Beginners guide to bolts

What are bolts?

Bolts have a **metal shaft** with a **threaded pattern**.
Bolts are **always used** with a **nut** in order to hold objects together.

Bolts are characterized by:

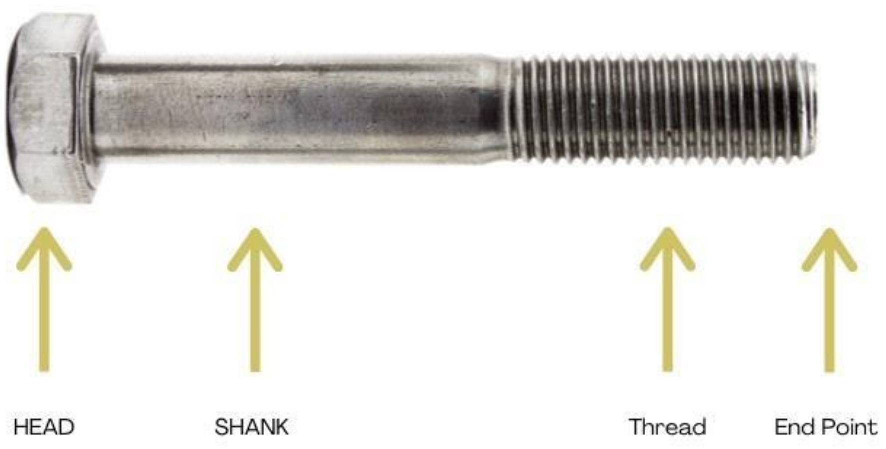
Bolt size

Grade of bolt

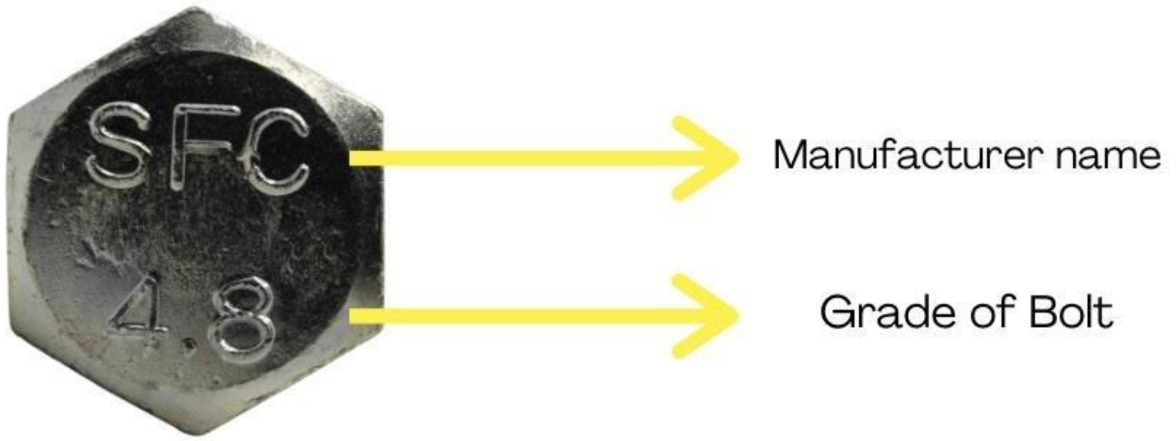
Material of bolt

Type of bolt

The parts of a bolt:



Parts of a bolt



Found on the head of a bolt

Head:

- **Hexagonal** part at the top of the bolt
- The hexagonal shape allows the **bolt to be loosened or tightened** with a **socket or spanner.**
- Has the **manufacturer's stamp** and the **grading** of the bolt.

Shank:

- This is the **smooth, cylindrical and unthreaded part** of the bolt.
- This part of the **bolt inserts through** the object.
- The shank **prevents rotation** of the object when the bolt and nut are tightened.
- The shank **prevents loosening** of the bolt and nut once tightened.

Thread:

- This is a pattern that is **engraved or tapped** into the metal shaft.
- The thread allows **nuts with the corresponding thread** to be **tightened** onto the bolt.

How to measure a bolt?

- A ruler, vernier caliper or bolt gauge can be used to measure.

