

RATTAN IRON WORKS

HARDWARE MATLAB RIW

An ISO 9001:2015 (Certified Company)



- Screws
- Sems Screw
- Bolts
- Nuts
- Self Clinching Nuts
- Rivet Nuts
- Washers
- Pipe Clamps
- Foundation Bolts

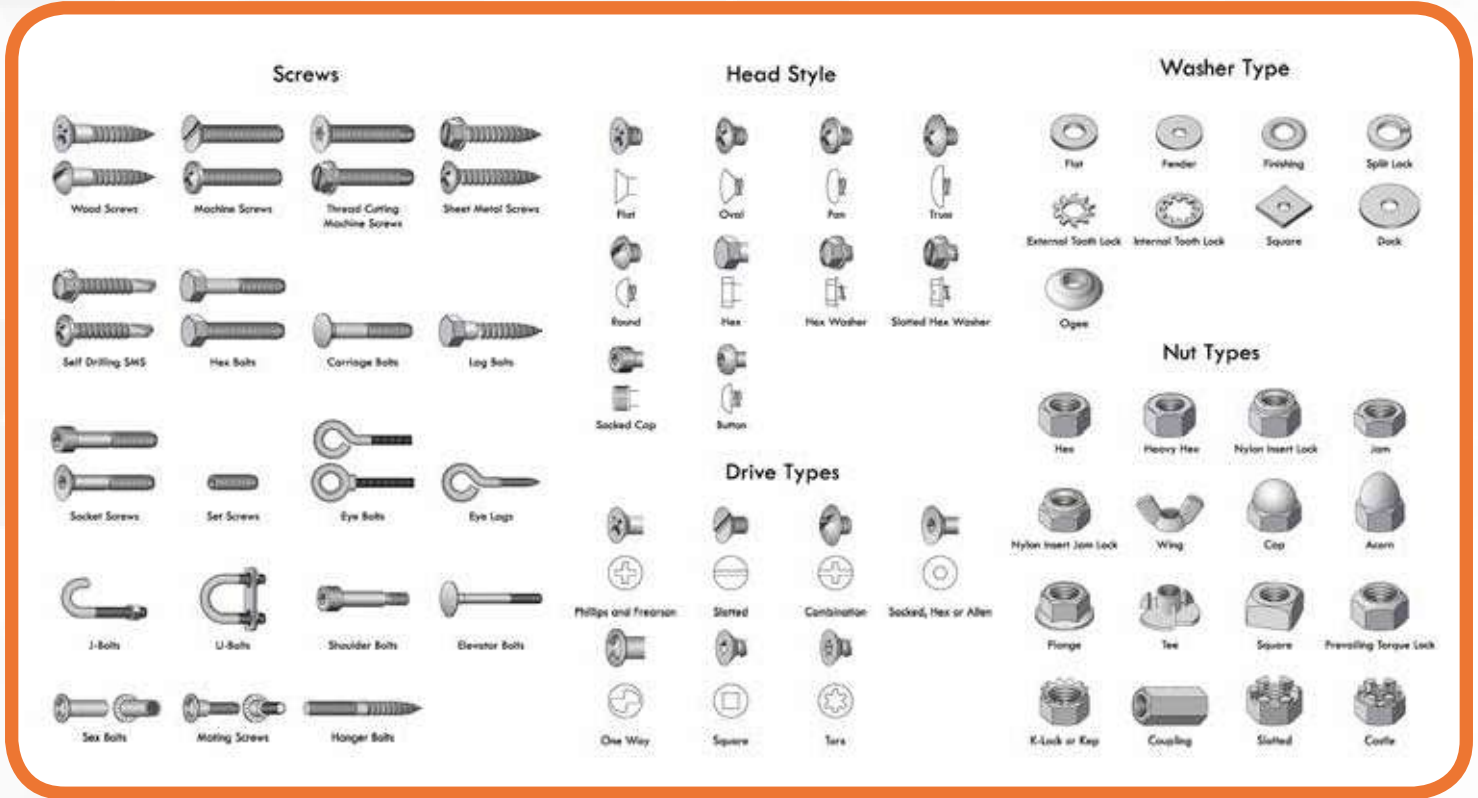


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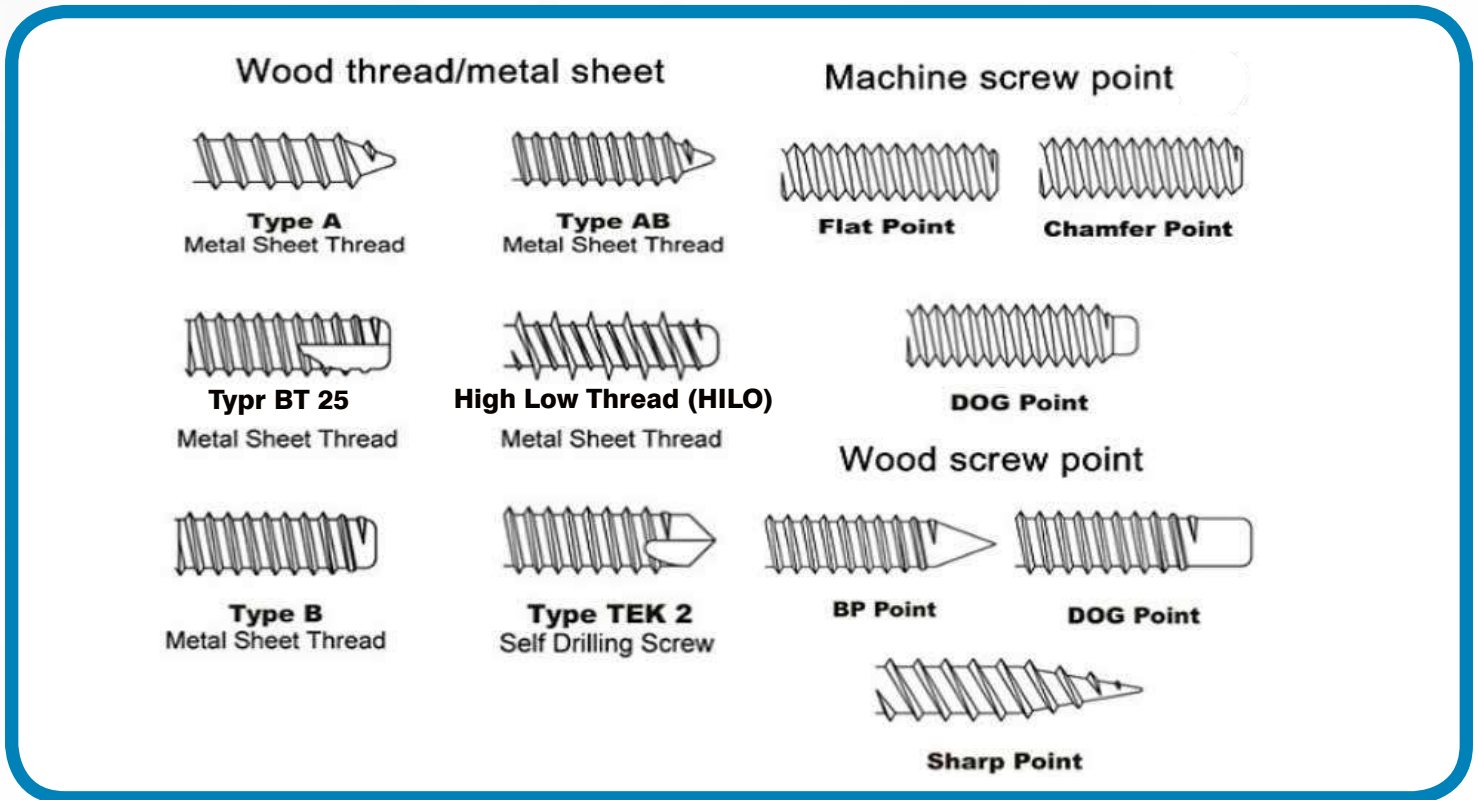
www.rattanironworks.com

