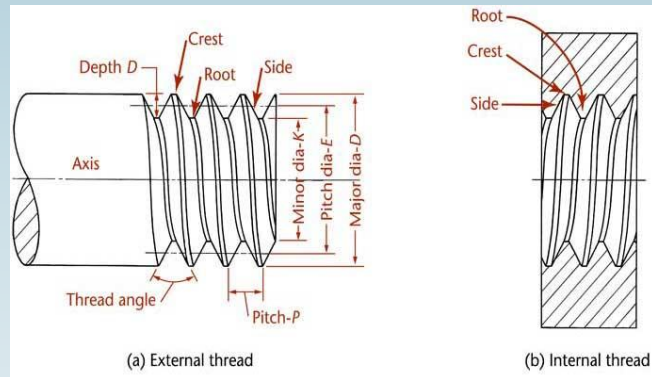


THREADS, FASTENERS, AND SPRINGS

Understanding Threads and Fasteners

- There are three basic applications for screw threads:
 - To hold parts together
 - To provide for adjustment between parts
 - To transmit power

Screw Thread Terms



Screw Thread Forms

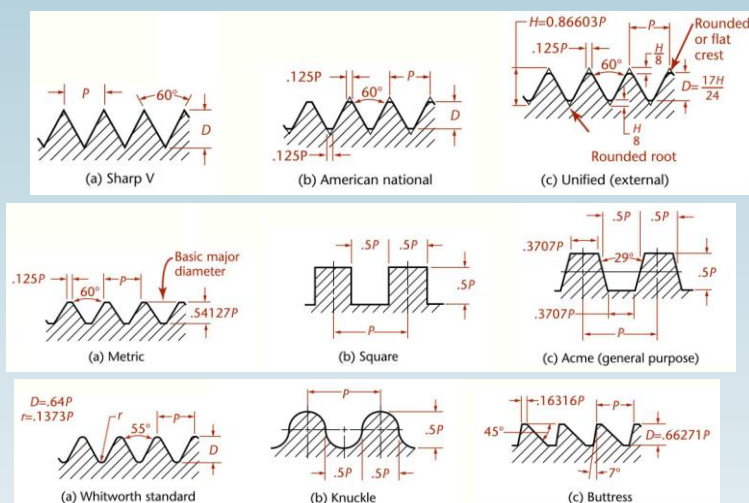
- Typical thread forms include:
 - Sharp-V thread (60 degrees)
 - American national thread
 - Unified thread
 - Unified extra fine thread series
 - Metric thread
 - Square thread
 - Acme thread

Screw Thread Forms

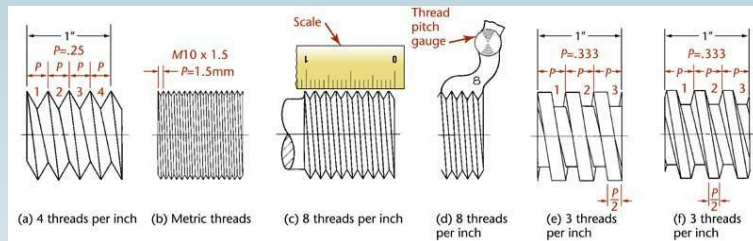
Typical thread forms (cont.)

- Standard worm thread
- Whitworth thread
- Knuckle thread
- Buttress thread

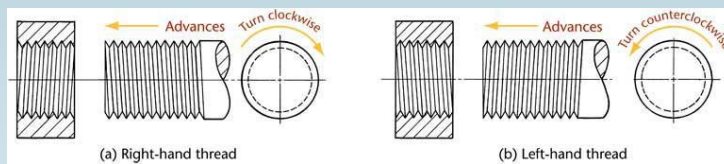
Screw Thread Forms



Thread Pitch



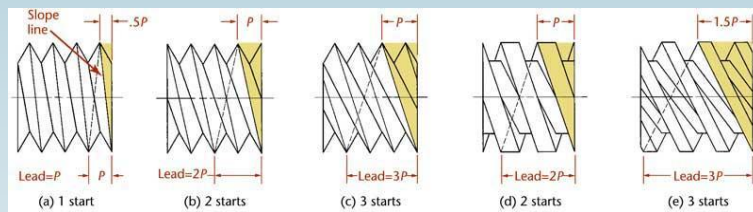
Right-hand and Left-hand Threads



Single and Multiple Threads

- Single threads are composed of one ridge and the lead is equal to the pitch
- Multiple threads are composed of two or more ridges running side by side

