



# CATALOGUE

[www.kensmetal.co.ke](http://www.kensmetal.co.ke)

# About Us

## “We Are What We Forge.”

In 1982, we pioneered the first foundry and castings facility in East Africa and over 40 years, we have evolved into **Kens Metal Industries Limited**, a dynamic and rapidly expanding company that is **ISO 9001:2015 certified** and now a leading force in the metal industry, proudly serving the East African region and beyond with unparalleled expertise and quality.

We specialize in the manufacturing and supplying of a wide range of high-quality metal and engineering products of international standards. Our growth is driven by a relentless focus on continuous improvement, leveraging cutting-edge technology to ensure excellence in our processes, products, and people.

At Kens Metal Industries, we operate on three fundamental cornerstones: **competitive pricing, uncompromising quality, and timely delivery.**

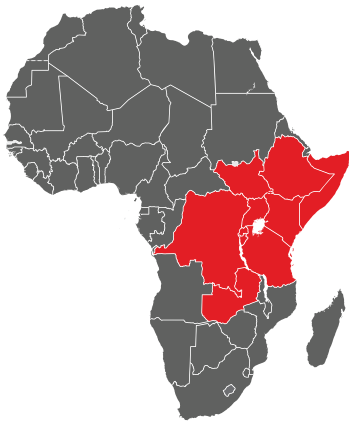
Our commitment to excellence has established us as a trusted partner in the construction, manufacturing, and engineering sectors, as we specialize in delivering top-tier metal and allied products.

Whether you need specially casted metal, precision-cut components, structural beams, or tailored metalwork, our skilled team of professionals will meet the most demanding specifications.

What sets us apart is not just our vast product range and industry knowledge, it is our unwavering dedication to customer satisfaction.

Kens Metal Industries is more than just a supplier; we are a partner in your success.





## Our Reach

- Kenya
- Uganda
- Tanzania
- Ethiopia
- Somalia
- South Sudan
- Rwanda
- Zambia
- D.R. Congo
- Burundi



## Core Values

### “Consistent Perseverance”

#### **Integrity**

With over 40 years of experience, integrity remains the foundation of our operations. It is at the core of who we are and what we do.

#### **Uncompromising Quality**

We are committed to delivering superior quality materials, ensuring excellence in every product we provide.

#### **Customer-Centric Relationships**

We build lasting partnerships with our customers, grounded in trust, mutual respect, and shared success.

#### **Ethical Conduct**

Our business practices are driven by the highest ethical standards. We conduct ourselves with fairness, honesty, transparency, and integrity in every interaction.

#### **Sustainability**

Our commitment to environmental stewardship and a safe workplace is as strong as steel. From casting a green shadow with our sustainability initiatives to hammering out compliance with legal standards, we're dedicated to reducing our environmental footprint and ensuring a greener future.

# Vision Statement

## “Moulding Tomorrow”

To be the premier manufacturer and supplier of metal and allied products for architectural, engineering, manufacturing and commercial applications in the East African region.

# Mission Statement

## “Cast In Metal”

We strive to strengthen the industrial base by providing a wide range of high-quality products through continuous improvement and innovation, while delivering the highest standards of customer satisfaction.



## Our Divisions

- **Manufacturing**
- **Trading**
- **Foundry**
- **Metal Cutting, Shaping & Conversion**

## Our Facilities

- **Casting** - Pressure die casting, Gravity casting, Continuous casting, Sand casting, Investment casting, Centrifugal casting, Forging & Extrusion
- **Cutting** - Computer Numerical Control (CNC) Waterjet & Laser cutting, Electrical discharge machining (EDM) Wire cut, Oxy Gas, Bandsaw cutting
- **Heat Treatment**
- **Metal Analysis**

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# Stainless Steel

Stainless steel is primarily composed of iron, carbon, nickel and chromium. The presence of chromium is key, as it forms a passive oxide layer on the surface, rendering stainless steel highly resistant to corrosion and tarnishing, even in harsh environments.



Stainless steel exhibits a remarkable combination of mechanical properties, including:

**High strength, ductility, and toughness**, making it suitable for a wide range of structural and functional purposes.

**Excellent formability, weldability, and machinability**, allowing for ease of fabrication and customization.

**Hygienic properties**, Smooth, easy-to-clean surface — ideal for food-grade and medical environments.

**Corrosion Resistance:** Excellent resistance to rust, oxidation, and many chemicals

**Durability:** Long-lasting material with low maintenance

**Aesthetic Appeal:** Attractive, modern finish — can be polished to a high gloss or given a brushed/matte look

**Recyclability:** Environmentally friendly and sustainable.

**Temperature Resistance:** Performs well in both high-heat and cryogenic (low-temperature) conditions.

## Industries that use Stainless Steel

- Commercial Kitchens
- Food & Beverage
- Dairy
- Breweries
- Sugar
- Cutlery & Kitchenware
- Medical & Pharmaceutical
- Industrial Manufacturing
- Marine & Offshore
- Energy & Power
- Chemical & Petrochemical
- Pulp & Paper
- Oil & Gas
- Consumer Goods & Appliances
- Construction & Architecture
- Automotive
- Defense & Aerospace
- Agriculture

## Available grades

- G 304
- G 201
- G 316
- G 410S
- G 430

# Stainless Steel

## Grade 304

### Summary

G 304 is the most versatile and the widely used of all stainless steels. Its chemical composition, mechanical properties, weldability and corrosion/oxidation resistance provides the best all-round performance at relatively low cost.

### Typical Applications

G304 is used in all industrial, commercial and domestic fields because of its corrosion and heat resisting properties, some applications include: Tanks and containers for a large variety of liquids and solids. Process equipment in the mining, chemical, cryogenic, food, dairy and pharmaceutical industries.

### Chemical Composition (%)

G 304	C	Si	Mn	P	S	Cr	Ni
Min	≤	≤	≤	≤	≤	18.00	8.00
Max	0.08	0.75	2.00	0.042	0.03	20.00	10.50

*The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for specification purposes.*

### Mechanical Properties At Room Temperature

		Typical	Min
Tensile Strength	MPa	600	515
Proof Stress (Offset 0.2%)	MPa	310	205
Elongation (Percent in 50mm)	—	60	40
Hardness (Brinell)	—	170	—
Endurance (fatigue) limit	MPa	240	—

### Properties At Elevated Temperatures

#### Time Elevated Temperature Tensile Strength

Temperature	°C	600	700	800	900	1000
Tensile Strength	MPa	380	270	170	90	50

#### Creep Data Stress for a creep rate of 1% in 10 000h

Temperature	°C	550	600	650	700	800
Tensile Strength	MPa	120	80	50	30	10

### Maximum Recommended Service Temperature (Oxidising Conditions)

Continuous Service	925 °C
Intermittent Service	850 °C

### Properties At Sub-zero Temperatures

Temperature	°C	-78	-161	-196
Tensile Strength	MPa	1100	1450	1600
Proof Stress (Offset 0.2%)	MPa	300	380	400
Impact Strength (Charpy V-Notch)	J	180	160	155

### Corrosion Resistance

#### Aqueous

As a rough guide the following examples are given for certain pure acid-water mixtures

Temperature °C	20						80					
Concentration % by mass	10	20	40	60	80	100	10	20	40	60	80	100
Sulphuric Acid	2	2	2	2	1	0	2	2	2	2	2	2
Nitric Acid	0	0	0	0	2	0	0	0	0	0	1	2
Phosphoric Acid	0	0	0	0	0	2	0	0	0	0	1	2
Formic Acid	0	0	0	0	0	0	0	1	2	2	1	0

**Key:** 0=resistant  
 1=partly resistant  
 2=non-resistant  
 -corrosion rate less than 100µm/year  
 -corrosion rate 100µ to 1000µm/year  
 -corrosion rate more than 1000µm/year

### Atmospheric

The performance of G304 compared with other metals in various environments is shown in the following table- the corrosion rates are based on 10 years exposure.

Environment	corrosion rate(µm/year)		
	G304	Aluminium-3S	Mild Steel
Rural	0.0025	0.025	5.8
Marine	0.0076	0.432	34.0
Marine Industrial	0.0076	0.686	46.2

### Thermal Processing

#### Annealing

Heat from 1010°C to 1120°C and cool rapidly in air or water. The best corrosion resistance is obtained when the final annealing is above 1070°C and cooling is rapid.

#### Hot working

Initial forging and pressing - 1150°C to 1260°C  
 Finishing temperature - 900 to 925°C  
 All hot working operations should be followed by annealing.

Note: soaking times to ensure uniformity of temperature are longer for stainless steel than for carbon steel - approximately 1 1/2 times.

#### Cold Working

G304 being extremely tough and ductile, is readily fabricated by cold working. Typical operations include bending, forming, deep drawing and upsetting.

# Stainless Steel G 304

## S S Sheets G 304

Size	Thickness (mm)	Kg/Pc
8' X 4'	0.50	12.0
8' X 4'	0.60	14.4
8' X 4'	0.80	19.1
8' X 4'	1.00	23.9
8' X 4'	1.20	28.7
8' X 4'	1.40	33.5
8' X 4'	1.50	35.9
3.0 X 1.5Mtr	1.50	54.3
8' X 4'	1.80	43.1
8' X 4'	2.00	47.9
8' X 4'	2.50	59.8
8' X 4'	3.00	71.8
3.0 X 1.5Mtr	3.00	108.5
8' X 4'	4.00	95.7
8' X 4'	5.00	119.7
8' X 4'	6.00	143.6
8' X 4'	8.00	191.5
8' X 4'	10.00	239.3
8' X 4'	12.00	287.2
8' X 4'	15.00	359.0
1.5 X 1.5Mtr	15.00	271.4
3.0 X 1.5Mtr	15.00	542.7
8' X 4'	20.00	478.7
1.5 X 1.5Mtr	20.00	361.8
3.0 X 1.5Mtr	20.00	723.6
8' X 4'	25.00	598.3
1.5X 1.7Mtr	25.00	512.5
3.0 X 1.7Mtr	25.00	1025.0
8' X 4'	32.00	765.9
8' X 4'	40.00	957.3
8' X 4'	50.00	1196.7

## S S Sheets G 304 Hairline - PVC

Size	Thickness (mm)	Kg/Pc
8' x 4'	0.80	19.1
8' x 4'	1.00	23.9
8' x 4'	1.20	28.7
8' x 4'	1.50	35.9
8' x 4'	2.00	47.9
8' x 4'	3.00	71.8

## S S Coil G 304 - Cut to Length

Size	Thickness (mm)	Kg/Mtr
730mm	1.00	5.9
730mm	1.20	7.0
730mm	1.50	8.8
730mm	2.00	11.8
1500mm	1.50	18.1
1500mm	3.00	36.2
1500mm	4.00	48.2

## S S Sheets G 304 - Chequered

Size	Thickness (mm)	Kg/Pc
8' X 4'	1.20	28.7
8' X 4'	1.50	35.9
8' X 4'	2.00	47.9
8' X 4'	3.00	71.8
8' X 4'	4.00	95.7
8' X 4'	6.00	143.6

## S S Sheets G 304 - Perforated

Size	Thickness (mm)	Hole Size
8' X 4'	1.00	5 mm
8' X 4'	1.20	5 mm
8' X 4'	1.50	5 mm

## S S Round Tubes G 304 (Length 5.8mtrs)

Diameter	Thickness(mm)
3/8"	1.00
1/2"	1.00
1/2"	1.20
1/2"	1.50
5/8"	1.00
5/8"	1.20
5/8"	1.50
3/4"	1.00
3/4"	1.20
3/4"	1.50
1"	1.00
1"	1.20
1"	1.50
1 1/4"	1.20
1 1/4"	1.50
1 1/2"	1.20
1 1/2"	1.50
1 1/2"	2.00
1 3/4"	1.50
2"	1.20
2"	1.50
2"	2.00
2 1/2"	1.20
2 1/2"	1.50
2 1/2"	2.00
3"	1.50
3"	2.00
4"	2.00
5"	2.00
6"	2.00
8"	2.00

## S S Slot Tube G 304 (Length 5.8 mtrs)

Size	Thickness(mm)
2" x 1" x 1"	1.20

## S S Square Tubes G 304 (Length 5.8mtrs)

Size	Thickness(mm)
5/8" X 5/8"	1.00
5/8" X 5/8"	1.20
3/4" X 3/4"	1.00
3/4" X 3/4"	1.20
1" X 1"	1.00
1" X 1"	1.20
1" X 1"	1.50
1 1/4" X 1 1/4"	1.20
1 1/2" X 1 1/2"	1.20
1 1/2" X 1 1/2"	1.50
1 1/2" X 1 1/2"	2.00
2" X 2"	1.20
2" X 2"	1.50
2" X 2"	2.00
3" X 3"	2.00
3" X 3"	3.00
4" X 4"	2.00
4" X 4"	3.00

## S S Rectangular Tubes G 304 (Length 5.8mtrs)

Size	Thickness(mm)
40mm X 20mm	1.20
50mm X 30mm	1.20
50mm X 30mm	1.50
60mm x 40mm	1.20
3" X 1 1/2"	2.00
4" X 2"	2.00
4" X 2"	3.00
6" X 3"	3.00

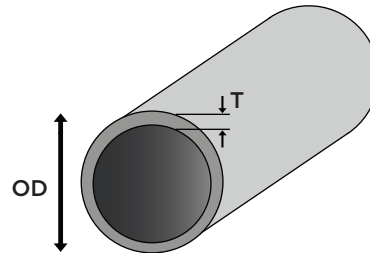
## S S Hygenic Round Tubes G 304 Double Sided Polished (Length 5.8mtrs)

Diameter	Thickness(mm)
1"	1.50
2"	1.50

# Stainless Steel G 304

## Schedule Stainless Steel Pipe

Schedule stainless steel pipe refers to a specific wall thickness of stainless-steel pipes. Schedule 10 designates a relatively thinner wall, making it lightweight and suitable for applications where moderate pressure and reduced weight are important. Schedule 40 designates a thicker wall and are often used in applications requiring a balance of strength and larger pressure handling.



For example;

**Pipe Size = 3/8"**  
**OD = 17.5mm**  
**T = 2.11mm**  
**L = 5.8metres**

## S S Round Pipes Sch 10 G 304 (Length 5.8mtrs)

			Temperature (°C)	-28.9 to 37.8	93	149	204	260	316	371	427
			Maximum stress	13,300	11,400	10,200	9,300	8,700	8,300	8,000	7,700
Nominal Pipe Size	Outside Dia(mm)	Thickness (mm)	Weight/ Pc (Kg)	Allowable working pressure (PSI)							
1/4"	13.76	1.65	2.80	2600	2229	1994	1818	1701	1623	1564	1506
3/8"	17.15	2.11	3.50	2043	1751	1567	1428	1336	1275	1229	1183
1/2"	21.34	2.11	5.90	2100	1800	1611	1468	1374	1311	1263	1216
3/4"	26.67	2.11	7.50	1655	1419	1270	1158	1083	1033	996	958
1"	33.40	2.77	12.40	1741	1492	1335	1217	1139	1086	1047	1008
1 1/4"	42.16	2.77	15.80	1362	1167	1044	952	891	850	819	788
1 1/2"	48.26	2.77	18.30	1182	1014	907	827	773	738	711	685
2"	60.33	2.77	23.10	938	804	719	656	614	585	564	543
2 1/2"	73.03	3.05	31.00	851	729	652	595	556	531	512	492
3"	88.90	3.05	38.00	695	596	533	486	455	434	418	402
4"	114.30	3.05	49.30	538	461	412	376	352	335	323	311
5"	141.50	3.40	66.10	485	415	372	339	317	302	292	281
6"	168.28	3.40	81.40	406	348	311	284	266	253	244	235
8"	219.08	3.76	118.80	344	295	264	240	225	214	207	199
10"	272.00	4.19	165.00	307	263	235	215	201	192	185	178
12"	323.80	4.57	212.00	282	242	216	197	185	176	170	163
14"	355.60	6.35	319.00	229	196	175	160	150	143	138	133
16"	406.40	6.35	366.00	200	171	153	140	131	125	120	116

## S S Round Pipes Sch 40 G 304 (Length 5.8mtrs)

			Temperature (°C)	-28.9 to 37.8	93	149	204	260	316	371	427
			Maximum stress	13,300	11,400	10,200	9,300	8,700	8,300	8,000	7,700
Nominal Pipe Size	Outside Dia(mm)	Thickness (mm)	Weight Kg/ Pc	Allowable working pressure (PSI)							
1/4"	13.76	2.20	3.70	3639	3119	2791	2545	2380	2271	2189	2107
3/8"	17.15	2.31	4.50	2945	2524	2259	2059	1926	1838	1771	1705
1/2"	21.34	2.77	7.50	2424	2420	2166	1974	1847	1762	1698	1635
3/4"	26.67	2.87	9.90	2303	1974	1766	1610	1506	1437	1385	1333
1"	33.40	3.38	14.70	2153	1846	1651	1506	1409	1344	1295	1247
1 1/4"	42.16	3.56	18.00	1773	1520	1360	1240	1160	1107	1067	1027
1 1/2"	48.26	3.68	23.90	1595	1367	1223	1115	1043	995	959	923
2"	60.33	3.91	32.10	1344	1152	1031	940	879	839	808	778
2 1/2"	73.03	5.16	51.40	1470	1260	1127	1028	961	917	884	851
3"	88.90	5.49	66.50	1276	1094	979	892	835	796	768	739
4"	114.30	6.02	94.80	1082	927	830	756	708	675	651	626
5"	141.50	6.55	128.40	948	813	727	663	620	592	570	549
6"	168.28	7.11	166.60	862	739	661	602	564	538	518	499
8"	219.00	8.10	220.00	758	650	582	530	496	473	456	439

# Stainless Steel G 304

## S S Fittings G 304

### S S Bends G 304 (90 degree)

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"
6"
8"

### S S Tees G 304

1/2"
3/4"
1"
1 1/2"
2"
2 1/2"
3"
4"

### S S Weldon Quick Fit Union G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"
6"
8"

### S S Weldon Union G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
3"
4"
6"

### S S Reducer G 304

1 1/4" x 1"
-------------

### S S Bends G 304 (135 degree)

1"	
1 1/2"	
2"	
<b>S S Ball Valves G 304</b>	
1/2"	
3/4"	
1"	
1 1/4"	
1 1/2"	
2"	
2 1/2"	
3"	

### S S Butterfly Valves G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"
6"
8"

## S S Hand Rail Fittings G 304

Item Description	Size	Code
SS Adjustable Elbow	1/2"	BF05
SS Adjustable Elbow	1 1/2" & 2"	AE02
SS Long Elbow	1 1/2", 2" & 2 1/2"	AE04
SS Short Elbow	2"	AE05
SS Tube connector	1 1/2" & 2"	AE06
SS Cross Bar	12mm & 16mm	BF01
SS Cross Bar Flat Base	12mm	BF01S
SS Base Plate	1 1/2" & 2"	BP04
SS Base Plate (With cover)	1 1/2" & 2"	BP07
SS Base Plate (Square)	1 1/2"x1 1/2"	BP05
SS Base Plate (Square)	2"x2"	BP08
SS Mounting Plate	1 1/2"	BP14
SS Mounting Plate	1 1/2"	BP16
SS Rosette Cover (Square)	1 1/2"x1 1/2" & 2"x2"	CC03
SS Rosette Cover (Round)	1 1/2", 2" & 2 1/2"	CC04
SS End Cap	12.7mm & 19mm	CC07
SS End Cap	38.1mm & 50.8mm	CC13
SS End Cap	1 1/2", 2" & 2 1/2"	CC21
SS Short Universal Joint	1 1/2"	HS10
SS Long Universal Joint	1 1/2" & 2"	HS15
SS Universal Joint Square	1 1/2"x1 1/2"	HS34
SS Fixed Wall Bracket	2"	HB05
SS Adjustable Wall Bracket	2"	HB14
SS Glass Bracket	1 1/2"	HBO2
SS Glass Clamp		GC01
SS Glass Clamp (Flat base)		GC01F
SS Glass Clamp		GC02
SS Glass Clamp (Flat base)		GC02F
SS Glass Clamp (Spigot)		GC11
SS Dual Glass Clamp		GC23
SS Glass Clamp Standoff		GC28
SS Wire rope	3mm, 6mm & 10mm	CS019
SS Swageless Tensioner Turnbuckles	6mm	CS028
SS Hand Swageless Toggle Cable Tensioner	6.0mm	CS029
	6.0mm	CS030

### SS Pipe Holder G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"
5"
6"

### SS Bolted Fixed Cleaning Ball

1"
1 1/2"
2"

### SS Threaded Rotary Cleaning Ball

1"
1 1/2"
2"

### SS Angle Type Strainer

1"
1 1/2"
2"
3"
4"



# Stainless Steel G 304

## S S Schedule Fittings G 304

### S S Elbow Sch10 G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"
6"
8"
10"
12"

### S S Tee Sch10 G 304

1/2"
3/4"
1"
1 1/2"
2"
2 1/2"
3"
4"
6"

### S S Threaded Socket Sch10 G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
3"
4"

### S S Threaded Elbow Sch10 G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"

### S S Threaded Tee Sch10 G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"

### S S Long Nipple Sch10 G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
3"
4"

### S S Socket Union Threaded Sch10 G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"

### S S Y Strainer Sch10 (PN16) G 304

1/2"
3/4"
1"
1 1/2"
2"
3"

### SS PN16 3-Pc Flanged Ball Valve

1"
1 1/2"
2"
3"
4"