info@rattanironworks.com





Type of Threads



Daily Useful Conversion Tables

Measurement Of Length		
	1 mm	.039337 inch
10 mm	1 cm	.39370 inch
1000 mm	1 metre	39.370 inch
1000 mm	1 metre	1.0936 yard
1000 mm	1 metre	3.280 feet
1 inch	1 inch	25.400 mm
1 foot	12 inch	304.800 mm
1 yard	1 yard	.914 mtr
1000 metre	1 kilometre	.62137 mile
	1 mile	1.609 km
Area		
1 sq inch	6.4516 sq cm	
1 sq feet	.0929 sq metre	
1 sq yard	0.836 sq meter	
1 sq metre	10.764 sq feet	
1 sq metre	1.196 sq yard	
Weights		
1 grain =		
64.7989 mg		
1 gram	15.432 grains	
1 ounce	28.35 gram	
1 pound	453.6 grams	
1000 gram	1 kilo gram	
measurement of capacity		
1 ltr =	1000 ml	
1 gallon=	3.7853 Ltr	
1 barrel =	119.237 Ltr	
measurement of temperature		
conversion celsius to fahrenheit	Multiply by 1.8 & add 32 for result	
conversion fahrenheit to celsius	substract 32, divide result by 1.8	

Quality policy

Our continuous endeavour is to satisfy customers requirement of quality, reliability & value for money

Major Thread Dia for Machine & Self Tapping Screws

LIMITS OF SIZE FOR ISO METRIC BOLT COARSE (STANDARD) THREADS. (REF.: IS 4218)			
Thread Size	Pitch	Major DIA	Blank
M 1.6	.35	1.49-1.58	1.25
M2	.4	1.88-1.98	1.60
M2.5	.45	2.38-2.48	2.05
M3	.5	2.87-2.98	2.50
M 3.5	.6	3.35-3.47	2.90
M4	.7	3.83-3.97	3.30
M5	.8	4.82-4.97	4.20
M6	1	5.79-5.97	5.00
M7	1	6.79-6.97	6.00
M8	1.25	7.76-7.97	6.80
M10	1.5	9.73-9.96	8.5
M12	1.75	11.70-11.96	10.2
M14	2	13.68-13.96	12
M16	2	15.68-15.96	14
M20	2.5	19.62-19.58	17.5

Threads To Choose From:

Machine Screws/ Bolt Threads Available In METRIC (Coarse & Fine), Ba, BSW, BSF, UNF, UNC & As Per Customers Specifications

Specification For Selftapping Screws Type A & B (Ref.: Is 5957)			
Nominal Size-Tpi	Pitch	Major Dia	Blank
No. 0-48	0.53	1.45-1.52	1.19
No. 1-42	0.50	1.83-1.91	1.52
No. 2-32	0.79	2.13-2.24	1.78
No. 3-28	0.91	2.46-2.57	2.06
No. 4-24	1.06	2.79-2.90	2.34
No. 5-20	1.27	3.20-3.30	2.60
No. 6-20	1.27	3.43-3.53	2.83
No. 7-18	1.34	3.78-3.91	3.14
No. 8-18	1.41	4.09-4.22	3.37
No. 10-16	1.56	4.65-4.80	3.86
No. 12-14	1.81	5.31-5.46	4.43
No. 14-14	1.81	6.10-6.25	5.17

Corrigendum

We have tried to provide you some vital information on fasteners as it is a very wide subject.

Every effort has been made to make sure that the data provided in this product information guides is correct.

For detailed studies please refer to related specifications.

For any other enquiry RIW Team would be delighted to offer assistance



About US

Settled in the **year 1980**, at **NEW DELHI**, **RATTAN IRON WORKS** is a leading manufacturer & trader of Industrial Screws, Nut, Bolts, Washers and so on.

Our Company Is **ISO 9001:2015 Certified**. Can Meet The Standards Of Each Country.