Single and Multiple Threads



Thread Fits

- ◎ ANSI has established 3 classes of fit:
 - Class 1 – when clearance between mating parts is essential
 - Class 2 – high quality for the bulk of interchangeable screw thread work
 - Class 3 – exceptionally high quality recommended only when high cost of precision is warranted

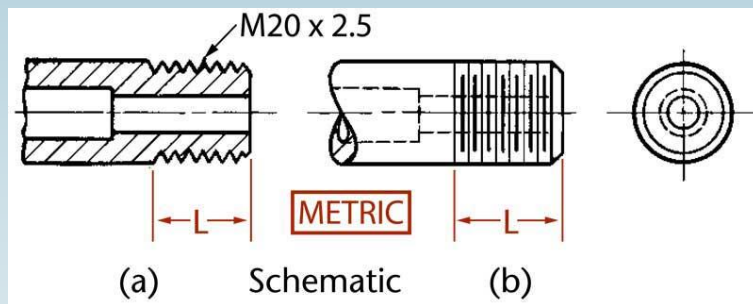
Thread Fits

- ◎ Some specialized metric thread applications are specified by:
 - Tolerance grade
 - Tolerance positions
 - Class
 - Length of engagement

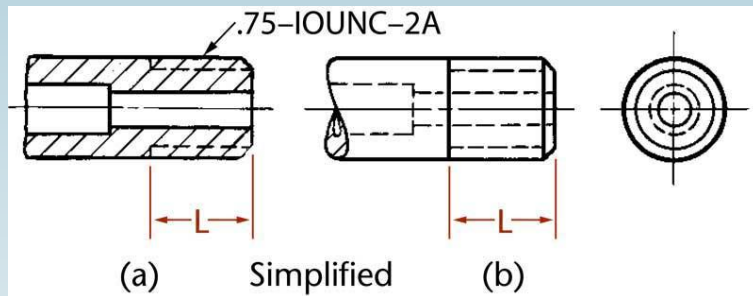
Methods for Drawing Thread

- ⦿ There are three methods of representing screw threads on drawings:
 - Schematic
 - Simplified
 - Detailed