### S S Threaded Hex Nipple Sch10 G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
3"
4"

### S S Flange Sch10 (PN16) G 304

1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"
6"
8"
10"
12"

### SS Threaded 1/2/3-Pc Ball Valve

1"
1 1/2"
2"
3"
4"

### S S Non Return Valve Sch10 G 304

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
3"
4"

### S S Elbow Sch40 G 304

1/2"
3/4"
1"
1 1/2"
2"
2 1/2"
3"
4"
6"

### S S Tee Sch40 G 304

1/2"
3/4"
1"
1 1/2"
2"



# Stainless Steel G 304

## S S Round Rod G 304

Dia (mm)	Kg/Mtr
3.00	0.06
4.50	0.13
6.00	0.25
8.00	0.40
10.00	0.60
12.00	0.90
16.00	1.60
20.00	2.50
25.00	3.80
30.00	5.50
35.00	7.50
40.00	9.80
45.00	12.20
50.00	15.30
55.00	18.50
60.00	22.10
65.00	24.80
70.00	30.00
75.00	35.70
80.00	39.00
90.00	48.60
100.00	61.80
130.00	94.30
150.00	136.50
180.00	200.00
200.00	247.00
250.00	394.00

## S S Flat Bars G 304

Size (width x thickness) mm	Kg/Mtr
40 x 4mm	1.30
50 x 5mm	2.00
60 x 6mm	2.80
80 x 6mm	4.00

## S S Square Bar G 304

Size (mm)	Kg/Mtr
6.00 x 6.00	0.31
8.00 x 8.00	0.53
10.00 x 10.00	0.81
12.00 x 12.00	1.19
14.00 x 14.00	1.49
16.00 x 16.00	2.05
19.00 x 19.00	2.81
20.00 x 20.00	3.13
22.00 x 22.00	3.85
25.00 x 25.00	4.80
30.00 x 30.00	7.10
36.00 x 36.00	10.17
40.00 x 40.00	12.52

## S S Hollow Bar G 304

Od x Id (mm)	Kg/Mtr
33.00 X 21.00	4.03
42.00 X 30.00	5.40
48.00 X 34.00	6.30
60.00 X 43.40	10.90
73.00 X 54.00	15.00
89.00 X 59.00	27.70
95.00 X 63.00	31.50
101.60 X 81.00	23.50
114.00 X 92.00	28.20

## S S Angles G 304

Size (mm)	Kg/Mtr
20 x 20 x 3	1.00
25 x 25 x 3	1.20
30 x 30 x 3	1.40
40 x 40 x 3	1.80
40 x 40 x 4	2.40
50 x 50 x 3	2.30
50 x 50 x 5	3.70
60 x 60 x 6	5.20
80 x 80 x 8	9.40

## S S Hex Bar G 304

Size (mm)	Kg/Mtr
14.00	1.36
16.00	2.00
17.00	2.10
19.00	2.50
22.00	3.32
24.00	4.00
27.00	5.00
30.00	6.08
36.00	8.75
41.00	11.50

## S S Mesh G 304

Width 1.2Mtrs, length cut to size	Kg/Mtr
Mesh 5	Gauge 20
Mesh 10	Gauge 20
Mesh 20	Gauge 27
Mesh 30	Gauge 30
Mesh 40	Gauge 32
Mesh 60	Gauge 37
Mesh 80	Gauge 40
Mesh 100	Gauge 42



# Stainless Steel

## Grade 201

### Summary

G 201 Stainless Steel is an austenitic chromium-nickel- manganese stainless steel. It is a lower cost alternative to conventional Cr-Ni stainless steels such as 316 and 304. Manganese and Nitrogen additions renders this grade more economical while endowing it with good strength and high formability making it highly suitable for a wide variety of consumer and structural applications.

### Typical Applications

**Catering** - Shallow/medium drawn utensils, tableware, cutlery, stands for water filters.

**Consumer Durables** - Steel furniture, fruit stands, flower vases, decorative pipes and tubes, gas stoves and gift items.

**Architecture Building and Construction** - In-house panels, hand rails, and structural support framework, door knobs, hinges and dust bin.

**Transport** - Roll formed sections and conveyors.

**Industrial** - Material handling equipment.

This grade should not be used for external application in coastal areas. It is not recommended for handling storage of acid and other highly corrosive industrial chemicals.

### Fabrication

#### Welding

G 201 can be welded by all conventional methods applied to 18/8 type of austenitic stainless steel. Filler wire or electrodes of the conventional Chromium-nickel 300 series stainless steel can be used.

#### Cold Forming

Tough and ductile and readily amenable to drawing, bending, stretch forming and spinning.



### S S Sheets G 201

Size	Thickness (mm)	Kg/Pc
8' X 4'	1.00	23.9
8' X 4'	1.20	28.7
8' X 4'	1.50	35.9
8' X 4'	2.00	47.9
8' X 4'	2.50	59.8
8' X 4'	3.00	71.8
8' X 4'	4.00	95.7
8' X 4'	6.00	143.6
8' X 4'	8.00	191.5

### S S Sheets G 201 - Chequered

Size	Thickness (mm)	Kg/Pc
8' X 4'	3.00	71.80

### S S Sheets G 201 Hairline - PVC

Size	Thickness (mm)	Kg/Pc
8' X 4'	0.50	12.0
8' X 4'	0.60	14.4
8' X 4'	0.70	16.7
8' X 4'	0.80	19.1
8' X 4'	0.90	21.5
8' X 4'	1.00	24.0
8' X 4'	1.10	26.3
8' X 4'	1.20	28.7
8' X 4'	1.40	33.5
8' X 4'	1.50	35.9
8' X 4'	2.00	47.9
8' X 4'	3.00	71.8

### S S Sheets G 201 - Decorative

Colour	Finish
Gold/Rose Gold/Black/Silver	Mirror
Green/Purple/Blue/ Brown/ Gold / Rose Gold	Hairline
Grey Sand Blast / Rice Embossed	

Size : 8' x 4' x 0.8mm

### S S Coil G 201- Cut to Length

Size	Thickness (mm)	Kg/Pc
730mm	1.00	5.9
730mm	1.20	7
730mm	1.50	8.8
730mm	2.00	11.8

# Stainless Steel G 201

## S S Round Tubes G 201 (5.8mtrs Length)

Diameter	Thickness (mm)
1/2"	1.00
1/2"	1.20
5/8"	1.00
5/8"	1.20
5/8"	1.50
3/4"	1.00
3/4"	1.20
3/4"	1.50
1"	1.00
1"	1.20
1"	1.50
1 1/4"	1.20
1 1/2"	1.00
1 1/2"	1.20
1 1/2"	1.50
2"	1.00
2"	1.20
2"	1.50
2"	2.00
2 1/2"	1.20
2 1/2"	1.50
2 1/2"	2.00
3"	1.50

## S S Square Tubes G 201 (5.8mtrs Length)

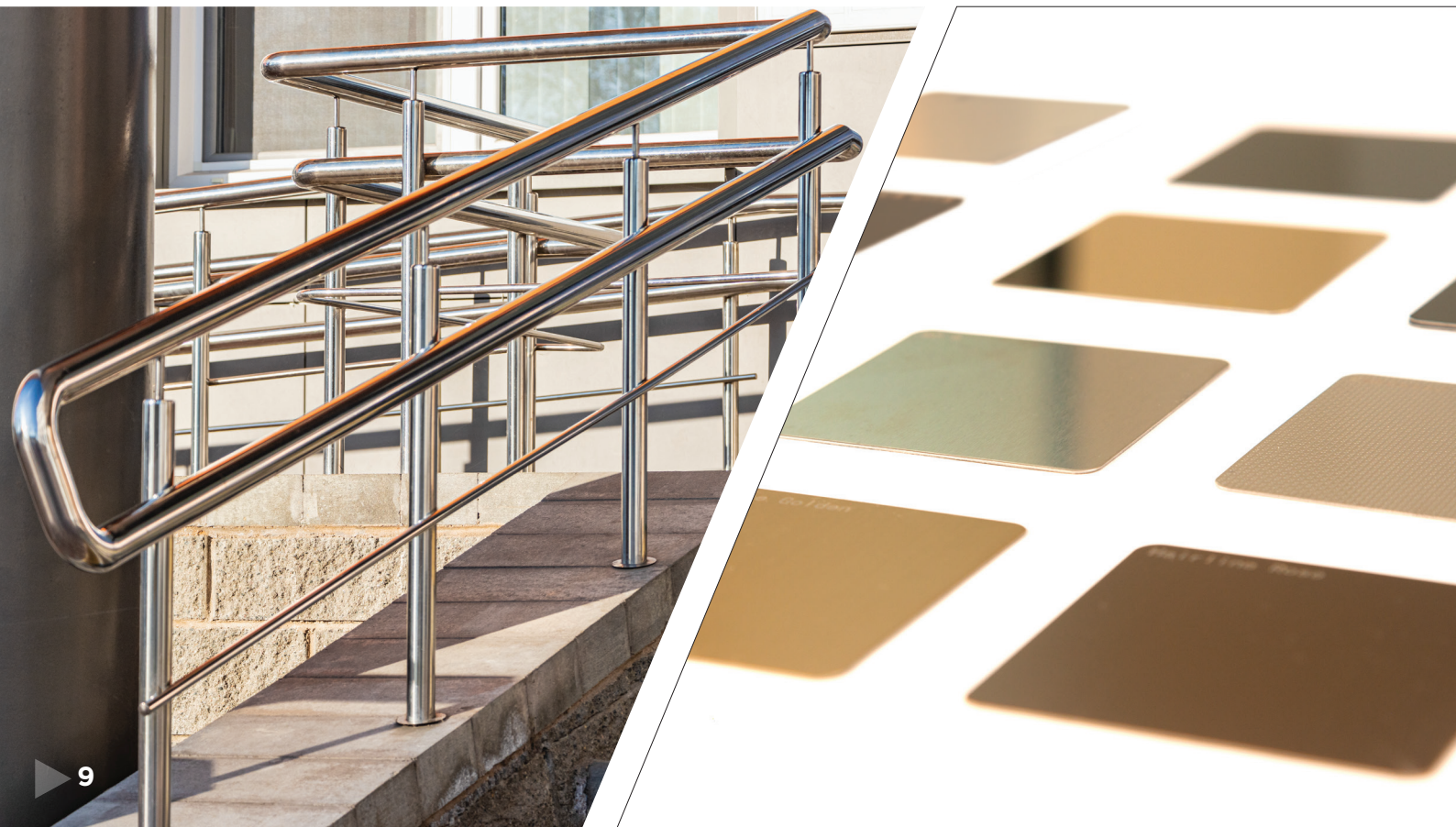
Size	Thickness (mm)
5/8" x 5/8"	1.00
3/4" x 3/4"	1.00
3/4" x 3/4"	1.20
1" x 1"	1.00
1" x 1"	1.20
1" x 1"	1.50
1 1/4" x 1 1/4"	1.00
1 1/4" x 1 1/4"	1.20
1 1/2" x 1 1/2"	1.00
1 1/2" x 1 1/2"	1.20
1 1/2" x 1 1/2"	1.50
1 1/2" x 1 1/2"	2.00
2" x 2"	1.20
2" x 2"	1.50
2" x 2"	2.00

## S S Rectangle Tubes G 201 (5.8mtrs Length)

Size	Thickness (mm)
40mm x 20mm	1.20
50mm x 30mm	1.20
50mm x 30mm	1.50
50mm x 30mm	2.00

## S S Slot Tube G 201 (5.8mtrs Length)

Size	Thickness (mm)
50mm x 25mm x 25mm	1.2mm



# Stainless Steel

## Grade 316

### Summary

G 316 is an improved version of 304, with the addition of molybdenum and a slightly higher nickel content. The resultant composition of 316 gives the steel increased corrosion resistance in many aggressive environments. The molybdenum makes steel more resistant to pitting and crevice corrosion in chloride- contaminated media, sea water and acetic acid vapours. The lower rate of general corrosion in mildly corrosive environment gives the steel good atmospheric corrosion resistance in polluted marine atmospheres.

316 offers higher strength and better creep resistance at higher temperatures than 304. 316 also possesses excellent mechanical and corrosion properties at sub-zero temperatures.

### Typical Applications

Because of its superior corrosion and oxidation resistance, good mechanical properties and fabricability, 316 has applications in many sectors of industry. Some of these include:

Tanks and storage vessels for corrosive liquids.

Specialised process equipment in the chemical, food, paper, mining, pharmaceutical & petroleum industries. Architectural applications in highly corrosives environment.

### Chemical Composition (%)

G 316	C	Si	Mn	P	S	Cr	Ni	Mo
Min	≤	≤	≤	≤	≤	16.00	10.00	2.00
Max	0.03	1.00	2.00	0.045	0.03	18.00	14.00	3.00

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for specification purposes.

### Mechanical Properties at Room Temperature

		316		S316L		316Ti	
		Typ	Min	Typ	Min	Typ	Min
Tensile Strength	MPa	580	515	570	485	600	515
Proof Stress (0.2% offset)	MPa	310	205	300	170	320	205
Elongation (Percent in L=5.65So)		55	40	60	40	50	40
Hardness (Brinell)		165	-	165	-	165	-
Erichsen Cup Test Value	mm	8-10	-	10-11	-	-	-
Endurance (fatigue) limit	Mpa	260	-	260	-	260	-

### Properties At Elevated Temperatures

#### Time Elevated Temperature Tensile Strength

Temperature	°C	600	700	800	900	1000
Tensile Strength	MPa	460	320	190	120	70

#### Creep Data Stress for a creep rate of 1% in 10 000h

Temperature	°C	500	600	650	700	800
Tensile Strength	MPa	160	120	90	60	20

#### Maximum Recommended Service Temperature (Oxidising Conditions)

Continuous Service	925 °C
Intermittent Service	870 °C

### Properties At Sub-zero Temperatures

Temperature	°C	-78	-161	-196
Tensile Strength	MPa	400	460	580
Proof Stress (Offset 0.2%)	MPa	820	1150	1300
Impact Strength (Charpy V-Notch)	J	180	165	155

### Corrosion Resistance

#### Aqueous

As a rough guide the following examples are given for certain pure acid-water mixtures

Temperature °C	20					80						
Concentration % by mass	10	20	40	60	80	100	10	20	40	60	80	100
Sulphuric Acid	0	1	2	2	1	0	2	2	2	2	2	2
Nitric Acid	0	0	0	0	0	1	0	0	0	0	1	2
Phosphoric Acid	0	0	0	0	1	2	0	0	0	0	1	2
Formic Acid	0	0	0	1	1	0	0	0	1	1	1	0

**Key:** 0=resistant -corrosion rate less than 100µm/year  
 1=partly resistant -corrosion rate 100µ to 1000µm/year  
 2=non-resistant -corrosion rate more than 1000µm/year

### S S Sheets G 316

Size	Thickness (mm)	Kg/Pc
8' X 4'	1.00	23.9
8' X 4'	1.50	35.9
8' X 4'	2.00	47.9
8' X 4'	3.00	71.8
8' X 4'	4.00	95.7
8' X 4'	6.00	143.6
10' X 5'	6.00	222.0
8' X 4'	8.00	191.5

# Stainless Steel G 316

## S S Round Tubes G 316 (Length 5.8mtrs)

Diameter	Thickness (mm)
1/2"	1.50
3/4"	1.50
1"	1.50
1 1/4"	1.50
1 1/2"	1.50
2"	1.50
2 1/2"	1.50
3"	1.50
4"	2.00
6"	2.00

## S S Round Rod G 316

Dia (mm)	Kg/Mtr
12.00	0.9
16.00	1.6
20.00	2.5
25.00	3.8
30.00	5.5
40.00	9.8
50.00	15.3
65.00	24.8
75.00	35.7
100.00	61.8

## S S G 316 Fittings

### S S Bends G 316

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"
6"

### S S Tees G 316

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"

### S S Weldon Union G 316

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"

### S S Reducer G 316

3/4" x 1/2"
3/4" x 1/4"
1" x 1/2"
1" x 3/4"
1 1/4 x 3/4"
1 1/4" x 1"
1 1/2" x 1/2"
1 1/2" x 3/4"
1 1/2" x 1"
1 1/2" x 1 1/4"
2" x 1"
2" x 1 1/4"
2" x 1 1/2"
2 1/2" x 1 1/4"
2 1/2" x 1 1/2"
2 1/2" x 2"
3" x 1 1/2"
3" x 2"
3" x 2 1/2"
4" x 2"
4" x 2 1/2"
4" x 3"

### S S Butterfly Valve G 316

1/2"
3/4"
1"
1 1/4"
1 1/2"
2"
2 1/2"
3"
4"

### S S Weldon Quick Fit Union G 316

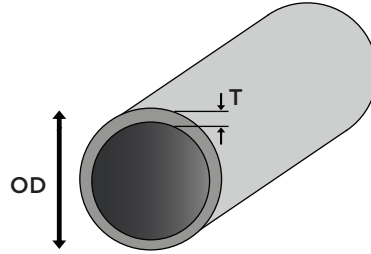
1"
1 1/4"
1 1/2"
2"
2 1/2"



# Stainless Steel G 316

## S S G 316 - Schedule 10

Schedule stainless steel pipe refers to a specific wall thickness of stainless-steel pipes. Schedule 10 designates a relatively thinner wall, making it lightweight and suitable for applications where moderate pressure and reduced weight are important.



For example;

**Pipe Size = 1/2"**  
**OD = 21.34mm**  
**T = 2.11mm**  
**L = 5.8metres**

## S S Round Pipes Sch 10 G 316 (Length 5.8mtrs)

			Temperature (°C)	-28.9 to 37.8	93	149	204	260	316	371	427
				Maximum stress	13,300	11,400	10,200	9,300	8,700	8,300	8,000
Nominal Pipe Size	Outside Dia(mm)	Thickness (mm)	Kg/ Pc	Allowable working pressure (PSI)							
1/2"	21.34	2.11	5.90	2100	1800	1611	1468	1374	1311	1263	1216
3/4"	26.67	2.11	7.50	1655	1419	1270	1158	1083	1033	996	958
1"	33.40	2.77	12.40	1741	1492	1335	1217	1139	1086	1047	1008
1 1/4"	42.16	2.77	15.80	1362	1167	1044	952	891	850	819	788
1 1/2"	48.26	2.77	18.30	1182	1014	907	827	773	738	711	685
2"	60.33	2.77	23.10	938	804	719	656	614	585	564	543
2 1/2"	73.03	3.05	31.00	851	729	652	595	556	531	512	492
3"	88.90	3.05	38.00	695	596	533	486	455	434	418	402
4"	114.30	3.05	49.30	538	461	412	376	352	335	323	311

## S S G 316 Schedule Fittings

### S S Elbow Sch10 G 316

1/2"
3/4"
1"
1 1/2"
2"
4"

### S S Tee Sch10 G 316

1/2"
3/4"
2 1/2"

### S S Reducer Sch10 G 316

3/4" x 1/2"	2" x 1 1/2"
1" x 3/4"	2 1/2" x 1 1/2"
1" x 1/2"	2 1/2" x 2"
1 1/2" x 1"	3" x 1 1/2"
1 1/4" x 1"	3" x 2"
1 1/2" x 1/2"	3" x 2 1/2"
1 1/2" x 3/4"	4" x 3"
2" x 1"	4" x 2"



# Stainless Steel

## Grade 410S

### Summary

The low carbon and a small alloy addition minimize austenite formation at high temperatures which restricts the alloy's ability to harden. 410S remains soft and ductile even when rapidly cooled from critical temperature. This non-hardening characteristic helps prevent cracking when the alloy is exposed to high temperatures or welded. 410S is completely ferritic in the annealed condition. It exhibits adequate corrosion resistance and good oxidation resistance.

It is used where strength, hardness, and/or wear resistance must be combined with corrosion resistance.

### Typical Applications

Food processing equipments, hydrometallurgy, heat exchangers, oil and gas production equipments, pulp mill bleach systems, seawater handling equipments, Tall oil distillation columns and equipments.

### Chemical Composition (%)

G 410S	C	Si	Mn	P	S	Cr	Ni
Min	≤	≤	≤	≤	≤	11.50	≤
Max	0.15	1.00	1.00	0.04	0.03	13.50	0.06

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for specification purposes.

### S S Sheets G 410S

Size	Thickness (mm)	Kg/Pc
1500mm x 3000mm	3.00	108.5
1500mm x 3000mm	6.00	217.1
1500mm x 3000mm	8.00	289.4
1500mm x 3000mm	10.00	361.8
1500mm x 3000mm	12.00	434.2

## Grade 430

### Summary

Stainless steel grade 430 is a ferritic, magnetic stainless steel with good corrosion resistance, formability, and heat resistance. It contains 16-18% chromium and no nickel, making it more economical than austenitic grades. While it performs well in mildly corrosive environments, it is not ideal for marine or highly acidic conditions. It has fair machinability and limited weldability, but its aesthetic appeal and magnetic properties make it suitable for various indoor and light-duty applications.

### Typical Applications

Automotive trim, interior architectural panels and decorative finishes, elevator doors and claddings, combustion chambers, gutters and downspouts, mufflers, stove tops, non-food contact restaurant equipment.

### Chemical Composition (%)

G 430	C	Si	Mn	P	S	Cr	Ni
Min	≤	≤	≤	≤	≤	16.00	-
Max	0.12	1.00	1.00	0.04	0.03	18.00	-

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for specification purposes.