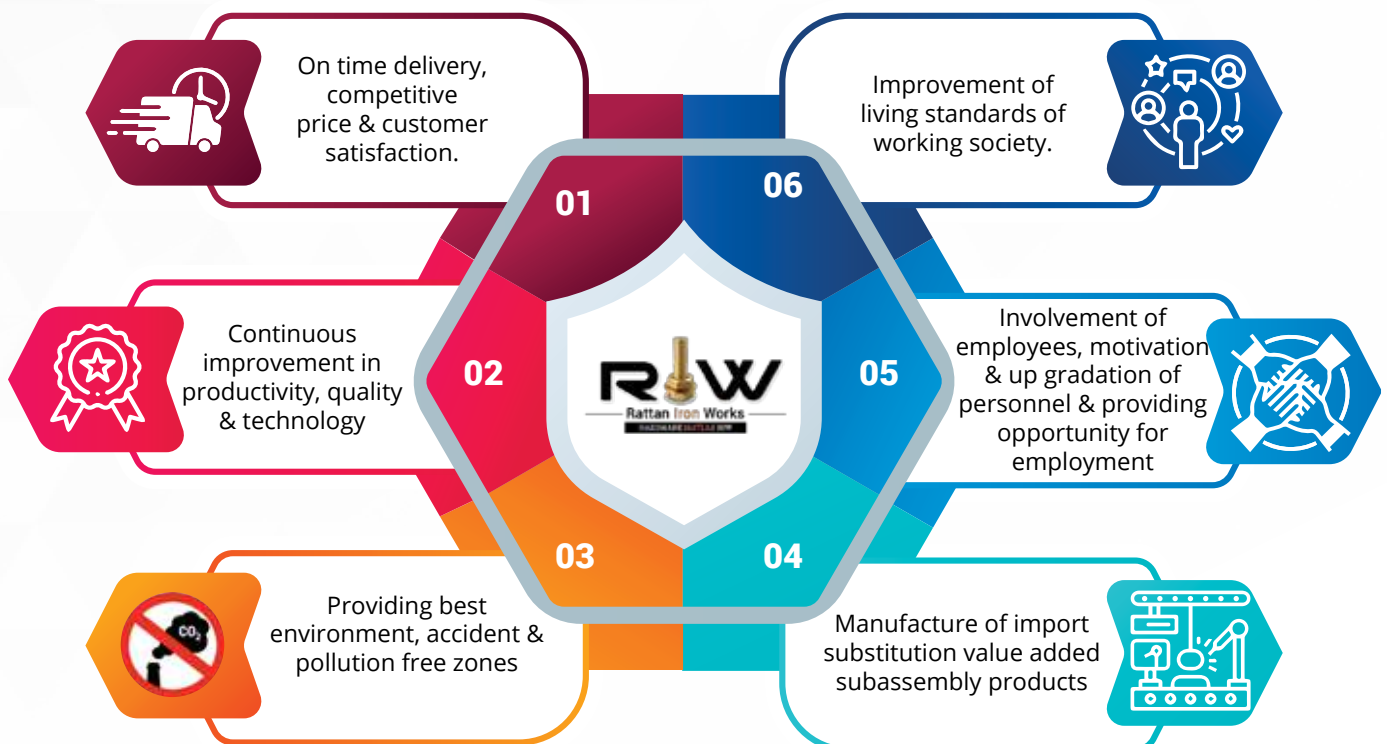
Most factories only produce single kind of products, and it is quite inconvenient for purchasers with different needs at the same time. We could provide customers a wide range of products under the hardware category under one roof. Purchasers can save much time & money through our trading service.

In Addition, Over **40+ Years Experience Engineers Team**, Which Can Solve All Your Fasteners Related Problems During The Processing Of Any Project Or Any Product. It Can Highly Improve Your Working Efficiency.

Quality Assurance/Policy

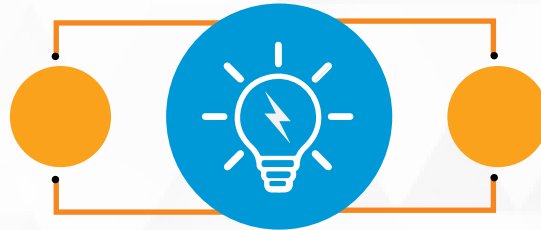
Directly from the acquirement of crude materials, generation and last dispatch, we have been keeping up the most elevated levels of value control to convey world-class items to our esteemed clients. **These Industrial Fasteners are made with the utilization of premium quality crude materials like Mild Steel, Stainless Steel, High Tensile Steel, Alloy Steel and so on that are fulfilled in all standards.** The in-house research center at our preparing unit is completely prepared to test the items on stringent parameters of value. This encourages us to keep up the pertinent norms in every one of the items.

Our Mission



Our Vision

To become a global leader & key partners for economic growth of nation.



To develop new generation leader to manage individual organization.



Specialized Coatings

- ▶ Zinc Electroplating
- ▶ Hot Dip Galvanizing
- ▶ Nickel Plating
- ▶ Copper Plating
- ▶ Trivalent Zinc Plating (White / Black)
- ▶ Tin Plating
- ▶ Dacromet Coating
- ▶ Geomet Coating

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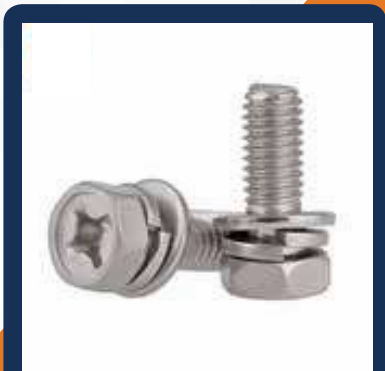
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SEMS SCREW

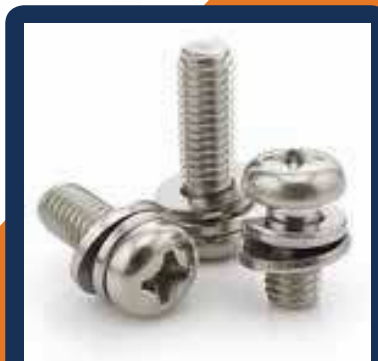
SEMS are created by combining a bolt with a permanently affixed washer. This washer stays in place due to the fact that it is installed on the blank bolt before the thread rolling is conducted.

Because the treads are larger than the initial diameter, the washer stays in place without falling loose from the bolt.