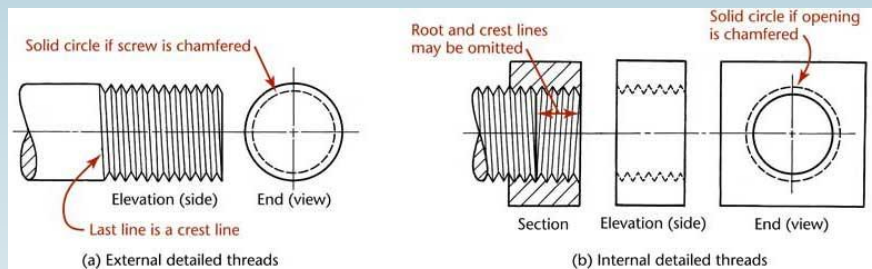
Methods for Drawing Thread



Methods for Drawing Thread



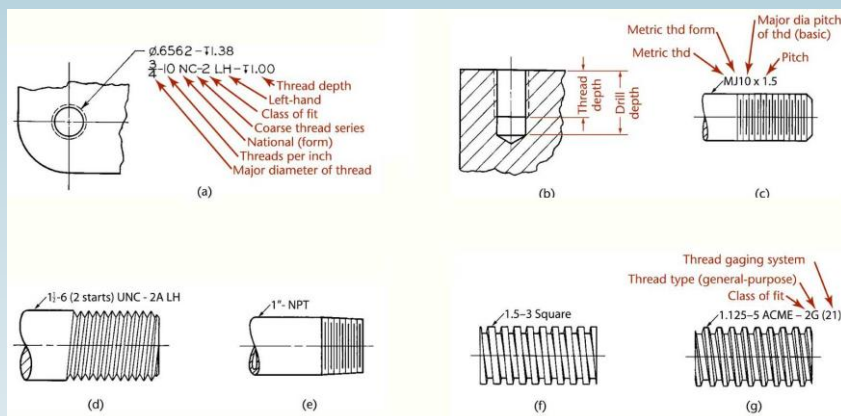
Methods for Drawing Thread



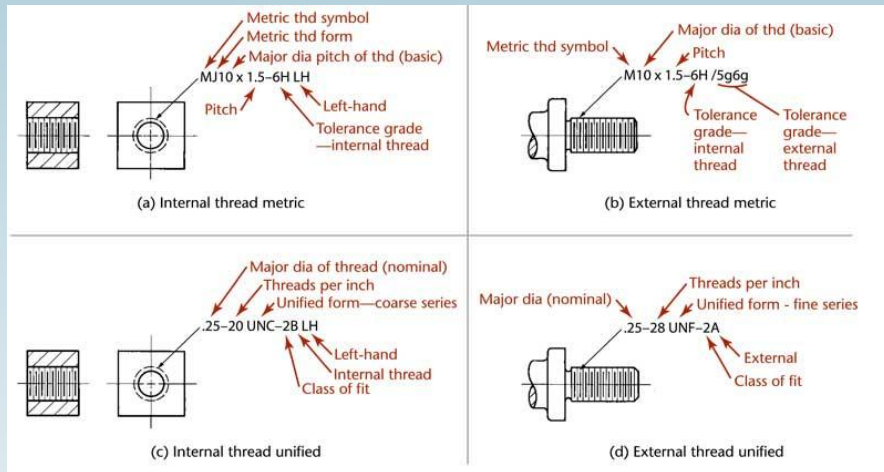
Thread Notes

- ASME/ANSI Y 14.6-2001 “Screw Thread Representations” is a standard for representing, specifying, and dimensioning screw threads on drawings
 - These same notes or symbols are used in correspondence, in records, and in specifications for parts, taps, dies, tools, and gages

