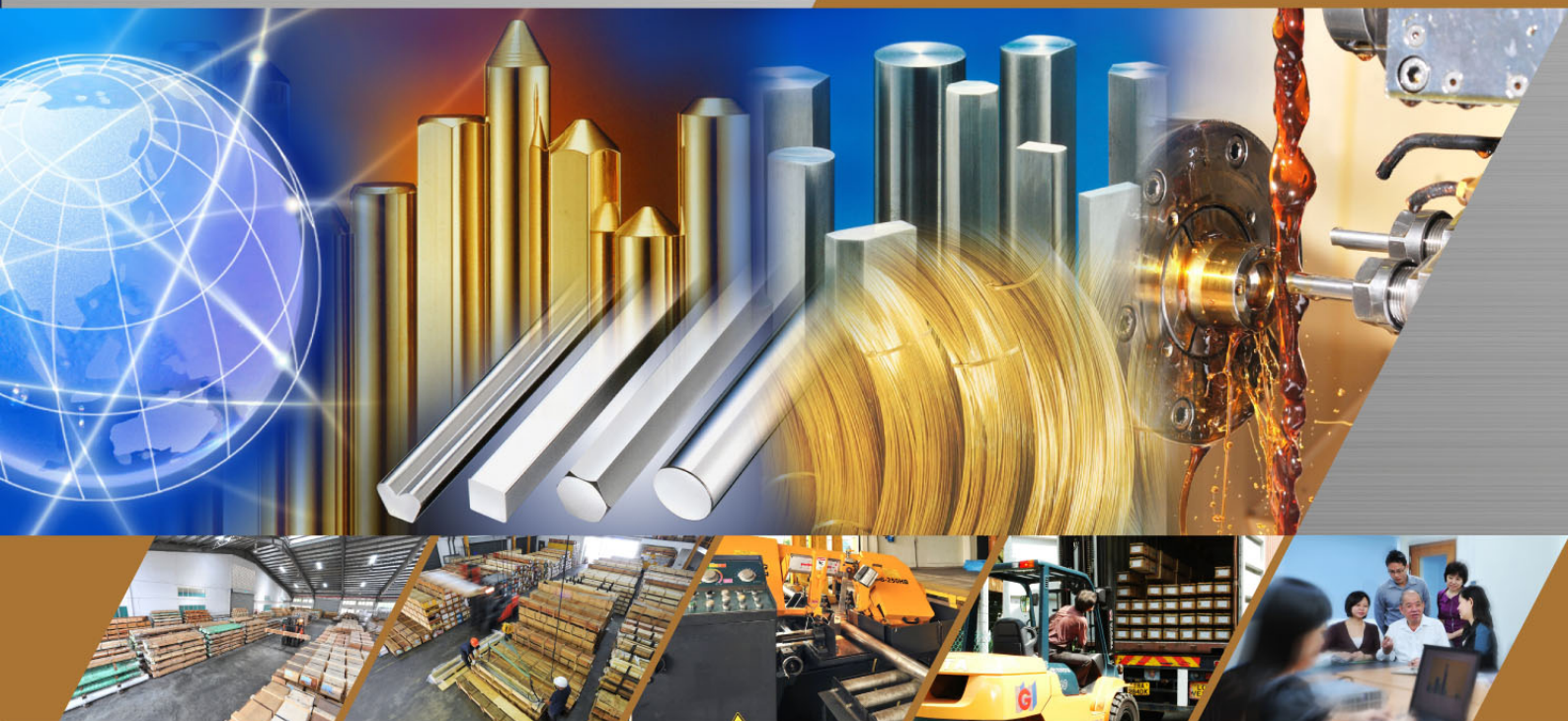


The Choice Supplier for

Metal Bars & Wires



华源金属机械私人有限公司  
HUA GUAN METAL & ENGINEERING PTE LTD

# Corporate Profile

Founded in 1977, **Hua Guan Metal & Engineering Pte Ltd** is one of the most established stockists in Singapore to supply metal bars and wires to the Precision Engineering Industries. Our products include Stainless Steel, Brass, Aluminium, Free Cutting Steel, Carbon, and Alloy Steel Bars and Wires in various shapes and sizes.

After Hua Guan Metal was officially incorporated into a private limited company in 1992, we started the expansion of our business into the overseas markets. Today, we are always seeking for new opportunities to enhance our business activities in the field of ferrous and non-ferrous metal industries.

For more than three decades, Hua Guan Metal has maintained the dedication to help customers in the Asia Pacific region to source for materials that suit their needs and requirements. We work closely with our international principals and suppliers at all times to offer a wide range of quality products to local and overseas customers at a competitive price.

Thanks to our customers' support, Hua Guan Metal has grown from strength to strength over the past years. As our management and staff strongly believe in supplying quality products, we strive to improve on our business processes and services so that we can continue to exceed the expectations of our customers in the coming years.