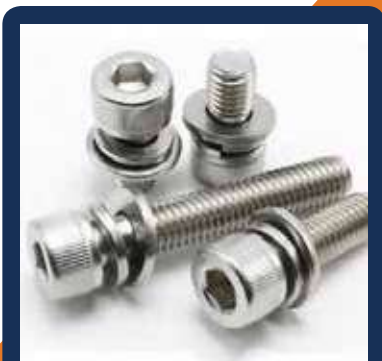
Thread	Length
3mm	6mm to 25mm
4mm	6mm to 50mm
5mm	8mm to 50mm
6mm	10mm to 50mm
8mm	16mm to 50mm
10mm	20mm to 75mm
12mm	25mm to 75mm
16mm	25mm to 70mm



Hex Philips Head Sems Screw



Pan Philips Head Sems Screw



Allen Socket Head Sems Screw

**Material Grade:
Stainless Steel,
Mild Steel, High
Tensile Steel**



SCREWS

1. MACHINE SCREWS

1.1 CHEESE (CH) HEAD & ROUND (RH) HEAD

Material Grade: Stainless Steel, Mild Steel



1.1.1 METRIC RANGE

Thread	Length
M-2	5mm to 15mm
M-3	5mm to 100mm
M-4	6mm to 150mm
M-5	6mm to 150mm
M-6	8mm to 150mm

1.1.2 INCHES RANGE

Thread	Length
1/8	1/4" to 3"
5/32	1/4" to 4"
3/16	1/4" to 6"
1/4	3/8" to 6"

1.2 COMBINATION (Combi) HEAD & PAN PHILIPS (PH) HEAD



Material Grade: Stainless Steel, Mild Steel

1.2.1 METRIC RANGE

Thread	Length
M-2	2mm to 20mm
M-3	3mm to 50mm
M-4	4mm to 100mm
M-5	6mm to 100mm
M-6	6mm to 100mm
M-8	12mm to 75mm

1.2.2 INCHES RANGE

Thread	Length
1/8"	3/16 to 1"
5/32"	3/16 to 1.5"
3/16"	3/16 to 2"
1/4"	3/8 to 1.5"

1.3 COMBINATION WITH WASHER (W/W) HEAD

Material Grade: Stainless Steel, Mild Steel



1.3.1 INCHES RANGE

Thread	Length
M-2	4mm to 12mm
M-2.5	4mm to 12mm
M-3	3mm to 30mm
M-4	5mm to 50mm
M-5	6mm to 50mm
M-6	8mm to 50mm

1.3.2 INCHES RANGE

Thread	Length
1/8"	1/4 to 1"
5/32"	1/4 to 2"
3/16"	1/4 to 2"

1.4 TRUSS (TH) HEAD

Material Grade: Stainless Steel, Mild Steel



1.4.1 INCHES RANGE

Thread	Length
M-3	4mm to 10mm
M-4	6mm to 30mm
M-5	6mm to 60mm
M-6	8mm to 50mm
M-8	20mm to 25mm

1.5 COUNTER SHANK (CSK) HEAD

Material Grade: Stainless Steel,
Mild Steel

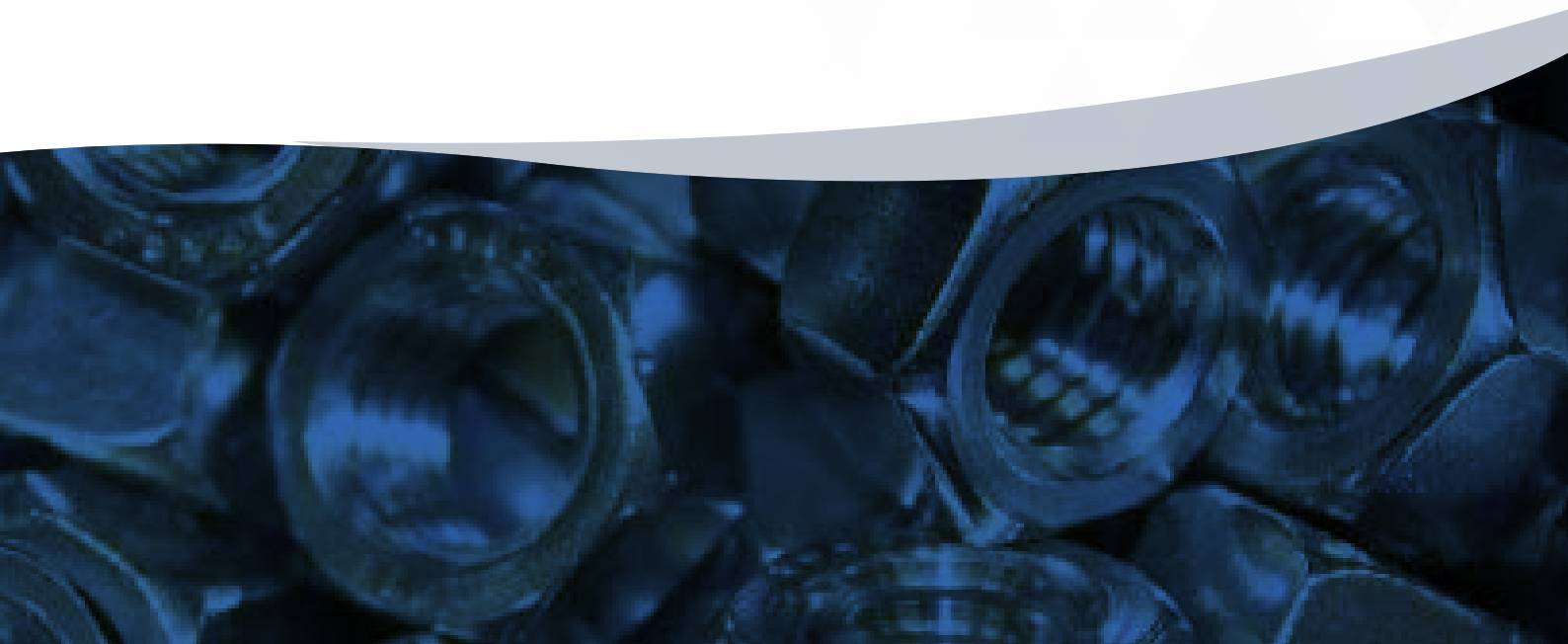


1.5.1 METRIC RANGE

Thread	Length
M-3	6mm to 100mm
M-4	6mm to 150mm
M-5	8mm to 150mm
M-6	10mm to 150mm
M-8	12mm to 150mm

1.5.2 INCHES RANGE

Thread	Length
1/8"	1/4 to 3"
5/32"	1/4 to 3"
3/16"	1/4 to 6"
1/4"	3/8 to 6"
5/16"	3/4 to 6"



