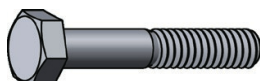


# Fastener Basics



## Common Fastener Types



**Hex bolts**, or *hex cap screws*, are used in machinery and construction. Can be used with a nut, or in a tapped hole. Fully threaded hex bolts are also known as *tap bolts*.



**Sheet metal screws** have sharp points and threads, and are designed to be driven directly into sheet metal. They can also be used in softer materials like plastic, fiberglass, or wood.



**Machine screws** are fully threaded for use with a nut or in a tapped hole. Certain types are sometimes referred to as *stove bolts*.

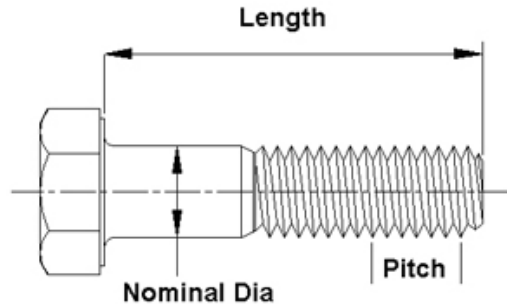
**Carriage bolts** have smooth, domed heads with a square section underneath that pulls into the material to prevent spinning during installation.

**Nuts** are used to fasten machine threaded fasteners in through-hole applications. *Lock nuts* help prevent loosening.

**Washers** spread the load over a greater surface area when tightening a bolt, screw or nut. *Lock washers* help preventing loosening

*Tip:* Find a more comprehensive fastener type chart at <http://boltdepot.com/info>

## Bolt Sizing



### How Fasteners are Notated: An Example Grade / Class and Fastener Strength

Fastener **Grade** (US) or **Class** (metric) refers to the mechanical properties of the fastener material. Generally, a higher number indicates a stronger, more hardened (but also more brittle) fastener.

US bolt head markings

Metric bolt head markings



Grade 2 Grade 5 Grade 8



Class 8.8 Class 10.9 Class 12.9

*Note:* In addition to these markings, the head will often have a manufacturer stamp.

## Thread Pitch

Metric equals the distance between threads.

Standard equal number of threads per inch.

## Nut Types



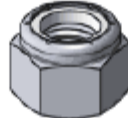
**Hex**

A six sided nut. Also referred to as a Finished Hex Nut.



**Heavy Hex**

A heavier pattern version of a standard hex nut.



**Nylon Insert Lock**

A nut with a nylon insert to prevent backing off. Also referred to as a Nylock.



**Jam**

A hex nut with a reduced height.



**Nylon Insert Jam Lock**

A nylock nut with a reduced height.



**Wing**

A nut with 'wings' for hand tightening.



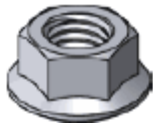
**Cap**

A nut with a domed top over the end of the fastener.



**Acorn**

Acorn nuts are a high crown type of cap nut, used for appearance.



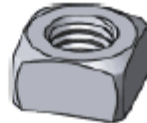
**Flange**

A nut with a built in washer like flange.



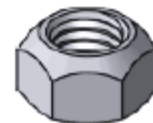
**Tee**

A nut designed to be driven into wood to create a threaded hole.



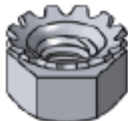
**Square**

A four sided nut.



**Prevailing Torque Lock**

A non-reversible lock nut used for high temperature applications.



**K-Lock or Kep**

A nut with an attached free-spinning external tooth lock washer.



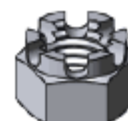
**Coupling**

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



**Slotted**

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



**Castle**

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

## Fastener Categories



**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



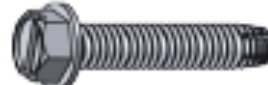
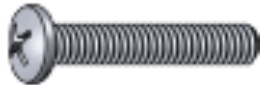
**Thread Cutting Machine Screws**

Machine screws with a thread cutting (self tapping) point.



**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.



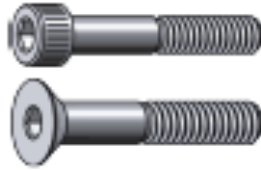
**Hex Bolts**  
Bolts with a hexagonal head with threads for use with a nut or tapped hole. Abbreviated HHMB or HXBT.



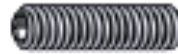
**Carriage Bolts**  
Bolts with a smooth rounded head that has a small square section underneath.



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



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



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



**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.



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



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



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

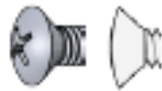


**Elevator Bolts**  
Elevator bolts are often used in conveyor systems. They have a large, flat head.

## Head Styles



**Flat**  
A countersunk head with a flat top. Abbreviated FH



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



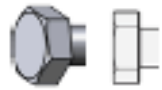
**Pan**  
A slightly rounded head with short vertical sides. Abbreviated PN



**Truss**  
An extra wide head with a rounded top.



**Round**  
A domed head. Abbreviated RH



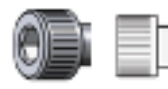
**Hex**  
A hexagonal head. Abbreviated HH or HX



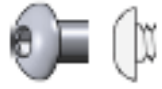
**Hex Washer**  
A hex head with built in washer.



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

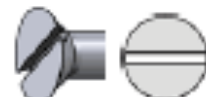
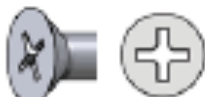


**Socket Cap**  
A small cylindrical head using a socket drive.

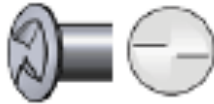


**Button**  
A low-profile rounded head using a socket drive.

## Drive Types



**Phillips and Frearson**  
An X-shaped drive.  
Abbreviated PH



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

**Slotted**  
A slot in the head.  
Abbreviated SL



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

**Combination**  
A combination of slotted and Phillips drives.  
Abbreviated combo



**Torx**  
A six-pointed star pattern, specifically designed to prevent cam-out and stripped heads.

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

## Washer Types



**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.



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



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



**Square**  
A square shaped washer.



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



**Ogee**  
Thick, large diameter, cast iron washers with a curved or sculpted appearance. Typically used in dock and wood construction.



**Sealing**  
A soft neoprene washer bonded to a metal backing. Used to seal out air/water or dampen noise and vibration.