Unit of measurement:

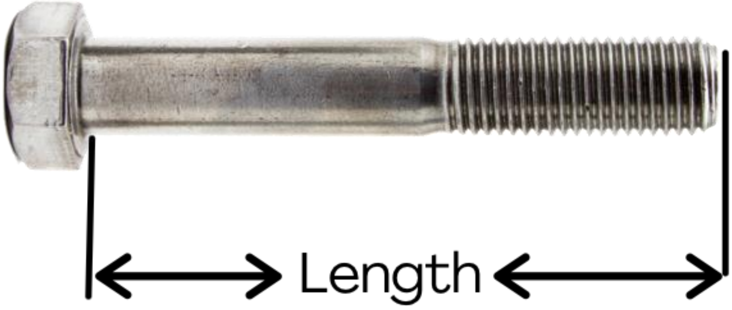
- Measurement mainly given in:
  - Metric bolts: millimeters or
  - Imperial bolts: inches

Click to find out more on Metric vs Imperial.

Dimensions:

Length:

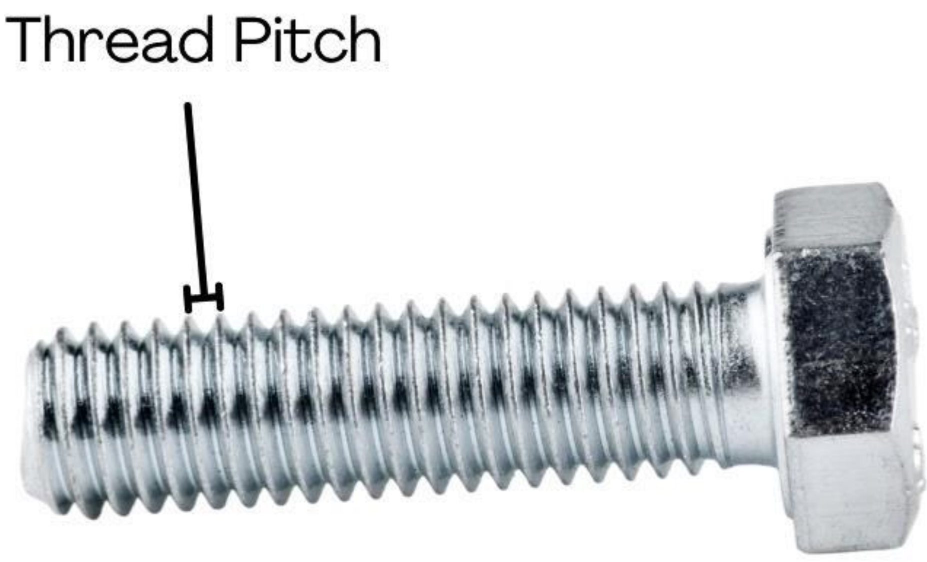
Distance from the **flat end of the head to the blunt end** of the bolt.



Diameter:

Distance from **one side of the outer thread to the other side of the outer thread**.

Thread pitch:
Distance from the **height of one thread to the height of the next thread**.



Format:

- Bolt measurement is written in the following format in **millimetres (mm)** :

- The ‘**M’** in front of the measurement stands for millimetres.

M Diameter x Length x thread pitch

Eg. M6x60x1

Imperial vs metric bolts?

- Imperial and metric systems refer to 2 different ways to measure bolts.
- They are used to measure the size and strength (grade) of the bolt.
- These systems makes it easy for you to communicate what bolt you are looking for.

Imperial system:

- American system of measurement.
- Measurement in inches.
- Grading of the bolt: line markings on the head of the bolt.