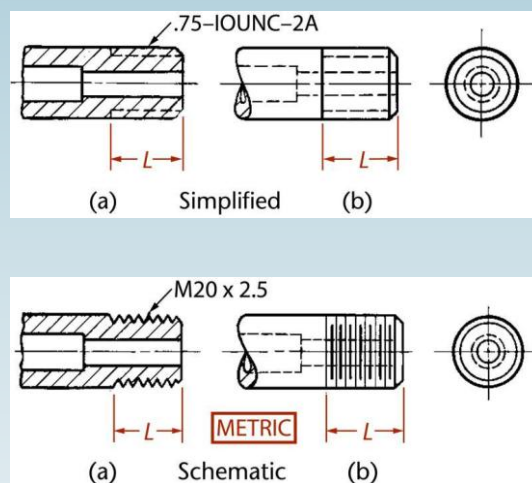
Thread Notes



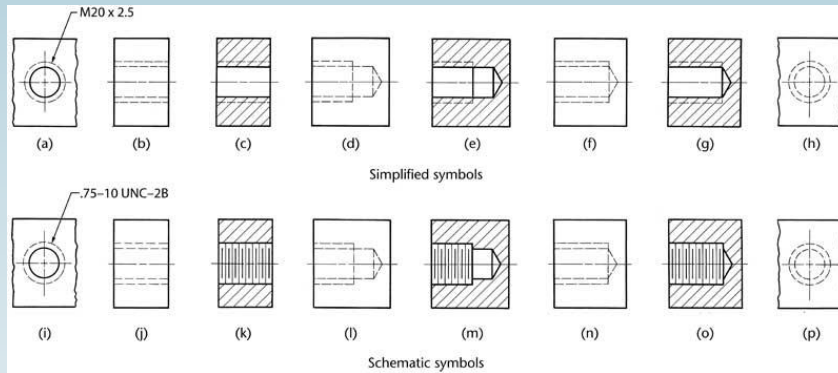
Thread Notes



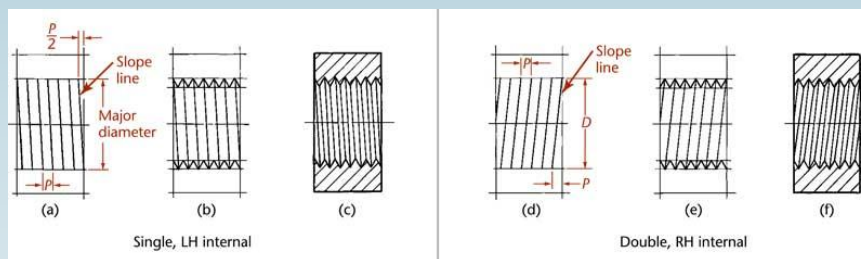
External Thread Symbols



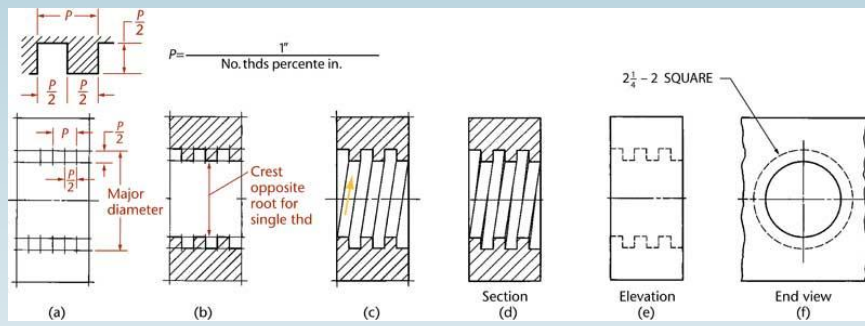
Internal Thread Symbols



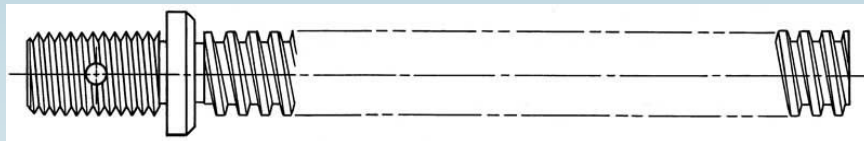
Detailed Representation



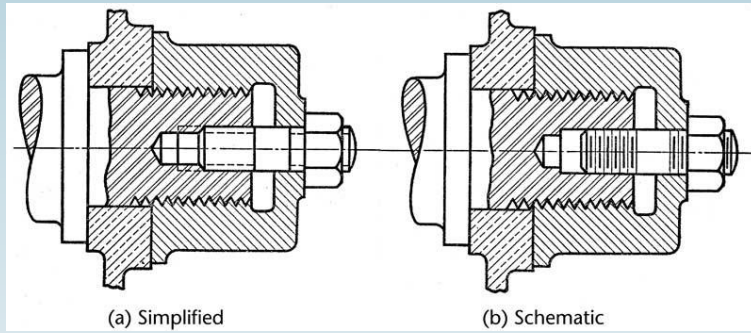
Detailed Representation



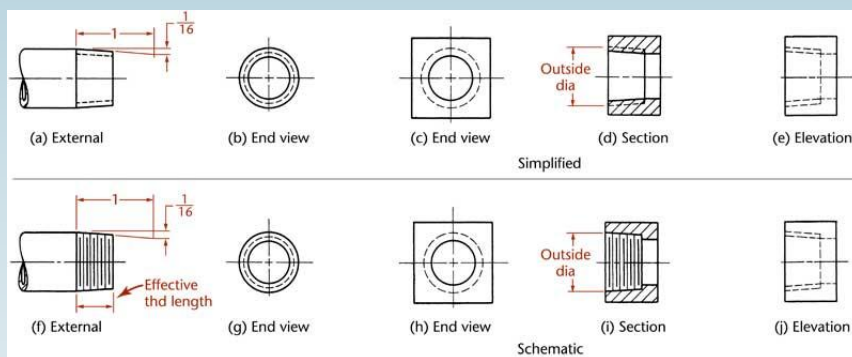
Use of Phantom Lines



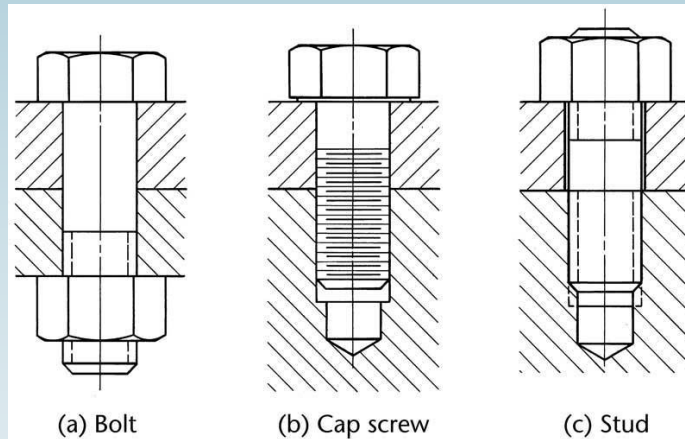
Threads in Assembly



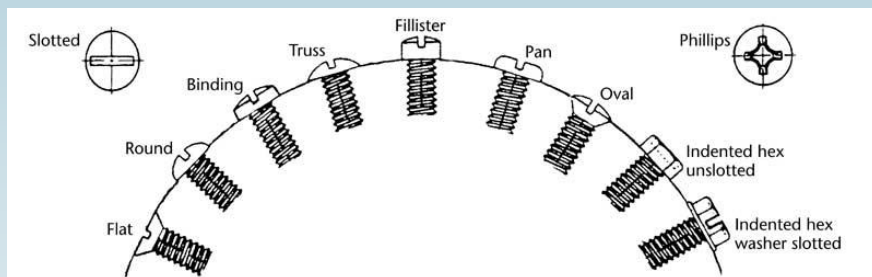
Pipe Thread Representation



Bolts, Studs, and Screws



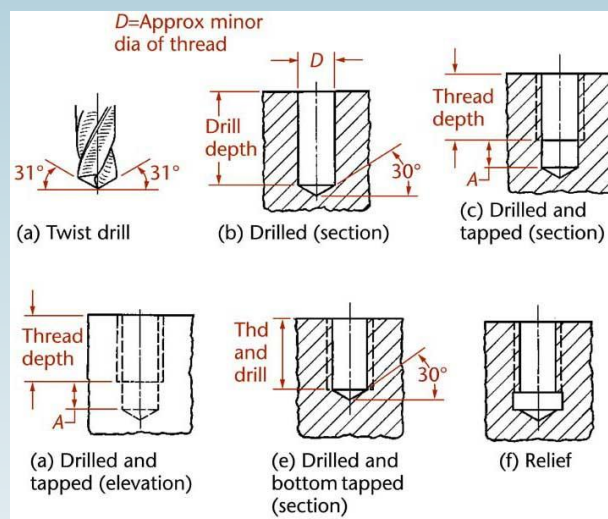
Types of Screw Heads



Tapped Holes

