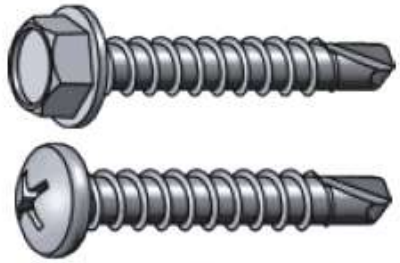
Wood Screws
Screws with a smooth shank and tapered point for use in wood. Abbreviated WS



Machine Screws
Screws with threads for use with a nut or tapped hole. Abbreviated MS



Sheet Metal Screws
Fully threaded screws with a point for use in sheet metal. Abbreviated SMS



Self Drilling SMS
A sheet metal screw with a self drilling point.

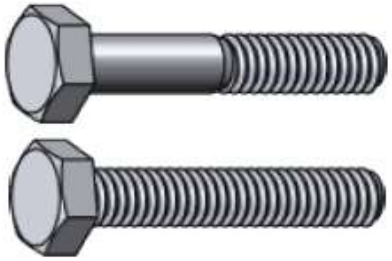
FASTENERS AND LOCKING DEVICES – NUTS & BOLTS

HEXAGONAL BOLTS

CARRIAGE BOLTS

LAG BOLTS

SET SCREW



Hex Bolts
Bolts with a hexagonal head with threads for use with a nut or tapped hole. Abbreviated HHMB or HXBT.

Carriage Bolts
Bolts with a smooth rounded head that has a small square section underneath.

Lag Bolts
Bolts with a wood thread and pointed tip. Abbreviated Lag.

Set Screws
Machine screws with no head for screwing all the way into threaded holes.

ADDITIONAL TYPES OF FIXING

SOCKET SCREW

EYE BOLT

EYE LAG

U - BOLT

Socket Screws
Socket screws, also known as Allen Head, are fastened with a hex Allen wrench.

Eye Bolts
A bolt with a circular ring on the head end. Used for attaching a rope or chain.

Eye Lags
Similar to an eye bolt but with wood threads instead of machine thread.

U-Bolts
Bolts in U shape for attaching to pipe or other round surfaces. Also available with a square bend.

ADDITIONAL TYPES OF FIXING

J - BOLTS

HANGER BOLTS

SHOULDER BOLT

ELEVATOR BOLT

J-Bolts
J shaped bolts are used for tie-downs or as an open eye bolt.

Hanger Bolts
Hanger bolts have wood thread on one end and machine thread on the other end

Shoulder Bolts
Shoulder bolts (also known as stripper bolts) are used to create a pivot point.

Elevator Bolts
Elevator bolts are often used in conveyor systems. They have a large, flat head.

ADDITIONAL TYPES OF FIXING

Sex Bolts

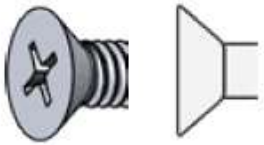
Sex bolts (a.k.a. barrel nuts or Chicago bolts) have a female thread and are used for through bolting applications where a head is desired on both sides of the joint.

Mating Screws

Mating screws have a shoulder that matches the diameter of the sex bolts they are used with.

HEAD STYLES AND DRIVES

FLAT

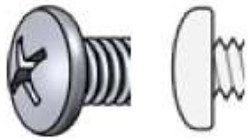


Flat
A countersunk head with a flat top.
Abbreviated FH

OVAL

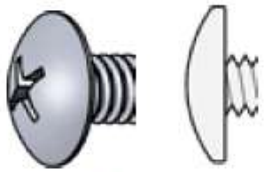
Oval
A countersunk head with a rounded top.
Abbreviated OH or OV

PAN



Pan
A slightly rounded head with short vertical sides.
Abbreviated PN

TRUSS



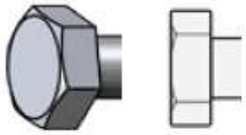
Truss
An extra wide head with a rounded top.

HEAD STYLES AND DRIVES

ROUND

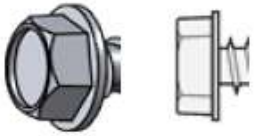
Round
A domed head.
Abbreviated RH

HEX



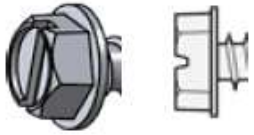
Hex
A hexagonal head
Abbreviated HH or HX

HEX WASHER



Hex Washer
A hex head with built in washer.

SLOTTED HEX WASHER



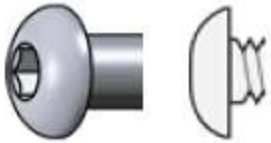
Slotted Hex Washer
A hex head with built in washer and a slot.

HEAD STYLES AND DRIVES

SOCKET CAP

Socket Cap
A small cylindrical head using a socket drive.

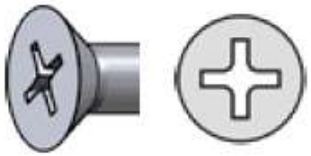
BUTTON



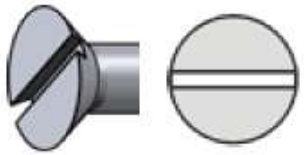
Button
A low-profile rounded head using a socket drive.

HEAD STYLES AND DRIVES

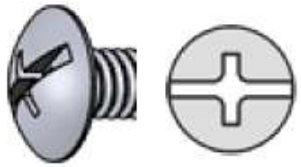
PHILLIPS / FREARSON SLOTTED COMBINATION SOCKET/ HEX/ ALLEN



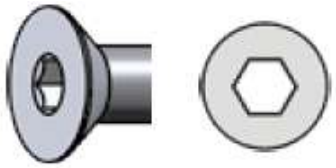
Phillips and Frearson
An X-shaped drive.
Abbreviated PH



Slotted
A slot in the head.
Abbreviated SL



Combination
A combination of slotted and Phillips drives.
Abbreviated combo



Socket, Hex or Allen
A hexagonal hole for use with an Allen wrench.

HEAD STYLES AND DRIVES

ONE WAY

One Way
Installs with a normal slotted driver but can not be removed without special tools.

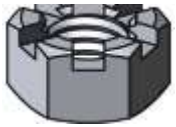
SQUARE

Square
Also known as Robertson drive.
Abbreviated SQ or SD.




NUTS

COUPLING
Coupling nuts are long nuts used to connect pieces of threaded rod or other male threaded fasteners..



SLOTTED
Slotted nuts are used in conjunction with a cotter pin on drilled shank fasteners to prevent loosening.

CASTLE
Castle nuts are similar to slotted nuts but with the slots in a rounded section above the main nut.

WASHER TYPES

FLAT | FENDER | FINISHING/CUP | SPLIT LOCK

Flat
A flat washer, used to distribute load. Available in SAE, USS and other patterns.

Fender
An oversize flat washer used to further distribute load especially on soft materials.

Finishing
A washer used to obtain a 'finished' look. Usually used with oval head screws.

Split Lock
The most common style of washer used to prevent nuts and bolts from backing out.

WASHERS ARE ALL FRICTION LOCKING DEVICES!

WASHER TYPES

EXTERNAL TOOTH LOCK

External Tooth Lock
A washer with external 'teeth'. Used to prevent nuts and bolts from backing out.

INTERNAL TOOTH LOCK

Internal Tooth Lock
A washer with internal 'teeth'. Used to prevent nuts and bolts from backing out.

SQUARE

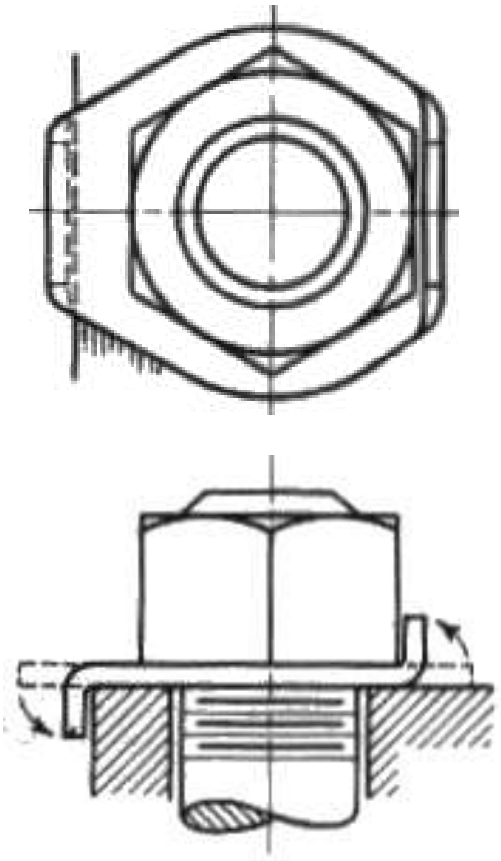
Square
A square shaped washer.