We sincerely hope that the information given in this catalogue is useful in providing you a better understanding of our products. With our commitment to provide excellent customer service, we are always ready to assist you with all your enquiries!



# Corporate Mission

“Reaching out to all customers who require our products and services, and be the long-term strategic partner for the Precision Engineering Industries.”



## Corporate Values

- **B**ring out the potential of our employees by providing meaningful jobs and advancement opportunities.
- **E**ngage in value-added activities to enhance shareholder's value.
- **S**upport our invaluable customers at all times through reliable deliveries, quality products and prompt services.
- **T**reasure the good working relationships with our suppliers by always keeping mutual interests in mind.



# Our Facilities

With new challenges arising in the ever-changing business world, Hua Guan Metal ensures that we are always well positioned to meet the needs of our customers through our warehouse facilities and value added services.

Today, our premises house an extensive range of products and a team of well-trained staff who are always mindful of quality products and services that you, the customer, so rightly deserved.

Other than supplying metal and steel products to the Precision Engineering Industry, we also help our customers cut the materials to their required lengths at a reasonable price.





# Our Regional Presence

In 1992, Hua Guan Metal started flexing its muscles and has since established a regional network and presence in 3 countries throughout Southeast Asia. Hence, we are able to provide our customers with better regional support and provide a consistent standard of service in Singapore, Malaysia & Thailand.



Singapore



Malaysia



Thailand

# 黄铜 Brass

Brasses are copper-zinc alloys, with or without relatively small quantities of other elements, namely aluminium, iron, lead, manganese, nickel, silicon and tin. These alloys are characterized by moderate to high strength (depending on grade), good corrosion resistance, good electrical and thermal conductivity, and an attractive colour.

Lead is frequently added to brass to improve machinability and pressure tightness. Addition of tin helps to improve corrosion resistance. Aluminium is sometimes added to increase fluidity and to give a smooth surface.

## Chemical Compositions

Name	Copper Alloy No.		Chemical Composition, wt.%					
	JIS	UNS	Cu	Pb	Fe	Sn	Zn	Other Named Elements
Brass	C2700	C27000	63.0 - 67.0	0.05	0.05	-	Rem.	-
	C2720	C27200	62.0 - 64.0	0.07	0.07	-	Rem.	-
	C2800	C28000	59.0 - 63.0	0.10	0.07	-	Rem.	-
Leaded Brass	-	C34000	62.0 - 65.0	0.8 - 1.5	0.15	-	Rem.	-
	-	C34500	62.0 - 65.0	1.5 - 2.5	0.15	-	Rem.	-
	-	C35000	60.0 - 63.0	0.8 - 2.0	0.15	-	Rem.	-
	-	C35300	60.0 - 63.0	1.5 - 2.5	0.15	-	Rem.	-
Free Cutting Brass	-	C36000	60.0 - 63.0	2.5 - 3.7	0.35	-	Rem.	-
	C3601	C36000	59.0 - 63.0	1.8 - 3.7	0.30	(Fe+Sn)0.5	Rem.	-
	C3602	C36000	59.0 - 63.0	1.8 - 3.7	0.50	(Fe+Sn)1.2	Rem.	-
	C3603	-	57.0 - 61.0	1.8 - 3.7	0.35	(Fe+Sn)0.6	Rem.	-
	C3604	-	57.0 - 61.0	1.8 - 3.7	0.50	(Fe+Sn)1.2	Rem.	-
	C3605	-	56.0 - 60.0	3.5 - 4.5	0.50	(Fe+Sn)1.2	Rem.	-
Forging Brass	C3712	C37100	58.0 - 62.0	0.25 - 1.2	(Fe+Sn)0.8	-	Rem.	-
	C3771	C37700	57.0 - 61.0	1.0 - 2.5	(Fe+Sn)1.0	-	Rem.	-
Naval Brass	C4622	C46200	61.0 - 64.0	0.30	0.20	0.7 - 1.5	Rem.	-
	C4641	C46400	59.0 - 62.0	0.50	0.20	0.50 - 1.0	Rem.	-
	-	C48500	59.0 - 62.0	1.3 - 2.2	0.10	0.50 - 1.0	Rem.	-
High Strength Brass	C6782	-	56.0 - 60.5	0.50	0.10 - 1.0	-	Rem.	0.20 - 2.0Al, 0.50 - 2.5Mn
	C6783	-	55.0 - 59.0	0.50	0.20 - 1.5	-	Rem.	0.20 - 2.0Al, 1.00 - 3.0Mn

Also available C5191 / C5441 Phosphor-Bronze Bar & Wire (磷青铜棒/线), C7541 / C7941 Nickel Silver Bar & Wire (洋白铜棒/线).  
Composition, percent maximum, unless shown as a range or a minimum.

# Stainless Steel 不锈钢

Stainless steels are alloy steels that contain up to 1.2% carbon and at least 10.5% chromium, with or without other elements. These steels exhibit a wide range of strength levels, excellent corrosion resistance and an aesthetically pleasing appearance.