1.6 COUNTER SHANK PHILLIPS (CSK Phillips) HEAD

Material Grade: Stainless Steel, Mild Steel

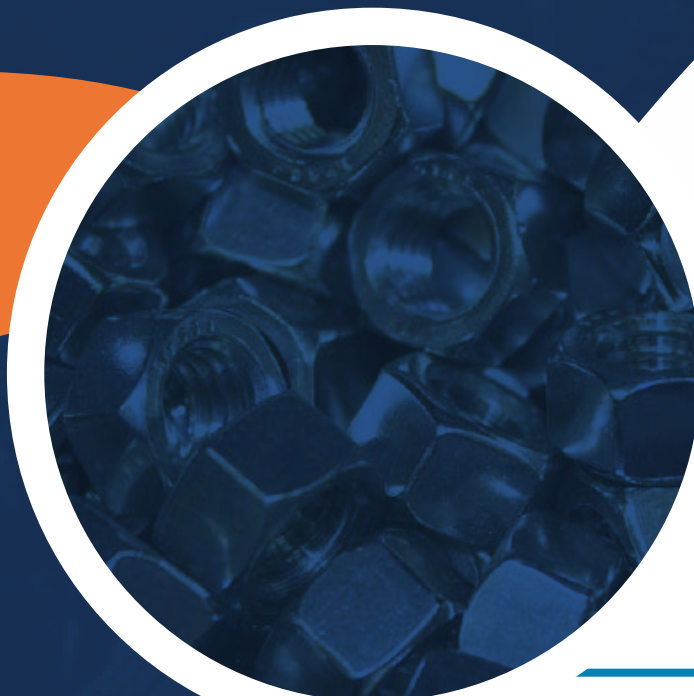


1.6.1 METRIC RANGE

Thread	Length
M-3	3mm to 50mm
M-4	6mm to 75mm
M-5	8mm to 100mm
M-6	10mm to 100mm
M-8	12mm to 75mm

1.6.2 INCHES RANGE

Thread	Length
1/8"	1/4" to 1/2"
5/32"	3/8" to 1/2"
3/16"	1/4" to 3.5"
1/4"	3/4" to 1.25"



2. STEEL SCREWS

Steel screws are also known as Self Tapping Screws. Self-tapping screws require a pilot hole slightly smaller than the screw diameter to be created before they can be driven into the material with a [HYPERLINK "https://uk.rs-online.com/web/c/tools/screwdrivers-screw-extractors/screwdrivers/"](https://uk.rs-online.com/web/c/tools/screwdrivers-screw-extractors/screwdrivers/) screwdriver. The action of driving the screw in will result in the self-tapping screw cutting a thread into the material and securing the materials together. Self-tapping screws are typically used to secure wood, plastic, metal and brick together.

Material Grade: Stainless Steel, Mild Steel

Size No.	Length
No.2	6.5mm to 19mm
No.3	6.5mm to 13mm
No.4	6.5mm to 25mm
No.6	6.5mm to 75mm
No.8	9.5mm to 100mm
No.10	13mm to 100mm
No.12	16mm to 100mm
No.14	19mm to 100mm



PAN (PH) HEAD



COUNTER SHANK (CSK) HEAD



TRUSS (TH) HEAD



COMBINATION WITH WASHER (W/W) HEAD



PAN PHILLIPS (PPH) HEAD



COUNTER SHANK PHILLIPS (CSK Phillips) HEAD

3. WOOD SCREWS

A metal screw with a sharp point designed to **attach two pieces of wood together**. A wood screw generally has a partially **unthreaded shank** below the head. The unthreaded portion of the shank is designed to slide through the top board (closest to the screw head) so that it can be pulled tight to the board to which it is being attached.

Material Grade:
Stainless Steel,
Mild Steel

Size No.	Length
No.4	M12, M15
No.5	M20, M30
No.6	M25
No.8	M35, M50, M60
No.10	M50, M60, M75, M100
No.12	M100, M125, M150



COUNTER SHANK
(CSK) Head



COUNTER SHANK
PHILIPS (CSK) Head.

Material Grade:
Stainless Steel,
Mild Steel,

BOLTS

1. Hex Bolts

A Hex bolts, is also known as Hexagon screw head bolts, Hex cap bolts, Hex Bolts can be used for many different applications that include **fastening wood, steel** and other construction materials for projects such as **bridges, highway structures, docks** and **buildings**.



Material Grade: Stainless Steel, Mild Steel High Tensile Steel

METRIC RANGE		INCHES RANGE	
Thread	Length	Thread	Length
5mm	10mm to 75mm	3/16	3/8 " to 3"
6mm	10mm to 150mm	1/4	3/8 " to 6"
8mm	12mm to 150mm	5/16 "	1/2 " to 6"
10mm	16mm to 250mm	3/8 "	1/2 " to 10"
12mm	16mm to 300mm	1/2 "	1 " to 12"
14mm	25mm to 300mm	5/8 "	1 " to 12"
16mm	25mm to 300mm	3/4 "	1 1/2 " to 6"
20mm	35mm to 300mm	1 "	2 " to 12"
24mm	50mm to 300mm	1 1/4"	2 " to 12"
27mm	50mm to 300mm	1 1/2"	3 " to 12"
30mm	80mm to 300mm	2 "	4" to 12"
36mm	100mm to 300mm		
48mm	100mm to 300mm		

2. Flange Bolts

Flange bolts have a circular flange under the head that acts like a washer to distribute the load. Flange bolts that are non-serrated are sometimes called frame bolts. The flange bolts are usually used in vehicle frames, especially in trucks and anywhere a head bolt is required.



**Material Grade: Stainless Steel, Mild Steel
High Tensile Steel**

Thread	Length
5mm	8mm to 30mm
6mm	8mm to 70mm
8mm	12mm to 60mm
10mm	20mm to 50mm



3. Allen Bolts

A Allen Bolt, is also known as **socket head cap screws** are used for applications with limited space. They have cylindrical head and internal wrenching features that allow them to be used in locations where externally wrenching fasteners aren't desirable. They are used for critical **vehicle applications, machine tools, tools and dies, earth moving and mining machinery, and a wide range of engineering applications.**

Material Grade: Stainless Steel, Mild Steel, High Tensile Steel

3.1 Socket Head Cap Screws

(a) METRIC RANGE

Thread	Length
2mm (Key M1.5)	4mm to 25mm
2.5mm (Key M2)	4mm to 25mm
3mm (Key M2.5)	4mm to 50mm
4mm (Key M3)	5mm to 75mm
5mm (Key M4)	6mm to 100mm
6mm (Key M5)	6mm to 150mm
8mm (Key M6)	8mm to 200mm
10mm (Key M8)	10mm to 250mm
12mm (Key M10)	12mm to 300mm
14mm (Key M12)	25mm to 300mm
16mm (Key M14)	25mm to 300mm
18mm (Key M14)	30mm to 300mm
20mm (Key M17)	30mm to 300mm
22mm (Key M17)	50mm to 300mm
24mm (Key M19)	35mm to 300mm
27mm (Key M19)	50mm to 300mm
30mm (Key M22)	50mm to 300mm
36mm (Key M27)	70mm to 300mm
40mm (Key M32)	100mm to 200mm