### S S Sheets G 430 - BA Finish

Size	Thickness (mm)	Kg/Pc
8' X 4'	0.40	9.6
8' X 4'	0.50	12.0
8' X 4'	0.60	14.4
8' X 4'	0.80	19.1
8' X 4'	0.90	21.5
8' X 4'	1.00	23.9
8' X 4'	1.20	28.7



# Stainless Steel

## Gas Burners, Grids & Fittings

Burner	Head Dia
Burner G-Type - G9	89mm
Burner G-Type - G10	113mm
Burner G-Type - G11	131mm
Burner G-Type - G12	180mm
Burner Mini Bottom with Valve	100mm
Burner Deluxe Bottom with Valve	145mm
Korean Burner With Valve	200mm
Platina Burner with Valve	140mm
Torch Burner T-65	110mm
Moon Burner M-22	59mm
Moon Burner M-35	91mm
Giant Jumbo Bottom Burner with Valve	310mm
Giant Jumbo Bottom Burner Complete with stand	310mm
JE 2 Ring Burner	305mm
Jodhpuri Burner NO.2	165mm
Aluminium Low Pressure with brass cap	115mm
Brass High Pressure	55mm
Low Pressure Burner top	115mm
Bunsen Burner 1	-

Grids & Fittings	Size
Female Hose Nipple	3/8"
Male Hose Nipple	3/8"
Brass Nut with Nipple	3/8"
Ball Valve - Nozzle	3/8"
Ball Valve - Regular	1/4", 3/8" & 1/2"
F Valve - Nozzle	1/4"
Square Grid	14" x 14", 18" x 18", 24" x 24"
Copper Pipe 1/4"	Thickness 0.8mm
Copper Pipe 3/8"	Thickness 0.76mm
Copper Pipe 1/2"	Thickness 0.89mm
Copper Pipe 7/8"	Thickness 1.14mm
Low Pressure Nozzel	-
Gas Tap	-

## S S Hex Screw -Bolts, Nuts, Flat & Spring Washer G 304

Size	Length
M4	20mm & 40mm
M6	30mm & 60mm
M8	40mm & 80mm
M10	30mm, 50mm & 100mm
M12	30mm, 50mm & 100mm
M16	60mm & 120mm
M20	80mm, 120mm & 160mm

## SS Rawl Bolts G 304

Size	Length
M6	50mm
M8	65mm
M10	80mm
M12	100mm
M16	100mm

## S S Full Thread Stud G 304

Size	Length
M4	1000mm
M6	1000mm
M8	1000mm
M10	1000mm
M12	1000mm
M16	1000mm
M20	1000mm
M24	1000mm
M30	1000mm

## Caster Wheels

Type	Size
Fixed	4", 5" & 6"
Swivel	4", 5" & 6"
Swivel Brake Type	3", 4" & 5"

## Polishing Items

Description	Size
Polishing Pads Black - BG1613B	Dia 100mm
Polishing Pads White - BG1613W	Dia 100mm
Polishing Pads Red - BG1613R	Dia 125mm
Flap Disc - BG1623	Dia 100mm
Sisal Mop - BG1627	Dia 210 x 50mm
Flap Wheel - BG1628	Dia 165 x 50 x 25.4mm
Nylon Sheel - 7P 320#	Dia 203.2 x 50.8mm
Hyphin Soap	
Buffing Mop	
Pickling & Passivating Paste	1 Kg

## Additional Items

S S Welding Rod - E 308L 2.5mm /3.15mm
S S Mig Wire - 308L 0.8, 1.0, 1.2, 1.6 (15Kg)
S S Filler Metal - G 316 1.6mm /2.4mm
Stainless Steel Pizza Jiko - 2 and 3 Tray
S S Tig Wire

## S S Weldmesh G304

40x40x3mm
30x30x3mm



# Mild Steel

Mild steel, often referred to as low-carbon steel, is one of the most commonly produced forms of steel and serves as a fundamental material in the steel industry due to its balanced composition and wide availability. It is one of the most commonly used materials in various applications due to its excellent properties.



As technology advances, Mild Steel continues to be a vital component of modern civilization due to its characteristics as below;

- High ductility and malleability:** Allows for easy shaping, forming, and welding.
- Good tensile strength:** Offers a balance of strength and flexibility.
- Cost-effective:** Mild Steel is relatively inexpensive compared to other materials.
- Versatility:** Can be used in various applications due to its wide range of properties.
- Weldability:** Mild Steel can be easily welded without compromising its structural integrity.
- Machinability:** It can be machined with ease, making fabrication processes efficient.
- Recyclability:** Mild Steel is 100% recyclable, making it an environmentally friendly choice.

## Industries that use Mild Steel

- Shipyard and Shipbuilding
- Railway
- Mining
- Cement
- Power Generation
- Agriculture
- Packaging
- Oil, gas & chemical
- Construction
- Automotive
- Telecommunication
- Architecture and Engineering sectors
- General engineering and manufacturing sectors
- HVAC (Heating, Ventilation, and Air Conditioning)

## Available product range

- Mild steel (Plates, Round/ Square/ Hexagonal Rods)
- Galvanised steel sheets
- Seamless Schedule 40, 80 and 160 Pipes & Fittings
- Universal Beams & Columns
- CRCA sheets (Cold Rolled Close Annealed)

# Mild Steel Plates

## Summary

Mild steel plates are hot rolled flat sheets made from mild steel with varying thicknesses.

They are available in different dimensions and can be cut or shaped according to specific requirements.

## Typical Applications

Building frames, bridges, storage tanks, containers, pipelines, fabrication of machinery, agricultural equipment, automotive chassis, and body panels.

## Chemical Composition (%)

	C	Si	Mn	P	S
Min	≤	≤	≤	≤	≤
Max	0.17	0.35	1.4	0.035	0.035

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

### Mild Steel Plates

Size	Thickness (mm)	Kg/Pc
8' X 4'	1.80	42.1
8' X 4'	1.90	44.5
8' X 4'	2.00	46.8
8' X 4'	2.80	65.5
8' X 4'	3.00	70.2
8' X 4'	3.85	88.9
8' X 4'	4.00	93.6
8' X 4'	5.80	135.7
8' X 4'	6.00	140.4
8' X 4'	8.00	187.2
8' X 4'	10.00	234.0
8' X 4'	12.00	280.8
8' X 4'	15.00	351.0
8' X 4'	18.00	421.2
8' X 4'	20.00	468.0
8' X 4'	25.00	585.0
8' X 4'	32.00	748.7
8' X 4'	38.00	889.1
8' X 4'	50.00	1,170.0
8' X 4'	63.00	1,474.1
8' X 4'	75.00	1,755.0
8' X 4'	100.00	2,340.0
8' X 4'	130.00	3045.0
8' X 4'	160.00	3745.0

# Galvanised Sheets

## Summary

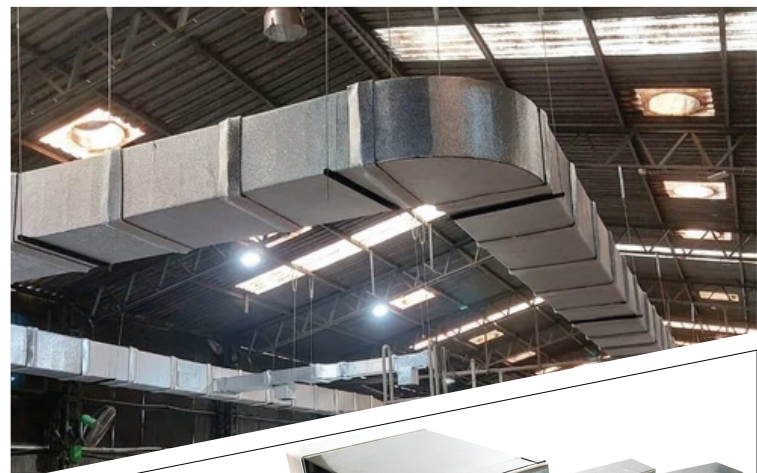
Galvanized steel sheets are coated with a protective layer of zinc through a process called galvanization, which enhances their resistance to rust and corrosion. They are valued for their durability, cost-effectiveness, smooth formability, and distinct silver-gray finish, making them both practical and aesthetically appealing. In addition, galvanizing extends product lifespan and is environmentally sustainable, as zinc is recyclable. Due to these characteristics, galvanized sheets are widely used across industries wherever corrosion resistance and long-lasting performance are required.

## Typical Applications

Roofing and cladding in residential, commercial and industrial buildings, automotive components such as body panels and exhaust systems, construction uses like fences, gates, and guardrails, HVAC ducting, electrical enclosures, outdoor furniture, water tanks, pipes, and industrial machinery.

### Galvanized Sheets

Size	Thickness (mm)	Kg/Pc
8' X 4'	0.3	7.1
8' X 4'	0.4	9.4
8' X 4'	0.5	11.7
8' X 4'	0.6	14.1
8' X 4'	0.8	18.7
8' X 4'	1.0	23.4
8' X 4'	1.2	28.1
8' X 4'	1.5	35.0
8' X 4'	2.0	47.0
8' X 4'	3.0	70.0



# Mild Steel Rods

## Summary

Mild steel rods, also called bright mild steel bars, MS rods or Shafts, are cylindrical bars made from mild steel.

They come in various diameters and lengths, making them versatile for different applications.

Common shapes include round, square, and hexagonal.

## Typical Applications

Shafts, bolts, nuts, studs, couplings and machinery components where low tensile strength material is required.

## Chemical Composition (%)

EN3B	C	Si	Mn	P	S
Min	0.16	0.10	0.50	≤	≤
Max	0.24	0.40	0.90	0.05	0.05

*The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

## Mild Steel Square Rods

Size	Kg/Mtr
1/4" x 1/4"	0.3
5/16" x 5/16"	0.6
3/8" x 3/8"	0.7
1/2" x 1/2"	1.3
5/8" x 5/8"	2.1
3/4" x 3/4"	3.1
7/8" x 7/8"	4.2
1" x 1"	5.5
1 1/4" x 1 1/4"	8.6
1 1/2" x 1 1/2"	12.3
2" x 2"	20.5
2 1/2" x 2 1/2"	34.4
3" x 3"	49.5
4" x 4"	88

## Mild Steel Hexagonal Rods

Size	Kg/Mtr
1/2"	1.2
5/8"	1.9
3/4"	2.7
7/8"	3.6
1"	4.7
1 1/8"	6.3
1 1/4"	6.8
1 3/8"	9.2
1 1/2"	10.7
1 3/4"	14.5
2"	19
2 1/4"	24
2 1/2"	30
2 3/4"	35
3"	40
3 1/8"	45
3 3/8"	51
3 1/2"	56
3 3/4"	63
4"	69

## Mild Steel Round Rods

Diameter	Kg/Mtr
5/16"	0.4
3/8"	0.6
1/2"	1.0
5/8"	1.6
3/4"	2.2
7/8"	3.0
1"	4.0
1 1/8"	5.0
1 1/4"	6.2
1 3/8"	7.5
1 1/2"	9.0
1 3/4"	12.2
2"	15.9
2 1/4"	20.2
2 1/2"	24.9
2 3/4"	30.0
3"	35.8
3 1/2"	48.7
4"	63.6
4 1/2"	81.5
5"	99.5
6"	147.50
180MM	200.0
210MM	272.0
230MM	326.0
280MM	482.0
305MM	573.0
350MM	755.0
400MM	986.0

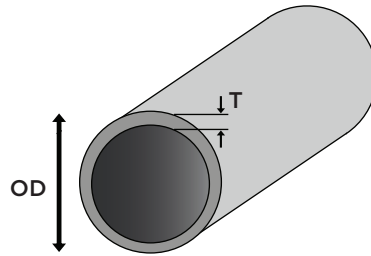


# Seamless Pipes

## Schedule 40, 80 and 160 - Grade B - API 5L

### Summary

Seamless pipes are typically manufactured from carbon steel, and are produced without welded joints, ensuring superior reliability in high-pressure and high-temperature applications. They offer key advantages such as exceptional strength, corrosion resistance, leak-proof performance, improved flow efficiency, and extended service life. Fittings such as elbows, tees, reducers and flanges; provide secure, efficient, and leak-free pipeline connections.



For example;

**Pipe Size = 1"**

**OD = 33.4mm**

**T = 2.77mm**

**L = 5.8metres**

### Typical Applications

Oil and gas, petrochemicals, power generation, automotive, aerospace, and heat exchangers. They also play a vital role in firefighting systems, including sprinklers, hydrants, and hose reels, where reliable and uninterrupted water flow is essential.

### Chemical Composition (%)

	C	Si	Mn	P	S	Cr	Mo	Ni
Min	≤	≤	≤	≤	≤	≤	≤	≤
Max	0.30	0.10	1.20	0.05	0.06	0.40	0.15	0.40

*The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

### Seamless Schedule 40 Pipes

Seamless Schedule 40 pipes are the most commonly used type, ideal for low to medium pressure applications such as water, gas, and structural use.

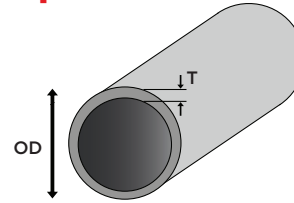
						Temperature (°C)				
						-29 to 343	371	399	413	
						Allowable stress (Mpa)				
						103	99	89	82	
Size (Inch)	Nominal bore	Outside Dia (mm)	Wall Thickness (mm)	Internal Dia (mm)	Kg/Mtr	Weight/ Pc (Kg)	Maximum working pressure (Mpa)			
3/8"	10	17.10	2.31	12.48	0.85	5.00				5.45
1/2"	15	21.30	2.77	15.76	1.27	7.40	7.60	7.27	6.56	6.55
3/4"	20	26.70	2.87	20.96	1.68	9.70	6.87	6.58	5.94	5.90
1"	25	33.40	3.38	26.64	2.50	14.50	8.27	7.92	7.14	5.49
1 1/4"	32	42.20	3.56	35.08	3.38	19.60	7.43	7.12	6.42	4.94
1 1/2"	40	48.30	3.68	40.94	4.05	23.50	6.93	6.63	5.98	6.64
2"	50	60.30	3.91	52.48	5.43	31.50	6.24	5.97	5.38	5.97
2 1/2"	65	73.00	5.16	62.68	8.62	50.00	8.39	8.03	7.25	7.82
3"	80	88.90	5.49	77.92	11.29	65.50	7.54	7.21	6.51	6.87
4"	100	114.30	6.02	102.26	16.07	93.00	9.88	9.45	8.53	6.24
5"	125	141.30	6.55	128.20	21.78	126.00	8.68	8.31	7.49	5.50
6"	150	168.30	7.11	154.08	28.26	164.00	7.88	7.52	6.81	4.98
8"	200	219.10	8.18	202.74	42.53	246.00	6.94	6.64	5.99	4.66
10"	250	273.00	9.27	254.46	60.29	350.00	6.29	6.01	5.43	4.58
12"	300	323.80	10.31	303.18	79.82	464.00	5.89	5.63	5.09	4.59
14"	350	355.60	11.13	333.34	94.40	548.00	5.78	5.54	4.99	4.58
16"	400	406.40	12.70	381.00	123.00	715.00	5.79	5.54	5.00	4.35
18"	450	457.20	14.27	428.66	156.00	904.00	5.78	5.53	4.99	4.66
20"	500	508.00	15.06	477.88	183.00	1,062.00	5.50	5.25	4.74	4.58
24"	600	610.00	17.48	575.00	255.40	1,481.00	5.50	5.25	4.74	4.58

# Seamless pipes

## Seamless Schedule 80 Pipes

### Summary

Seamless Schedule 80 pipes have thicker walls than Schedule 40, providing higher pressure and temperature resistance, making them suitable for industrial and chemical applications.



For example;

Pipe Size = 1"

OD = 33.4mm

T = 4.55mm

L = 5.8metres

Size (Inch)	Nominal bore	Outside Dia (mm)	Wall Thickness (mm)	Internal Dia (mm)	Kg/Mtr	Weight/ Pc (Kg)	Temperature (°C)	-29 to 343	371	399	413
							Allowable stress (Mpa)	103	99	89	82
							Maximum working pressure (Mpa)				
3/8"	10	17.10	3.20	10.70	1.10	6.40	16.78	16.05	14.49	13.25	
1/2"	15	21.30	3.73	13.84	1.62	9.40	14.56	13.93	12.58	11.53	
3/4"	20	26.70	3.91	18.88	2.18	12.80	15.73	14.65	13.22	12.13	
1"	25	33.40	4.55	24.30	3.24	18.80	13.37	12.79	11.54	10.58	
1 1/4"	32	42.20	4.85	32.50	4.48	26.00	12.56	12.01	10.84	9.94	
1 1/2"	40	48.30	5.08	38.14	5.39	31.30	11.45	10.96	9.89	9.07	
2"	50	60.30	5.54	49.22	7.50	43.50	13.39	12.81	11.56	10.60	
2 1/2"	65	73.00	7.01	58.98	11.39	66.10	12.26	11.73	10.58	9.70	
3"	80	88.90	7.62	73.66	15.25	88.50	14.31	13.69	12.36	11.33	
4"	100	114.30	8.56	97.18	22.31	129.40	12.80	12.25	11.05	10.13	
5"	125	141.30	9.52	122.26	30.94	179.50	12.36	11.82	10.67	9.79	
6"	150	168.30	10.97	146.36	42.56	246.90	10.95	10.47	9.38	8.67	
8"	200	219.10	12.70	193.70	64.63	374.90	10.41	9.96	8.98	8.24	
10"	250	273.00	15.07	242.88	95.91	556.30	10.15	9.71	8.76	8.03	
12"	300	323.80	17.35	289.10	31.89	765.00	10.10	9.65	8.65	8.00	

## Seamless Schedule 160 Pipes

Seamless Schedule 160 pipes offer the heaviest wall thickness, delivering maximum strength and durability for high-pressure, high-temperature, and critical service environments.

Size (Inch)	Nominal bore	Outside Dia (mm)	Wall Thickness (mm)	Internal Dia (mm)	Kg/Mtr	Weight/ Pc (Kg)	Temperature (°C)	-29 to 343	371	399	413
							Allowable stress (Mpa)	103	99	89	82
							Maximum working pressure (Mpa)				
3/8"	10	17.10	4.78	7.54	1.46	8.47	27.21	26.03	23.5	21.55	
1/2"	15	21.30	4.78	11.74	1.94	11.25	27.7	26.5	23.91	21.93	
3/4"	20	26.70	5.56	15.58	2.89	16.76	26.7	25.55	23.06	21.14	
1"	25	33.40	6.35	20.7	4.23	24.53	21.33	20.4	18.42	16.89	
1 1/2"	40	48.30	7.14	34.02	7.22	41.88	22.32	21.35	19.27	17.67	
2"	50	60.30	8.74	42.82	11.09	64.32	20.26	19.39	17.5	16.04	
3"	80	88.90	11.12	66.66	21.33	123.71	23.30	22.29	20.11	18.58	
4"	100	114.30	13.49	87.32	33.49	194.24	19.00	18.88	18.00	17.77	
5"	125	141.30	15.88	109.54	49.15	285.00	19.00	18.88	18.00	17.77	
6"	150	168.30	18.26	131.74	67.60	392.00	19.00	18.88	18.00	17.77	



# Seamless Pipe Fittings

## Seamless Schedule 40 Fittings

### Sch 40 Elbow - 90 Degree

Size	Kg/Pc
1/2"	0.10
3/4"	0.10
1"	0.20
1 1/4"	0.30
1 1/2"	0.40
2"	0.70
2 1/2"	1.30
3"	2.00
4"	3.60
5"	6.50
6"	10.00
8"	20.00
10"	36.00
12"	53.00
14"	68.00
16"	89.00
18"	113.00
20"	140.00

### Sch 40 Sockets

Size	Kg/Pc
1 1/4"	0.34
1 1/2"	0.40
2 1/2"	1.14
4"	2.54

### Sch 40 Equal Tee

Size	Kg/Pc
3/4"	0.11
1"	0.14
1 1/2"	0.71
2"	0.99
2 1/2"	1.90
3"	2.85
4"	4.83
5"	8.00
6"	10.20
8"	22.90
10"	36.60
12"	46.70

### Sch 40 End Cap

Size	Kg/Pc
1"	0.11
1 1/2"	0.17
2"	0.23
2 1/2"	0.39
3"	0.66

### Sch 40 Concentric Reducers

Size	Kg/Pc
3/4" x 1/2"	0.07
1" x 3/4"	0.18
1" x 1/2"	0.18
1 1/2" x 1"	0.28
1 1/2" x 3/4"	0.25
2" x 1 1/2"	0.40
2" x 1"	0.34
2 1/2" x 1"	0.60
2 1/2" x 2"	0.68
2 1/2" x 1 1/2"	0.62
3" x 1 1/2"	0.80
3" x 2 1/2"	0.90
3" x 2"	0.80
4" x 2"	1.40
4" x 2 1/2"	1.50
4" x 3"	1.50
5" x 3"	2.50
6" x 3"	3.60
6" x 4"	3.70
8" x 3"	5.00
8" x 4"	4.80
8" x 6"	6.00
10" x 4"	10.00
10" x 6"	9.80
10" x 8"	9.70

### Sch 40 Eccentric Reducers

Size	Kg/Pc
1 1/2" x 1/2"	0.24
1 1/2" x 3/4"	0.22
1 1/2" x 1"	0.24
2" x 1"	0.42
2" x 1 1/2"	0.40
2 1/2" x 1"	0.74
2 1/2" x 1 1/2"	0.62
2 1/2" x 2"	0.78
3" x 1 1/2"	0.92
3" x 2"	0.84
4" x 2"	1.46
4" x 2 1/2"	1.42
4" x 3"	1.46
6" x 3"	3.72
6" x 4"	3.62
8" x 3"	7.14
8" x 4"	6.52

### Sch 40 Sockets - Threaded

Size	Kg/Pc
1/2"	0.14
3/4"	0.18
2"	1.28
3"	2.98

### Class 150 - Socketed Weld Flange

Size	Kg/Pc
1/2"	0.42
3/4"	0.60
1"	0.82
1 1/4"	1.04
1 1/2"	1.04
2"	2.10
2 1/2"	3.50
3"	4.10
4"	5.60
5"	6.50
6"	8.04
8"	8.10

### Class 150 - Blind Flange

Size	Kg/Pc
1/2"	0.46
3/4"	0.64
1"	0.96
1 1/4"	1.28
1 1/2"	1.66
2"	2.68
2 1/2"	4.28
3"	4.96
4"	7.16
5"	9.92
6"	12.22
8"	19.58

### Class 150 - Slip on Flange

Size	Kg/Pc
1/2"	0.42
3/4"	0.54
1"	0.80
1 1/4"	1.02
1 1/2"	1.32
2"	2.00
2 1/2"	3.30
3"	3.90
4"	5.40
5"	6.30
6"	7.90
8"	12.60
10"	15.50
12"	23.50

### Class 150 - Flanged Ball Valve

Size
1 1/4"
2 1/2"
2"
3"
4"
6"
8"

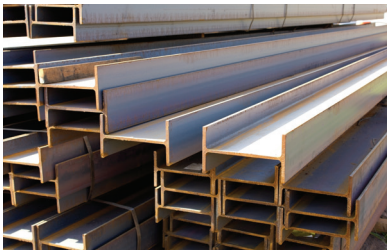
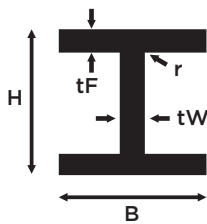
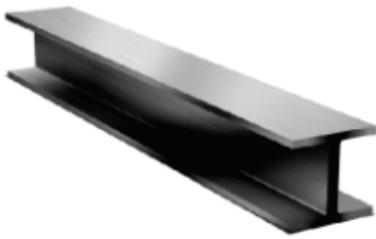
### Class 150 - Flanged Gate Valve

Size
1 1/4"
2 1/2"
2"
3"
4"
6"
8"

# Universal Beams And Columns

## Summary

Universal Beams and Columns are essential structural elements used in construction and engineering. Their I shape (I-beams) or uniform cross-section (columns) makes them ideal for supporting heavy loads and providing stability.