- The bottom of a drilled hole formed by the point of a twist drill is cone shaped
- The thread length is the length of full or perfect threads
 - The tap drill depth does not include the cone point of the drill

Tapped Holes



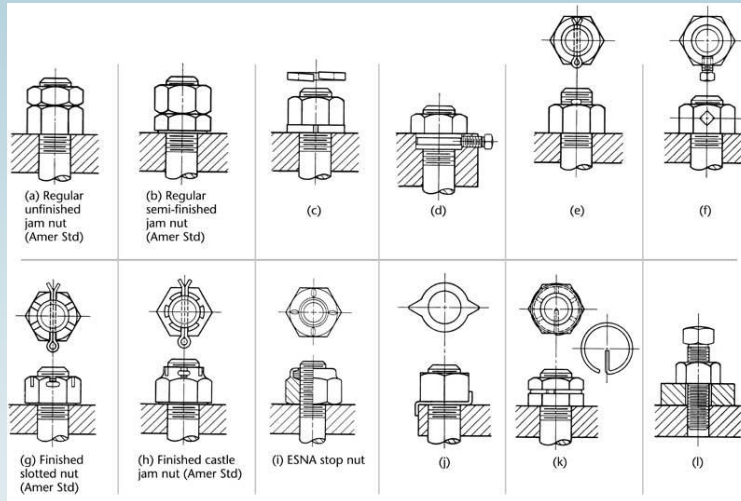
Standard Bolts and Nuts

- ◎ Standard bolts and nuts have characteristics determined by:
 - Bolt types
 - Finish
 - Proportions
 - Threads
 - Thread lengths
 - Bolt lengths

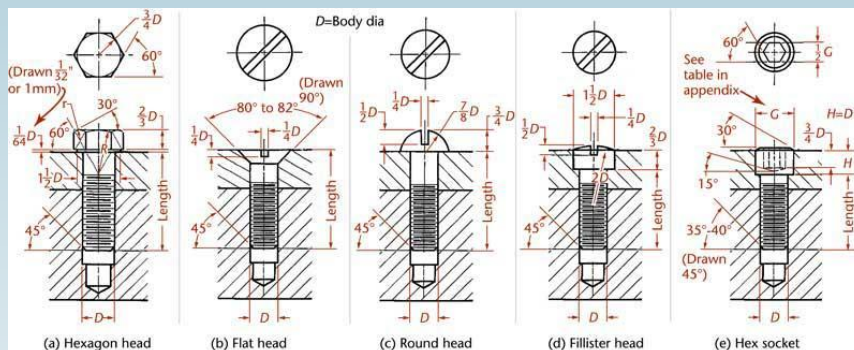
Specifications

- ◎ In specifying bolts, the following information must be covered in order:
 - Nominal size of bolt body
 - Thread specification or thread note
 - Length of bolt
 - Finish of bolt
 - Style of head
 - Name