(B) Inches Range

Thread	Length
1/8" (Key 3/32")	3/8" to 2"
3/16" (Key 5/32")	3/8" to 3"
1/4" (Key 3/16")	1/4" to 4"
5/16" (Key 7/32")	1/2" to 6"
3/8" (Key 5/16")	1/2" to 8"
7/16" (Key 5/16")	1" to 4"
1/2" (Key 3/8")	3/4" to 12"
5/8" (Key 1/2")	1" to 12"
3/4" (Key 9/16")	1 1/2" to 10"
7/8" (Key 9/16")	1 1/2" to 8"
1" (Key 5/8")	3" to 10"

3.2 SOCKET COUNTERSUNK SCREWS



(a) METRIC RANGE

Thread	Length
3mm (Key M2)	6mm to 50mm
4mm (Key M2.5)	6mm to 60mm
5mm (Key M3)	6mm to 50mm
6mm (Key M4)	8mm to 150mm
8mm (Key M5)	10mm to 100mm
10mm (Key M6)	12mm to 100mm
12mm (Key M8)	20mm to 100mm
16mm (Key M12)	25mm to 100mm
20mm	40mm to 100mm
24mm	50mm to 100mm

(B) Inches Range

Thread	Length
1/4" (Key 5/32")	3/8" to 3"
5/16" (Key 3/16")	1/2" to 2"
3/8" (Key 7/32")	3/4" to 2"
1/2" (Key 5/16")	3/4" to 3"
5/8" (Key 3/8")	1" to 3"
3/4"	1 1/2" to 2"

3.3 SOCKET BUTTON HEAD CAP SCREWS



(a) METRIC RANGE

Thread	Length
3mm (Key M2)	4mm to 30mm
4mm (Key M2.5)	4mm to 40mm
5mm (Key M3)	6mm to 50mm
6mm (Key M4)	8mm to 80mm
8mm (Key M5)	10mm to 100mm
10mm (Key M6)	16mm to 100mm
12mm (Key M8)	20mm to 100mm
16mm	25mm to 70mm

SELF CLINCHING NUTS

Clinch nuts are self-clinching, internally threaded nuts that are pressed into the base material. Often times, these high strength fasteners are used in material that is too thin to tap threads

The installation of the clinch nut usually results in a flush mounting into the base material, which is desired by many manufacturers. Another reason why clinch nuts provide excellent value is because they can be installed at high volumes using automation lines or manually clinched with an arbor press or riveters. *Can also easily perform tapping at locations that are difficult to weld.*



Ideal For Applications That Need

- Access to both sides of the base material
- High thread strength and superior pull-out force requirements
- Metal base materials: steel, stainless steel, and aluminum

Material Grade:
Stainless Steel,
Mild Steel



RIVET NUTS

A rivet nut, also known as a blind threaded insert, is a one piece internally threaded fastener with an engineered body that compresses when installed, thus securing the fastener in place. They are commonly installed in applications with blind fastening requirements, however, they have become more frequently utilized in high production volume environments due to simple installation and economical costs. Rivet nuts can be installed on pre painted components without distorting the base material and are a suitable replacement for weld nuts, eliminating weld spatter and toxic fumes.

Material Grade: Stainless Steel, Mild Steel



ROUND BODY:

Round bodied rivet nuts feature either a smooth or knurled surface. While both provide minimal spinout resistance, a knurled surface provides additional torque resistance.



FULL HEX BODY:

Hexagonal rivet nuts provide the ultimate spinout resistance. Full hexagonal, or full hex, rivet nuts are designed for heavy duty applications. Hexagonal nuts are recommended if hex shaped holes can be produced.



HALF HEX BODY:

Hexagonal rivet nuts provide the ultimate spinout resistance. Half hexagonal, or half hexagonal rivet nuts are suitable for light duty applications. Hexagonal nuts are recommended if hex shaped holes can be produced.

NUTS

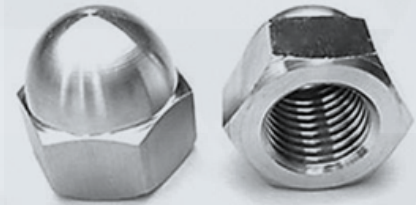
1. NYLOCK NUT



Material Grade:
Stainless Steel, Mild Steel

(a) DIN 982	(b) DIN 985
M3	M3
M4	M4
M5	M5
M6	M6
M8	M8
M10x1.25	M10
M10x1.50	M12
M12x1.50	
M12x1.75	
M14x1.50	
M14x2	
M16x1.5	
M16x2	
M18	
M20	
M24	

2. DOME NUT



Material Grade:
Stainless Steel, Mild Steel

M3
M4
M5
M6
M8
M10

3. LONG NUT



Material Grade:
Mild Steel

M6x25
M8x30
M10x50
M12x50
M16x50
M20x50
M24x50

4. SPRING NUT



Material Grade:
Mild Steel

M8
M10
M12

6. WELD SQUARE NUT / WELD HEX NUT



Material Grade:
Mild Steel

M4
M5
M6
M8

5. WING NUT



Material Grade:
Stainless Steel, Mild Steel

M4
M5
M6
M8
M10
M12
1/4"
3/8"

7. ALLEN INSERT NUT



Material Grade:
Mild Steel

M6x12
M6x15
M8x12
M8x15

8. Hex Nuts

Hex nuts are the most common nuts, hex finish nuts are hex shaped with internal threads and driven with a wrench. Hex finish nuts are used for fastening to a hex cap screw, socket cap screw or bolt.