Metric system:

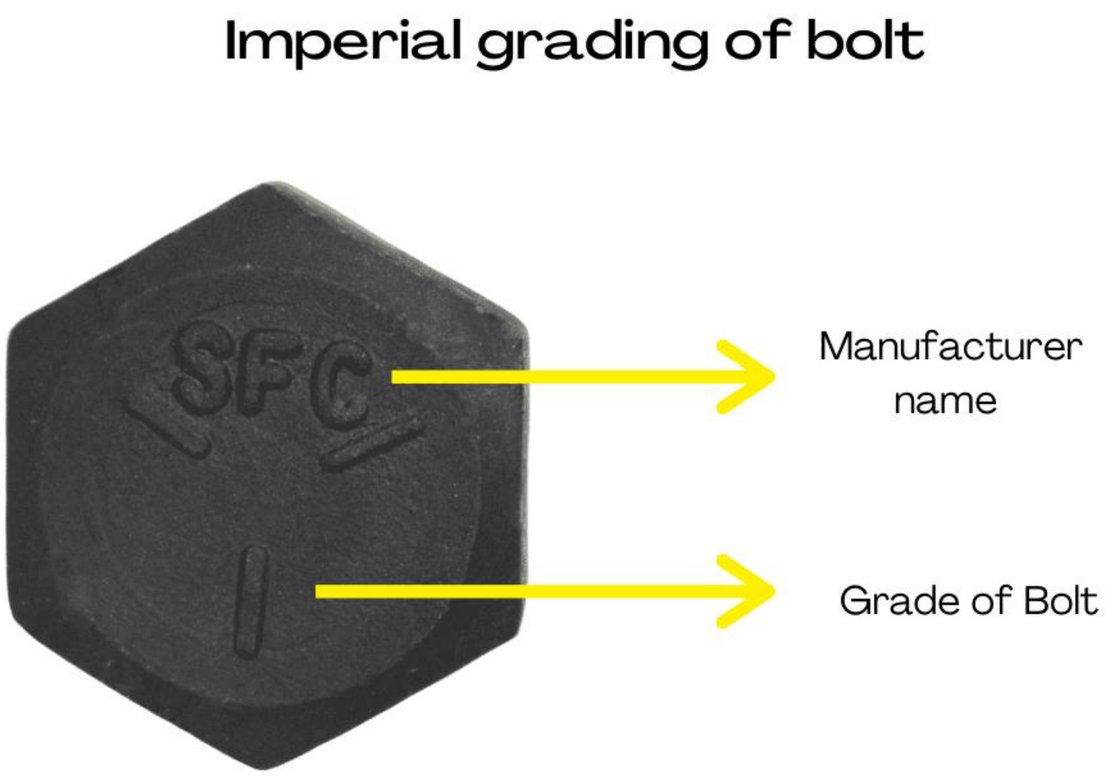
- Measurement system used by most of the world.
- Measurement in mm/cm.
- Grading of bolt: a number found on the head of the bolt.

	imperial	metric
System of Measurement	American	rest of the world
Measurement unit	inches	mm/cm
Grading of bolt	line markings on the head of the bolt	number found on the head of the bolt