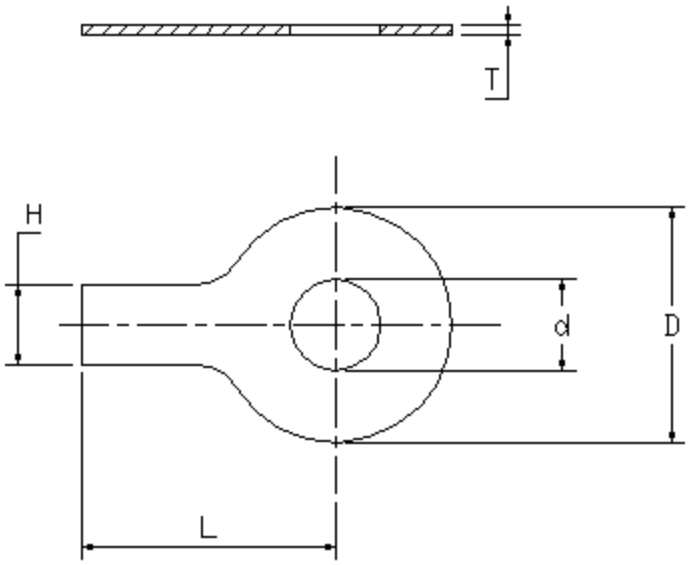
DOCK

Dock
Dock washers have a larger outside diameter and are thicker than standard.

WASHERS ARE ALL FRICTION LOCKING DEVICES!

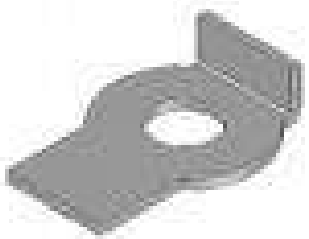
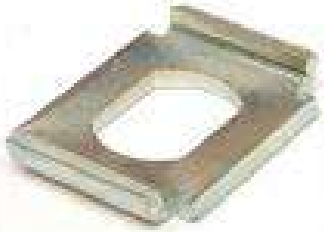
USING A TAB WASHER





WASHER BEGINS LIFE FLAT AND IS BENT INTO POSITION

TAB WASHER FORMS

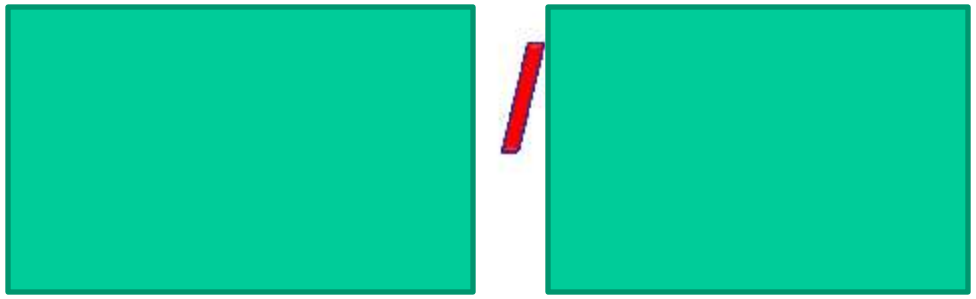


TAB WASHERS ARE ALL POSITIVE LOCKING DEVICES!

THREE STEPS TO THREAD IDENTIFICATION

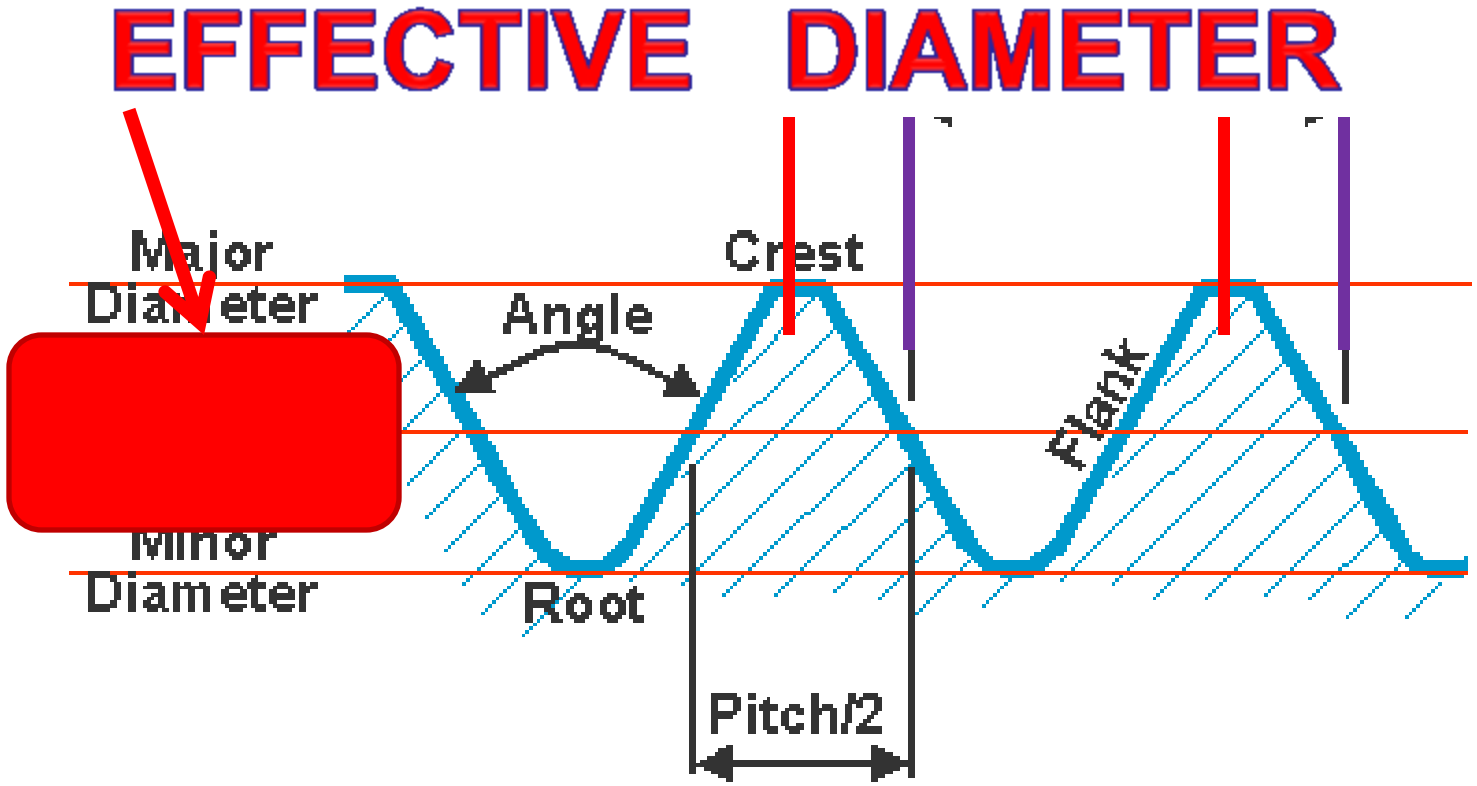
STEP 01

MEASURE THE

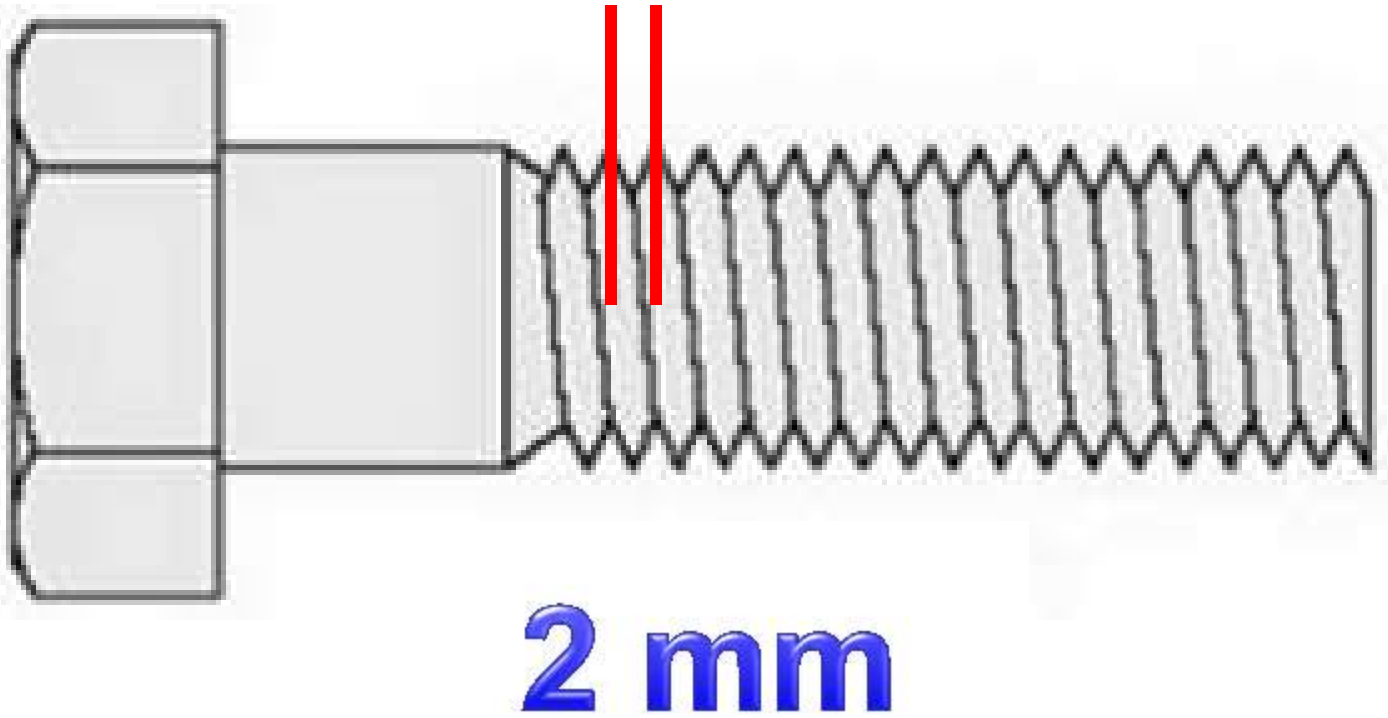


MEASURING THE PITCH

The pitch is the distance between thread peaks, or a similar position from one thread to the adjacent thread.