## Stainless steels are commonly divided into:

### Austenitic Stainless Steels

Austenitic stainless steels are stainless steels that have been sufficiently alloyed with nickel, or by a combination of nickel, manganese and nitrogen, to produce an austenitic structure at ambient temperature. Austenitic steels cannot be hardened by heat treatment, but they can be significantly strengthened by cold working. In the annealed condition, austenitic stainless steels are essentially nonmagnetic, although some of them may become slightly magnetic by cold working.

### Ferritic Stainless Steels

Ferritic stainless steels are stainless steels that are used in a condition in which the microstructure consists essentially of ferrite and carbides. These steels cannot be strengthened by heat treatment. However, they can be strengthened moderately by cold working. They are magnetic, have good ductility, and possess good resistance to corrosion and oxidation.

## Chemical Composition Of Stainless Steel Bar & Wire

Classification	Specification		C	Si	Mn	P
	JIS	AISI				
Martensitic Grades	SUS403	403	≤0.15	≤0.50	≤1.00	≤0.040
	SUS410	410	≤0.15	≤1.00	≤1.00	≤0.040
	SUS410J1	-	0.08 - 0.18	≤0.60	≤1.00	≤0.040
	SUS410F2	-	≤0.15	≤1.00	≤1.00	≤0.040
	SUS416	416	≤0.15	≤1.00	≤1.25	≤0.060
	SUS420J1	420	0.16 - 0.25	≤1.00	≤1.00	≤0.040
	SUS420J2	420	0.26 - 0.40	≤1.00	≤1.00	≤0.040
	SUS420F	420F	0.26 - 0.40	≤1.00	≤1.25	≤0.060
	SUS420F2	-	0.26 - 0.40	≤1.00	≤1.00	≤0.040
	SUS431	431	≤0.20	≤1.00	≤1.00	≤0.040
	SUS440A	440A	0.60 - 0.75	≤1.00	≤1.00	≤0.040
	SUS440B	440B	0.75 - 0.95	≤1.00	≤1.00	≤0.040
	SUS440C	440C	0.95 - 1.20	≤1.00	≤1.00	≤0.040
	SUS440F	S44020	0.95 - 1.20	≤1.00	≤1.25	≤0.060
Ferritic Grades	SUS405	405	≤0.08	≤1.00	≤1.00	≤0.040
	SUS430	430	≤0.12	≤0.75	≤1.00	≤0.040
	SUS430F	430F	≤0.12	≤1.00	≤1.25	≤0.060
	SUS434	434	≤0.12	≤1.00	≤1.00	≤0.040
	SUS201	201	≤0.15	≤1.00	5.50 - 7.50	≤0.060
Austenitic Grades	SUS202	202	≤0.15	≤1.00	7.50 - 10.00	≤0.060
	SUS301	301	≤0.15	≤1.00	≤2.00	≤0.045
	SUS302	302	≤0.15	≤1.00	≤2.00	≤0.045
	SUS303	303	≤0.15	≤1.00	≤2.00	≤0.200
	SUS303Se	303Se	≤0.15	≤1.00	≤2.00	≤0.200
	SUS303Cu	-	≤0.15	≤1.00	≤3.00	≤0.200
	SUS304	304	≤0.08	≤1.00	≤2.00	≤0.045
	SUS304L	304L	≤0.03	≤1.00	≤2.00	≤0.045
	SUS304N1	304N	≤0.08	≤1.00	≤2.50	≤0.045
	SUS304N2	-	≤0.08	≤1.00	≤2.50	≤0.045
	SUS304LN	304LN	≤0.03	≤1.00	≤2.00	≤0.045
	SUS304J3	-	≤0.08	≤1.00	≤2.00	≤0.045
	SUS305	305	≤0.12	≤1.00	≤2.00	≤0.045
	SUS309S	309S	≤0.08	≤1.00	≤2.00	≤0.045
	SUS310S	310S	≤0.08	≤1.50	≤2.00	≤0.045
	SUS316	316	≤0.08	≤1.00	≤2.00	≤0.045
	SUS316L	316L	≤0.03	≤1.00	≤2.00	≤0.045
	SUS316N	316N	≤0.08	≤1.00	≤2.00	≤0.045
	SUS316LN	316LN	≤0.03	≤1.00	≤2.00	≤0.045
	SUS316F	-	≤0.08	≤1.00	≤2.00	≤0.045
	SUS321	321	≤0.08	≤1.00	≤2.00	≤0.045
	SUS347	347	≤0.08	≤1.00	≤2.00	≤0.045
	SUSXM7	304Cu	≤0.08	≤1.00	≤2.00	≤0.045
Precipitation Hardening Grades	SUS630	S17400	≤0.07	≤1.00	≤1.00	≤0.040
	SUS631	S17700	≤0.09	≤1.00	≤1.00	≤0.040

Note: 1) Each grade may contain 0.60% or under of Ni. 2) 0.60% or under of Mo may be added. 3) 0.75% or under of Mo may be added.