## Typical Applications

**Building Construction:** Used in the framework of residential, commercial, and industrial buildings to support floors, roofs, and walls.

**Bridges:** Provide structural strength to handle dynamic loads like traffic and weather.

**Industrial Structures:** Found in factories and warehouses, supporting heavy machinery and equipment.

**Civil Engineering Projects:** Used in infrastructure projects such as highways, tunnels, and flyovers.

**Cranes and Lifting Equipment:** Essential in cranes and heavy lifting due to their load-bearing capabilities.

### Universal Beams

Size (mm)	Kg/Mtr	Height	Width	Web (tW)	Flange (tF)
203 x 133	25.1	203.2	133.4	5.7	7.8
254 x 146	31.1	254.2	146.1	6.1	8.6
305 x 165	40.3	304.8	165.1	6.1	10.2
356 x 171	45.0	352.0	171.0	6.9	9.7
406 x 178	54.1	402.6	177.6	7.6	10.9
406 x 178	67.1	409.4	179.8	8.8	14.3

### Universal Columns

Size (mm)	Kg/Mtr	Height	Width	Web (tW)	Flange (tF)
152 x 152	23.0	152.4	152.4	6.1	6.8
203 x 203	46.1	203.2	203.2	7.3	11.0
254 x 254	73.1	254.2	254.2	8.6	14.2
305 x 305	97.0	304.8	304.8	9.9	15.4

Available Length - 12Mtrs and cut to length as per specifications

# CRCA [Cold Rolled Close Annealed] Sheets

## Summary

CRCA (Cold Rolled Close Annealed) sheets are steel sheets produced by cold rolling hot-rolled coils and then annealing them to enhance their mechanical and surface properties. The cold rolling process ensures consistent thickness, higher strength, and a smooth finish, while annealing improves ductility and formability. As a result, CRCA sheets combine strength, accuracy, and excellent surface quality, making them highly versatile.

## Typical Applications

Automotive industry for body panels and chassis parts, in the manufacture of appliances such as refrigerators, washing machines, air conditioners, furniture sector for cabinets, shelves, structural components, electrical enclosures, construction for roofing and cladding.

### CRCA Sheets

Size	Thickness (mm)	Kg/Pc
8' X 4'	0.4	9.4
8' X 4'	0.5	11.7
8' X 4'	0.6	14.1
8' X 4'	0.8	18.7
8' X 4'	1.0	23.4
8' X 4'	1.2	28.1
8' X 4'	1.5	35.0
8' X 4'	2.0	47.0
8' X 4'	3.0	70.0

# Engineering Steel

Engineering steels are premium quality carbon and alloy steels developed for demanding mechanical and engineering applications. They provide essential properties such as strength, toughness, wear resistance, and fatigue resistance. With these qualities, engineering steels are extensively used in industries that require precision, durability, and long-term reliability.



## Key Advantages of Engineering Steel

**High strength & toughness:** Withstands heavy loads, impact, and stress.

**Wear resistance:** Resists abrasion and surface damage.

**Good machinability:** Easy to cut, shape, and machine.

**Versatility:** Suitable for automotive, oil & gas, defence, construction and various other sectors.

**Heat treatable:** Properties can be enhanced for strength and hardness.

**Reliable performance:** Uniform quality with predictable results.

**Cost-effective:** Balances performance with affordability.

## Industries that use Engineering Steel

- Shipyard and Shipbuilding
- Railway
- Mining
- Cement
- Power Generation
- Agriculture
- Packaging
- Oil, gas & chemical
- Construction
- Automotive
- Architecture and Engineering sectors
- General engineering and manufacturing sectors
- Large Machinery Building
- Aerospace and Defense

## Available product range

Round Rods, Square Rods, Plates, Hollow Steel Rods available in the below materials;

- EN8
- EN9
- EN19
- EN24

# Engineering Steel

## EN8

### Summary

EN8 is an unalloyed medium carbon steel which is used in applications where better properties than mild steel are required but where the costs do not justify the purchase of a steel alloy. EN8 can be heat treated to provide a good surface hardness and moderate wear resistance by flame or induction hardening processes. From the automotive trade to wider general engineering applications, EN8 is a popular steel in industry.

Standard	Grade
BS970 of 1955	En8
BS970 Pt of 1983	080M40
Werkstoff (German)	1.0503
AISI (American)	1040

### Typical Applications

Dynamo and motor shafts, heat treated bolts, crankshafts, connecting rods, driving rings and flanges, railway couplings, axles, brackets, automotive, general engineering components, housing, parts not subject to high stresses or severe wear.

### Chemical Composition (%)

EN 8	C	Si	Mn	P	S
Min	0.43	0.10	0.60	≤	≤
Max	0.50	0.40	1.00	0.04	0.05

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

### Properties minima unless stated

Heat Treatment	Tensile Strength Rm MPa	Yield Stress Re MPa	Rp0.2 MPa	A min on 5.65 √S <sub>0</sub>	Impact		Hardness HB	Limiting Ruling Section
					Izod ft.lb	KCV J		mm
N	660	530	495	7	-	-	150/207	>6 <13
-	650	510	485	8	-	-	-	>13 <16
R	620	480	435	9	-	-	201/255	>16 <40
S	600	465	370	10	-	-	-	>40 <63
T	570	430	350	10	-	-	-	>63 <76

### Forging

Preheat the steel carefully, then raise temperature to 1050°C for forging. Do not forge below 850°C. After forging cool slowly, preferably in a furnace.

### Annealing

Heat slowly to 680-710°C. Soak well and cool slowly in the furnace.

### Hardening

Heat the component slowly to 820-860°C and allow it to be heated through. Quench in oil, or water.

### Tempering

Temperature, between 550/660°C and hold at heat for one hour per inch of total thickness.

### EN8 Round Rods

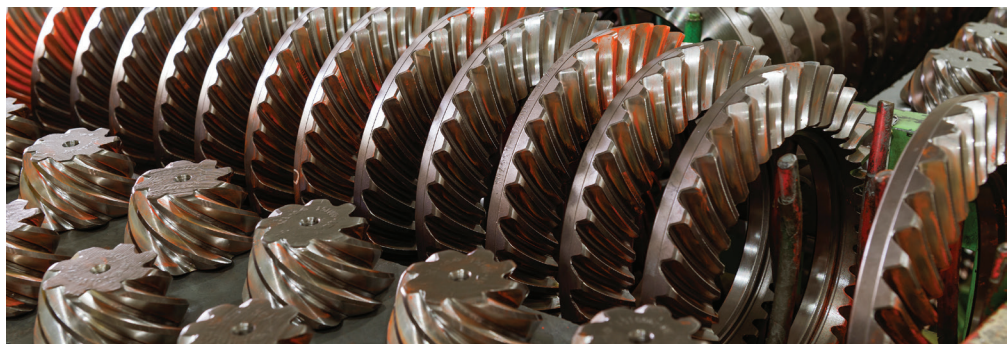
Diameter (mm)	Kg/Mtr
15	1.40
22	3.00
25	3.90
30	5.60
35	7.60
40	9.90
45	12.50
50	15.50
55	18.70
60	22.20
65	26.40
70	30.20
75	35.10
80	39.50
90	50.00
100	61.70
115	81.50
130	104.00
160	163.00

### EN8 Square Rods

Size	Kg/Mtr
1 1/2 "x 1 1/2 "	11.5
2"x 2	20.5

### N.B.

- Actual mass may vary from theoretical mass due to manufacturing tolerances.
- A 6% allowance should always be considered for removal of surface defects during machining.
- Normalised hardness values are provided for guidance only.
- Condition "T" may not always be obtained by bulk heat treatment, but the required properties can be achieved by appropriate heat treatment of individual components.



# Engineering Steel

## EN9

### Summary

EN9 is a medium carbon steel with higher carbon content than EN8, providing greater hardness, wear resistance, and strength. It is widely used for components subjected to higher stress and wear conditions where toughness and machinability are still important. It is supplied at the hardness obtained after hot rolling or cold drawing hardness normally within the range of 180 to 230 HB. EN9 can be hardened to further improve its performance.

Standard	Grade
BS970 of 1955	En9
BS970 Pt of 1983	070M55
Werkstoff (German)	1.1203
AISI (American)	1055

### Typical Applications

Sprockets, cylinders, cams, crankshafts, keys, small gears, machine tools, grinding balls for ball mills, ball race rings requiring moderate wear resistance.

### EN9 Round Rods

Diameter (mm)	Kg/Mtr
16	1.60
20	2.50
25	3.90
30	5.60
35	7.60
40	9.90
45	12.50
50	15.50
55	18.70
60	22.20
65	26.40
70	30.40
75	35.10
80	39.50
90	50.00
100	62.00
115	82.00
130	104.00
160	163.00
180	206.00
210	280.00
230	336.00
260	422.00
280	504.00
310	602.00
360	813.00
405	1032.00
500	1606.00

### N.B.

- Actual mass will vary from theoretical mass due to manufacturing tolerances.
- A 6% allowance should always be made for removal of surface defects during machining.
- Normalised Hardness given for guidance only.
- Condition "T" may not always be obtained by bulk heat treatment but the properties can be achieved by appropriate heat treatment of components.

### Chemical Composition (%)

EN 9	C	Si	Mn	P	S
Min	0.50	0.05	0.50	≤	≤
Max	0.60	0.35	0.80	0.04	0.04

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

### Properties minima unless stated

Heat Treatment	Tensile Strength Rm MPa	Yield Stress Re MPa	Rp0.2 MPa	A min on 5.65 √S <sub>0</sub>	Impact		Hardness HB	Limiting Ruling Section
					Izod ft.lb	KCV J		mm
N	700	355	-	12	-	-	201/255	63
-	600	310	-	13	-	-	170/223	250
R	700/850	415	385	14	-	-	201/255	100
S	775/925	480	450	14	-	-	233/277	63
T	850/1000	570	555	12	-	-	248/302	19

### Forging

Heat slowly and uniformly to 1100°C. After forging cool slowly.

### Annealing

Heat uniformly to 700°C. Soak well and cool slowly in the furnace.

### Hardening

Heat uniformly to 820/840°C until heated through. Quench in oil, or water.

### Tempering

Heat uniformly and thoroughly at the selected tempering temperature, between 550/660°C and hold at heat for one hour per inch of total thickness.

### Normalising

Normalise at 840-870°C and cool in air.

### Hard Chromium Plating

After hard chromium plating, the steel should be tempered for approximately 4 hours at 180°C, in order to avoid hydrogen embrittlement.

### Welding

Firstly heat to approximately 100-350°C. Use an unalloyed basic electrode, for welding unalloyed structural steels.

### Stress Relieving

After rough machining tools should be stress relieved. Soaking time 2 hours after the whole piece has attained a temperature of approximately 675°C. Cool in furnace to approximately 500°C and then freely in air.

### Physical Properties

Density kg/m	Coefficient of Thermal Expansion per c from 20 c	Modulus of Elasticity N/mm
7800	11.6 x 10 <sup>-6</sup>	206000

# Engineering Steel

## EN19

### Summary

EN19 is a high-quality, high-tensile alloy steel, typically supplied in the readily machinable "T" condition. It offers excellent durability, good shock resistance, and superior wear resistance, making it a preferred choice for demanding engineering applications.

Standard	Grade
BS970 of 1955	En19
BS970 Pt of 1983	709M40
Werkstoff (German)	1.7225
AISI (American)	4140

### Typical Applications

Axles, crankshafts, connecting rods, gears, engine gearboxes, high tensile bolts and studs, pinions, propeller shaft joints, rifle and breech mechanisms for small arms, induction-hardened track pins.

### Chemical Composition (%)

EN 19	C	Si	Mn	Cr	Mo	P	S
Min	0.36	0.10	0.60	0.90	0.17	≤	≤
Max	0.44	0.35	0.80	1.20	0.35	0.04	0.035

*The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

### Properties minima unless stated

Heat Treatment	Tensile Strength Rm MPa	Yield Stress Re MPa	Rp0.2 MPa	A min on 5.65 √S <sub>0</sub>	Impact		Hardness HB	Limiting Ruling Section
					Izod ft.lb	KCV J		mm
R	700/850	495	480	15	25	28	201/255	250
S	775/925	555	540	13	20	22	223/277	250
-	775/925	585	570	15	40	50	223/277	150
T	850/1000	680	665	13	40	50	248/302	100
U	925/1075	755	740	12	35	42	269/331	63
V	1000/1150	850	835	12	35	42	293/352	29
W	1075/1225	940	925	12	30	35	311/375	19

### EN19 Round Rods

Diameter (mm)	Kg/Mtr
20	2.40
30	5.50
40	9.80
50	15.4
65	26.0
80	40.0
90	50.0
100	62.0
115	82.0
130	104.0
160	163.0
180	206.0
230	336.0
250	397.0

### Hardening

Heat uniformly to 820/840°C until heated through. Quench in oil.

### Tempering

Heat uniformly and thoroughly at the selected tempering temperature, and hold at heat for one hour per inch of total thickness.

EN19 is machinable and it doesn't show brittleness in tempering. It can be used at temperatures up than 400°C for shaft and connecting rod. It can be nitrated.

### EN19 Plates

Thickness (mm)
25
50
100

### N.B.

- Sizes above limiting ruling section will be heat treated to a hardness only, with no guarantee on mechanical properties.
- Actual mass will vary from theoretical mass due to manufacturing tolerances.
- A 6% allowance should always be made for removal of surface defects during machining.
- For sizes not listed please contact our sales department - we may be able to assist you.
- Condition "W" may not always be obtained by bulk heat treatment, but the properties can be achieved by appropriate heat treatment of components.

# Engineering Steel

## EN24

### Summary

EN24 is a high-quality, high-tensile alloy steel, usually supplied in the readily machinable Q & T (Quenched and Tempered) condition. It offers excellent tensile strength, shock resistance, good ductility, and wear resistance, making it suitable for several demanding applications. It is also suitable for a variety of elevated temperature applications.

Standard	Grade
BS970 of 1955	En24
BS970 Pt of 1983	817M40
Werkstoff (German)	1.6511
AISI (American)	4340

### Typical Applications

Automobile main shafts, axles, connecting rod bolts, high duty connecting rods, push rods, high tensile bolts & studs, differential shafts, pinion sleeves, mandrels for tube manufacture, gun barrels, breech mechanism parts, spindle gears, compensating washers, power transmission slide gears, slide cams.

### Chemical Composition (%)

EN24	C	Si	Mn	Cr	Ni	Mo	P	S
Min	0.35	0.10	0.45	0.90	1.30	0.20	≤	≤
Max	0.44	0.35	0.70	1.40	1.80	0.35	0.04	0.04

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

### Properties minima unless stated

Heat Treatment	Tensile Strength Rm MPa	Yield Stress Re MPa	Rp0.2 MPa	A min on 5.65 √S <sub>0</sub>	Impact		Hardness HB	Limiting Ruling Section mm
					Izod ft.lb	KCV J		
T	850/1000	650	635	13	30	35	248/302	250
	850/1000	680	665	13	40	50	248/302	150
U	925/1075	755	740	12	35	42	269/331	100
V	1000/1150	850	835	12	35	42	293/352	63
W	1075/1225	940	925	11	30	35	311/375	29
X	1150/1300	1020	1005	10	25	28	341/401	29
Y	1225/1375	1095	1080	10	18	21	363/429	29
Z	1550	1235	1125	5	8	9	444	29

### Hardening

Heat uniformly to 823/850°C until through. Quench in oil.

### Tempering

Heat uniformly and thoroughly at the selected tempering temperature, up to 660°C and hold at heat for two hours per inch of total thickness. Tempering between 250-375°C is not recommended as this can seriously reduce the steel impact value.

### Stress Relieving

Heat slowly to 650-670°C, soak well before cooling in the furnace or in air.

### EN24 Round Rods

Diameter (mm)	Kg/Mtr
20	2.5
25	3.9
30	5.5
35	7.7
40	9.9
45	12.7
50	15.4
55	18.9
60	22.2
65	27.0
70	30.0
75	35.0
80	40.0
90	50.0
100	62.0
130	104.0
150	139.0
160	165.0
180	206.0
210	285.0
230	336.0
250	397.0
300	565.0
400	1029.0
500	1607.0
600	2313.0

### EN24 Plates

Thickness (mm)
100
150

### N.B.

- Sizes above limiting ruling section will be heat treated to a Hardness only, with no guarantee on mechanical properties.
- Actual mass will vary from theoretical mass due to manufacturing tolerances.
3. A 6% allowance should always be made for removal of surface defects during machining.

# Wear Resistant Plate 400 & 500

## Summary

Wear-resistant steel is tougher and harder than conventional steel plate, offering significantly longer service life compared to standard high-strength steels. Made from high-carbon, abrasion-resistant alloy steel, it provides excellent resistance to sliding and impact wear, making it an ideal choice for heavy-duty equipment.

## Typical Applications

**Mining & Quarrying:** Truck bodies, liners, crushers, chutes

**Construction:** Buckets, blades, wear strips

**Recycling:** Shredders, scrap shears, hammers

**Cement & Aggregate:** Mixers, screens, silos

**Agriculture:** Ploughs, tillage tools, conveyors

## Chemical Composition (%)

	C	Si	Mn	Cr	Ni	B	P	S
Min	≤	≤	≤	≤	≤	≤	≤	≤
Max	0.30	0.50	1.60	1.20	0.25	0.005	0.025	0.01

*The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

## Mechanical Properties At Room Temperature

Yield Strength	Tensile Strength	Elongation	Impact
1366 (Rm/Mpa)	1601 (Rm/Mpa)	16%	45 KV2/J

*Typical values for 10mm plate*

## Wear Resistant Plates

Size (mm)	Thickness (mm)	Kg/Pc
1220 x 2440	3.00	70.00
1220 x 2440	4.00	94.00
1220 x 2440	6.00	140.00
1220 x 2440	8.00	187.00
1220 x 2440	10.00	234.00
1220 x 2440	12.00	280.00
1220 x 2440	15.00	351.00
1220 x 2440	16.00	383.00
1220 x 2440	20.00	467.00
1220 x 2440	25.00	598.00
1220 x 2440	30.00	702.00
1220 x 2440	50.00	1170.00
1220 x 2440	75.00	1755.00
1220 x 2440	100.00	2340.00
1220 x 4880	3.00	140.00
1220 x 4880	4.00	188.00
1220 x 4880	6.00	280.00
1220 x 4880	8.00	374.00
1220 x 4880	10.00	468.00
1220 x 4880	12.00	560.00
1220 x 4880	15.00	702.00
1220 x 4880	16.00	766.00
1220 x 4880	20.00	934.00
1220 x 4880	25.00	1,196.00
2000 x 6000	4.00	386.00
2000 x 6000	6.00	579.00
2000 x 6000	10.00	965.00
2000 x 6000	12.00	1,158.00

## Stone Cutting Blade

Size	Thickness (mm)
24"	12
48"	12
52"	12



# Wear Resistant Plate 400 & 500

## Cold Bending

Cold bending should be carried out at a minimum temperature of 10°C. The bending radius should be as large as possible considering the minimum stated parameters. To avoid cracking, flame cut plate edges should have a 2-3mm wide chamfer ground on the top and bottom edges.