MEASURING THE PITCH

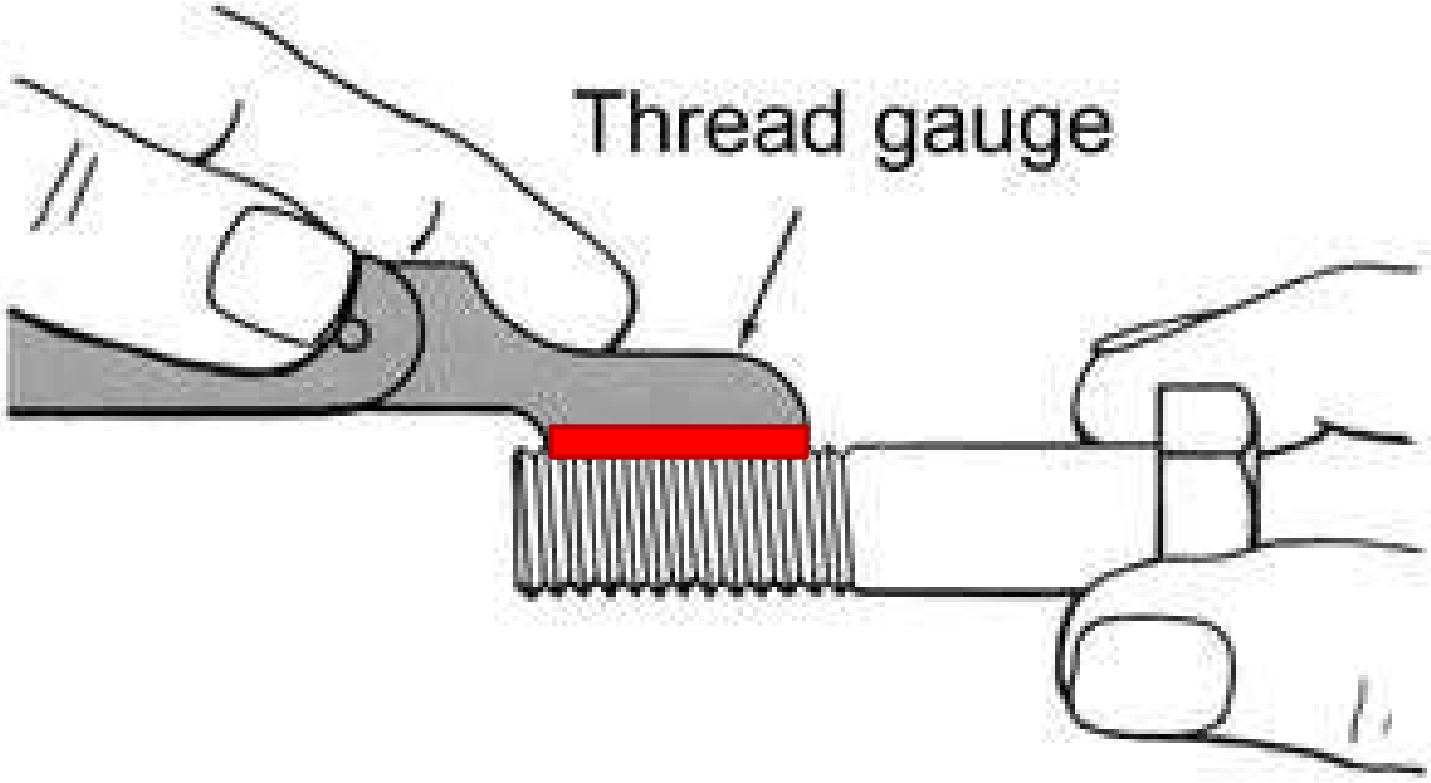


MEASURING THE PITCH

NOMINAL DIA.		THREAD PITCH	NOMINAL DIA.		THREAD PITCH
MM	INCHES	MM	MM	INCHES	MM
1.6	.0630	0.35	20	.7874	2.5
2	.0787	0.40	24	.9449	3.0
2.5	.0984	0.45	30	1.1811	3.5
3	.1181	0.50	36	1.4173	4.0
3.5	.1378	0.60	42	1.6535	4.5
4	.1575	0.70	48	1.8898	5.0
5	.1969	0.80	56	2.2047	5.5
6.3	.2480	1.00		2.5197	
8	.3150	1.25		2.8346	
10	.3937	1.50		3.1496	
12	.4724	1.75		3.5433	
				3.9370	

Measuring the TPI

Place the thread gauge onto the threads so it is flat, no light showing underneath.



Measuring the TPI

Refer the TPI to a thread chart

Diameter (Inches)	Threads Per Inch (TPI)			
	BSW	UNC	UNF	BSF
1/8	40	40		
5/32	32	32		
3/16	24	24	32	32
1/4	20	20	28	26
5/16	18	18	24	22
3/8	16	16	24	20
7/16	14	14	20	18
1/2	12	13	20	16
5/8	11	11	18	14
3/4	10	10	16	12
7/8	9	9	14	11
1	8	8	12	10
1-1/8	7	7	12	9
1-1/4	7	7	12	9
1-1/2	6	6	12	8

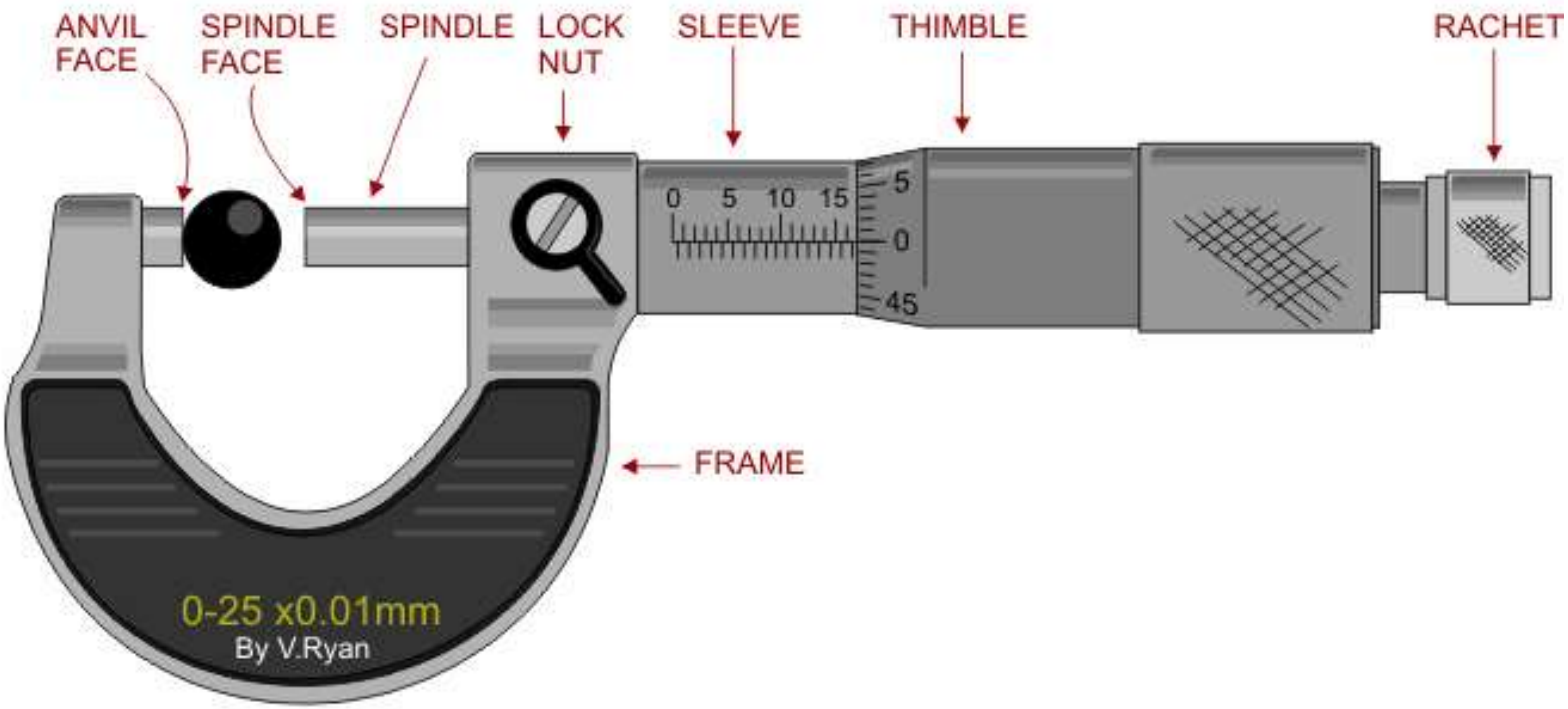
THREE STEPS TO THREAD IDENTIFICATION

STEP 02

MEASURE THE DIAMETER –
To next full size up!