### Martensitic Stainless Steels

Martensitic stainless steels are stainless steels that can be hardened by heat-treatment, i.e. they develop a martensitic structure when rapidly cooled from austenitizing temperature. These steels in the hardened tempered condition possess high strength and hardness, fairly good ductility, adequate toughness and good wear resistance. They also resist corrosion in mild environments. They are magnetic.

### Precipitation Hardening Stainless Steels

Precipitation hardening stainless steels are stainless steels which are strengthened by solution treatment and ageing. They possess high strength at ambient and elevated temperatures, relatively good ductility and good corrosion resistance.

#### Chemical Composition

S	Ni	Cr	Mo	Cu	N	Others
≤0.030	(1)	11.50 - 13.00	-	-	-	-
≤0.030	(1)	11.50 - 13.50	-	-	-	-
≤0.030	(1)	11.50 - 14.00	0.30 - 0.60	-	-	-
≤0.030	(1)	11.50 - 13.50	-	-	-	Pb 0.05 - 0.30
≥0.150	(1)	12.00 - 14.00	(2)	-	-	-
≤0.030	(1)	12.00 - 14.00	-	-	-	-
≤0.030	(1)	12.00 - 14.00	-	-	-	-
≥0.150	(1)	12.00 - 14.00	(2)	-	-	-
≤0.030	(1)	12.00 - 14.00	-	-	-	Pb 0.05 - 0.30
≤0.030	1.25 - 2.50	15.00 - 17.00	-	-	-	-
≤0.030	(1)	16.00 - 18.00	(3)	-	-	-
≤0.030	(1)	16.00 - 18.00	(3)	-	-	-
≤0.030	(1)	16.00 - 18.00	(3)	-	-	-
≥0.150	(1)	16.00 - 18.00	(3)	-	-	-
≤0.030	-	11.50 - 14.50	-	-	-	Al 0.10 - 0.30
≤0.030	-	16.00 - 18.00	-	-	-	-
≥0.150	-	16.00 - 18.00	(2)	-	-	-
≤0.030	-	16.00 - 18.00	0.75 - 1.25	-	-	-
≤0.030	3.50 - 5.50	16.00 - 18.00	-	-	≤0.25	-
≤0.030	4.00 - 6.00	17.00 - 19.00	-	-	≤0.25	-
≤0.030	6.00 - 8.00	16.00 - 18.00	-	-	-	-
≤0.030	8.00 - 10.00	17.00 - 19.00	-	-	-	-
≥0.150	8.00 - 10.00	17.00 - 19.00	(2)	-	-	-
≤0.060	8.00 - 10.00	17.00 - 19.00	-	-	-	Se 0.15
≥0.150	8.00 - 10.00	17.00 - 19.00	(2)	1.50 - 3.50	-	-
≤0.030	8.00 - 10.50	18.00 - 20.00	-	-	-	-
≤0.030	9.00 - 13.00	18.00 - 20.00	-	-	-	-
≤0.030	7.00 - 10.50	18.00 - 20.00	-	-	0.10 - 0.25	-
≤0.030	7.50 - 10.50	18.00 - 20.00	-	-	0.15 - 0.30	≤Nb 0.15
≤0.030	8.50 - 11.50	17.00 - 19.00	-	-	0.12 - 0.22	-
≤0.030	8.00 - 10.50	17.00 - 19.00	-	1.00 - 3.00	-	-
≤0.030	10.50 - 13.00	17.00 - 19.00	-	-	-	-
≤0.030	12.00 - 15.00	22.00 - 24.00	-	-	-	-
≤0.030	19.00 - 22.00	24.00 - 26.00	-	-	-	-
≤0.030	10.00 - 14.00	16.00 - 18.00	2.00 - 3.00	-	-	-
≤0.030	12.00 - 15.00	16.00 - 18.00	2.00 - 3.00	-	-	-
≤0.030	10.00 - 14.00	16.00 - 18.00	2.00 - 3.00	-	0.10 - 0.22	-
≤0.030	10.50 - 14.50	16.50 - 18.50	2.00 - 3.00	-	0.12 - 0.22	-
≥0.100	10.00 - 14.00	16.00 - 18.00	2.00 - 3.00	-	-	-
≤0.030	9.00 - 13.00	17.00 - 19.00	-	-	-	≥Ti 5XC%
≤0.030	9.00 - 13.00	17.00 - 19.00	-	-	-	≥Nb 10XC%
≤0.030	8.50 - 10.50	17.00 - 19.00	-	3.00 - 4.00	-	-
≤0.030	3.00 - 5.00	15.00 - 17.50	-	3.00 - 5.00	-	Nb 0.15 - 0.45
≤0.030	6.50 - 7.75	16.00 - 18.00	-	-	-	Al 0.75 - 1.50