The following table is valid for bending angles up to 90°, where t = Plate thickness

Bending direction (Bend axis)	Minimum inside bending radius	Minimum V-block opening
Perpendicular to rolling direction	4t	12 t
Parallel to rolling direction	5t	14 t

## Welding in accordance with NF: EN 1011

The plate is weldable under normal conditions using MMA, MIG, or SAW processes without preheating for combined plate thicknesses up to 60 mm, provided that low-hydrogen electrodes are used. All welding consumables must be properly dried before use.

Welding can be successfully carried out with controlled heat inputs in the range of 1.5–3.0 kJ/mm, and the interpass temperature should not exceed 250 °C.

For thicker sections, the following minimum preheat temperatures should be observed:

30–50 mm: 75 °C (170 °F)  
Above 50 mm: 100 °C (215 °F)

## Flame Cutting

The plates can be cut by oxy-gas, plasma, waterjet, or laser methods with preheating as required : 75 °C for up to 50 mm and 100–150 °C for plates above 50mm.

## Drilling

Because of high hardness, drilling requires specialized tooling and careful setup.

Use 8% cobalt high-speed steel drills (grade M24) or carbide-tipped drills.

Drill geometry: slow helix, short flute length, thick web, and point angle ~130°.

A rigid setup is essential — clamp the workpiece securely to a mild steel backing plate, close to the drill post.

Apply an abundant flow of cutting fluid for cooling and lubrication.

Drill Ø (mm)	Speed (rpm)	Feed (mm/rev)
5 mm	570.00	0.05
10 mm	290.00	0.10
15 mm	190.00	0.16
20 mm	150.00	0.20
30 mm	90.00	0.30

## Hot Bending

Hot bending is generally not recommended, as heating above 200–250 °C can soften the plate. If unavoidable, forming should be limited to temperatures below 300 °C to maintain wear resistance.



# Tool Steel

## D2 Cold Work Tool Steel

### Summary

D2 is a high-carbon, high-chromium cold work tool steel with excellent wear resistance, high hardness, and good toughness. It is extremely stable in hardening and is capable of being nitrided. It combines strength and wear resistance making it suitable for demanding cold work tooling applications.

### Typical Applications

Fine blanking tools, heavy-duty press tools, punches and dies, shear blades, granulating knives, slitting cutters, clipping tools, thread rolling dies, molds for abrasive compounds, forming rolls, deep drawing tools, cold extrusion tools, spinning tools, industrial knives, and wear-resistant tooling components.

Standard	Grade
BS EN ISO 4957:2000	X153CrMoV12
Werkstoff No.	1.2379
Supersedes (BS 4659)	BD2

### Chemical Composition (%)

C	Si	Mn	P	S	Cr	Mo	V
1.40	0.10	0.20	≤	≤	11.00	0.70	0.70
0.30	0.40	0.60	0.030	0.030	13.00	1.00	1.00

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

### Heat Treatment

#### Annealing

800 / 850 °C for 4 hours approx.  
Cool slowly in the furnace at 20 °C maximum per hour.

#### Stress Relieving

650 / 700°C for 2 hours approx.  
Cool in still air. Always stress relieve before hardening.

#### Hardening

##### Pre-Heating

- 400°C Holding time at temperature:  
1 min / mm effective section approx.
- 650°C Holding time at temperature:  
30 sec / mm effective section approx:
- 850°C Holding time at temperature:  
30 sec /mm effective section approx.

##### Austenitizing

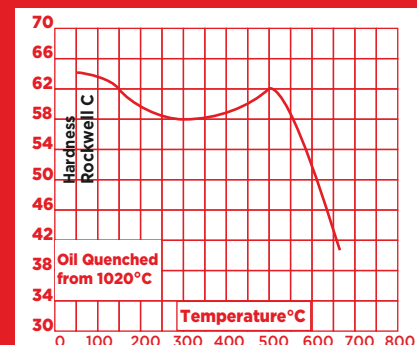
980/1020°C Holding time at temperature:  
90 sec / mm effective section approx.  
D2 is suitable for Vacuum Hardening.

##### Quenching

- \* Quench in Air or,
- \* Quench in Oil or,
- \* Quench into Neutral Salts (Martempering) at 500 / 550°C then cool slowly in still air.

Temper immediately after quenching whilst tools are still hand warm.

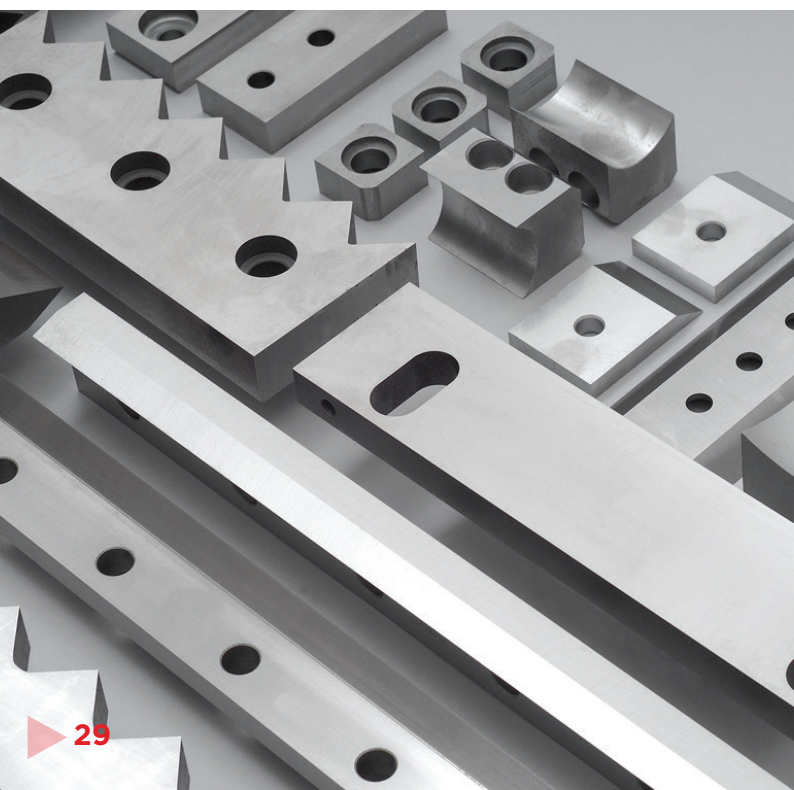
### Tempering



Consult the tempering diagram and temper according to requirements.

For guidance, temper at:  
150 / 220°C for maximum hardness  
250 / 300°C for hardness with toughness  
450/550°C for maximum toughness

Triple tempering is recommended, cooling to room temperature between tempers.  
NB. Lower hardness values will tend to result when hardening larger sections.



# Tool Steel

## D2 Cold Work Tool Steel

### D2 Round Rods

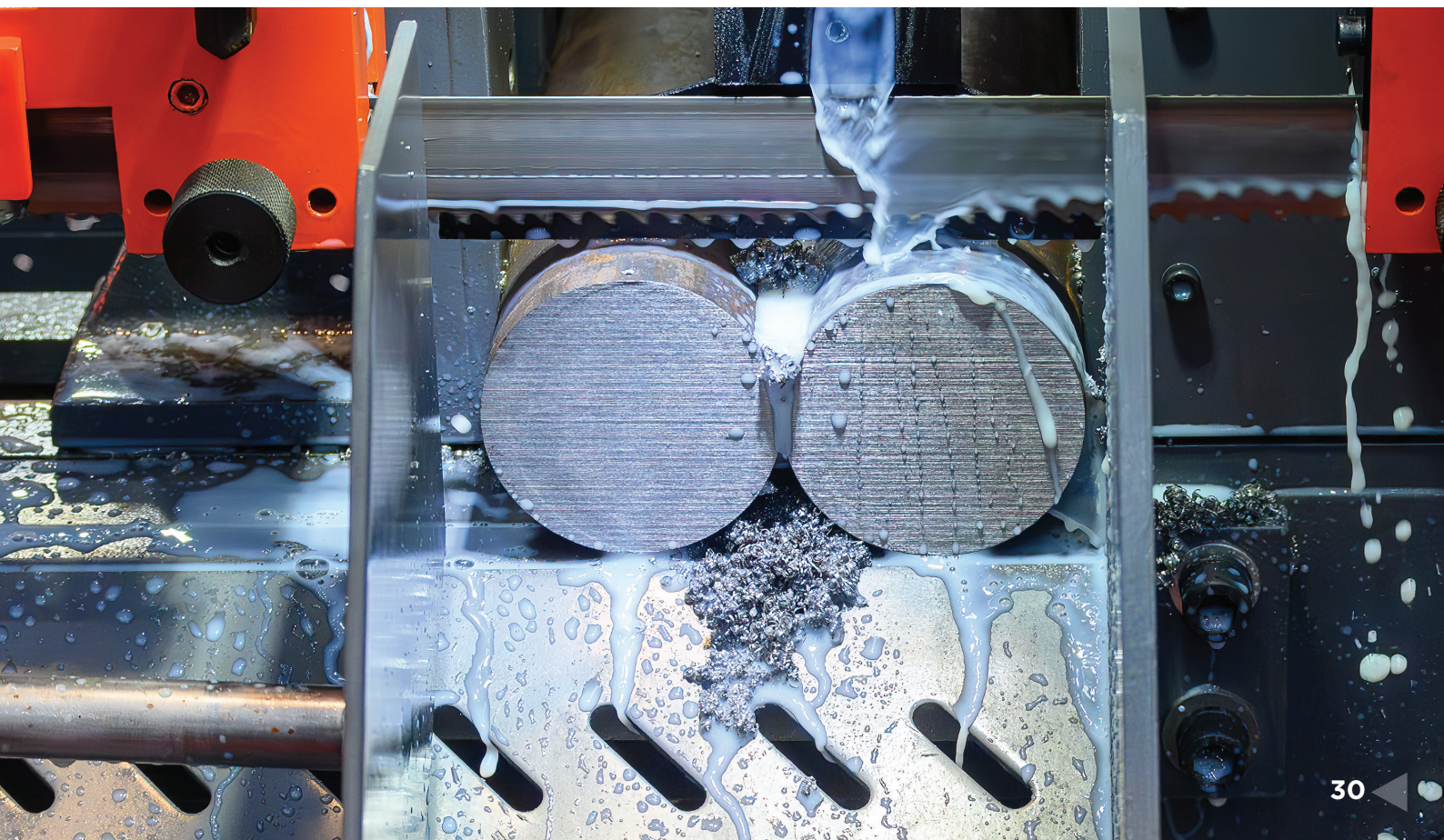
Diameter (mm)	Kg/m
20	2.5
30	6.0
40	10.0
50	15.5
60	22.2
70	30.2
80	40.0
90	50.0
100	64.0
130	108.2
150	144.0
230	339.0
260	433.0
300	576.0

### D2 Flat Bars

Width (mm)	Thickness (mm)	Kg/m
50	20	8.00
100	20	16.00
150	20	24.00
200	20	32.00
300	20	48.00
50	30	12.00
100	30	24.00
150	30	36.00
200	30	48.00
300	30	72.00
50	40	16.00
100	40	32.00
150	40	48.00
200	40	64.00
300	40	96.00
50	60	24.00
100	60	48.00
150	60	72.00
200	60	96.00
300	60	144.00
50	100	40.00
100	100	80.00
150	100	120.00
200	100	160.00
300	100	240.00

### Available D2 plate thickness in length of 3mtrs

Width (mm)	Thickness (mm)	Kg/m
600	20	96
600	30	144
600	40	192
600	60	288
600	100	472



# Tool Steel

## P20 /P20 S - Plastic Mould Tool Steel

### Summary

P20 or P20 S is a pre-hardened plastic mould steel supplied in the hardened and tempered condition, typically at 280-325 BHN. They are primarily used in the manufacture of moulds and dies for the plastics industry. Their combination of good polishability, machinability, toughness, and uniform hardness makes them ideal for producing precision moulds and tooling components.

### Typical Applications

**Injection moulds** for thermoplastics and thermosetting plastics.

**Compression and transfer moulds** for plastic components.

**Mould bases and tool holders** requiring consistent mechanical strength.

**Extrusion dies, blow moulds, and vacuum forming tools.**

**Plastic mould inserts, core and cavity blocks, and pressure die casting tools.**

**Large plastic moulds** for automotive body panels, bumpers, and appliance housings.

Standard	Grade
BS EN ISO 4957:2000	40CrMnNiMo8-6-4
Werkstoff No.	1.2311/ 1.2312
Supersedes (BS 4659)	BP20/ BP20 S

### Chemical Composition (%)

C	Si	Mn	P	S	Cr	Mo
≤ 0.40	≤ 0.41	1.40 1.60	≤ 0.035	≤ 0.10	1.80 2.10	0.15 0.25

*The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*



### HEAT TREATMENT

#### Annealing

720 / 750°C for 4 hours approx.  
Cool slowly in the furnace at 20 °C maximum per hour.

#### Stress Relieving

580 / 600°C for 2 hours approx.  
Cool in still air. Always stress relieve before hardening.

#### Hardening

##### Pre-Heating

- 400°C Holding time at temperature:  
1 min / mm effective section approx.
- 650°C Holding time at temperature:  
30 sec / mm effective section approx:

##### Austenitizing

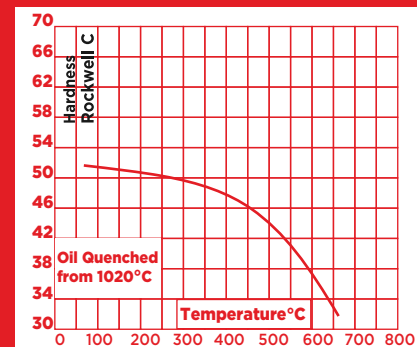
830 / 870°C Holding time at temperature:  
1 min / mm effective section approx.

##### Quenching

- \* Quench in Oil or,
- \* Quench into Neutral Salts (Martempering) at 180 / 220°C then cool slowly in still air.

Temper immediately after quenching whilst tools are still hand warm.

### Tempering



Consult the tempering diagram and temper according to requirements.

Temper for 1 hour/ 25mm effective section for minimum of 2 hours then cool in still air.

For guidance, temper at:  
500 / 600°C for most applications.

Triple tempering is recommended, cooling to room temperature between tempers.  
NB. Lower hardness values will tend to result when hardening larger sections.

# Tool Steel

## P20 /P20 S - Plastic Mould Tool Steel

**P 20 Round Rods**

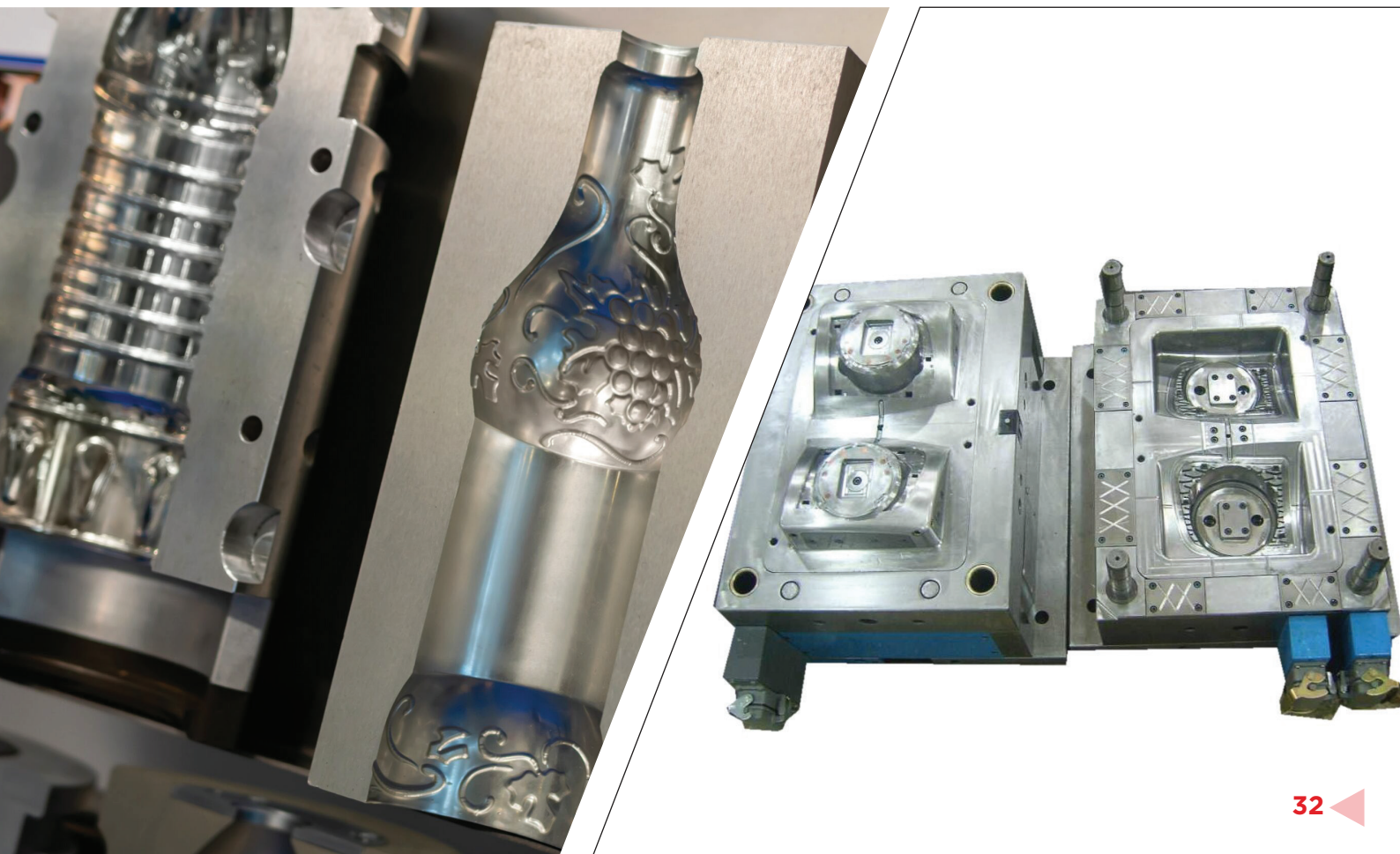
Diameter (mm)	Kg/m
20	2.6
40	10.5
60	23.0
65	27.0
75	36.0
80	42.0
100	65.0
130	110.0
160	166.0
200	258.0
260	437.0

**P 20 Flat Bars**

Width (mm)	Thickness (mm)	Kg/m
100	20	16.00
200	20	32.00
300	20	48.00
400	20	64.00
100	30	24.00
200	30	48.00
300	30	72.00
400	30	96.00
100	40	32.00
200	40	64.00
300	40	96.00
400	40	128.00
100	60	48.00
200	60	96.00
300	60	144.00
400	60	192.00
100	100	80.00
200	100	160.00
300	100	240.00
400	100	320.00

**Available P20 plate thickness in length of 3mtrs**

Width (mm)	Thickness (mm)	Kg/m
600	20	96
600	30	144
600	40	192
600	60	288
600	100	472



# Carbon Steel Hollow Bar

## Summary

Carbon Steel Hollow Bar is a low alloy, high-strength carbon steel grade known for its good toughness, high strength-to-weight ratio, excellent weldability, and reliable machinability. It maintains uniform mechanical properties and is often preferred where both strength and ductility are required.

## Typical Applications

Carbon Steel Hollow Bar hollow bars are extensively used in the manufacture of hydraulic cylinders, automotive and mechanical components, machine parts, and precision engineering applications owing to their excellent machinability, toughness, and strength. They serve as a reliable raw material for a wide variety of general engineering purposes wherever circular components are required, whether plain bushes or complex precision parts.

Typical applications include shafts, sleeves, bushings, bosses, cylinders, rams, piston rods, hubs, spacers, collars, couplings, axles, and other load-bearing parts demanding good weldability and durability.

To a greater or lesser extent, Carbon Steel Hollow Bar finds application across all machining related industries, with frequent use in automotive, earth-moving, agricultural, and machine tool sectors, as well as in construction equipment, heavy machinery, mining tools, and equipment designed for drilling, mining, and mechanical handling.

## Chemical Composition (%)

	C	Si	Mn	P	S
Min	≤	≤	≤	≤	≤
Max	0.22	0.55	1.60	0.05	0.05

*The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

## Mechanical Properties

Ultimate Tensile Strength:	560/610 Mpa	
Yield Stress:	Wall Thickness	Mpa
	< 16mm	350
	>16 - 30mm	335
	> 30mm	315
Elongation:	21% min	

## Manufacturing Tolerances

Wall Tolerances:  
For sizes up to 300mm OD  $\pm$  7.5% -10%, depending on OD to wall ratio.  
For sizes over 300mm OD  $\pm$  12.5%

## Carbon Steel Hollow Bars

Size OD x ID (mm)	Kg/Mtr
40 x 25	7.30
56 x 28	15.80
63 x 40	15.10
70 x 41	20.30
77 x 33	26.60
80 x 50	25.00
89 x 60	26.30
102 x 62	42.00
102 x 70	35.00
106 x 71	40.00
114 x 77	45.00
114 x 90	29.00
120 x 90	40.50
125 x 81	58.00
127 x 77	63.00
133 x 92	58.00
140 x 104	56.00
150 x 90	91.00
168 x 106	108.00
180 x 145	72.00
203 x 153	113.00
232 x 160	181.00
253 x 190	177.00
273 x 201	217.00
300 x 225	250.00
325 x 253	258.00
355 x 305	204.00
405 x 325	371.00
419 x 347	350.00
508 x 428	476.00



# Non Ferrous Metal

## Brass

### Summary

Brass is an alloy of copper and zinc. It is known for its excellent machinability, corrosion resistance, and ability to be easily formed, drawn, or rolled into various shapes. It offers a balanced combination of strength, ductility, good thermal and electrical conductivity.