Material Grade: Stainless Steel, Mild Steel High Tensile Steel & Nylon

(a) METRIC RANGE	(b) INCHES RANGE
M2	1/8"
M2.5	3/16"
M3	1/4"
M4	5/16"
M5	3/8"
M6	7/16"
M8	1/2"
M10	5/8"
M12	3/4"
M14	7/8"
M16	1"
M18	1 1/4"
M20	1 1/2"
M22	2"
M24	
M27	
M30	
M36	
M42	
M48	

9. FLANGE NUT

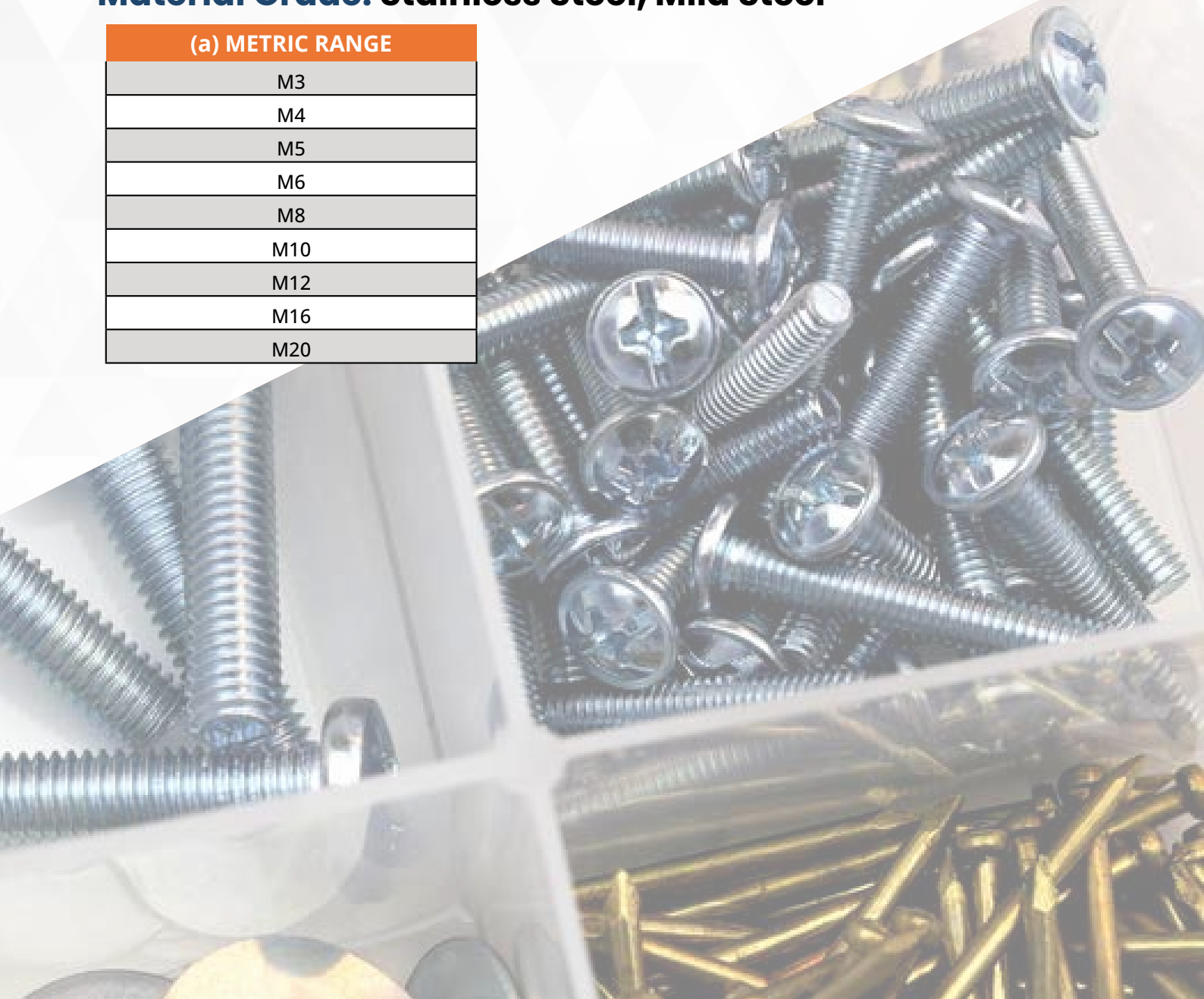
A flange nut is a nut that has a wide flange at one end which acts as an integrated washer that does not move or spin. The serrated flange distributes the pressure of the nut over the part being secured and creates a locking action to prevent loosening.



Material Grade: Stainless Steel, Mild Steel

(a) METRIC RANGE

M3
M4
M5
M6
M8
M10
M12
M16
M20



Flat Washer

Flat washers are round outer diameter thin plates with a center hole punched to the size of the bolt or screw. Flat washers are used to distribute loads of threaded bolts, screws and nuts evenly as the fastener is tightened.

Material Grade:

Stainless Steel, Mild Steel, Alloy Steel, Brass, Copper, Nylon

1. FLAT WASHER
M2
M2.5
M3
M4
M5
M6
M8
M10
M12
M14
M16
M18
M20
M22
M24
M27
M30
M36
M42
M48



Spring Washer

Spring washers are used to prevent nuts, bolts and screws from vibrating loose. These washers are rings which are split at one point and bent into a helical shape.

PICS WITH CAPTION

Material Grade:

Stainless Steel, Mild Steel

2. SPRING WASHER (Flat/Square)
M3
M4
M5
M6
M8
M10
M12
M14
M16
M18
M20
M22
M24
M27
M30
M36
M42
M48



Flat
Section



Square
Section

3. STAR WASHER EXTERNAL / INTERNAL / OVERLAPING

Star Washer

Star washers are used for locking and tension. A star washer is designed to prevent a nut or screw head from loosening with the strut action created by the teeth.

**Material Grade: Stainless Steel,
Mild Steel**

2. SPRING WASHER (Flat/Square)

M3
M4
M5
M6
M8
M10
M12
M14
M16
M18
M20
M22
M24
M27
M30
M36
M42
M48



Overlapping



Internal Tooth



External Tooth

PIPE CLAMPS

1. U-CLAMPS

U-Clamps, is also known as **U-bolts**, are typically used for attaching pipe or steel round bar to a round wood or steel post. Another common application is to hang wrought **iron pipe** in **mechanical** installations. They can also be embedded in concrete as anchor bolts.



Material Grade: **Stainless Steel, Mild Steel**

Thread	For Nominal Bore (NB) of Pipe
M6 (1/4")	15mm to 100mm
M8(5/16")	15mm to 150mm
M10 (3/8")	15mm to 350mm
M12 (1/2")	40mm to 350mm
M16 (5/8")	65mm to 400mm
M20 (3/4")	100mm to 500mm
M24 (1")	150mm to 900mm

2. RUBBER CLAMP

A Rubber pipe clamps are typically used for the suspension of **cast iron, PVC and GI pipes**. Frequently specified for **supporting sanitation, water supply, fire fighting, HVAC and electrical pipes**. A rubber clamp has a Rubber lining for suppression of sound and vibrations and two combination head screws for tightening the clamp.