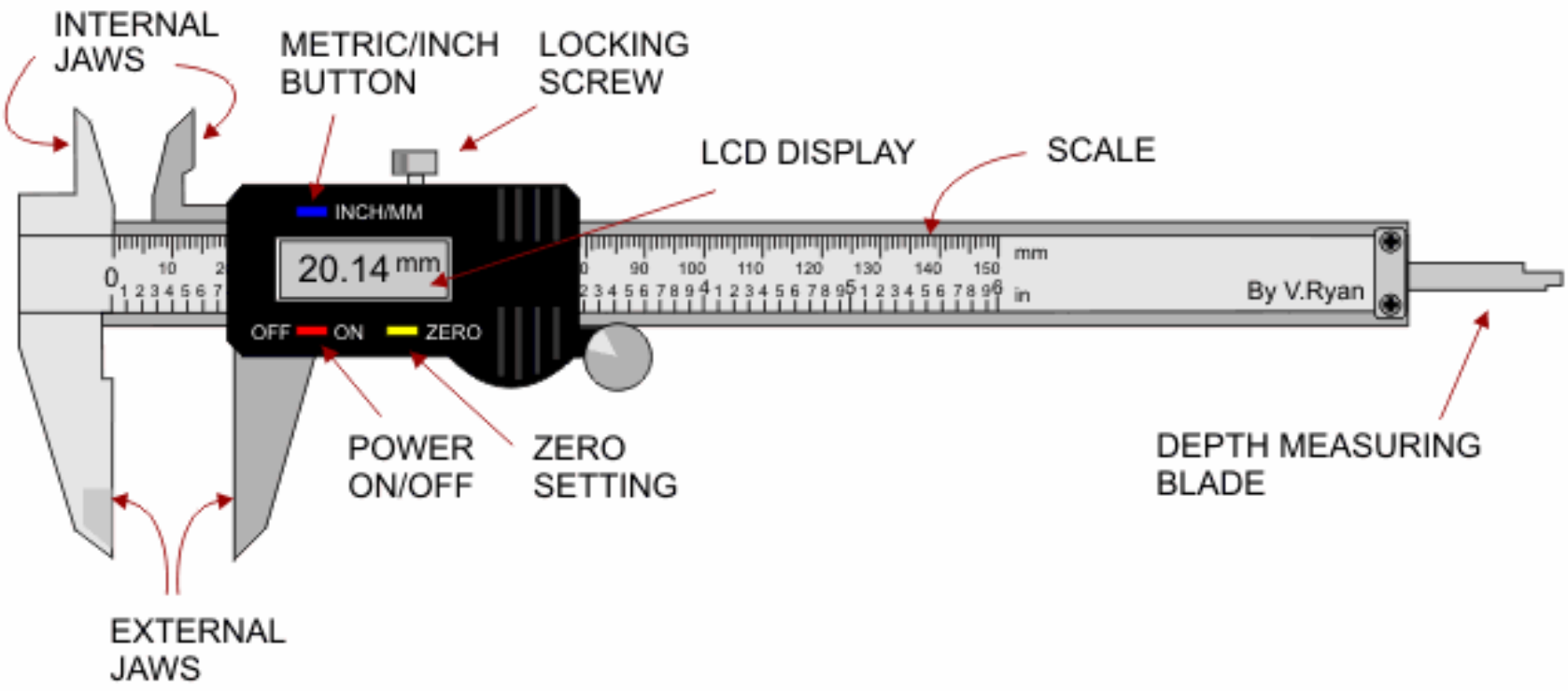
Measure the diameter

Use a micrometer.....



Measure the diameter

Or use a vernier, so long as you understand how to read the measurement and you select the correct micrometer or vernier scale – mm / inches!



Measure the diameter

General

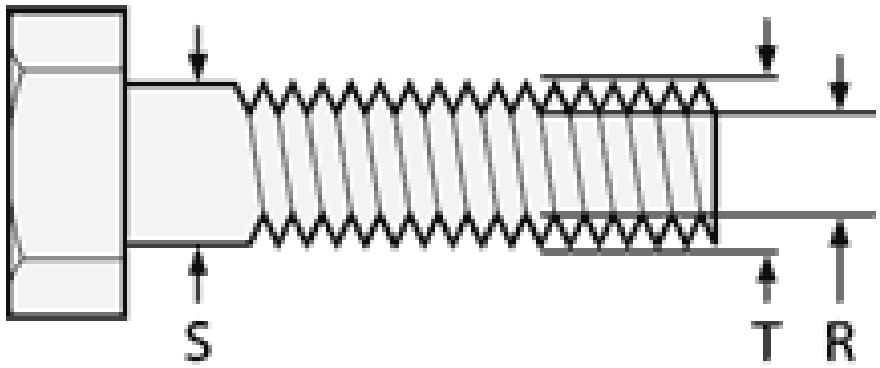
There are several different locations on a fastener where one can measure the diameter.

The most commonly used diameters are:

Thread Diameter (T). Also called major diameter.

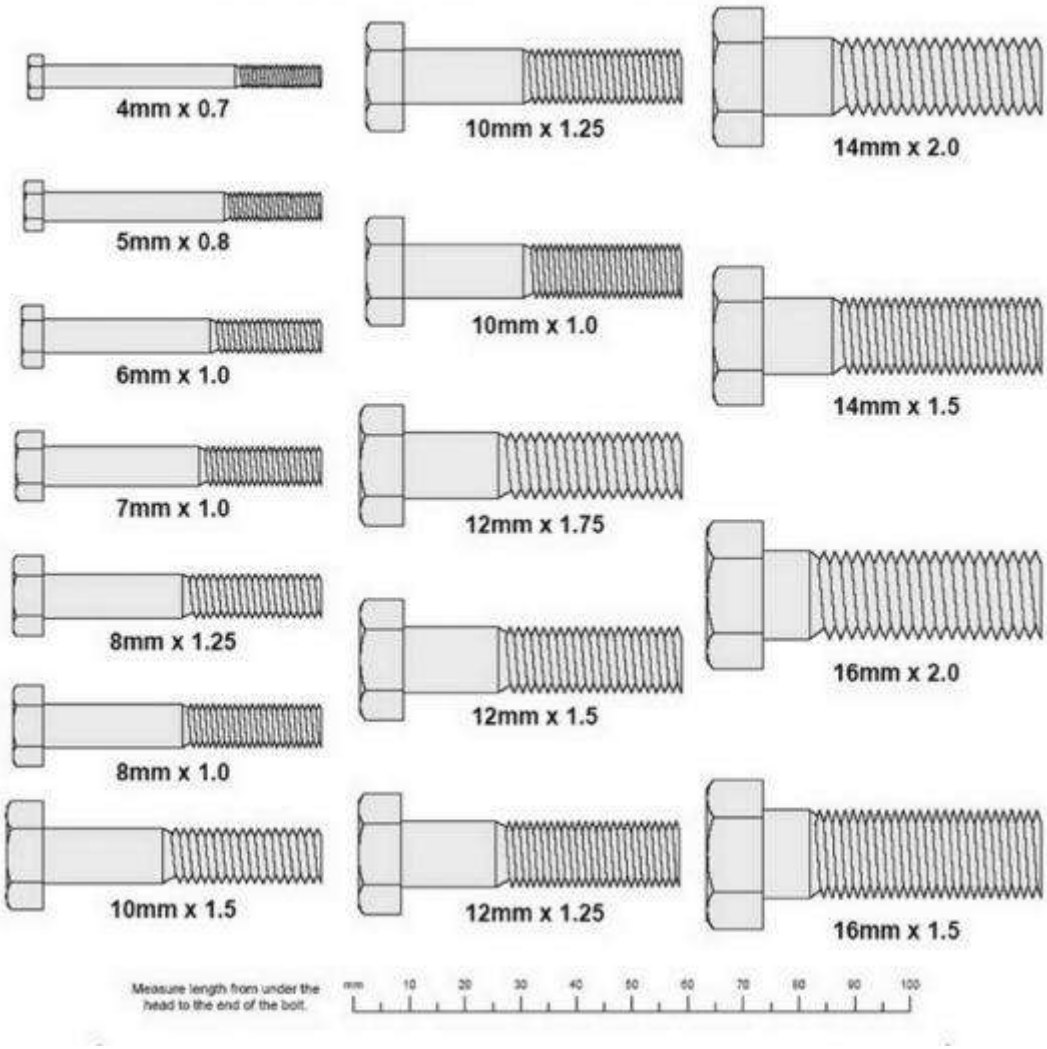
Shank Diameter (S). Also called the grip length.

Root Diameter (R). Also called minor diameter.