### Typical Applications

**Fittings and Valves:** Commonly used in plumbing, HVAC, and hydraulic systems due to corrosion resistance and workability.

**Fasteners & Connectors:** Ideal for nuts, bolts, and terminals requiring conductivity and wear resistance.

**Machined Components:** Used in precision instruments, gears, and bearings where smooth operation is critical.

**Electrical Equipment:** Utilized in switchgear parts, terminals, and connectors for its conductive nature.

**Architectural & Decorative Uses:** Valued for its golden finish and resistance to tarnish.

**Marine Hardware:** Preferred for boat fittings and pump parts due to resistance to saltwater corrosion.

### Chemical Composition (%)

Cu	Pb	Zn
58.00	1.00	37.00
62.00	3.00	42.00

The properties quoted in this publication are typical of production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.



### Brass Round Rods

Dia (inches)	Kg/ mtr
1/4"	0.3
5/16"	0.4
3/8"	0.6
1/2"	1.1
5/8"	1.7
3/4"	2.4
7/8"	3.3
1"	4.3
1 1/8"	5.4
1 1/4"	6.7
1 1/2"	9.7
2"	17.2
2 1/2"	26.8
3"	38.6
3 1/2"	55.0
4"	68.6

### Brass Hexagon Rods

Size (inches)	Kg/ mtr
1/4"	0.3
5/16"	0.5
3/8"	0.7
1/2"	1.2
5/8"	1.9
3/4"	2.7
7/8"	3.6
1"	4.7
1 1/8"	5.8
1 1/4"	7.5
1 1/2"	10.7
2"	19.0

### Brass Sheets

Size (mm)	Thickness (mm)	Kg/Pc
2000 x 1000	0.5	8.4
2000 x 1000	0.7	11.8
2000 x 1000	1.0	16.8
2000 x 1000	1.5	26.8
2000 x 1000	2.0	33.6
2000 x 1000	3.0	50.4
2000 x 1000	6.0	101.6

### Brass Round Tubes

Diameter	Thickness (mm)
3/8"	1.00
1/2"	1.00
5/8"	1.00
3/4"	1.00
1"	1.00
1 1/4"	1.00
1 1/2"	1.00
2"	1.20
2 1/2"	1.20
2 3/4"	1.20
3"	1.20

### Brass Square Tubes

Size	Thickness (mm)
3/4" x 3/4"	1.00
1" x 1"	1.00
1 1/2" x 1 1/2"	1.00

### Brass Terrazzo Strips

Size (mm)	Thickness	Length
20	3	3mtrs

### Brass Angles

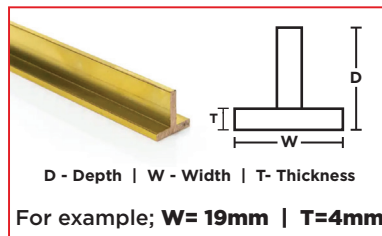
Size (mm)	Thickness (mm)	Kg/Pc
20 x 20	20 x 20	1.0
25 x 25	25 x 25	1.1

### Brass Brazing Rods

Size (mm)	Length (mtr)	Pcs/ Kg
1.6	1	61
1.6	2.5	24
3	1	17

### Brass Square Rods

Size (inches)	Kg/ mtr
3/8"	0.8
1/2"	1.4
5/8"	2.1
3/4"	3.1
1"	5.5



### Brass T Section

Length (feet)	Kg/pc
7	2.6
10	3.6
12	4.2

### Services available in Brass

\* Extrusion of profiles

\* Gravity casting

\* Pressure die casting

\* Forging

\* Brass Ingots

# Non Ferrous Metal

## Bronze - LG2

### Summary

Bronze is an alloy primarily composed of copper, tin, zinc, and lead. It is generally stronger and more durable than brass, offering superior corrosion, tensile, and wear resistance. These qualities make it highly suitable for demanding engineering and industrial applications where reliability and longevity are essential.

LG2 bronze is a commonly used grade, ideal for bearings operating under light loads and low to medium speeds when properly lubricated. It also performs well in applications requiring resistance to friction, wear, and fatigue.

### Typical Applications

**Springs:** Offer resilience and long service life under repeated stress.

**Load Bearings:** Ensure smooth operation and reduced friction in mechanical assemblies.

**Bushings and Gears:** Provide excellent wear resistance and consistent performance under load.

**Large Stem Valves:** Withstand pressure and corrosion in fluid-handling systems.

**Bridge Pins:** Maintain strength and dimensional stability under static and dynamic stresses.

**Hydraulic Cylinder Components:** Resist wear and galling in systems exposed to high pressure and movement.

**Pump Components:** Suitable for impellers, housings, and sleeves in water, oil, or chemical handling.

**Guides and Liners:** Used in mechanical systems requiring low friction and long life.

**Valve Seats and Seals:** Offer tight sealing and durability under repeated use.

### Chemical Composition (%)

Sn	Zn	Pb	Zn
4.00	4.00	4.00	Balance
6.00	6.00	6.00	Balance

The properties quoted in this publication are typical of production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

### Mechanical Properties

0.2% PS N/mm <sup>2</sup>	110
UTS N/mm <sup>2</sup>	250
Elongation %	13
Hardness HB	65

### Bronze Round Rods

Dia (inches)	Kg/ mtr
3/4"	3.20
1"	5.40
1 1/4"	8.00
1 1/2"	11.60
2"	20.00
2 1/4"	26.00
2 1/2"	31.00
3"	44.50
3 1/2"	60.20
4"	76.00
4 1/2"	97.80
5"	119.00
5 1/2"	144.50
6"	172.40
7"	235.50
8"	305.50

### Bronze Hollow Rods

OD x ID (inches)	Kg/ mtr
1 1/2 x 3/4	10.00
2 x 1	17.00
2 1/2 x 1	28.00
2 1/2 x 1 1/2	23.00
3 x 1	41.00
3 x 1 1/2	36.00
3 x 2	30.00
3 1/2 x 1	55.00
3 1/2 x 2	44.50
4 x 2	62.50
4 1/2 x 3	54.50
5 x 2	105.00
5 x 3	85.00
6 x 2	156.50
6 x 3	136.50
6 x 4	108.00
7 x 2	215.50
7 x 3	195.50
7 x 4	167.00
8 x 2	285.50
8 x 3	265.50
8 x 4	237.00

### Bronze Hollow Rods - Centrifugal casting sizes in length of 300mm

OD x ID (inches)	Kg/ft
7 x 4	47
7 x 5	34
8 x 4	69
8 x 5	56
8 x 6	40
9 x 4	108
9 x 5	96
9 x 6	80
10 x 5	111
10 x 6	95
10 x 7	75
11 x 5	141
11 x 6	126
11 x 7	107
12 x 6	159
12 x 7	141
12 x 8	120
13 x 6	196
13 x 6	156

**Note - Weight for all sizes varies by +/- 5%**

**Note - Sizes from 9" to be made on order**

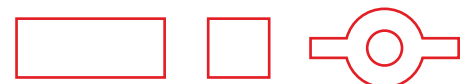
### Services available in LG2

\* Continuous casting - Profiles, round, hollow, flats and related items

\* Gravity die casting

\* Centrifugal casting

\* Bronze Ingots



# Non Ferrous Metal

## Phosphorous Bronze

### Summary

Phosphorous raises the hardness of Bronze, appreciably due to its property of forming hard, uniformly dispersed particles of copper phosphide (Cu<sub>3</sub>P) throughout the cast metal structure. It is the structure of phosphorous bronze which imparts the excellent heavy duty bearing properties for which these alloys are renowned; the essential requirement of a bearing being the ability to undergo some deformation and yet be sufficiently hard to resist rapid wear. Phosphorous Bronze is notable for its toughness, high strength and resilience, corrosion resistance, electrical conductivity, low coefficient of friction, excellent elasticity and fine grain. Phosphorous bronze castings alloy generally contains 8-15% of tin and 0.1-1.5% of phosphorous.

### Typical Applications

Springs, bearings, bushings, gears, electrical contacts, connectors, pump components, marine hardware, sleeve bearings, washers, valve components, pressure gauge parts, precision instruments, and anti-friction components operating under high load and low speed.

### Chemical Composition (%)

Sn	P	Pb	Zn	Cu
8.00	≥	≤	≤	Balance
10.00	0.5	2.00	2.00	Balance

*The properties quoted in this publication are typical of production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

### Phosphorous Bronze Round Rods

Dia (inches)	Kg/ mtr
3/4"	3.5
1"	5.50
1½"	11.60
2"	20.20
2½"	31.10
3"	44.30
3½"	58.60
4"	76.30
5"	118.80
6"	170.70
7"	229.30
8"	299.60

### Phosphorous Bronze Hollow Rods

OD x ID (inches)	Kg/ mtr
1½ x ¾	9.90
2 x 1	16.80
2½ x 1¼	23.10
3 x 1½	36.30
3½ x 2	44.60
4 x 2	62.30
4½ x 3	64.00
5 x 2½	104.80
5½ x 3½	95.90
6 x 3	136.70
7"X4"	167.20

### Services available in Phosphorous Bronze

- \* Gravity casting
- \* Continuous casting
- \* Ingots

### Comparison chart (Mechanical properties)

Alloy	UTS N/mm <sup>2</sup>			0.2% Proof Stress N/mm <sup>2</sup>			Elongation%			Hardness HB		
	Sand	Die	Cont.	Sand	Die	Cont.	Sand	Die	Cont.	Sand	Die	Cont.
BS 1400												
Phosphorous Bronze	250	310	350	130	170	170	5	2	5	60	85	85
LG2	200	220	250	90	110	110	13	6	13	60	65	65



# Non Ferrous Metal

## Aluminium Bronze - AB2

### Summary

Aluminium bronze contains aluminum as the principle alloying element together with Copper, Iron and Nickel which gives high strength and excellent corrosion resistance. AB2 has a more homogenous microstructure, better sliding properties. It offers exceptional corrosion and wear resistance, particularly in marine, chemical, and heavy engineering environments. The alloy also provides high tensile strength, toughness, and good resistance to shock loading.

### Typical Applications

- Aircraft
- Petro-chemical engineering
- General sea water-related services
- Bushings and Bearings
- Structural fittings
- Pumps and valve components
- Heat exchangers
- Machine tools as gears

### Chemical Composition (%)

Al	Fe	Ni	Cu
8.50	3.50	4.50	Balance
10.50	5.50	6.50	Balance

*The properties quoted in this publication are typical of production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

### TYPICAL PROPERTIES OF ALLOYS USED FOR WEARING AGAINST STEEL SURFACES

Alloy Specification	Cast Aluminium Bronze B.S. 1400: AB2	Cast Phosphor Bronze B.S. 1400: PB1	Cast Steel B.S. 592 Grade C	Cast Iron B.S. 1452 Grade 17	Wrought Alu. Bronze B.S. 2033		Wrought Alu. Bronze B.S. 2033	
					Rolled	Heat treated	Normalized	Heat treated
0.1% proof Stress ton/in <sup>2</sup> kg/mm <sup>2</sup>	18.0 28.3	8.0 12.6	18.0 28.3	- -	28.8 44.1	35.0 55.1	14.0 22.0	23.0 36.2
Tensile strength ton/in <sup>2</sup> kg/mm <sup>2</sup>	42.0 66.1	15.0 23.6	35.0 55.1	18.0 28.3	46.0 72.4	50.0 78.7	35.0 55.1	47.0 74.0
Elongation per cent	18.0	5.0	18.0	-	20.0	15.0	20.0	19.0
Hardness HV	160	90.0	180.0	250.0	230.0	280.0	170.0	200.0
Izod value ft lb kg/m	18.0 2.5	8.0 1.1	18.0 2.5	15.0 2.1	15.0 2.1	13.0 1.8	30.0 4.2	50.0 6.9
Fatigue strength (108 cycles) ton/in <sup>2</sup> kg/mm <sup>2</sup>	14.0 22.0	5.0 7.9	14.0 22.0	7.0 11.0	18.0 28.3	22.0 34.6	- -	18.0 28.3
Coefficient of Friction*	0.45	0.35	0.8	0.4	0.45	0.45	0.8	0.8

\*Against steel: starting friction without lubrication.

### Aluminium Bronze Round Rods

Dia (inches)	Kg/ mtr
1"	4.40
2"	17.60
3"	39.60
4"	70.50
5"	110.00
6"	158.50
7"	215.50
8"	281.50

### Services Available In AB2

- \* Gravity castings
- \* Continuous casting
- \* Ingots



# Non Ferrous Metal

## Copper

### Summary

Copper is a soft, tough, ductile, and malleable metal with excellent thermal and electrical conductivity. It exhibits good corrosion resistance and retains its mechanical and electrical properties even at cryogenic temperatures. Copper is also diamagnetic, and it maintains a high level of formability and strength across a wide range of applications.

Its superior conductivity, combined with durability and ease of fabrication, makes copper an essential material in electrical, thermal, and industrial engineering."

### Typical Applications

- Refrigeration tubing
- Architectural applications
- Bus bars
- Electrodes & Spark Plugs
- Lightning and Earthing Systems
- Engineering Bushes
- Gas lines

### Chemical Composition (%)

Cu
99.99%

*The properties quoted in this publication are typical of production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

### Copper Round Rods

Dia (inches)	Kg/M
1/2"	1.1
5/8"	1.8
3/4"	2.5
1"	4.4
1 1/2"	10.1
2"	18.2
3"	42.5
4"	72.5
5"	118.5
6"	162.0

### Copper Square Rods

Sizes (inches)	Kg/mtr
1"X1"	5.8
1 1/2"X1 1/2"	13
2"X 2"	23
3"X 3"	52

### Earthing Tape

Sizes	Kg/m	Rating Amps
25X3mm	0.67	298

### Copper Flat Bars

Size (mm)	Kg/M	Rating Amps
20 x 5	0.90	355
20 x 10	1.80	540
30 x 5	1.40	496
30 x 10	2.80	740
40 x 5	1.80	632
40 x 10	3.60	932
50 x 5	2.30	764
50 x 10	4.60	1118
60 x 5	2.70	894
60 x 10	5.40	1301
80 x 5	3.60	1146
80 x 10	7.20	1657
100 x 5	4.50	1391
100 x 10	9.00	2003
125 x 5	5.60	1690
125 x 10	11.20	2426
150 x 5	6.90	1983
150 x 10	13.80	2839
200 x 30	54.00	6542

### Copper Pipes (Length 6mtr)

Diameter	Thickness (mm)
5/16"	0.80
5/16"	1.20
3/8"	0.76
1/2"	0.89
5/8"	1.20
3/4"	1.07
7/8"	1.14
1"	1.20
1 1/8"	1.27
1 3/8"	1.40
1 5/8"	1.52
2 1/8"	1.78

### Copper Sheet

Size (mm)	Thickness (mm)	Kg/Pc
2000 x 1000	0.5	8.4
2000 x 1000	1.0	16.8
2000 x 1000	1.5	26.8
2000 x 1000	2.0	33.8
2000 x 1000	3.0	50.8
2000 x 1000	6.0	101.6

### Copper Pipes

Diameter	Thickness (mm)
1/4" (Roll)	0.76
3/8" (Roll)	0.76
1/2" (Roll)	0.89
7/8" (Roll)	1.14

### Electrical Earth Fittings

Size (mm)	Length
Pure Copper Earthing Rods dia 5/8"	500mm
Pure Copper Earthing Rods dia 5/8"	2 feet
Pure Copper Earthing Rods dia 5/8"	4 feet
Pure Copper Earthing Rods dia 1/2"	4 feet
Pure Copper Earthing Rods dia 1/2"	5 feet
Multiple Spike /Arrestors	
Flat / Ridge Saddles	
Test Clamp	
Copper Tape Saddles	3/4" or 1"L/ H duty
Copper Tape 4 Way Connectors	
Brass Earthing Rod Sleeves 1/2" or 5/8"	
Earth Clamps / Earthing Rod Connector	

### Formulae for calculating current rating as a function of constant area.

$$I = 7.73 \times A^{0.5} P^{0.39}$$

Where  
**I** = Current in amperes  
**A** = Cross sectional area in mm<sup>2</sup>  
**P** = Perimeter of conductor in mm



# Aluminium

Aluminium is a lightweight, ductile, and corrosion-resistant metal known for its excellent strength-to-weight ratio, high thermal and electrical conductivity, and ease of fabrication. It can be extruded, rolled, cast, or machined, making it suitable for a wide range of engineering, structural, and industrial applications. Aluminium naturally forms a protective oxide layer, offering long-term durability even in harsh environments.

## Aluminium Grade AA 1050

### Summary

AA 1050 is a high-purity aluminium grade containing 99.5% aluminium, making it one of the most corrosion-resistant and highly conductive alloys. It offers excellent ductility, workability, and reflectivity, allowing it to be easily formed, welded, and fabricated into a wide range of shapes. Although it has low mechanical strength, it is ideal for applications where corrosion resistance, conductivity, and formability are more critical than strength.

### Typical Applications

Heat exchangers, chemical and food equipment, reflectors, architectural cladding, sheet-metal work, signage, and general engineering components requiring high ductility.

### Chemical Composition (%)

A1050	Si	Fe	Cu	Mn	Mg	Zn	Ti	Al
Min	≤	≤	≤	≤	≤	≤	≤	≤
Max	0.25	0.40	0.05	0.05	0.05	0.05	0.03	Remainder

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

### Mechanical Properties

	Tensile Strength (mpa)	Elongation (%)	Yield Strength
Min	95	≥	>
Max	125	2.0	75

### Aluminium Sheet Grade AA1050 - Plain + PVC coated

Size	Thickness (mm)	Kg/mtr
8' X 4'	0.4	3.3
8' X 4'	0.5	4.2
8' X 4'	0.6	4.9
8' X 4'	0.7	5.8
8' X 4'	0.8	6.8
8' X 4'	0.9	7.3
8' X 4'	1.0	8.1
8' X 4'	1.2	9.8
8' X 4'	1.5	12.3
8' X 4'	2.0	16.3
8' X 4'	3.0	24.5
8' X 4'	4.0	32.2
8' X 4'	6.0	48.3
8' X 4'	8.0	64.5

### Aluminium Sheet Grade AA1050 - Chequered

Size	Thickness (mm)	Kg/mtr
8' X 4'	1.0	9.2
8' X 4'	1.2	10.6
8' X 4'	1.5	13
8' X 4'	2.0	16.9
8' X 4'	3.0	25.5
8' X 4'	4.0	34
8' X 4'	6.0	51

### Aluminium Rod - Grade 6063

Dia (inches)	Kg/mtr
3/8"	0.20
1/2"	0.35
5/8"	0.60
3/4"	0.90
1"	1.40
<b>Length 6 mtrs.</b>	

### Aluminium Angles

Size (mm)	Kg/mtr
18 x 18 x 3.0	0.27
20 x 20 x 3.0	0.30
25 x 25 x 3.0	0.40
38 x 38 x 3.0	0.70
50 x 50 x 3.0	0.90
50 x 50 x 5.0	1.30
60 x 60 x 6.0	1.70
<b>Length 6 mtrs.</b>	

### Aluminium Flats

Size (mm)	Kg/mtr
25 x 3	0.30
40 x 3	0.40
50 x 5	0.70
60 x 6	1.00

# Aluminium Grade AA 5083

## Summary

It is known for exceptional performance in extreme environments. It is highly resistant to seawater and industrial chemical environments. It is strong and retains good formability due to excellent ductility. It has low density and excellent thermal conductivity.

## Typical Applications

Shipbuilding, Rail cars, Vehicle bodies, Tip truck bodies, Marine skips and cages, Pressure Vessels, Auto aircraft cryogenics, Drilling rigs, TV towers, Transportation equipment, various structural applications that make use of the high strength aluminium alloys.

## Chemical Composition (%)

AA 5083	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other	Al
Min	≤	≤	≤	0.40	4.00	0.05	≤	0.05	≤	
Max	0.40	0.40	0.10	1.00	4.90	0.25	0.10	0.25	0.15	Remainder

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

Mechanical Properties	Metric	Imperial
Elastic modulus	70-80 GPa	10152-11603 ksi
Poisson's ratio	0.33	0.33

## Fabrication and Heat Treatment

### Annealing

Aluminium 5083 alloy can be annealed at 343°C (650°F) and then cooled in air.

### Welding

Aluminium 5083 alloy can be welded by conventional methods and the filler rod used in this process is of the same alloy.

### Forging

Aluminium 5083 alloy can be forged in the temperature range of 454 to 399°C (850 to 750°F).

### Forming

Aluminium 5083 alloy has good forming characteristics when either cold or hot worked.

### Machinability

Conventional methods are used for the machining process of Aluminium 5083 alloy.

### Hot Working

Aluminium 5083 alloy is hot formed at 204°C (400°F) or higher to 371°C (700°F) when severe deformation is needed.