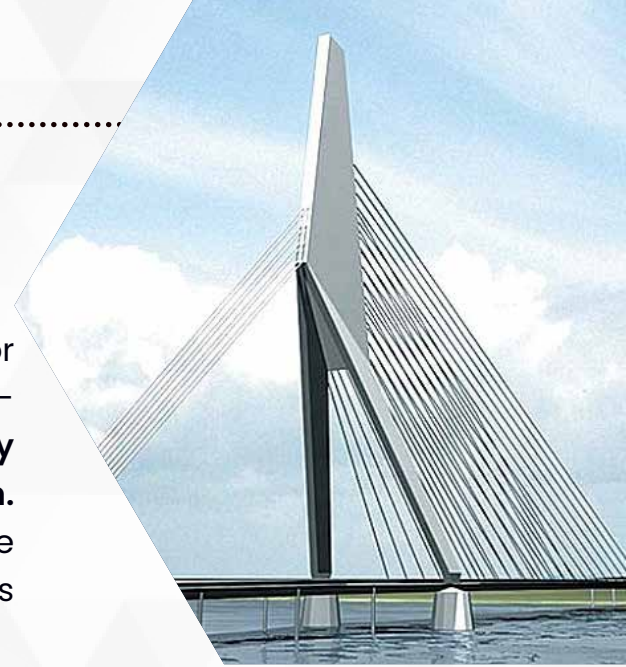


Material Grade: Mild Steel

For Pipe Size	Strip Size	Thread Rod Size
1/2"	1.5x19mm	M8 / M10
3/4"	1.5x19mm	M8 / M10
1"	1.5x19mm	M8 / M10
1 1/4"	1.5x19mm	M8 / M10
1 1/2"	1.5x19mm	M8 / M10
2"	2.0x20mm	M8 / M10
2 1/2"	2.0x20mm	M8 / M10
3"	2.0x20mm	M8 / M10
4"	2.0x20mm	M8 / M10
5"	2.0x20mm	M8 / M10
6"	2.0x20mm	M8 / M10
8"	2.0x25mm	M8 / M10

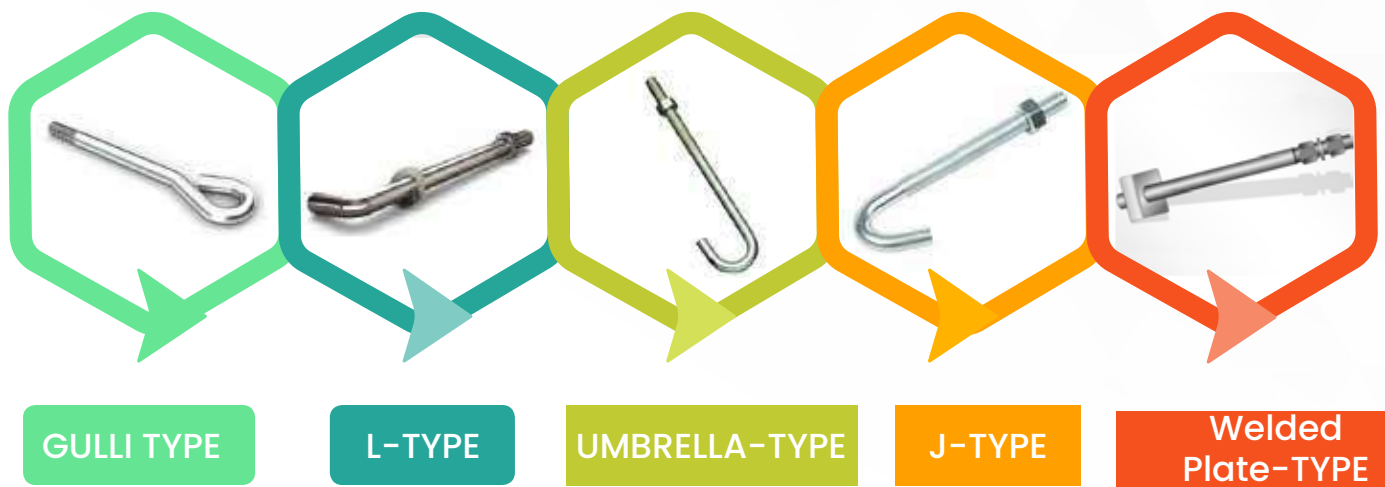
FOUNDATION BOLTS

A Foundation Bolt, is also known as **Anchor Bolt** or **Grouting Bolt**. Foundation bolts are mainly used in pre-engineered buildings manufacturing, **fastening heavy machines to foundations, Pole fixing and construction**. They are also used in process-based businesses like petrochemical, sugar, and FMCG manufacturing. This is available in different type of shapes.



Material Grade: Mild Steel, High Tensile Steel, EN8 Grade

Thread	Length
M12 (1/2")	250mm to 600mm
M16 (5/8")	300mm to 900mm
M20 (3/4")	300mm to 900mm
M24 (1")	300mm to 1200mm
M30 (1 1/4")	600mm to 1500mm
M36 (1 1/2")	600mm to 1800mm
M48 (2")	600mm to 1800mm



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TECHNICAL INFORMATION

CAUSES OF BOLT FAILURE

1) ENVIRONMENT

- a) Corrosive or restive environment will cause reduction in dimension hence bolt failure
- b) Hydrogen embrittlement will cause loss of hardness hence failure
- c) Frequent heating and cooling will cause loss of tensile strength hence bolt failure

2) IMPROPER JOINT

- a) Improper Bolt and Nut mating surface will cause localized loading, hence bolt failure
- b) Loose joint will cause vibration and bolt failure

3) IMPROPER LOAD

- a) Over tension will cause bolt failure
- b) Loose bolt will cause vibration and bolt failure

4) FAULTY DESIGN

- a) Bolt is subjected to more load than specified cause bolt failure
- b) Bolt subjected to more shear load then tensile load may cause bolt failure
- c) Excessive momentary high load due to heavy wind or other natural causes may cause bolt failure.

5) INFERIOR QUALITY

- a) Bolt having less than designated strength may cause failure in tightening
- b) Cracks, material internal fault, Head non alignment to shank or forging fault will add in bolt failure.




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