STANDARD HEX BOLT SIZES AND THREAD PITCHES

(Note: Head sizes may differ from what is shows due to differences between metric standards)

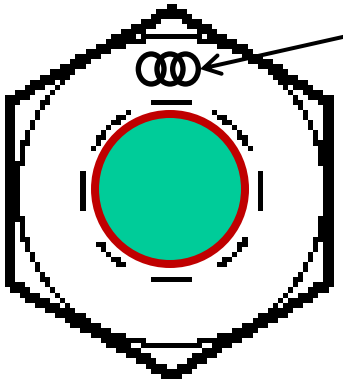


THREE STEPS TO THREAD IDENTIFICATION

STEP 03

NOTE ANY IDENTIFYING MARKS

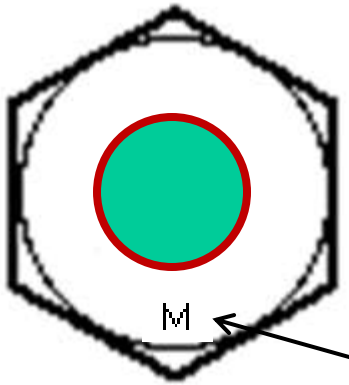
IDENTIFYING MARKS - BOLTS



CIRCULAR RECESSED BOLTS

IMPERIAL / UNIFIED THREAD

IDENTIFYING MARKS - NUTS

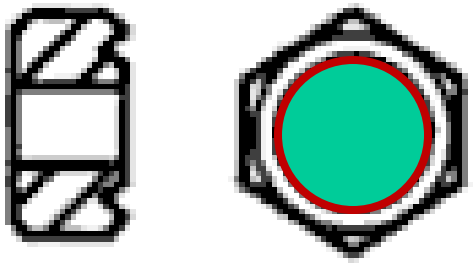


FLAT HEAD BOLTS
– NO RECESS

THE LETTER “M” IS EMBOSSED ONTO THE SURFACE

METRIC THREAD

IDENTIFYING MARKS - NUTS

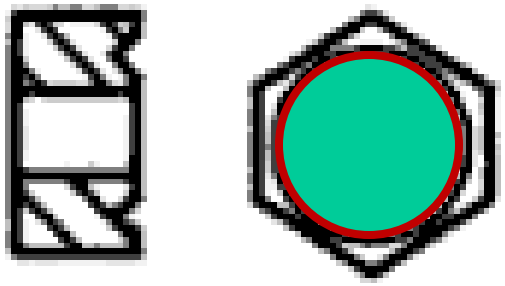


CIRCULAR RECESSED NUTS

PRECISION –
ON THE NONE BEARING FACE

IMPERIAL / UNIFIED THREAD

IDENTIFYING MARKS - NUTS



CIRCULAR RECESSED
NUTS

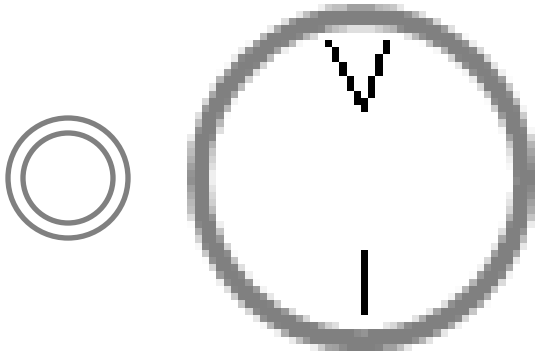
PRESSED–
ON THE NONE BEARING FACE

IMPERIAL / UNIFIED THREAD

IDENTIFYING MARKS - NUTS

THREE TOUCHING RINGS FOR UNIFIED THREAD

IDENTIFYING MARKS - STUDS



A “VEE” AND A LINE BELOW FOR UNIFIED THREAD

IDENTIFYING MARKS – STUD HOLES

THREE TOUCHING RINGS FOR UNIFIED THREAD, STAMPED INTO THE SURFACE

Identification Markings

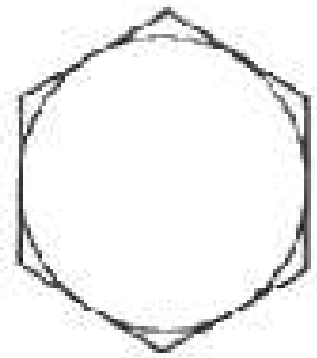
Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered



Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
SAE Grade 1	1/4 to 1 1/2	33	60	
SAE Grade 2	1/4 thru 3/4	55	74	1
	over 3/4 thru 1-1/2	33	60	
ASTM A307	1/4 to 1 1/2	33	60	3
SAE Grade 4	1/4 to 1 1/2	65	115	2,a

Identification Markings

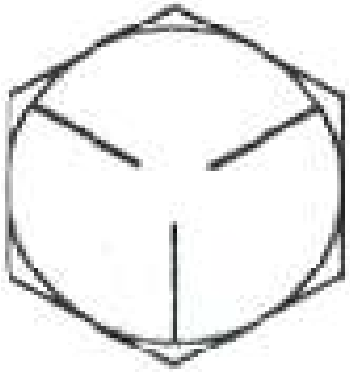
Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered



Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
SAE - Grade 5	1/4 thru 1	85	120	
ASTM A449 - Type 1	1 1/8 thru 1-1/2	74	105	2, b
	1 3/4 thru 3	55	90	

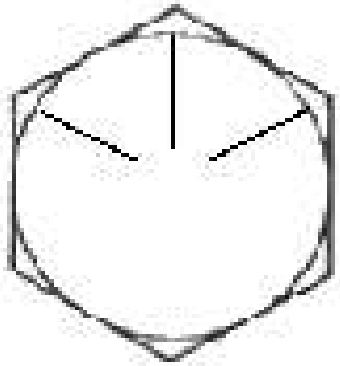
Identification Markings

Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn
b - quenched and tempered



Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
SAE - Grade 5.2	1/4 thru 1	85	120	4, b

Identification Markings

Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered

Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
ASTM A325 - Type 1	1/2 thru 1	85	120	2, b
	1 1/8 to 1-1/2	74	105	

Identification Markings

Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered

Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
ASTM A325 - Type 2	1/2 thru 1	85	120	4,b
	1 1/8 to 1-1/2	74	105	

Identification Markings

Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered

Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
ASTM A325 - Type 3	1/2 thru 1	85	120	5,b
	1 1/8 to 1-1/2	74	105	

Identification Markings

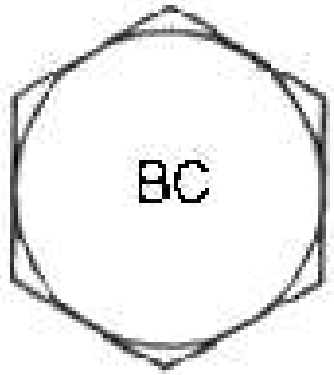
Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered



Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
ASTM A354 - Grade BC	1/4 thru 2-1/2	105	125	5,b
	2-3/4 thru 4	95	115	

Identification Markings

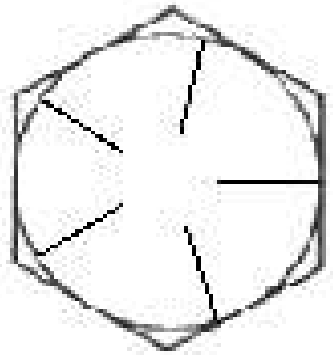
Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered



Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
SAE Grade 7	1/4 to 1 1/2	105	133	7,b

Identification Markings

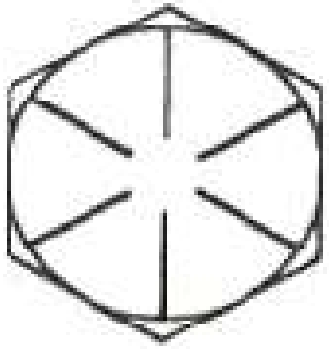
Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered



Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
SAE - Grade 8	1/4 thru 1-1/2	120	150	7,b
ASTM A354 - Grade BD	1/4 thru 1-1/2	120	150	6,b

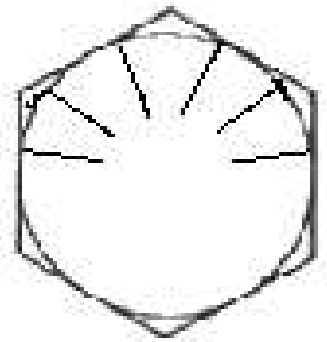
Identification Markings

Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn
b - quenched and tempered



Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
SAE - Grade 8.2	1/4 thru 1	120	150	4,b

Identification Markings

Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

a - cold drawn

b - quenched and tempered

Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
ASTM A490 - Type 1	½ to1-1/2	120	150	6,b

Identification Markings

Material Notes

1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment -

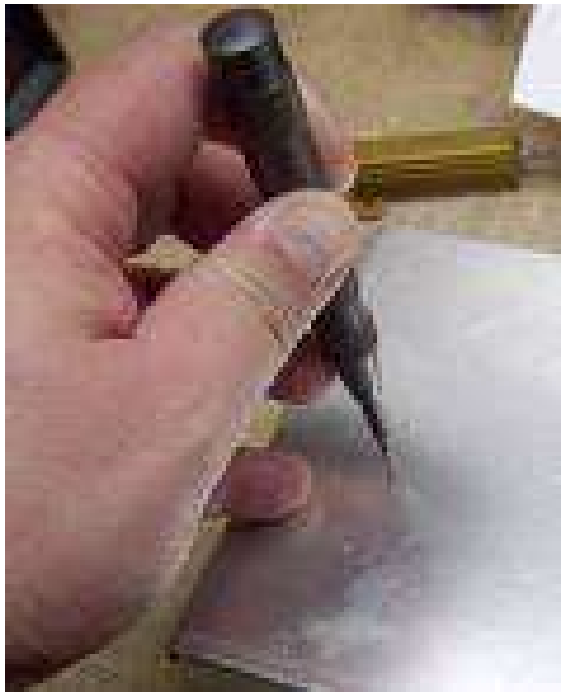
a - cold drawn

b - quenched and tempered

Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
ASTM A490 - Type 3	1/2 thru 1-1/2	120	150	5,b

TAPPING A NEW HOLE

Step 1
Mark the location for the threaded hole with the ruler and scribe.
With the center punch and hammer, center mark the hole location.