## Aluminium Sheet Grade AA 5083

Size (mm)	Thickness (mm)	Kg/Pc
3000 x 1500	6.0	74
3000 x 1500	10.0	124
3000 x 1500	12.0	148
3000 x 1500	16.0	197
3000 x 2000	12.0	196
3000 x 2000	16.0	262

# Aluminium Grade AA 7075

## AlZn5, 5MgCu (AZ5GU) High Resistance Grade

Aluminium 7075 is a high-strength alloy primarily alloyed with zinc. It is one of the strongest commercially available aluminium grades, offering strength comparable to some steels while remaining lightweight. It is heat-treatable, highly durable, and widely used in high-performance applications requiring excellent fatigue resistance and mechanical strength.

## Typical Applications

Aerospace components, high-performance machinery, gears, shafts, structural parts, sporting equipment, and automotive performance parts.

## Chemical Composition (%)

AA 5083	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other	Al
Min	≤	≤	1.2	≤	2.10	0.18	5.10	≤	≤	
Max	0.40	0.50	2.00	0.30	2.90	0.28	6.10	0.20	0.05	Remainder

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

## Mechanical Properties

	Tensile Strength (mpa)	Elongation (%)	Yield Strength
Min	≥	≥	>
Max	540	6.0	460

## Aluminium 7075 Flat Bars

Width (mm)	Thickness (mm)	Kg/mtr
100	20	5.50
200	20	10.90
300	20	16.30
400	20	13.60
100	30	8.20
200	30	16.40
300	30	24.60
400	30	32.80
100	40	11.00
200	40	22.00
300	40	33.00
400	40	44.00
100	50	13.70
200	50	27.30
300	50	41.00
400	50	54.60
200	65	36.00
300	65	54.00
400	65	72.00
200	80	43.60
300	80	65.40
400	80	87.20
200	100	54.60
300	100	82.00
400	100	109.20
200	150	82.00
300	150	123.00
400	150	164.00

## Aluminium 7075 Round Rods

Dia (mm)	Kg/mtr
38	3.3
50	5.6
63	9.5
75	12.7
100	22.5
130	38.2
150	50.6
175	68.5
200	90

# Engineering Nylon

## Nylon (PA6)

### Summary

Nylon (PA6) is a high-performance engineering thermoplastic known for its excellent strength, toughness, flexibility, and wear resistance, making it suitable for demanding mechanical applications.

### Key Advantages

- High mechanical strength with good damping ability
- Excellent abrasion and wear resistance
- Good thermal and chemical stability (oils, fuels, lubricants)
- Low coefficient of friction
- Easy machining and processing
- Good electrical insulation properties
- Food-grade variants available

### Typical Applications

- Rollers, bushes, gears, sprockets
- Guides, wear strips, chain guides
- Pulleys, sheaves, thrust washers
- Star wheels, clamps, spacers, liners
- Ploughs, mandrels, structural machine parts
- Automotive under-the-hood components

### PA6 Sheet

Size (mm)	Thickness (mm)	Kg/Sheet
1000 x 1000	6.0	8.8
1000 x 1000	8.0	10.8
1000 x 1000	12.0	15.3
1000 x 1000	15.0	18.7
1000 x 1000	20.0	29.0
1000 x 1000	25.0	30.0
1000 x 1000	40	50.2

### PA6 Rods

Dia (mm)	Kg/Mtr
10	0.10
15	0.22
20	0.38
25	0.60
30	0.90
40	1.51
50	2.36
60	3.46
65	3.97
70	4.60
80	6.15
90	8.00
100	9.42
130	16.60
160	24.20
180	31.30
200	39.50
250	60.90
300	86.90
350	118.70
400	154.00

## Polyoxymethylene (POM-C)

### Summary

POM-C (Acetal Copolymer) is a rigid engineering thermoplastic with excellent dimensional stability, low friction, and high fatigue resistance, ideal for precision components.

### Key Advantages

- High stiffness and dimensional accuracy
- Very low friction and self-lubricating properties
- Excellent fatigue, creep, and wear resistance
- Low moisture absorption
- Good chemical and electrical insulation properties
- Porosity-free, suitable for food and medical contact

### Typical Applications

- Precision gears, sprockets, cams
- Bushes, bearings, rollers
- Conveyor components and chain guides
- Cutting boards and wear parts
- Star wheels, spacers, clamps
- Seals, valve parts, pump components

### POMC Sheets

Size (mm)	Thickness (mm)	Kg/Sheet
620 x 1220	3.0	3.5
1000 x 1000	6.0	10.2
1000 x 1000	12.0	19.0
1000 x 1000	15.0	23.4
1000 x 1000	20.0	31.0
1000 x 1000	25.0	38.2
1000 x 1000	40.0	61.2
1000 x 1000	50.0	76.0
1000 x 1000	70.0	107.0
1000 x 1000	100.0	153.0

### POMC Rods

Dia (mm)	Kg/Mtr
5	0.03
10	0.12
15	0.27
20	0.47
25	0.74
30	1.00
40	1.87
50	2.92
60	4.20
65	4.91
70	5.69
80	7.45
90	9.43
100	11.65
130	19.79
160	29.94
180	38.00
200	48.00



# Engineering Nylon

## Lubricated Nylon

### Summary

Nylube is a high-performance, wear-resistant nylon grade engineered with a combined liquid and solid lubrication system, enabling an exceptionally low coefficient of friction (as low as 0.08). It offers excellent pressure-velocity (P-V) performance, making it ideal for continuously running bearing and sliding applications. Nylube performs reliably across a wide range of loads and speeds, significantly reducing wear, noise, and maintenance requirements while extending component life in demanding engineering and industrial environments.

### Typical Applications

Nylube is commonly used for bearings, bushings, gears, wear pads, rollers, and other sliding or rotating components operating under high load and varying speeds where low friction and maintenance-free performance are required.

### Lubricated Nylon Rods

Dia (mm)	Kg/Mtr
50	2.5
60	3.6
70	4.9
100	12.7
130	16.6
160	24.5

## UHMW-PE (Ultra High Molecular Weight Polyethylene)

### Summary

UHMW-PE is a high-performance thermoplastic known for its exceptional wear and abrasion resistance, very low coefficient of friction, and high impact strength. It is self-lubricating, lightweight, and highly resistant to chemicals and moisture, making it ideal for demanding industrial environments.

### UHMW-PE Rods (Black)

Dia (mm)	Kg/Mtr
25	0.46
40	1.18
50	1.85
65	3.12
80	4.72
100	7.38
130	12.48
160	18.90
200	29.53

### UHMW-PE Sheets (Black)

Dia (mm)	Thickness (mm)	Kg/Sheet
1000 x 1000	25.0	25.0
1000 x 1000	50.0	50.0
1000 x 1000	80.0	80.0
1000 x 1000	100.0	100.0
1000 x 1000	150.0	150.0

### Properties of PA6, POMC, Lubricated Nylon & UHMW-PE

PROPERTY	APPROXIMATE KG/M				
	GENERAL	PA6	POMC	LUBRICATED NYLON	UHMW-PE
Colour		Neutral	White/Black	Green	Black
Density	g/cm <sup>3</sup>	1.135	1.41	1.145	0.94
Moisture Absorption (Equilibrium)	%	3	0.1	-	-
Water Absorption (24 hours)	%	-	0.20	-	<0.01
Water Absorption (Saturation)	%	9.50	0.90	-	-
<b>MECHANICAL</b>					
Tensile strength	Mpa	75	70	80	30-50
E-modulus	Mpa	3500	2700	4000	-
Elongation at break	%	>30	>15	>20	350
Compressive Strength	Mpa	90	110	95	-
Compressive Modulus	Mpa	2600	2600	2600	-
Flexural Strength	Mpa	80	80	105	-
Flexural Modulus	Mpa	2100	2600	3400	-
Izod Impact Strength	KJ/m <sup>2</sup>	8.00	7.20	6.00	-
Charpy Impact Strength	KJ/m <sup>2</sup>	-	-	-	-
Hardness (Shore D)	-	-	85	84	>65
Coefficient of Friction (Dynamic)	-	-	0.25	0.08	0.15-0.25
Limiting PV	Mpa/m.min	-	6	-	-
Wear Rate	mg/km	-	-	-	0.58
K-Factor	mm <sup>2</sup> /Nm	-	+	0.25x10 <sup>-4</sup>	-
<b>THERMAL</b>					
Melting Temperature	°C	220	170	220	136
Glass Transition Temperature (Tg)	°C	60	-60	-	-
Heat Deflection Temperature HDT/A	°C	70	110	-	-
Heat Deflection Temperature HDT/B	°C	160	160	-	-
Maximum Intermittent Service Temperature	°C	160	140	180	120
Maximum Continuous Service Temperature	°C	90	90	110	90
Minimum Intermittent Service Temperature	°C	-	-	-100	-
Minimum Continuous Service Temperature	°C	-40	-	-40	-
Coefficient of Linear Thermal Expansion (TMA)	°C-1	8.5 x 10 <sup>-5</sup>	9.2 x 10 <sup>-5</sup>	8 x 10 <sup>-4</sup>	6.5 x 10 <sup>-4</sup>
Thermal Conductivity	W/m°C	0.26	0.31	-	-
Flammability	-	HB	HB	HB	-
<b>ELECTRICAL</b>					
Dielectric Constant	-	3.5	3.8	3.7	2.3
Dielectric Constant (Low Frequency)	-	3.9	-	4	-
Dissipation Factor	Hz	0.021	0.005	-	-
Dielectric Strength	kV/mm	25	16.5	25	50
Volume Resistivity	ohm.m	1 x 10 <sup>13</sup>	1 x 10 <sup>13</sup>	1 x 10 <sup>13</sup>	1 x 10 <sup>17</sup>
Surface Resistivity ROA	ohm.m	1 x 10 <sup>12</sup>	1 x 10 <sup>13</sup>	1 x 10 <sup>12</sup>	1 x 10 <sup>13</sup>
Comparative Tracking Index	CTI	600	600	600	-

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

# PTFE (Polytetrafluoroethylene /Teflon)

## Summary

PTFE is a high-performance fluoropolymer widely used in chemical, mechanical, electrical, and electronic industries due to its exceptional chemical inertness, very low friction, and wide operating temperature range.

## Key Properties

- Chemically inert to almost all chemicals (except molten alkali metals and certain fluorine compounds at high temperature)
- Excellent solvent resistance; insoluble up to **260°C**
- Wide service temperature range: **-250°C to +260°C**
- Lowest coefficient of friction among known solids
- Non-toxic and food-safe
- Negligible water absorption
- Excellent electrical insulation and radiation resistance
- Outstanding weathering and UV resistance

## Typical Applications

### Chemical process industries

- \* Rods, bushes, tubes, sheets
- \* Expansion joints, bellows, valve bellows
- \* Gaskets (envelope, rope, ready-cut)
- \* Mechanical packings, seals, O-rings
- \* Valve and pump components
- \* Laboratory ware and thread seal tapes

### Mechanical Industries

- \* Guideway and slideway liners
- \* Piston rings for non-lubricated compressors
- \* Bush bearings (low load, high speed)
- \* Hydraulic and pneumatic seals
- \* Bridge bearings and pipeline expansion supports
- \* Bridge bearings, pipeline expansion supports

### Electrical & Electronic Industries

- \* SF<sub>6</sub> circuit breaker nozzles
- \* Insulation tapes and capacitor films
- \* Insulator bushes and brush holders
- \* Thin-wall tubing for electrical insulation

## PTFE Sheets

Size (mm)	Thickness (mm)	Kg/Sheet
1000 x 1000	6.0	13.5
1000 x 1000	12.0	27
1000 x 1000	20.0	45
1000 x 1000	30.0	67.5
1000 x 1000	50.0	112.5
1000 x 1000	100.0	225

## PTFE Rods

Dia (mm)	Kg/Mtr
20	0.75
25	1.15
30	1.65
40	2.80
50	4.60
65	7.70
80	11.50
100	18.00
130	31.10
150	41.40
200	73.60

## PTFE (Poly Tetra Fluoro Ethylene)

Sr. No	Property	Unit	Virgin PTFE
1	Density	gm/cc	2.1 -2.2
2	Tensile Strength	kgf / cm <sup>2</sup>	210 - 375
3	Elongation of Break	%	250 - 400
4	Compressive Strength	kgf/ cm <sup>2</sup>	40-50
5	Compressive Modulus	kgf / cm <sup>2</sup>	3500-4000
6	Deformation under load (Max.)		
A.	2 Hrs. 23°C 113 kgf		12
B.	24 Hrs. 23°C 113 kgf	%	15
C.	Permanent		8
D.	2 Hrs. 150°C 113 kfg		55
7	Flexural Strength	kgf/ cm <sup>2</sup>	50-57
8	Flexural Modulus	kgf/ cm <sup>2</sup>	3500 - 6300
9	Impact Strength		
A.	-20°C	cm kgf/ cm <sup>2</sup>	9
B.	+20°C		15
10	Hardness	Shore D	52-58
11	Coefficient of friction		
A.	Dynamic P-7 kg / cm <sup>2</sup> V-o.5	-	0.04-0.06
B.	Static P-35 kg/cm <sup>2</sup>		0.05-0.08
12	Wear Rate (Max.)	gm/s	0.01
13	Continuous Service Temp. At Continuous Service Temp. At	°c	-250 to +260
14	Heat Resistance ( Max. )	%	0.01
15	Thermal Conductivity ( Max. )	10 <sup>1</sup> cal cm S°C	6
16	Liner Thermal Expansion ( Max.)		A R
A.	30 -150°C	%	1.5 1.5
B.	30- 200°C		2.4 2.3
C.	30-250°C		3.4 3.6
17	Dimensional stability		
A.	Length	%	1.5 - 3
B.	Diameter		0.5 - 1
18	Dielectric Strength	kv/mm	22 - 24
19	Volume Resistivity	ohm cm	> 10 <sup>1b</sup>
20	Surface Resistivity	ohm	> 10 <sup>1b</sup>
21	Water Absorption (Max.)	%	0
22	Chemical Resistance ( Max.)		
A.	Permeability	%	0.01
B.	Dissolution		0.01
23	PTFE is chemically inert & unaffected by all known chemicals except molten or dissolved alkali metal.		

The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.

# Tufnol - Grade LPF-3 (F3)

## Summary

Tufnol, Grade LPF-3 (F3), is a laminated composite made from coarse weaved grey cotton fabric and phenolic resin. It offers an excellent balance of mechanical strength, wear resistance, dimensional stability, and good electrical insulation, making it ideal for medium to heavy-duty engineering applications. It is particularly valued for its good machinability, low noise operation, and shock absorption.

## Typical Applications

- Gears, pinions, and sprockets
- Bushes, bearings, and thrust washers
- Wear plates, guides, and slideways
- Pulleys and rollers
- Electrical insulating components
- Structural and load-bearing machine parts
- Components requiring vibration damping and quiet operation

PROPERTIES	UNITS	AVERAGE TEST RESULTS	VALUES AS PER IS 2036-1995		
<b>MECHANICAL</b>					
Tensile Strength	Kgf/cm <sup>2</sup>	700	525 Min		
Flexural Strength / Cross Breaking Strength	Kgf/cm <sup>2</sup>	1300	1000 Min		
Shear Strength	Kgf/cm <sup>2</sup>	735	650 Min		
Impact Strength(Edgewise) (Charpy Method)	KJ/m <sup>2</sup>	10.0	8.8 Min		
Specific Gravity		1.35	-----		
<b>ELECTRICAL</b>					
Electric Strength in oil at 900C	Kv	Withstood 1.2 for 1 Min	1.2 Min		
• Flat wise 1.6 mm Thk	Kv	Withstood 2Kv for 1 Min.	1.0 Min		
• Edgewise 3.2 mm Thk	Meg Ohms	10.0	0.5 Min		
Insulation Resistance after immersion in water or 24 hours at 20°C					
Water Absorption	(Specimen size - 50+ 1mm square)				
•• Thickness	mm	1.6	6.0	20	25
•• Average Test Results	mg	116	188	195	250
•• Maximum Values	mg	220	277	384	420

## Tufnol Sheet

Size (mm)	Thickness (mm)	Kg/Sheet
1220 x 1220	3.0	6.1
1220 x 1220	6.0	12.9
1220 x 1220	10.0	21.1
1220 x 1220	12.0	25.9
1220 x 1220	15.0	31.2
1220 x 1220	20.0	41.3
1220 x 1220	25.0	52.5
1220 x 1220	30.0	60.8
1220 x 1220	40.0	85.5
1220 x 1220	50.0	105
1220 x 1220	70.0	150
1220 x 1220	100.0	210

## Tufnol Rods

Dia (mm)	Kg/Mtr
50	0.80
100	2.90
150	7.20
200	12.10
300	27.00

**SPECIFICATIONS MET : BS: 2572::1955::GRADE F3 / BSEN-60893-3-4-PFCC201  
DIN: 7735 GRADE HGW: 2082**

# Bakelite

## Summary

Bakelite is a rigid phenolic laminate known for its high electrical insulation, good mechanical strength, heat resistance, and dimensional stability, widely used in electrical, mechanical, and industrial applications where durability and insulation are critical.

## Typical Applications

Electrical panels, switchboards, terminal boards, insulation sheets, gears, bushes, spacers, coil formers, transformer components, mechanical supports, and heat-resistant structural parts.

## Bakelite Sheet

Size (mm)	Thickness (mm)	Kg/Sheet
2080 x 1040	3.0	9
2080 x 1040	6.0	18
2080 x 1040	10.0	30
2080 x 1040	12.0	35.6

# Cast Iron

## Grey / Ductile

### Summary

Grey cast iron contains carbon in the form of graphite flakes, giving it excellent compressive strength, wear resistance, and vibration damping. It is easy to cast, machine, and has good dimensional stability.

### Key Characteristics

- Brittle in tension but strong in compression
- Good resistance to wear and deformation
- Excellent vibration and noise damping
- Corrosion resistance under normal atmospheric conditions
- Good castability and stability during solidification

### Typical Applications

**Machine Tools:** Gear blanks, timer pulleys, bushes, drum cams, spacers

**Hydraulic and Pneumatic Equipment:** Pistons, glands, rotors, couplings, hydraulic press rams, control valves, manifold blocks, valve bodies

**Textile Machinery:** Cam shafts, wharves, drums of cone winding machines, guides for tubes in spinning looms

**Glass Bottle Industry:** Neck rings, guide bushes, plugs, funnels, bottom plates

**General Engineering Castings (Wear & Vibration Applications):** Guide valves, plungers, inking rollers, gears, pulleys, cams, rolls and various maintenance items

### Chemical Composition (%)

Cast Iron	C	Si	Mn	S	P
Min	≤	≤	≤	≤	≤
Max	3.66	2.86	0.91	0.021	0.05

*The properties quoted in this publication are typical of mill production and unless indicated should not be regarded as guaranteed minimum values for the specification purposes.*

### Cast Iron Rods (Grey)

Dia (mm)	Kg/m
30	5.20
40	9.30
50	14.50
60	20.25
70	27.50
80	36.10
90	45.40
100	56.00
110	70.05
115	74.50
130	94.60
160	145.00
170	161.00
180	184.00
200	225.00
230	300.00
250	352.00
300	516.00
320	580.00
370	715
420	1030
450	1110
500	1550
600	2120

### Cast Iron Rods (Ductile)

Dia (mm)	Kg/ Mtr
50	14.5
100	56
130	94.6
160	145
300	516

# Hard Chrome Shaft

### Summary

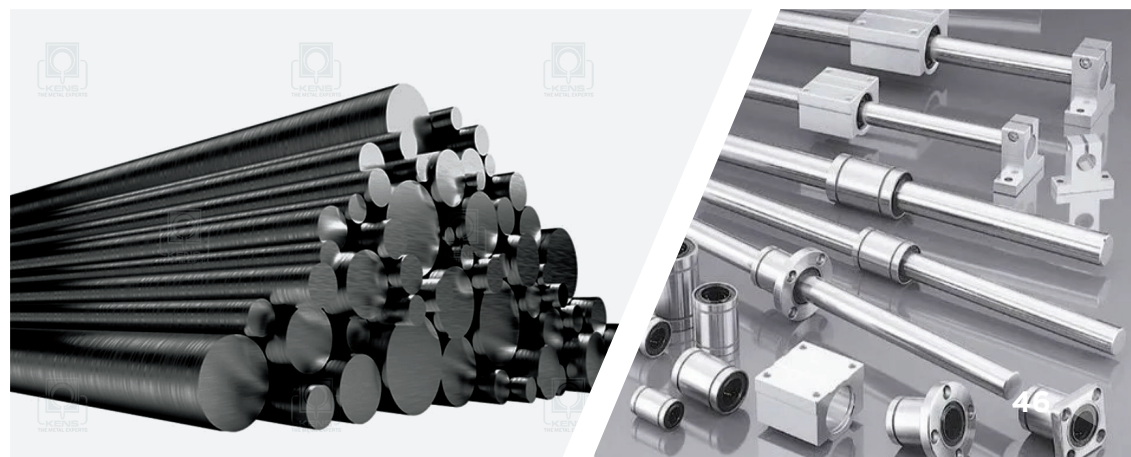
A Hard Chrome Shaft is a steel shaft coated with a layer of hard chromium to enhance its surface hardness, wear resistance, and corrosion resistance. The chrome plating reduces friction, improves sliding performance, and extends the service life of the shaft, while maintaining the core strength of the base steel.