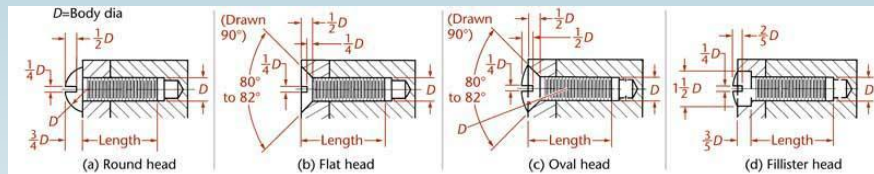
Locknuts and Locking Devices



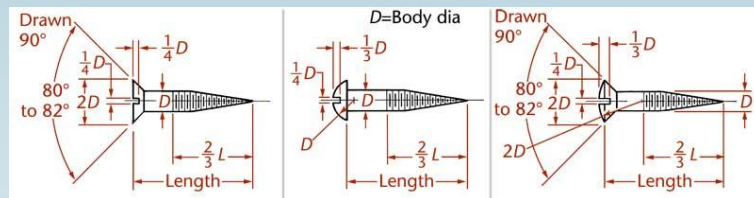
Standard Cap Screws



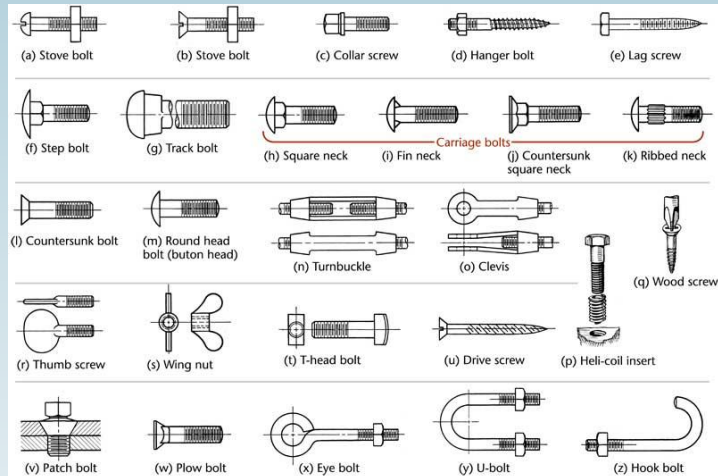
Standard Machine Screws



Standard Wood Screws



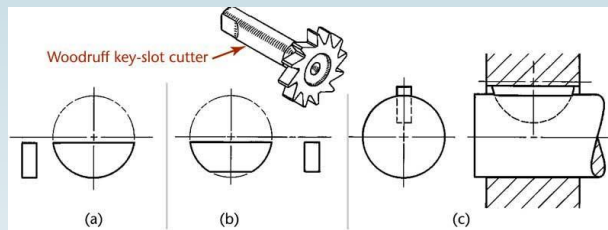
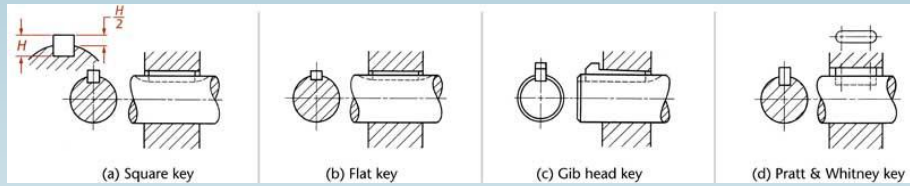
Miscellaneous Fasteners



Keys

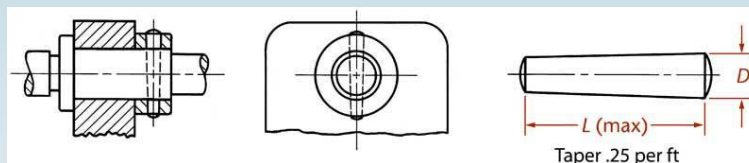
- Keys are used to prevent movement between shafts and wheels, couplings, cranks, and similar machine parts attached to or supported by shafts

Keys



Machine Pins

- Machine pins include taper pins, straight pins, dowel pins, clevis pins, and cotter pins



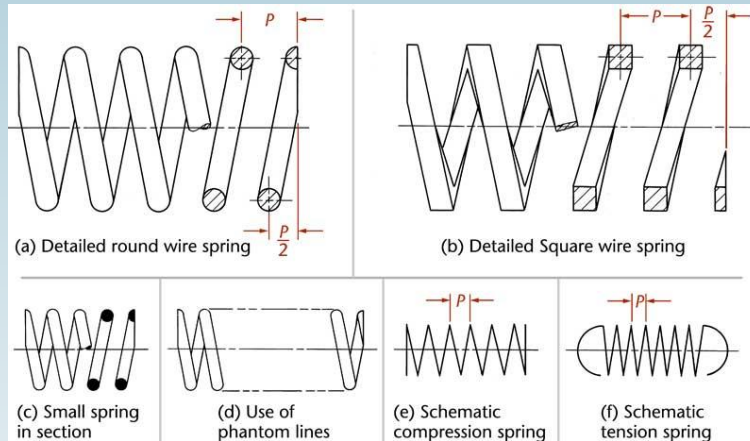
Springs

- ⦿ A spring is a mechanical device designed to store energy when deflected and to return the equivalent amount of energy when released
- ⦿ Springs are classified as:
 - Helical springs
 - Flat springs