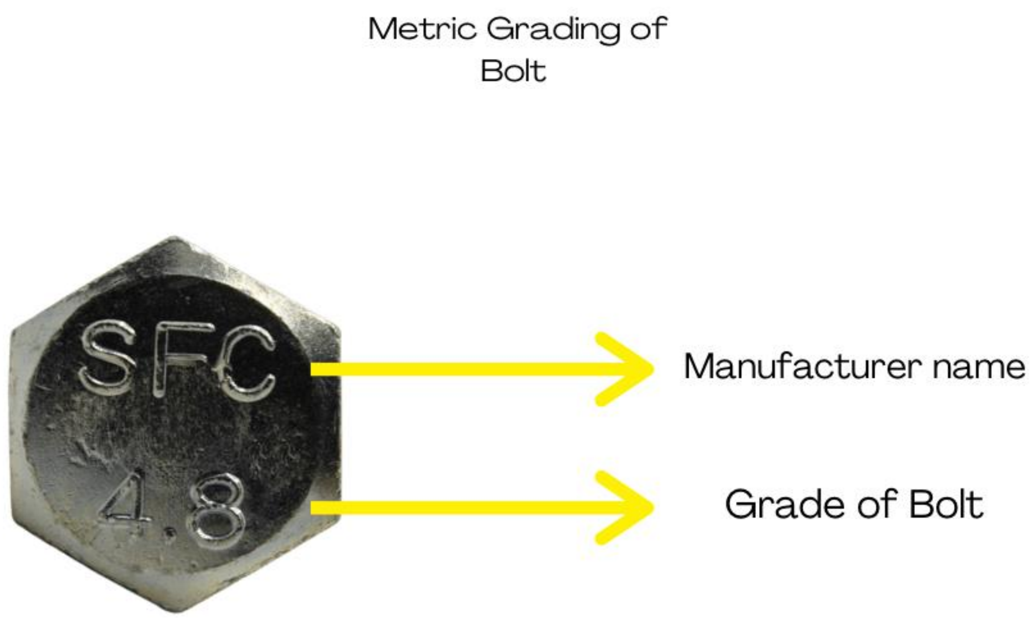
Grading of bolts

- Grade refers to the **strength of the bolt.**
- The grade is set by **the International Organization for Standardization (ISO**).
- ISO standards is a ‘**universal language’**- which means that **anyone in the world** will understand how strong the bolt is.

- They are represented by:
    - Metric: number markings that is stamped on the head.
    - Imperial: markings that is stamped on the head.
    - Higher number = stronger but more brittle fastener.



Imperial grading of bolt 1



Metric grading of bolt 1

Tensile strength = **maximum load in tension/pulling force** a bolt can withstand before breaking.

Grade of bolt	4.8	8.8	10.9	12.9
Minimum tensile strength(MPa)	420	800	1040	1220

For detailed information on the grade and the respective strength of the bolt click here

Note: Please consult us for further information when selection the appropriate for your application.

The information above serves as a GUIDE only.

Torque specifications of bolts

- Torque refers to **how much a bolt can be tightened** before the bolt will weaken or break.
- This is measured in **Newton Meters (Nm)**.
- Each bolt **based on size and grade** has a different maximum torque.
- For a guide to the torque specifications on bolts, you can find a complete list of bolt torque specifications at Engineering Toolbox.

Note: Please consult us for further information when selection the appropriate for your application.

The information above serves as a GUIDE only.

Bolt materials:

Zinc plated bolts:

- Bolts are most commonly made in this material
- Suitable for general use, indoors and dry conditions
- Low corrosion resistance when compared to stainless steel.

Alloy / high tensile steel bolts:

- Have a black colour and are oil coated
- These are used for heavy duty applications - able to withstand high levels of strain.

Stainless steel bolts:

- Have good corrosion resistance.
- Most suitable for marine and outdoor applications.

Galvanised bolts:

- Bolts that have a zinc coating.
- Suitable for outdoor use.
- Better corrosion resistance than zinc plated bolts.

Brass bolts:

- Have good corrosion resistance.
- Used for decorative and plumbing purposes.

Bolt types

There are many different types of bolts. Let’s take a look at some of the different ones:

Anchor bolts.

- These are designed to **secure objects to concrete**.
- Anchor bolts are used in heavy duty applications.
- Egs. Wedge anchors, Expansion bolts

Cup Square Bolt/ Carriage bolt.

- This has a **square section and a smooth, rounded head**.
- The function of the **square section is to prevent turning**.
- Egs. Cup Squre Bolt, Ploughing bolt.

Hangar bolt.

- A rod that has a **screw thread and a bolt** thread on either end.
- They are used to fasten objects to wood.

Hex bolt.

- Most common type of bolt found.
- This has a **threaded body and hexagonal head**.
- They are used widely from general to specialized applications.

J - Bolt.

- J - shaped rod that is partially threaded.
- The **J section hooks onto steel rebar embedded in concrete** leaving a the thread exposed.
- They are used in mainly roofing and other construction applications

U- bolt.

- U - shaped rod with the straight sections threaded.
- These are mainly used to **support objects within the 'U'** such as wire or piping.

There are lots of other types of bolts, you can see mentioned here.

Bolts Vs Screws:

Both these terms are **regularly used interchangeably**.

There are some characteristics that **differentiate a bolt from a screw** based on the way they are being used:

Bolt	Screw
Always need a nut.	Does not use a nut.
Uses a 'clamping' force to secure objects together.	Engage/ 'Screw' into objects to secure them.
Externally fasten objects together.	Internally fasten objects together.

Adapted from black book of fasteners

If you require information on any of the fasteners not mentioned in this guide please let us know!

Do you have any suggstions , additions or comments to add to our beginners guide?
Please let us know!