### Typical Applications

Hydraulic and pneumatic cylinders, Machine tool spindles, Pistons and rams, Rollers and shafts in industrial machinery, Guide shafts and rods in precision equipment

### Hard Chrome Shaft

Dia (mm)	Kg/Mtr
8	0.4
10	0.6
12	0.9
16	1.6
18	2.0
20	2.5
22	3.0
25	3.8
28	4.8
30	5.5
32	6.3
36	8.0
38	8.9
40	9.8
45	12.5
50	15.4
56	19.3
60	22.1
63	24.4
65	26.0
70	30.1
75	35.0
80	40.0
85	45.0
90	50.0
100	62.0



# CNC- WATER JET & LASER CUTTING FACILITIES

## Water Jet Cutting

We are the pioneer in setting up the first water jet machine in the country.

For over 15 years, our team of water jet and laser machine engineers have been using innovative cutting technologies to provide ultimate solutions for various industries.

Water jet cutting offers manufacturers versatility and flexibility like no other. With numerous benefits, this cutting technology has an edge over others.

### Advantages of Water jet cutting

- Precise internal cut-outs
- Superior edge quality
- Cuts virtually any shape or thickness
- Efficient and cost-effective
- Cuts any panels to size
- Cuts parts up to 100mm thick in virtually any material.

### Materials Water jet can cut

- |                   |                        |
|-------------------|------------------------|
| • Marble          | • Stainless steel      |
| • Granite         | • Mild steel           |
| • Ceramic tile    | • Wear-resistant steel |
| • Stone           | • Copper               |
| • Glass           | • Brass                |
| • Perspex         | • Aluminium            |
| • Nylons/plastics |                        |

## Laser Cutting

A CNC laser cutter uses a focused high-powered laser beam to mark or cut material to form custom shapes. Its unique design and operation makes it highly accurate with intricate shapes, small holes upto thickness of 25mm.

### Advantages of Laser Cutting

- Produces cleaner cuts, eliminating the need for additional post-processing or finishing
- High-speed and precision cutting
- High-quality edges
- Low cost and more affordable
- Less material distortion
- Narrower kerf widths
- Less material contamination and waste

### Materials Laser can cut

- Stainless steel
- Mild steel
- Cold Rolled Close Annealed (CRCA) Steel Sheets
- Wear-resistant steel
- Galvanized Steel Sheet

## Other cutting facilities -

Electrical discharge machining (EDM) Wire Cut, Oxy Gas, Horizontal & Vertical Bandsaw cutting



# Brass Ironmongery

## Window Fittings

Item Description	Finish	Code
Steel Window Long Stay	Brass	101GF
Steel Window Long Stay	Brush Finish	101BF
Steel Window Long Stay	Black Nickel	101BN
Steel Window Long Stay	E.Oxidised	101EO
Steel Window Long Stay	Oxidised	101O
Forged Steel Window Long Stay	Brush Finish	101FBF
Forged Steel Window Long Stay	Black Nickel	101FBN
Forged Steel Window Long Stay	E.Oxidised	101FEO
Steel Window Long Stay Forged (Imported)	Brass	101FG
Steel Window Long Stay Forged (Imported)	Nickel	101FN
Steel Window Short Stay	Brass	102
Steel Window Short Stay	Black Nickel	102BN
Steel Window Short Stay	E.Oxidised	102EO
Steel Window Short Stay	Oxidised	102O
Forged Steel Window Short Stay	Brush Finish	102FBF
Forged Steel Window Short Stay	Black Nickel	102FBN
Forged Steel Window Short Stay	E.Oxidised	102FEO
Steel Window Left Hand Fastener	Brass	105GF
Steel Window Left Hand Fastener	Brush Finish	105BF
Steel Window Left Hand Fastener	Black Nickel	105BN
Steel Window Left Hand Fastener	E.Oxidised	105EO
Steel Window Left Hand Fastener	Oxidised	105O
Forged Steel Window Left Hand Fastener	Brush Finish	105FBF
Forged Steel Window Left Hand Fastener	Black Nickel	105FBN
Forged Steel Window Left Hand Fastener	E.Oxidised	105FEO
Steel Window Left Hand Fastener Forged (Imported)	Brass	105FG
Steel Window Left Hand Fastener Forged (Imported)	Nickel	105FN
Steel Window Right Hand Fastener	Brass	106GF
Steel Window Right Hand Fastener	Brush Finish	106BF
Steel Window Right Hand Fastener	Black Nickel	106BN
Steel Window Right Hand Fastener	E.Oxidised	106EO
Steel Window Right Hand Fastener	Oxidised	106O
Forged Steel Window Right Hand Fastener	Brush Finish	106FBF
Forged Steel Window Right Hand Fastener	Black Nickel	106FBN
Forged Steel Window Right Hand Fastener	E.Oxidised	106FEO
Steel Window Right Hand Fastener Forged (Imported)	Brass	106FG
Steel Window Right Hand Fastener Forged (Imported)	Nickel	106FN
Steel Door Handle	Brass	107
Steel Door Handle	Black Nickel	107BN
Steel Door Handle	E.Oxidised	107EO
Steel Door Handle	Oxidised	107O
Wooden Window Long Stay	Brass	108
Wooden Window Long Stay	Black Nickel	108BN
Wooden Window Long Stay	E.Oxidised	108EO
Wooden Window Long Stay	Oxidised	108O
Wooden Window Fastener	Brass	110
Wooden Window Fastener	Black Nickel	110BN
Wooden Window Fastener	E.Oxidised	110EO
Wooden Window Fastener	Oxidised	110O



### Tower Bolts/Flash Bolts

Item Description	Size	Code
Tower Bolt	20" Long	201
Tower Bolt	12" Long	202
Tower Bolt	8" Long	203
Tower Bolt	6" Long	204
Tower Bolt	4" Long	205
Flash Bolt	6" Long	207
Flash Bolt	10" Long	208
Cabin Hook	4" Long	209
Cabin Hook	6" Long	210
Concealed bolts	-	-
Spring Latches	-	-

### Brass Water Coupling

Male/ Female	1 1/2", 2", 2 1/2", 3", 4"
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### Aluminium furniture fittings

Railing Heads/ Spears with steel studs	Ask within for sizes
Coffee gratings	
Full Bora	4"
Grills	Ask within for sizes
Benches	4' & 5'
Bench Sides	Left & Right

### Door Fitting/ Handles/ Knobs

Item Description	Finish
Lion Head Knocker	-
Lamu Door Studs	Plain/ Lined/ Pointed
Round & Square Studs	Plain/ Pointed
Aldrop	Straight/ Curved
Hat & Coat Hook	-
Drawer Handle	Various Sizes
Cupboard Handle	Various Sizes
Knobs	3/4", 1", 1 1/4", 1 1/2"
Harps & Hinges	Small, Medium, Large
Shelve Brackets	3", 4", 5", 7"
Curtain Rail Brackets	1 1/2"
Hand Rail Brackets	3/4", 1", 1 1/4", 1 1/2"
Foot Rail Brackets	1 1/2", 2"
Elbows & Tees	1", 1 1/2", 2"
Flanges	3/4", 1", 1 1/2", 2"
End Caps	3/4", 1", 1 1/2", 2"
Alphabets & Numbers	3" High
Brass Balls	3/4", 1", 1 1/2", 2"
Connectors	1/2", 3/4", 1", 1 1/2", 2"
Toilet seat Hinges	
Bronze Lamu chest Fittings	As per casting

# Castable Refractories

## Summary

Castable refractories - including castables, bricks, mortars, and gunning mixes are engineered for easy installation, repair, and maintenance. Our shaped and unshaped solutions offer exceptional thermal resistance, durability, and adaptability, ensuring reliable performance and efficiency across a diverse range of high-temperature industrial applications.

Refractory Castables Cement	60% & 90% Alumina
FONDU Cement	
Insulating Cement Blackyt	
Refractory Mortar	50 Fine
Refractory FireBricks 230mm x 115mm x 75mm	30% & 70% Alumina
Insulating Bricks 230mm x 115mm x 75mm	Hot / Cold
Acid Resistant Bricks 230mm x 115mm x 38mm	
Calcium Silicate boards 600mm x 300mm x 50mm	
Refractory Board	
Refractory Blanket	





# Environmental Sustainability & Management



## Solar Power

We are turning up the heat on sustainability with our investment in renewable energy. We have harnessed the power of the sun by integrating solar energy at two of our manufacturing facilities.

## Emission Control & Air Quality:

Dedicated to maintaining high standards in emission control and air quality. We closely monitor and manage emissions from our production processes, conducting regular testing to ensure safer discharge of emissions and compliance with the EMC ( Air Quality) Regulations, 2014.

## Water Conservation & Treatment:

Committed to conserving every drop, water is a core focus for us and is reflected by our dedicated practices. Our in-house water treatment facility turns wastewater from our operations into a resource that is safe to discharge into the municipal system, minimizing environment impact.

## Waste Management & Recycling

Our approach focuses on **Reducing, Reusing, and Recycling**. Here is how we do it:

**"Sorting Out Success"**: We segregate waste at the source to maximize recycling efficiency and responsible disposal.

**"Partnering for a Cleaner Planet"**: We team up with licensed waste handlers to ensure eco-friendly collection and disposal practices.

**"Circular Economy Champions"**: By recycling specific materials, we contribute to resource conservation and a sustainable cycle.



At Kens Metal Industries Limited, we are all about **"Forging a Greener Future"** and **"Welding Safety into Our Practices"**.

# Definitions

## TENSILE TEST

Test pieces are used for establishing mechanical properties. When the test is done. Four values (1, 2, 3 and 4) are obtained.

### 1. TENSILE STRENGTH

The stress required to rupture in tension (pull), expressed in Megapascals(MPa). Also called Breaking Strength, Ultimate Strength and Ultimate Tensile Strength.

### 2. YIELD STRENGTH

The stress at which a material exhibits a specified limiting set, commonly taken by the offset method as 0.20 per cent of the specimen's original length, expressed in Megapascals.

### 3. ELONGATION

The amount of permanent stretch, after fracture in tension, expressed as a percentage of the specimen's original length.

### 4. REDUCTION OF AREA

The difference between the original cross sectional area of a specimen and the least cross sectional area after rupture in tensile tests, expressed in percentage of the original cross-sectional area.

### 5. IMPACT STRENGTH

A measure of toughness. The force to fracture a notched specimen with a single blow. Expressed in Joules (J) or foot-pounds of energy absorbed. Designated as "Charpy" or "Izod" Impact Strength, depending on the testing machine used

### 6. HEAT TREATMENT

An operation or combination of operations involving the heating and cooling of a metal to obtain certain desirable conditions or properties, and not for the sole purpose of mechanical working.

### 7. ANNEALING

Heating and cooling primarily:

- a) To induce softness
- b) To relieve internal stresses
- c) To obtain the optimum combination of strength and ductility.

### 8. DUCTILITY

The property which permits deformation under tension without rupture. Values of "Elongation" and "Reduction of Area" are generally taken as a measure of Ductility.

### 9. HARDNESS

Resistance to plastic deformation by indentation, penetration, scratching or bending. Expressed by means of "Brinell", "Rockwell", "Scleroscope" or "Vickers" Hardness numbers, depending upon the testing machine used and should be read in conjunction with specified mechanical required.

### 10. STRESS RELIEVING

Heating and cooling to effect the release of stresses contained in material induced by heat treatment, welding or machining.

### 11. TEMPERING

Bringing about an intermediate condition in steel between being ductile and very hard, to provide a desired combination of hardness and ductility, to achieve prescribed mechanical properties.

### 12. QUENCHING

This is the process carried out after material has been heated to the required hardening temperature. The material is then immersed in specific cooling agents to attain hardnesses which is dependant on the cooling speed which is possible for the hardening temperature concerned.

### 13. CASE HARDENING

In applications where it is necessary for components to have great toughness but, at the same time must have a high resistance to wear, the required hardness can be achieved by case hardening the outer surface by means of one of the following methods:

Carburising  
Carbonitriding

Nitriding  
Nitrocarburising

Tuftriding  
Flame Hardening

Induction Hardening

### 14. LIMITING RULING SECTION

The maximum Section on which certain mechanical properties are guaranteed according to the British Standard Specification, BS 970 Pt 1 of 1983.

# Hardness Conversions

The values in the table must be taken as approximates only and are based on DIN. 50150 (May 1957) and EURONORM 8-55 (July 1955) Values converted according to ASTM may differ.

Vickers hardness	Brinell hardness		Rockwell hardness		Tensile strength
HV	HB	Indentation (10mm ball)	HRB	HRC	MPa
80	80	6.48	36.4		275
85	85	6.32	42.4		295
90	90	6.16	47.4		315
95	95	6.01	52.0		325
100	100	5.87	56.4		345
105	105	5.76	60.0		365
110	110	5.63	63.4		385
115	115	5.52	66.4		390
120	120	5.42	69.4		410
125	125	5.32	72.0		420
130	130	5.22	74.4		440
135	135	5.12	76.4		460
140	140	5.04	78.4		470
145	145	4.96	80.4		490
150	150	4.88	82.2		500
155	155	4.81	83.8		520
160	160	4.74	85.4		540
165	165	4.67	86.8		550
170	170	4.60	88.2		570
175	175	4.54	89.6		590
180	180	4.48	90.8		610
185	185	4.42	91.8		620
190	190	4.37	93.0		640
195	195	4.32	94.0		655
200	200	4.26	95.0		665
205	205	4.21	95.8		685
210	210	4.17	96.6		705
215	215	4.12	97.6		715
220	220	4.07	98.2		735
225	225	4.03	99.0		755
230	230	3.99		19.2	765
235	235	3.95		20.2	785
240	240	3.91		21.2	805
245	245	3.87		22.1	825
250	250	3.83		23.0	835
255	255	3.80		23.8	855
260	260	3.76		24.6	875
265	265	3.73		25.4	885
270	270	3.70		26.2	900
275	275	3.66		26.9	920
280	280	3.63		27.6	940
285	285	3.60		28.3	950
290	290	3.57		29.0	970
295	295	3.54		29.6	990
300	300	3.51		30.3	1010
310	310	3.45		31.5	1040
320	320	3.41		32.7	1080
330	330	3.36		33.8	1110
340	340	3.31		34.9	1150
350	350	3.26		36.0	1175

Vickers hardness	Brinell hardness		Rockwell hardness		Tensile strength
HV	HB	Indentation (10mm ball)	HRB	HRC	MPa
360	359	3.22		37.0	1213
370	368	3.18		38.0	1240
380	376	3.15		38.9	1269
390	385	3.11		39.8	1301
400	392	3.08		40.7	1326
410	400	3.05		41.5	1354
420	408	3.02		42.5	1385
430	415	3		42.5	1409
440	423	2.97		44.0	1438
450	430	2.95		44.8	1462
460	(437)	(2.92)		45.5	(1490)
470	(443)	(2.90)		46.3	(1520)
480	(450)	(2.88)		47.0	(1550)
490	(457)	(2.86)		47.7	(1580)
500	(464)	(2.84)		48.3	(1610)
510	(471)	(2.82)		49.0	(1640)
520	(478)	2.80		49.6	(1670)
530	(485)	(2.78)		50.3	(1700)
540	(491)	(2.76)		50.9	(1730)
550	(497)	(2.74)		51.5	(1760)
560	(504)	(2.73)		52.1	(1780)
570	(510)	(2.71)		52.7	(1810)
580	(516)	(2.69)		53.3	(1840)
590	(523)	(2.68)		53.8	(1870)
600	(529)	(2.66)		54.4	(1900)
610				54.9	
620				55.4	
630				55.9	
640				56.4	
650				56.9	
660				57.4	
670				57.9	
680				58.4	
690				58.9	
700				59.3	
720				60.2	
740				61.1	
760				61.9	
780				62.7	
800				63.5	
820				64.3	
840				65.0	
860				65.7	
880				66.3	
900				66.9	
920				67.5	
940				68.0	






( ) = Values very doubtful

# Hardness Values

Symbol	ton F/Sq in.	MPa	Hardness (Brinell)
P	35/45	540/695	83 - 96 HRB (152/207)
Q	40/50	618/772	88 - 99 HRB (179/229)
R	45/55	695/849	95B - 24 HRC (201/255)
S	50/60	772/926	18 - 27 HRC (223/277)
T	55/65	849/1004	23 - 30 HRC (248/302)
U	60/70	926/1080	27 - 34 HRC (269/331)
V	65/75	1004/1158	29 - 36 HRC (293/352)
W	70/80	1080/1235	31 - 39 HRC (311/375)
X	75/85	1158/1312	35 - 41 HRC (341/401)
Y	80/90	1235/1390	38 - 45 HRC (363/429)
Z	100 MIN	1544 MIN	47 - HRC MIN (444 MIN)

Abbreviation	
MPa	Mega Pascal (1 Mpa = 1 Newton/mm <sup>2</sup> )
N/mm <sup>2</sup>	Newtons per mm squared
HR	Hot Rolled
CD	Cold Drawn
CD & G	Cold Drawn & Ground
HB	Hardness Brinell
HRC	Hardness Rockwell "C" Scale
HRB	Hardness Rockwell "B" Scale
HV	Hardness Vickers
kg/m	Kilograms per metre
KCV	Charpy V Notch
J	Joules
Rm	Tensile Strength
Re	Yield Stress
Rp 0.2	Yield at 0.2% offset
LRS	Limiting Ruling Section
N	Normalised
AISI	American Iron and Steel Institute
BS	British Standard

## FORMULAE FOR THEORETICAL MASS CALCULATIONS

Symbol	Formula x Spec	Al	Brass	Bronze	Copper	Steel	Stainless
 Round	D x D x	0.002132	0.006657	0.006924	0.007010	0.00616	0.00631
 Hollow	(D - t) x t x	0.0085	0.026	0.02778	0.028	0.02466	0.0253
 Flat	w x t x	0.002712	0.00848	0.00882	0.00889	0.00786	0.00804
 Square	D x D x	0.002712	0.00848	0.00882	0.00889	0.00786	0.00804
 Hexagon	D x D x	0.00235	0.007344	0.007638	0.00776	0.0068	0.006963

All dimension in "mm", Mass = Kgs

## **SOME FACTS ABOUT ALLOYING AND ACCOMPANYING ELEMENTS IN STEEL**

### **Al. Aluminium**

This is the most powerful de-oxidiser used which also combines with Nitrogen, thereby reducing the susceptibility to strain ageing. Small additions assist fine-grained structure. As Aluminium forms very hard nitrides with Nitrogen, it is usually an alloying element in nitriding steels. Aluminium improves the scale resistance and is therefore often used as an alloying element in ferritic heat resisting steels.

### **C Carbon**

Carbon is the most important and influential alloying element in steel. In addition to Carbon every unalloyed steel contains Silicon, Manganese Phosphorus and Sulphur which occur unintentionally during manufacture. The addition of further alloying elements to achieve special effects and intentional increase of Manganese and Silicon contents, result in alloy steel. With increased Carbon content the strength and hardenability of steel increase but its ductility, forgeability and machineability reduces. The Carbon content in steel has virtually no effect on the steel corrosion resistance to water, acids and hot gases.

### **Cr. Chromium**

Chromium increases the hardenability of steel while the ductility is effected minimally. Higher Chrome content in steel increases its corrosion resistance, and by forming carbides the edge holding quality of steel increases. The tensile strength of steel increases by 8 100N/mm<sup>2</sup> for every 1% Chrome added. The yield strength also increases but the notch impact value reduces.

### **Mn. Manganese**

Manganese increases the strength of steel to a lesser degree than Carbon while it favourably influences the forgeability, weldability and markedly increases the hardness penetration depth.

### **Mo. Molybdenum**

While Molybdenum improves the tensile strength and increases the heat resistance and weldability of steel, the forgeability of steel with a high Molybdenum content decreases. When used in combination with Chromium and Nickel, Molybdenum may produce high yield points and tensile strength values.

### **Ni. Nickel**

By adding Nickel to steel the notch toughness is increased significantly and is therefore alloyed for increasing toughness in case-hardening, heat-treatable and subzero toughness steels. Nickel combined with Chromium ensures good through hardening. Chrome-Nickel steel are stainless, heat resistant and resistant to scaling. Nickel does not impair the welding properties of steel.

### **P Phosphorus**

Phosphorus is normally regarded as being detrimental to steel and every endeavour is therefore made to keep Phosphorus content in high grade steels to maximum of 0.03 to 0.05%.

### **Pb. Lead**

Lead is added in free cutting steels in amounts of 0.20 0.50%. Because of its fine homogenous distribution, formation of shorter chips and clean faces of cut is achieved., thus improving machineability. The stated lead content does not effect the mechanical properties of steel.

### **S Sulphur**

Sulphur produces the most pronounced segregation of all steel accompanying elements. It leads to red shortness or hot shortness. Sulphur is added to steels for automatic machining in quantities of up to 0.40%. This reduces the friction on the tool cutting edges by means of a lubricating action, thereby increasing tool life. It also produces shorter chips during machining. Sulphur also increases susceptibility to welding cracks in steel.

### **Si. Silicon**

Silicon, like Manganese is contained in all steels as iron ore contains Silicon in various quantities, depending on overall composition. Silicon is also absorbed from the furnace refractory linings during the melting process. However, only steels containing more than 0.40% of Silicon are called Silicon steels. Silicon is a deoxidize and promotes graphite precipitation, it also increases the strength and wear resistance of steel while significantly increasing the elastic limit, thus being a useful alloying element in spring steels. Because of Silicons ability to greatly reduce electrical conductivity, extensive use is made of it in electrical steels.

### **V Vanadium**

Vanadium is used as a primary grain refiner in the manufacture of steel. It is also a strong carbide former, thus providing increased wear resistance, edge holding and high temperature strength. Vanadium is therefore used primarily as an alloying element in high speed, hot forming and creep resistant steels.



**An ISO 9001:2015 Certified Company**

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