# Carbon & Alloy Steel 碳钢与合金钢

## Free-Cutting Steel

JIS G4804-1983

Kind	Symbol of Class	Chemical Composition %					AISI
		C	Mn	P	S	Pb	
Resulphurized Carbon Steel	SUM11	0.08 - 0.13	0.30 - 0.60	0.040 max.	0.08 - 0.13	-	1110
	SUM12	0.08 - 0.13	0.60 - 0.90	0.040 max.	0.08 - 0.13	-	1108
	SUM21	0.13 max.	0.70 - 1.00	0.07 - 0.12	0.16 - 0.23	-	1212
	SUM22	0.13 max.	0.70 - 1.00	0.07 - 0.12	0.24 - 0.33	-	1213
	SUM23	0.09 max.	0.75 - 1.05	0.04 - 0.09	0.26 - 0.35	-	1215
	SUM25	0.15 max.	0.90 - 1.40	0.07 - 0.12	0.30 - 0.40	-	-
	SUM31	0.14 - 0.20	1.00 - 1.30	0.040 max.	0.08 - 0.13	-	1117
	SUM32	0.12 - 0.20	0.60 - 1.10	0.040 max.	0.10 - 0.20	-	-
	SUM41	0.32 - 0.39	1.35 - 1.65	0.040 max.	0.08 - 0.13	-	1137
	SUM42	0.37 - 0.45	1.35 - 1.65	0.040 max.	0.08 - 0.13	-	1141
	SUM43	0.40 - 0.48	1.35 - 1.65	0.040 max.	0.24 - 0.33	-	1144
Leaded Carbon Steel	SUM22L	0.13 max.	0.70 - 1.00	0.07 - 0.12	0.24 - 0.33	0.10 - 0.35	12L13
	SUM23L	0.09 max.	0.75 - 1.05	0.04 - 0.09	0.26 - 0.35	0.10 - 0.35	-
	SUM24L	0.15 max.	0.85 - 1.15	0.04 - 0.09	0.26 - 0.35	0.10 - 0.35	12L14
	SUM31L	0.14 - 0.20	1.00 - 1.30	0.040 max.	0.08 - 0.13	0.10 - 0.35	-

Remark: The silicon content is not specified. Such ranges or limits as 0.10% or less, 0.10% to 0.20%, or 0.15% to 0.35% may be selected and applied, as necessary, by agreement between the purchaser and manufacturer.

## Chromium Molybdenum Alloy Steel for Structural Use

JIS G4105-1979

Symbol of Class	Reference Previous Symbol	Chemical Composition %								AISI
		C	Si	Mn	P	S	Ni	Cr	Mo	
SCM 415	SCM 21	0.13 - 0.18	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.15 - 0.25	-
SCM 418	-	0.16 - 0.21	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.15 - 0.25	-
SCM 420	SCM 22	0.18 - 0.23	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.15 - 0.25	-
SCM 421	SCM 23	0.17 - 0.23	0.15 - 0.35	0.70 - 1.00	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.15 - 0.25	-
SCM 430	SCM 2	0.28 - 0.33	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.15 - 0.30	4130
SCM 432	SCM 1	0.27 - 0.37	0.15 - 0.35	0.30 - 0.60	0.030 max.	0.030 max.	0.25 max.	1.00 - 1.50	0.15 - 0.30	-
SCM 435	SCM 3	0.33 - 0.38	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.15 - 0.30	4137
SCM 440	SCM 4	0.38 - 0.43	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.15 - 0.30	4140
SCM 445	SCM 5	0.43 - 0.48	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.15 - 0.30	4145
SCM 822	SCM 24	0.20 - 0.25	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.030 max.	0.25 max.	0.90 - 1.20	0.35 - 0.45	-

Remark: 1. As impurities, Ni and Cu shall not exceed 0.25% and 0.30%, respectively, throughout all classes.

2. When the product analysis on steel is requested by the purchaser, the tolerance for the product analysis shall conform to Table 3 in JIS G 0321.

Application: SCM 415, SCM 418, SCM 420, SCM 421 and SCM 822 are used mainly for case hardening.