TAPPING A NEW HOLE

Step 2

Refer to the drill and tap chart to determine the correct size of the drill bit required for the tap. If the hole is larger than 1/2 an inch, you will need to drill a pilot hole before you can drill the final hole size. Do not use a pilot hole that is larger than 40 percent of the diameter of the final hole size. A larger pilot hole will cause the final drill bit to bind and break, resulting in a poor final hole quality or injury to the person drilling the hole.

Thread Size	Tap Drill Size (in.)	.....	Thread Size	Tap Drill Size(mm)
9/16-18	33/64		M36 x 4	32.00
5/8-11	17/32		M39 x 4	35.00
5/8-18	37/64		M42 x 4.5	37.50
3/4-10	21/32		M45 x 4.5	40.50
3/4-16	11/16		M48 x 5	43.00
7/8-9	49/64		M52 x 5	47.00
7/8-14	13/16		M56 x 5.5	50.50
1"-8	7/8		M60 x 5.5	54.50
1"-14	15/18		M64 x 6	58.00
			M68 x 6	62.00

DRILL TO TAPPING CHART

Tap Drill Chart			
To Tap for this Size Bolt or Screw	Drill this Size Hole Drill Size (Best)	To Tap for this Size Bolt or Screw	Drill this Size Hole Drill Size (Best)
0-80 NF	56	1/4-20 NS	10
1-56 NS	54	1/4-20 NC	7
1-64 NC	53	1/4-24 NS	4
1-72 NF	53	1/4-28 NF	3
2-56 NC	50	1/32-32 NEF	7/32
2-64 NF	50	5/16-18 NC	F
3-48 NC	47	5/16-24 NF	I
3-56 NF	45	5/16-32 NEF	9/32
4-36 NS	44	3/8-16 NC	5/16
4-40 NC	43	3/8-24 NF	21/64
4-48 NF	42	7/16-14 NC	3/8
5-40 NC	38	7/16-20 NF	25/64
5-44 NF	37	1/2-13 NC	27/64
6-32 NC	35	1/2-20 NF	29/64
6-36 NF	34	1/2-24 NS	29/64
6-40 NF	33	9/16-12 NC	31/64
8-32 NC	29	9/16-18 NF	33/64
8-36 NF	29	5/8-11 NC	17/32
8-40 NS	28	5/8-18 NF	37/64
3/16-24 NS	26	3/4-10 NC	21/32
3/16-32 NS	20	3/4-16 NF	11/16
10-24 NC	25	7/8-9 NC	49/64
10-30 NS	22	7/8-14 NF	13/16
10-32 NF	21	1-8 NC	7/8
12-24 NC	16	1-12 NF	15/16
12-28 NF	14	1-14 NS	15/16
12-32 NEF	13	1/8-27 NPT (PIPE)	21/64
		1/4-18 NPT (PIPE)	7/16

TAPPING A NEW HOLE

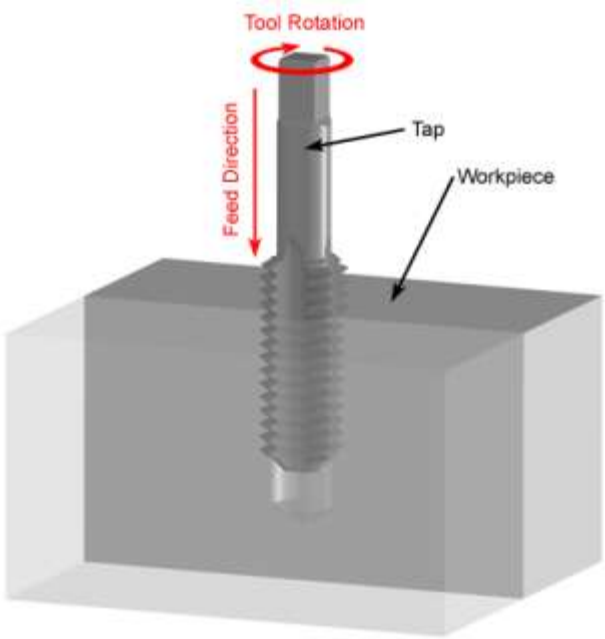
Step 3
Insert the drill bit into the drill. Apply cutting fluid to the center mark that you placed on the metal and onto the drill bit. Drill the hole through the metal, using steady pressure. Apply additional cutting fluid as necessary to keep the drill bit cool. If you are drilling into stainless steel, pump the trigger to keep the drill bit moving slow. Increased drilling speeds will result in your drill bit heating up and losing its cutting edge. With stainless steel, slower is always better.

TAPPING A NEW HOLE

Step 4
Clean the shavings from around the drilled area with a clean rag. Insert the proper tap into the tee handle. A drill can be used to run the tap through the hole, but it is not recommended as even slight pressure other than straight down will break the fragile carbide tap.

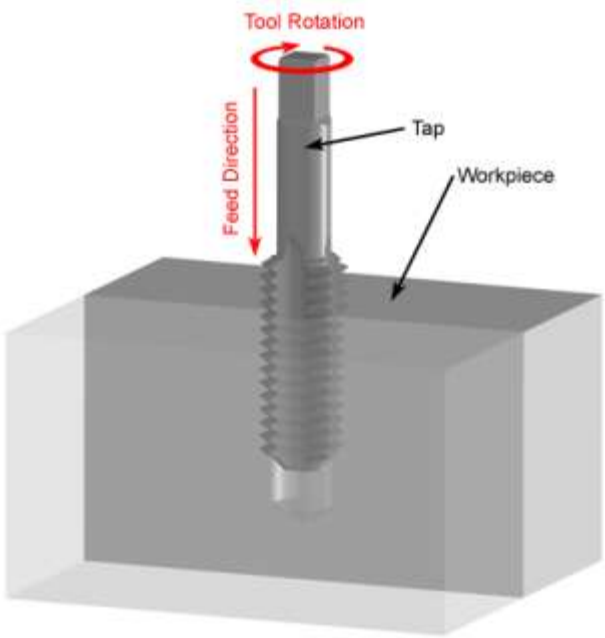
TAPPING A NEW HOLE

Step 5
Liberally coat the tap with cutting and tapping fluid. With the tap aligned straight with the hole, turn the tee handle clockwise to start tapping the hole. If you are tapping for left-handed threads, you need to turn the tee handle counter-clockwise for the tap to start in the hole.



TAPPING A NEW HOLE

Step 6
Eliminate tap binding by turning the tee handle backwards 1/4 of a turn after each revolution of the tee handle. The 1/4 turn back will remove filing build-up from the front edge of the tap. Apply tapping fluid to the tap before continuing the tap into the hole.



TAPPING A NEW HOLE

Step 7
Reverse the tap to remove it from the threaded hole. Remove the burr from the hole. Test the threads with the correct size bolt to ensure that the bolt threads correctly.

