[Materials]
Varieties and Applications 1

1.General Steel Materials

Type	Material Code	Applications	Comment	JIS	Flat Bar	Square Bar	Hexagonal Bar	Round Bar	Steel Plate	Section Steel
Rolled Steel for General Structure	SS400	General Machine Parts	Fine Workability and Weldability	JIS G 3101	Good	Good		Good	Good	Good
Polished Steel Bar (Cold-Drawn)	SS400D	General Machine Parts	Excellent Precision and Surface Roughness. Ready for use directly after slight cutting.	–	Good	Good	Good	Good		
Carbon Steel for Machine Structural Use	S45C	General Machine Parts	it for Hardening Tensile Strength 58kgf/mm²	JIS G 4051	Good	Good	Good	Good	Good	
	S50C		Fit for Hardening Tensile Strength 66kgf/mm²							
Carbon Tool Steel	SK4	Shafts, Pins, etc.	For Drill Rod(Round Bar)SK4 surface-finished after cold drawing. Class 7(–DG7)=h7 Class 8(–DG8)=h8 Class 9(–DG9)=h9.	JIS G 4401	Good			Good		
	SK5				Good			Good	Good	
Alloy Tool Steel	SKS93	Hardening Parts	Deformation caused by Hardening is much less than that of SK material.	JIS G 4404	Good	Good		Good		
	SKS3									
Chrome Molybdenum Steel	SCM435	General machine parts requiring strength. Screws, etc.	Tensile Strength 70kgf/mm², Tensile Strength after Hardening & tempering:95 kgf/mm² or more. Hardness:HB270 or more. Hardening:HRC50 or more.	JIS G 4105	Good	Good	Good	Good	Good	
	SCM415									
	SCM420									
Sulfuric and Sulfur Compound Free Cutting Steel	SUM21	General Machine parts (Free-Cutting steel)	Made of carbon steel plus sulfur to enhance machinability.	JIS G 4804		Good	Good	Good		
	SUM22L		Free-Cutting Steel containing sulfur and lead.							
	SUM24L									
High Carbon Chrome Bearing Steel	SUJ2	Roller bearings, etc.	Bearing Steel	JIS G 4805				Good		
Cold-Rolled Steel Plate	SPCC	Covers, cases, etc.	Rolled at an almost ambient temperature. High dimensional precision and fair texture. Fine machinability. Easy to bend, wring and cut. Fine Weldability.	JIS G 3141					Good	
Hot-Rolled Steel Plate	SPHC	General machine structural parts.	Plates for general use are 6 mm or less in thickness.	JIS G 3131					Good	

2. Stainless Steel Materials

Type	Material Code	Applications	Comment	Magnetism	JIS	Flat Bar	Square Bar	Hexagonal Bar	Round Bar	Steel Plate	Section Steel
Austenite	SUS303	Machine parts requiring antirusting	18-8 Free-Cutting Stainless Steel, Non-Magnetic. More Machinable than SUS304	None†	JIS G 4303~	Good			Good		
Austenite	SUS304	Machine parts requiring antirusting	Most Versatile Antirusting and Heat-Resisting Steel for General Use	None†		Good	Good	Good	Good	Good	Good
Austenite	SUS316	Machine parts requiring antirusting	More resisting to seawater and other media than SUS304.	None†		Good			Good	Good	
Martensite	SUS440C	Machine parts requiring antirusting (Less corrosion resistant than austenite.)	Fit for Hardening.	Available					Good		
Martensite	SUS410	Machine parts requiring antirusting (Less corrosion resistant than austenite.)	Fit for Hardening. Fine Machinability.	Available					Good		

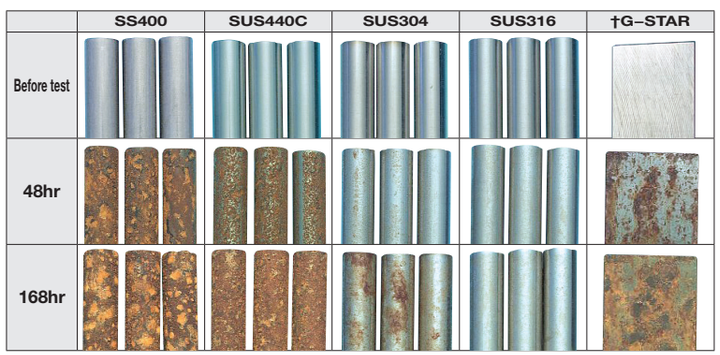
†Martensite exhibits magnetic properties. Machining of Austenite may cause magnetic properties.

<Reference:Corrosion Resistance of Stainless Steel>

Testing Method
Conforms to the JIS H 8502 Cycle Test
Method as a complex corrosion test

Test Conditions
(1) Salt water spray test(5%NaCl. 35˚C) 2hr
(2) Drying(60˚C) 4hr
(3) Wetting(95%RH. 35˚C) 2hr
One cycle takes 8 hr.

Appearance of test piece 48 hr, 168 hr before test.



†G-STAR is martensite stainless steel (pre-hardened steel) manufactured by the Daido Special Steel Co., Ltd.