## Carbon Steels for Machine Structural Use

JIS G4051-1979

Symbol of Class	Chemical Composition %					AISI
	C	Si	Mn	P	S	
S 10 C	0.08 - 0.13	0.15 - 0.35	0.30 - 0.60	0.030 max.	0.035 max.	1010
S 12 C	0.10 - 0.15	0.15 - 0.35	0.30 - 0.60	0.030 max.	0.035 max.	1012
S 15 C	0.13 - 0.18	0.15 - 0.35	0.30 - 0.60	0.030 max.	0.035 max.	1015
S 17 C	0.15 - 0.20	0.15 - 0.35	0.30 - 0.60	0.030 max.	0.035 max.	1017
S 20 C	0.18 - 0.23	0.15 - 0.35	0.30 - 0.60	0.030 max.	0.035 max.	1020
S 22 C	0.20 - 0.25	0.15 - 0.35	0.30 - 0.60	0.030 max.	0.035 max.	1023
S 25 C	0.22 - 0.28	0.15 - 0.35	0.30 - 0.60	0.030 max.	0.035 max.	1025
S 28 C	0.25 - 0.31	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1029
S 30 C	0.27 - 0.33	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1030
S 33 C	0.30 - 0.36	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	-
S 35 C	0.32 - 0.38	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1035
S 38 C	0.35 - 0.41	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1038
S 40 C	0.37 - 0.43	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1040
S 43 C	0.40 - 0.46	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1043
S 45 C	0.42 - 0.48	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1045
S 48 C	0.45 - 0.51	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	-
S 50 C	0.47 - 0.53	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1049
S 53 C	0.50 - 0.56	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1053
S 55 C	0.52 - 0.58	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1055
S 58 C	0.55 - 0.61	0.15 - 0.35	0.60 - 0.90	0.030 max.	0.035 max.	1059
S 09 CK	0.07 - 0.12	0.10 - 0.35	0.30 - 0.60	0.025 max.	0.025 max.	-
S 15 CK	0.13 - 0.18	0.15 - 0.35	0.30 - 0.60	0.025 max.	0.025 max.	-
S 20 CK	0.18 - 0.23	0.15 - 0.35	0.30 - 0.60	0.025 max.	0.025 max.	-

Remarks: 1. As impurities, Cu, Ni, Cr and Ni + Cr for classes S 09 CK, S 15 CK, S 20 CK shall not exceed respectively 0.25%, 0.20%, 0.20% and 0.30%, and Cu, Ni, Cr and Ni + Cr for throughout other classes shall not exceed respectively 0.30%, 0.20%, 0.20% and 0.35%.

2. When the product analysis on steel is requested by the purchaser, the tolerance for the product analysis shall conform to Table 2 specified in JIS G 0321.

## Other Carbon and Alloy steel materials available

Standard No.	Title	Symbol
JIS G3441 (1988)	Alloy Steel tubes for machine purpose	SCM-TK
JIS G3445 (1988)	Carbon Steel tubes for machine structural purposes	STKM
JIS G3507 (1991)	Carbon Steel wire rods for Cold heading and Cold forging	SWRCH
JIS G3521 (1991)	Hard drawn steel wire	SW
JIS G4103 (1979)	Nickel Chromium Molybdenum Steel	SNCM
JIS G4401 (1983)	Carbon tool steels	SK
JIS G4801 (1984)	Spring Steels	SUP
JIS G4805 (1990)	High Carbon Chromium bearing steels	SUJ

# Aluminium 铝



Pure aluminium is a silvery-white metal with a density of approximately one-third that of ferrous alloys, copper or brass. It is an excellent conductor of heat and electricity, and is also highly reflective to radiant energy. It exhibits excellent corrosion resistance in most environments. It is non-toxic, non-ferromagnetic and also has non-sparking characteristics.

Aluminium is a soft metal with a low tensile strength in the annealed condition. However, by alloying, cold working or heat treatment, it can be much stronger and harder.

## Aluminium and Aluminium Alloy

JIS Standard H4040 : 99

Alloy No.	Chemical Composition %									
	Si	Fe	Cu	Mn	Mg	Cr	Zn	Others	Ti	Al
1070	0.20 max.	0.25 max.	0.04 max.	0.03 max.	0.03 max.	-	0.04 max.	V 0.05 max.	0.03 max.	99.70 min.
1050	0.25 max.	0.40 max.	0.05 max.	0.05 max.	0.05 max.	-	0.05 max.	V 0.05 max.	0.03 max.	99.50 min.
1100	Si + Fe 0.95 max.		0.05 - 0.20	0.05 max.	-	-	0.10 max.	-	-	99.00 min.
1200	Si + Fe 1.00 max.		0.05 max.	0.05 max.	-	-	0.10 max.	-	0.05 max.	99.00 min.
2011	0.40 max.	0.70 max.	5.00 - 6.00	-	-	-	0.30 max.	Bi 0.20 to 0.6 Pb 0.20 to 0.6	-	Remainder
2014	0.50 - 1.20	0.70 max.	3.90 - 5.00	0.40 - 1.20	0.20 - 0.80	0.10 max.	0.25 max.	Zr + Ti 0.20 max.	0.15 max.	Remainder
2017	0.20 - 0.80	0.70 max.	3.50 - 4.50	0.40 - 1.00	0.40 - 0.80	0.10 max.	0.25 max.	Zr + Ti 0.20 max.	0.15 max.	Remainder
2117	0.80 max.	0.70 max.	2.20 - 3.00	0.20 max.	0.20 - 0.50	0.10 max.	0.25 max.	-	-	Remainder
2024	0.50 max.	0.50 max.	3.80 - 4.90	0.30 - 0.90	1.20 - 1.80	0.10 max.	0.25 max.	Zr + Ti 0.20 max.	0.15 max.	Remainder
3003	0.60 max.	0.70 max.	0.05 - 0.20	1.00 - 1.50	-	-	0.10 max.	-	-	Remainder
5052	0.25 max.	0.40 max.	0.10 max.	0.10 max.	2.20 - 2.80	0.15 - 0.35	0.10 max.	-	-	Remainder
5 N 02	0.40 max.	0.40 max.	0.10 max.	0.30 - 1.00	3.00 - 4.00	0.50 max.	0.10 max.	-	0.02 max.	Remainder
5056	0.30 max.	0.40 max.	0.10 max.	0.05 - 0.20	4.50 - 5.60	0.05 - 0.20	0.10 max.	-	-	Remainder
5083	0.40 max.	0.40 max.	0.10 max.	0.40 - 1.00	4.00 - 4.90	0.05 - 0.25	0.25 max.	-	0.15 max.	Remainder
6061	0.40 - 0.80	0.70 max.	0.15 - 0.40	0.15 max.	0.80 - 1.20	0.04 - 0.35	0.25 max.	-	0.15 max.	Remainder
6063	0.20 - 0.60	0.35 max.	0.10 max.	0.10 max.	0.45 - 0.90	0.10 max.	0.10 max.	-	0.10 max.	Remainder
7003	0.30 max.	0.35 max.	0.20 max.	0.30 max.	0.50 - 1.00	0.20 max.	5.00 - 6.50	Zr 0.05 - 0.25	0.20 max.	Remainder
7075	0.40 max.	0.50 max.	1.20 - 2.00	0.30 max.	2.10 - 2.90	0.18 - 0.28	5.10 - 6.10	Zr + Ti 0.25 max.	0.20 max.	Remainder