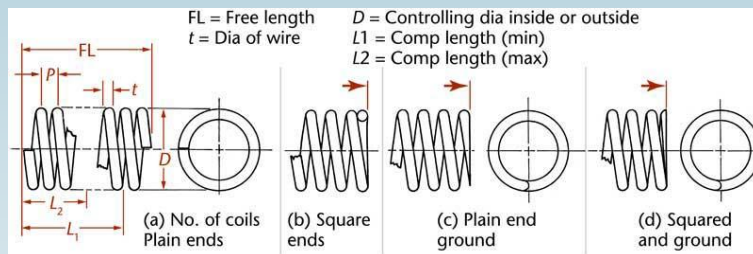
Helical Springs

- ⦿ Helical springs have three types:
 - Compression springs
 - Extension springs
 - Torsion springs

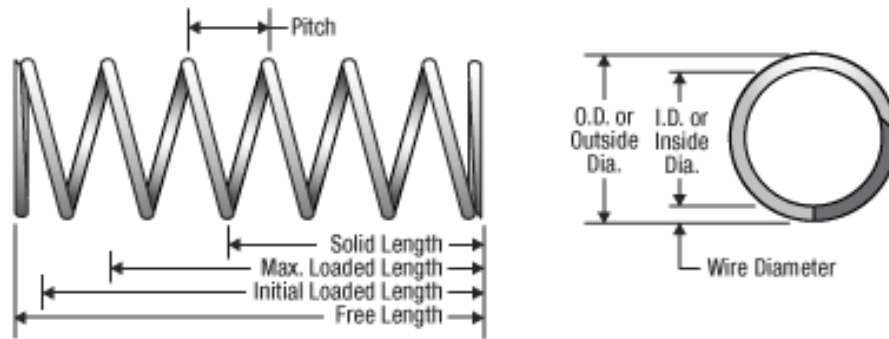
Helical Springs



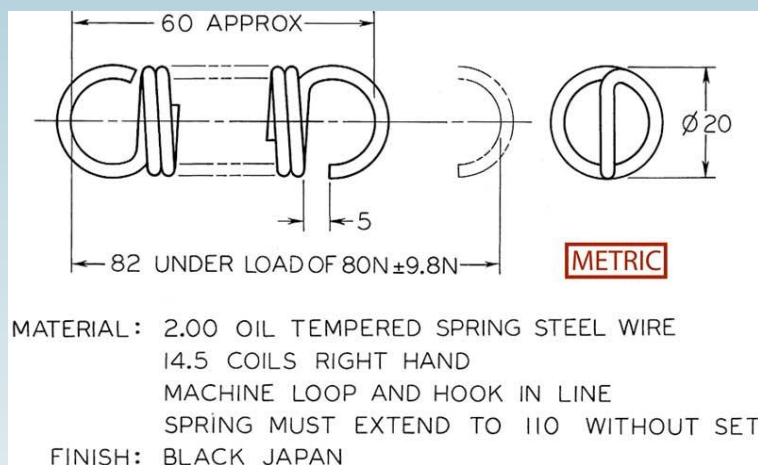
Compression Springs



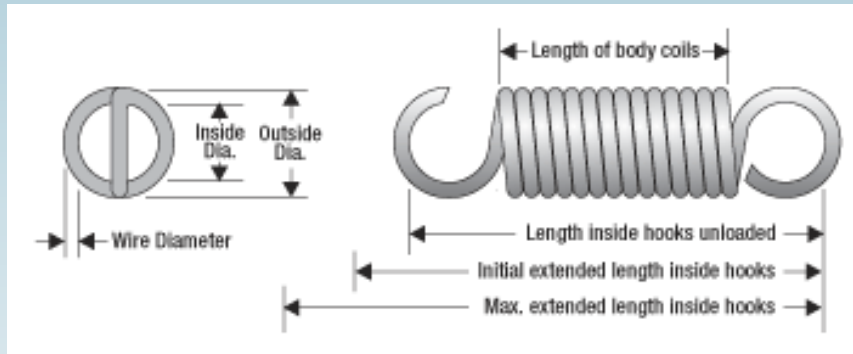
Compression Springs Required Information