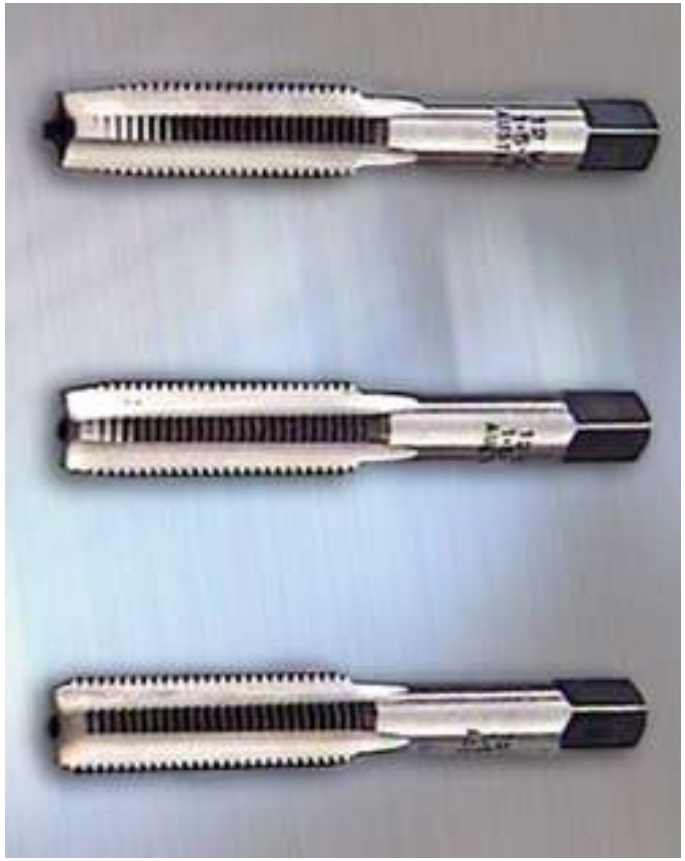
TAPPING A NEW HOLE

The correct order of using the tap and wrench to cut a new thread is :-

S = STARTING TAP

I = INTERMEDIATE TAP

F = FINISHING TAP



TAPPING A NEW HOLE

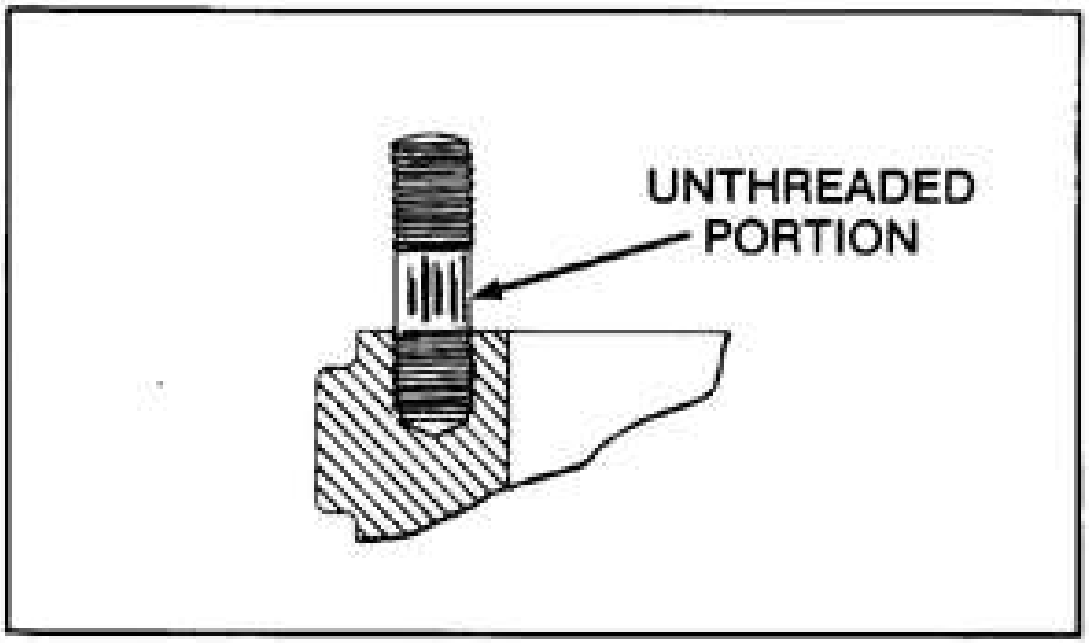
The correct order of using the tap and wrench to cut a new thread is :-

T I P

P = PLUGGING TAP

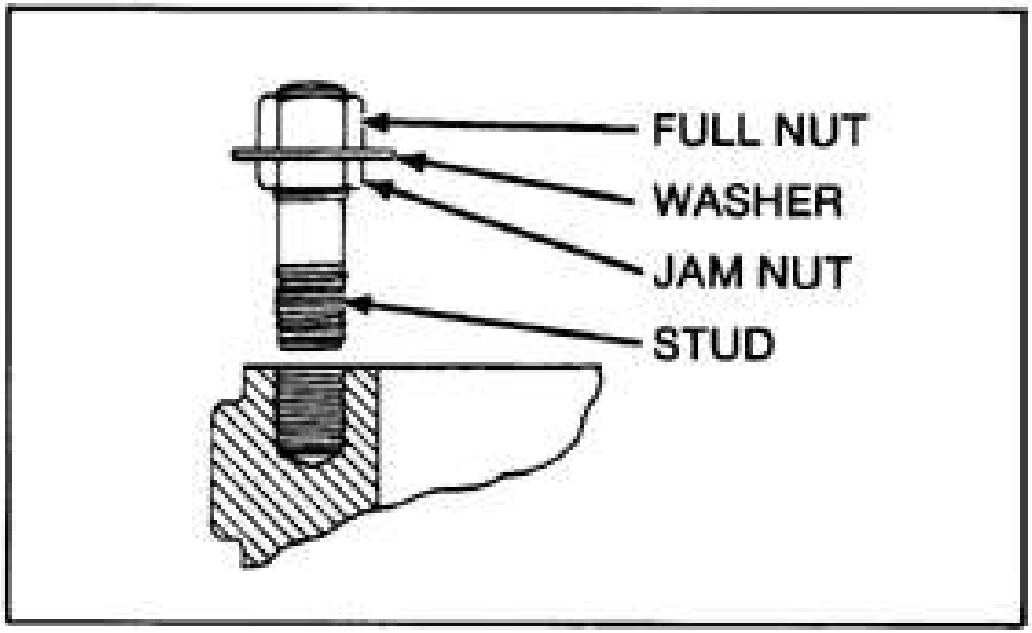
INSERTING A STUD

All studs have an unthreaded portion between the two threaded ends.
Do NOT install studs using a pipe wrench on the unthreaded portion of the stud.
Aside from possible damage to the threads, the marks or notches (Fig. 1) made by the pipe wrench create stress riser points in the stud.



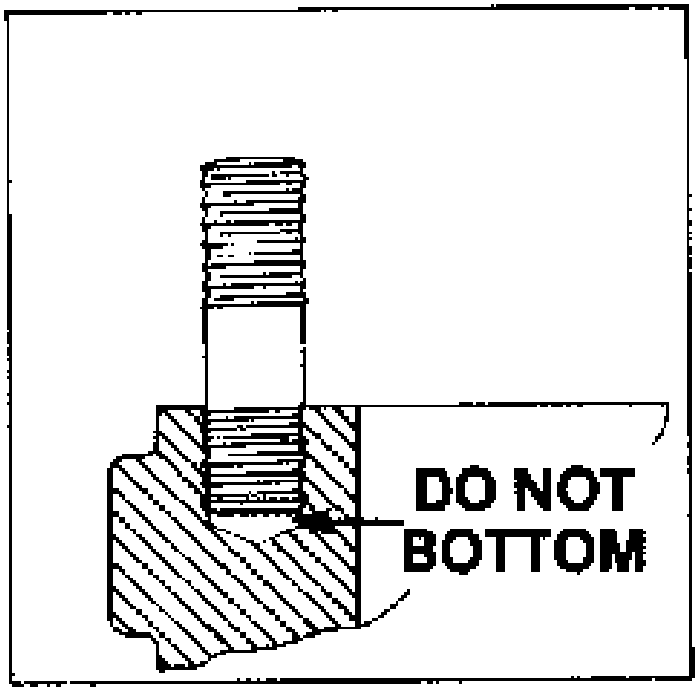
INSERTING A STUD

The accepted method for stud installation is as follows: (1) First thread Lock/Jam Nut into stud. (2) Place flat washer on top of Jam Nut. (3) Thread Full Nut onto stud over washer. (Assembly shown in Fig. 2) After assembly, stud may be driven into tapped hole In the casting using either impact wrench or hand wrench. The washer prevents turning of the nuts and reduces thread stresses.