# 适用零件 Application



# Comparison of Materials 规格对比

DIN  
AISI  
ASTM  
JIS



## Stainless Steel

JIS	AISI	DIN / EN Type	EN Materials No.
SUS303	303	X8CrNiS18-9	1.4305
SUS303CU	303Cu	X6CrNiCuS18-9-2	1.4570
SUS304	304	X5CrNi18-10	1.4301
SUS304L	304L	X2CrNi19-11	1.4306
SUS310S	310S	X8CrNi25-21	1.4845
SUS316	316	X5CrNiMo17-12-2	1.4401
SUS316L	316L	X2CrNiMo17-12-2	1.4404
SUS321	321	X6CrNiTi18-10	1.4541
SUS416	416	X12CrS13	1.4005
SUS420J2	420	X30Cr13	1.4028
SUS420F	420F	X29CrS13	1.4029
SUS431	431	X17CrNi16-2	1.4057
SUS430	430	X6Cr17	1.4016
SUS430F	430F	X14CrMoS17	1.4104
SUS440C	440C	X105CrMo17	1.4125
SUS630	S17400	X5CrNiCuNb16-4	1.4542

## Free-Cutting Steel

JIS	AISI	DIN	EN Materials No.
SUM22	1213	11SMn30 / 9SMn28	1.0715
SUM23	1215	11SMn37 / 9SMn36	1.0736
SUM43	1144	-	-
SUM22L	12L13	11SMnPb30 / 9SMnPb28	1.0718
SUM24L	12L14	11SMnPb37 / 9SMnPb36	1.0737

## Carbon Steel

JIS	AISI	DIN	EN Materials No.
S10C	1010	C10	1.0301
S15C	1015	C15	1.0401
S30C	1030	C30E	1.1178
S35C	1035	C35	1.0501
S45C	1045	C45	1.0503
SCM430	4130	25CrMo4	1.7218
SCM435	4135	34CrMo4	1.7220
SCM440	4140	42CrMo4	1.7225
SCM445	4150	50CrMo4	1.7228

## Brass

JIS	ASTM	DIN
C2700	C27000	CuZn36
C2800	C28000	CuZn40
C3601	C36000	CuZn36Pb3
C3602	C36000	
C3603	-	CuZn39Pb3
C3604	-	
C3712	C37100	CuZn39Pb0.5
C3771	C37700	CuZn39Pb2
C6782	-	CuZn40Al1

## Aluminium

JIS	ASTM	DIN
A2011	2011.0000	AlCuBiPb
A2014	2014.0000	AlCuSiMn
A2017	2017.0000	AlCuMg1
A2024	2024.0000	AlCuMg2
A5052	5052.0000	AlMg2.5
A5056	5056.0000	AlMg5
A6061	6061.0000	AlMg1SiCu
A6063	6063.0000	AlMgSi0.5
A6082	6082.0000	AlMgSi1
A7075	7075.0000	AlZnMgCu1.5