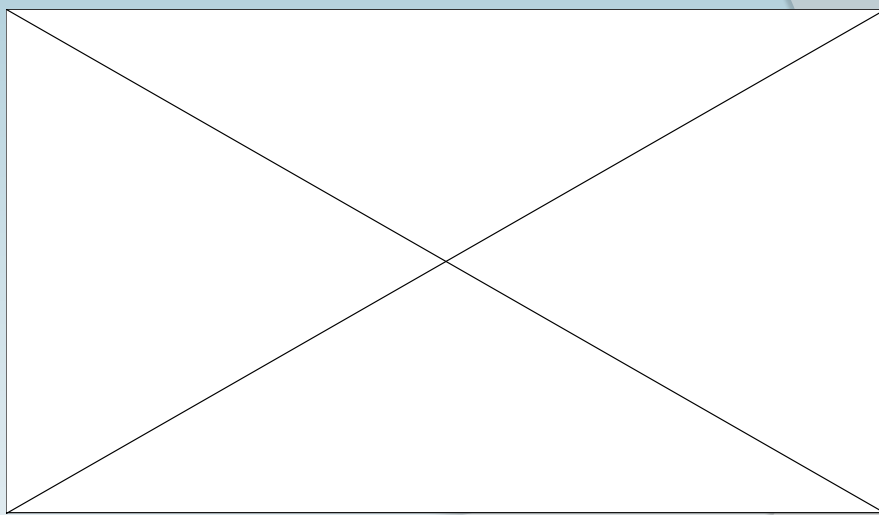
Extension Springs



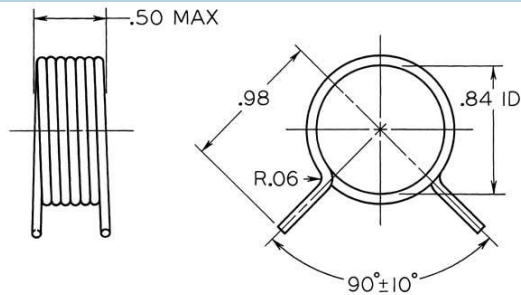
Extension Springs Required Information



Extension Spring

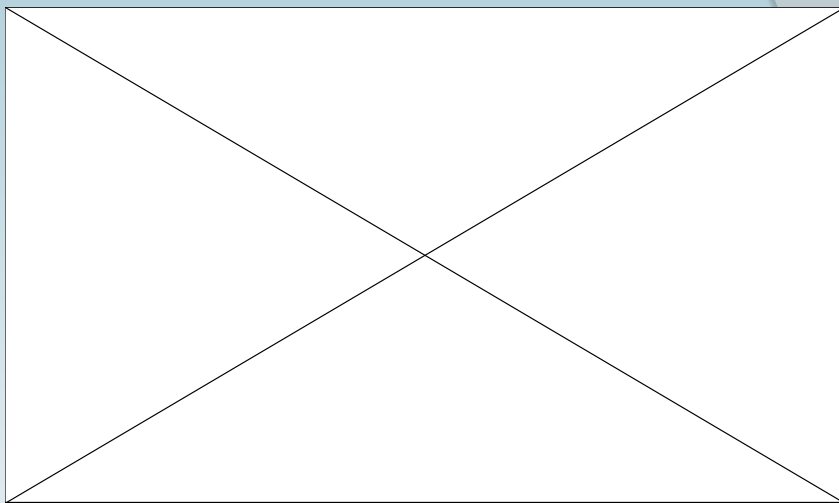


Torsion Springs

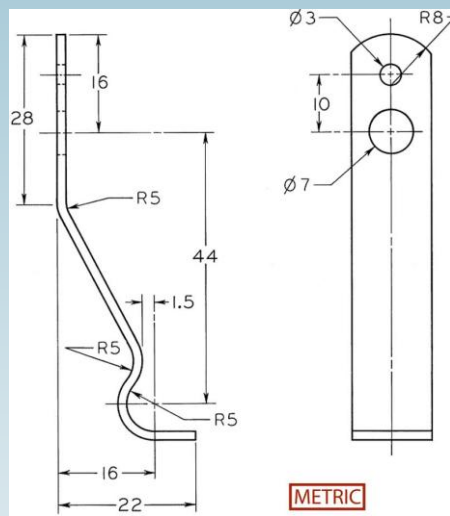


MATERIAL : .059 MUSIC WIRE
 6.75 COILS RIGHT HAND NO INITIAL TENSION
 TORQUE : 2.50 INCH LB AT 155° DEFLECTION SPRING MUST
 DEFLECT 180° WITHOUT PERMANENT SET AND
 MUST OPERATE FREELY ON .75 DIAMETER SHAFT
 FINISH : CADMIUM OR ZINC PLATE

Torsion Spring Manufacture



Flat Springs



MATERIAL : 1.20 X 14.0 SPRING STEEL
HEAT TREAT : 44-48 C ROCKWELL
FINISH : BLACK OXIDE AND OIL