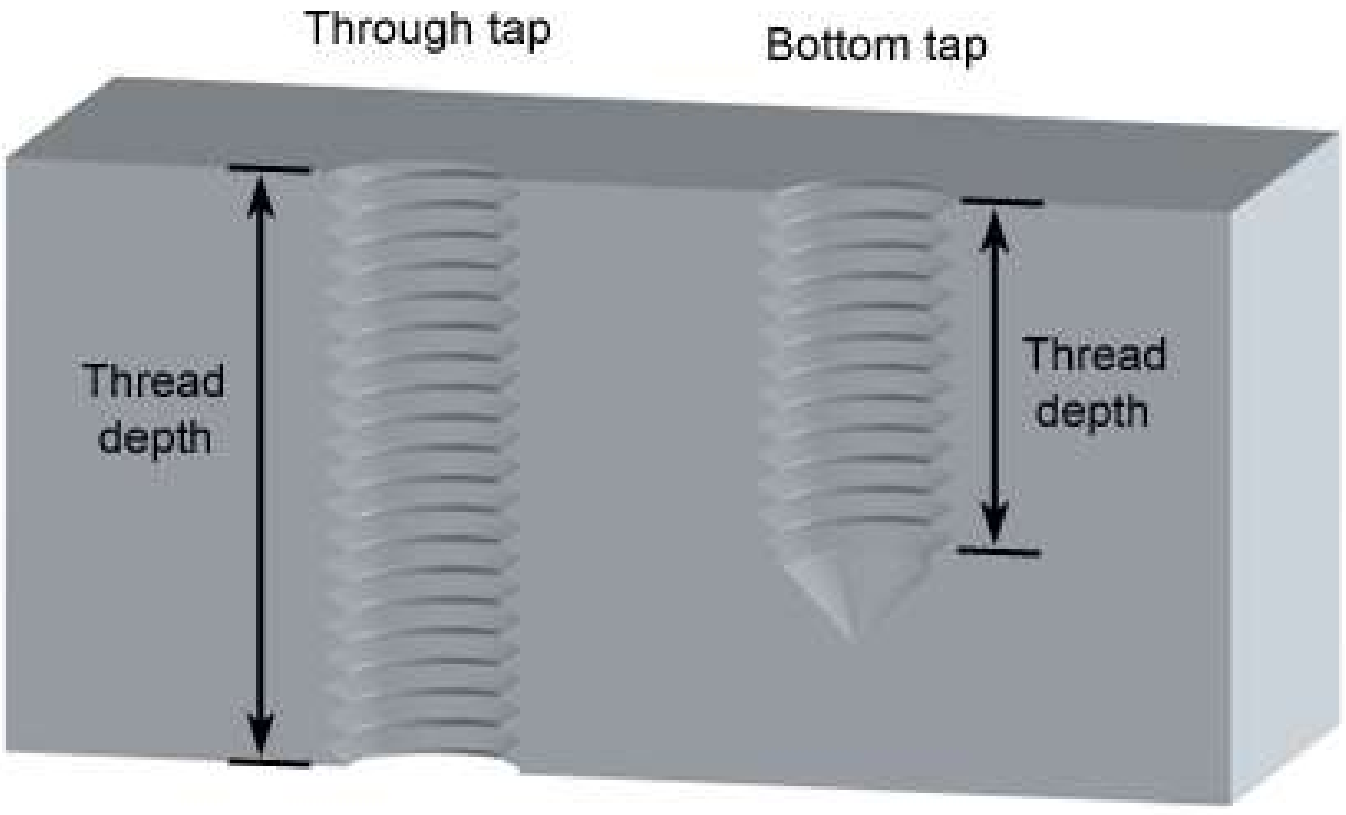


INSERTING A STUD

When installing new studs, care must be taken to assure that the stud Is not over-inserted. NEVER!! insert a stud into a tapped hole to the extent that it bottoms-out. If the stud is bottomed, the thread stresses are mislocated and the probability of stud failure is greatly increased.



TAPPED HOLE OR STRAIGHT THROUGH

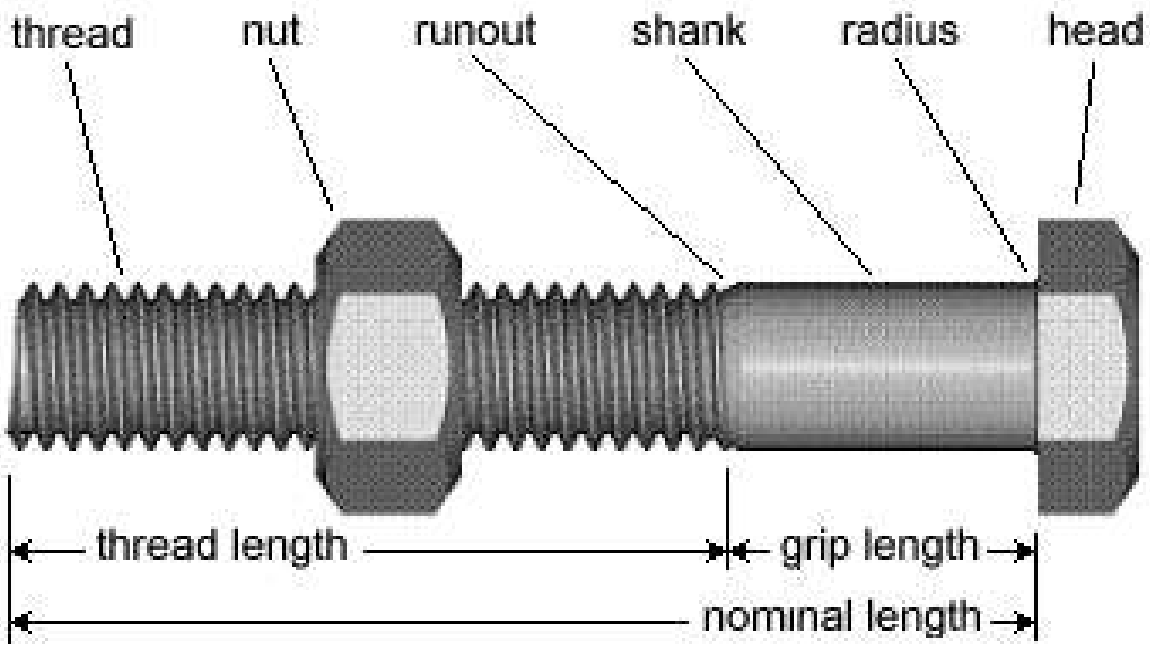


ANTI-FRICTION COATING

AF coatings are dry lubricants consisting of suspensions of solid lubricants, such as graphite, PTFE or molybdenum disulphide of small particle size in a binder. Such coatings can be applied to fastener threads to replace metallic coatings such as zinc and cadmium and offer maintenance free permanent lubrication. By careful selection of the lubricants, AF coatings can be designed to meet specific applications. The coatings are permanently bonded to the metal surface and provide a lubricating film preventing direct metal to metal contact.

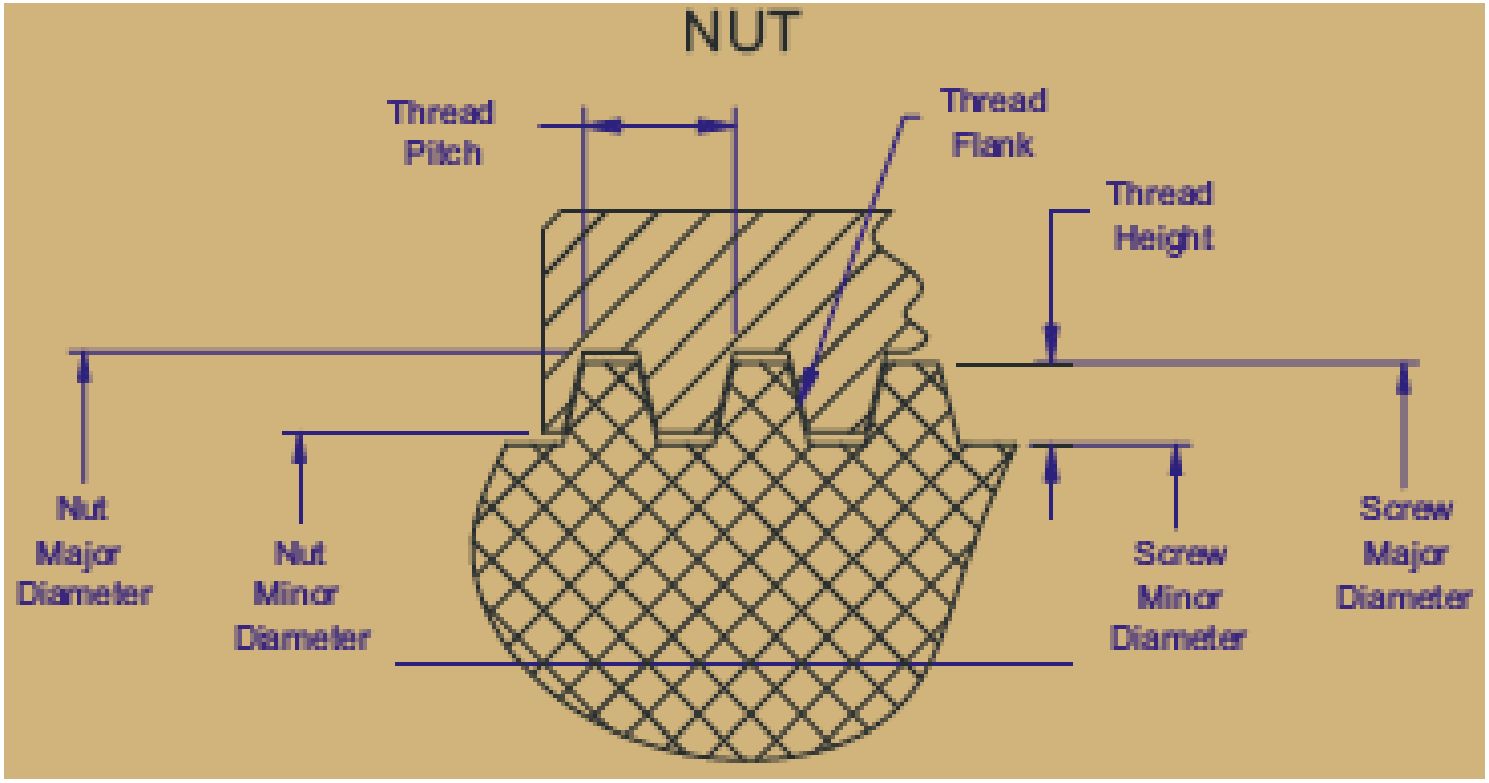
BOLT

A bolt is the term used for a threaded fastener, with a head, designed to be used in conjunction with a nut.



BOLT – ROOT DIAMETER

ACME THREAD



ANY QUESTIONS