# Product Standard Tolerance & Hardness Conversion Table

## 公差等级硬度单位换算表

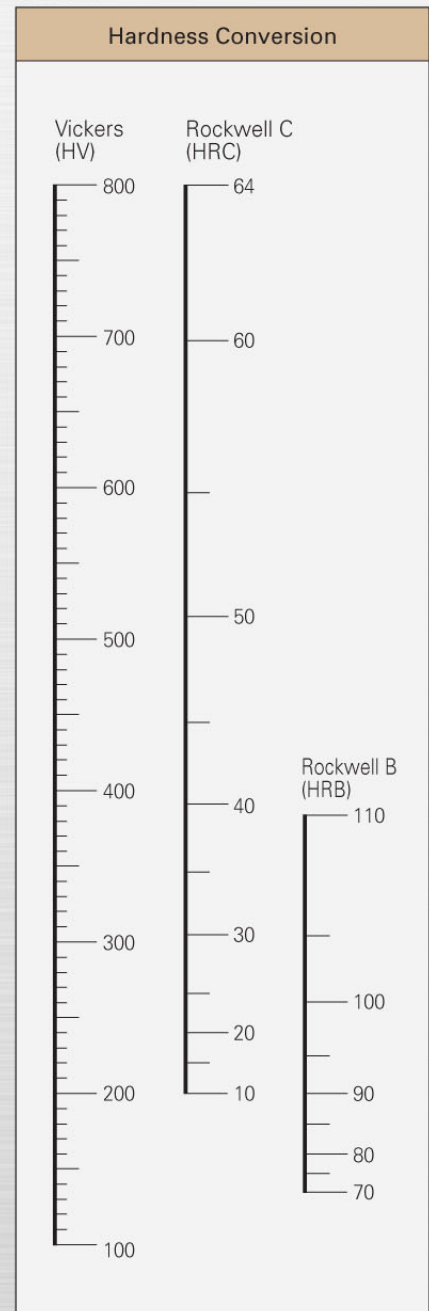
### Size and Tolerance 公差等级表

Size 尺寸范围	h6	h7	h8	h9	h10	h11	h12
≤3.00mm	+0, -0.006	+0, -0.010	+0, -0.014	+0, -0.025	+0, -0.040	+0, -0.060	+0, -0.100
3.01 - 6.00	+0, -0.008	+0, -0.012	+0, -0.018	+0, -0.030	+0, -0.048	+0, -0.075	+0, -0.120
6.01 - 10.00	+0, -0.009	+0, -0.015	+0, -0.022	+0, -0.036	+0, -0.058	+0, -0.090	+0, -0.150
10.01 - 18.00	+0, -0.011	+0, -0.018	+0, -0.027	+0, -0.043	+0, -0.070	+0, -0.110	+0, -0.180
18.01 - 30.00	+0, -0.013	+0, -0.021	+0, -0.033	+0, -0.052	+0, -0.084	+0, -0.130	+0, -0.210
30.01 - 50.00	+0, -0.016	+0, -0.025	+0, -0.039	+0, -0.062	+0, -0.100	+0, -0.160	+0, -0.250
50.01 - 80.00	-	+0, -0.030	+0, -0.046	+0, -0.074	+0, -0.120	+0, -0.190	+0, -0.300
80.01 - 120.00	-	+0, -0.035	+0, -0.054	+0, -0.087	+0, -0.140	+0, -0.220	+0, -0.350

### Conversion Table For Various Hardness 各种硬度单位换算表

Vickers (HV)	Brinell (HB)	Rockwell		Shore HS	Tensile Strength (kg/mm <sup>2</sup> ) 抗张强度
		HRB	HRC		
470	441	-	46.9	-	158
460	433	-	46.1	62	155
450	425	-	45.3	-	151
440	415	-	44.5	59	148
430	405	-	43.6	-	144
420	397	-	42.7	57	141
410	388	-	41.8	-	137
400	379	-	40.8	55	134
390	369	-	39.8	-	130
380	360	110.1	38.8	52	127
370	350	-	37.7	-	123
360	341	109.0	36.6	50	120
350	331	-	35.5	-	117
340	322	108.0	34.4	47	113
330	313	-	33.3	-	110
320	303	107.0	32.2	45	106
310	294	-	31.0	-	103
300	284	105.5	29.8	42	99
295	280	-	29.2	-	98
290	275	104.5	28.5	41	96
285	270	-	27.8	-	94
280	265	103.5	27.1	40	92
275	261	-	26.4	-	91
270	256	102.0	25.6	38	89
265	252	-	24.8	-	87
260	247	101.0	24.0	37	85
255	243	-	23.1	-	84
250	238	99.5	22.2	36	82
245	233	-	21.3	-	80
240	228	98.1	20.3	34	78
230	219	96.7	18.0	33	75
220	209	95.0	15.7	32	71
210	200	93.4	13.4	30	68
200	190	91.5	11.0	29	65
190	181	89.5	8.5	28	62
180	171	87.1	6.0	26	59
170	162	85.0	3.0	25	56
160	152	81.7	0.0	24	53
150	143	78.7	-	22	50
140	133	75.0	-	21	46
130	124	71.2	-	20	44
120	114	66.7	-	-	40
110	105	62.3	-	-	-
100	95	56.2	-	-	-
95	90	52.0	-	-	-
90	86	48.0	-	-	-
85	81	41.0	-	-	-

### Hardness Conversion Table 换算表





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