3.Aluminum Alloy Materials

Type	Material Code	Applications	Comment	JIS	Flat Bar	Square Bar	Hexagonal Bar	Round Bar	Section Steel
Al–Cu Alloy	A2011	General-Use Strength Materials	Free-Cutting Alloy. It excels in machinability but has worse corrosion resistance.	JIS H 4000			Good		
Al–Cu Alloy	A2017	General-Use Strength Materials	High Strength and Machinability Duralumin		Good		Good	Good	
Al–Mg Alloy	A5052	General Machine Parts Covers, cases, etc.	Most typical aluminum alloy with medium strength. With high fatigue strength in comparison with its strength and high corrosion resistance to seawater.		Good			Good	
Al–Mg Alloy	A5056	General Machine Parts	It has fine machined surface and high corrosion resistance to seawater. It has fine machined surface and high corrosion resistance to seawater.				Good		
Al–Mg–Si Alloy	A6061	General Machine Parts	Heat-treated corrosion resisting alloy. High durability owing to T6 treatment.		Good		Good		
Al–Mg–Si Alloy	A6063	General Machine Parts and Structural Material	Weaker than 6061, but more extrudable. Applicable to complex cross-sections shapes. Good corrosion resistance and surface treatment.		Good	Good			Good
Al–Zn–Mg Alloy	A7075	Jigs and Dies	It is one of the strongest aluminum alloys but has worse corrosion resistance. Extra Super Duralumin		Good				

JIS Acronyms for Non-Ferrous Metal

P	Plate, Strip, Disk
PC	Laminate
BE	Extruded Bar
BD	Drawn Bar
W	Drawn Wire
TE	Seamless Extruded Tube
TD	Seamless Drawn Tube

TW	Welded Tube
TWA	Arc-Welded Tube
S	Extruded Section
BR	Riveted Bar
FD	Die-Forged Part
FH	Frce-Forged Part

Quality Codes for Aluminum and Aluminum Alloys

Code		Definition	Description
F		Plain Manufactured Material	Completed as a product, without any order for thermal refining. Extruded or forged material, not thermally refined.
H112		Wrought material, for which certain mechanical properties are guaranteed without the need of hardening.	
O		Brought into the softest state by annealing.	Completely re-crystallized by annealing. A thermally treated alloy should be cooled at a temperature below the annealing temperature to prevent the effect of annealing completely.
H	H1n	Hardened by cold working.	n is a numeral from 1 to 9, representing the degree of hardening. 8 represents hard material, and "4" represents the state halfway 1/2 between 0 and hard material. 2 represents the level halfway between 0 and 1/2 hardness, and "6" the state halfway between 1/2 hardness and hard material.
	H2n	Hardened and then properly softened by heat.	
	H3n	Stabilized after cold working.	
T	T1	Cooled after high-temperature working and then allowed to age naturally.	Quenched at the end of a cold working process and allowed to age and harden at ambient temperature.Extruded material is typical material processed in this way. Cold working such as correction may be conducted unless it affects the strength. Used for an alloy such as 6063, for which the effect of quenching can be realized by cooling after hot working(extrusion).
	T3	Allowed to age naturally after solution treatment and cold working.	Cold working is conducted for plates, rods, tubes, etc. to enhance the strength in some cases, and to improve the corrective dimension precision in other cases, with an obvious effect. T361 when cold working is performed to a higher degree than that for T3.
	T351	Allowed to age naturally after solution treatment and cold working.	Cold working is conducted to enhance the strength after solution treatment, and then it is tension processed to give 1.5%to 3%permanent distortion to remove residual tension, and allowed to age naturally.
	T4	Natural aging after solution treatment	Aging is usually completed after exposure to ambient temperature for approx. 4 days. In the case of 7N01, however, aging is a longer process. The tensile property upon the elapse of one month is adopted as referential data.The variety that is given T4 treatment by a user under specified conditions is called T42.
	T5	Hardened through artificial aging after high-temperature processing and quenching	Hardened through artificial aging to improve the mechanical properties and stabilize the dimensions. Used for an alloy or casting such as 6063, for which the effect of quenching can be realized by cooling after hot working(extrusion).
	T6	Hardened through artificial aging after solution treatment.	Excellent strength can be attained for a thermally treated alloy without cold working in the typical heat treatment process. An item that is given T6 treatment by a user under specified conditions is called T62.
	T61	Wrought Materials: Hardened through artificial aging after solution treatment by quenching with lukewarm water. Casting:Tempered after hardening	Quenched with lukewarm water to prevent distortion due to the main hardening. The conditions for hardening through artificial aging are adjusted to attain strength exceeding that accomplished by regular T6 treatment.
	T7	Stabilized after solution treatment	Overaging surpassing those needed for hardening through artificial aging is carried out to attain the maximum strength, because special properties are adjusted somewhat at the expense of strength.
	T73	Overaging after solution treatment.	Overaging after solution treatment to rectify the tendency to crack due to corrosion under stress. Specified in 7075, forgings, of JIS.
	T7352	Overaging after removal of residual stress after solution treatment.	Overaging after removal of residual stress by compression to retain 1%to 5%permanent deformation subsequent to solution treatment, in order to rectify the tendency to crack due to corrosion under stress. Included in free-forged part, 7075.
	T8	Hardened through artificial aging after cold working subsequent to solution treatment.	Cold working performed, with a noticeable effect, to improve the mechanical properties or to rectify drawbacks or improve dimension precision. Called T83 when the sectional area is reduced 3%through cold working. CalledT86 when the reduction rate is 6%. These procedures are performed to enhance the strength.
	T9	Cold working after hardening through artificial aging subsequent to solution treatment.	Cold working is necessary to enhance the strength.