Metal Plates Property Table

Property Comparison of Metal Plate Materials

* Data below are not guaranteed values but standard values.

Type	Material Code	Heat Treatment (°C)	Representative Values of Mechanical Properties: Tensile Strength (N/mm²)	Proof Stress (N/mm²)	Elongation	Hardness	Representative Values of Physical Properties: Specific Gravity (at 20°C) (g/cm³)	Conductivity (20°C) IACS	Thermal Conductivity (at 20°C) (CGS)	Linear Expansion Coefficient (20 ~ 100°C) (x10-6/°C)
Structural Steel	SS400	-	400~510	215 or More	21% or More	-	7.87	-	-	11.7
Carbon Steel	S50C	Normalized 810 ~ 860 Air-cooled	610 or More	365 or More	18% or More	179~235HB	7.87	-	-	11.7
		Annealed Approx. 800 Furnace-cooled	-	-	-	143~187HB				
		Hardened 810 ~ 860 Water-cooled	740 or More	540 or More	15% or More	212~277HB				
		Tempered 550 ~ 650 Quenched								
	S55CN	Normalized (At the Time of Delivery)	700 or More	370 or More	25% or More	210HB	7.87	-	-	11.7
		Hardened 850 Oil-cooled	810 or More	540 or More	25% or More	250HB				
		Tempered 600 Air-cooled								
Special Steel	SKS93	Hardened 820 Oil-cooled	-	-	-	63HRC or More	7.87	-	-	11.7
		Tempered 180 Air-cooled								
	SKS3	Hardened 800 ~ 850 Oil-cooled	-	-	-	58~63HRC	7.85	-	0.083	12.2
		Tempered 150 ~ 200 Air-cooled								
	SKD11	Hardened 1000 ~ 1050 Air-cooled	-	-	-	58~63HRC	7.8	-	0.07	12
		Tempered 150 ~ 200 Air-cooled								
	DC53	Hardened 1020 ~ 1040 Air-cooled	-	-	-	56~63HRC	7.87	-	0.057	12.2
		Tempered 180 ~ 200 Air-cooled								
	SCM440	Normalized 850 ~ 1050 Air-cooled	980 or More	835 or More	12% or More	285~352HB	7.85	-	-	-
		Annealed 830 ~ 880 Furnace-cooled								
		Hardened 830 ~ 880 Oil-cooled								
	SKH51	Annealed 800 ~ 880 Slow-cooled	-	-	-	255HB or Less	8.16	-	-	11.9
		Hardened 1220 ~ 1240 Oil (Hot Bath)				63HRC or More				
		Tempered 550 ~ 570 Air-cooled								
Stainless Steel	SUS303	Solution Treatment Heat Treatment 1010 ~ 1150 Quenched	520 or More	205 or More	40% or More	187HB or Less	7.93	-	0.039	17.3
	SUS304	Solution Treatment Heat Treatment 1010 ~ 1150 Quenched	520 or More	205 or More	40% or More	187HB or Less	7.93	-	0.039	17.3
	SUS316	Solution Treatment Heat Treatment 1010 ~ 1150 Quenched	520 or More	205 or More	40% or More	187HB or Less	7.98	-	0.039	15.9
	SUS316L	Solution Treatment Heat Treatment 1010 ~ 1150 Quenched	481 or More	177 or More	40% or More	187HB or Less	7.98	-	0.039	15.9
	SUS430	Annealed 780 ~ 850 Air-cooled	450 or More	205 or More	22% or More	183HB or More	7.7	-	0.063	10.4
	SUS440C	Hardened 1010 ~ 1070 Oil-cooled	-	-	-	58HRC or More	7.7	-	0.058	10.2
		Tempered 100 ~ 180 Air-cooled								
Pre-Hardened Steel	G-STAR	-	1060	855	16%	33~37HRC	7.78	-	0.06	10.3
	PX5	-	990	880	20%	30~33HRC	7.85	-	0.101	12.7
	NAK55	-	1255	981	15%	37~43HRC	7.8	-	0.093	12.5
Aluminum Alloy	A5052P-H112	-	225	125	18%	65HB	2.68	35%	0.33	23.8
	A5052P-H112 (Precision Rolled Type)	-	215	120	21%	58HB	2.68	35%	0.33	23.8
	A6061P-T651	-	309	274	12%	95HB	2.7	43%	0.52	23.6
	A2017P-T351	-	390	250	13%	105HB	2.79	34%	0.32	23.6
	ANP79-T651	-	560	500	12%	165HB	2.77	32%	0.31	22.1
	A7075P-T651	-	550	490	12%	160HB	2.8	33%	0.31	23.6
Rolled Copper	Tough Pitch Copper C1100P	-	215~275	49~343	25% or More	87HB or Less	8.89	97% or More	0.93	16.8
	Oxygen Free Copper C1020P	-	245~315	49~343	15% or More	112HB or Less	8.89	97% or More	0.93	16.8
	Chromium Copper Z3234	-	380 or More	-	15% or More	125HB	8.89	70% or More	0.8	-
	Brass Board C2801P	-	355~440	-	25% or More	-	8.43	-	-	-
Pure Titanium Class 2	TP340H	Annealed	340~510	215 or More	23% or More	-	4.51	3~4%	0.04	8.4

CGS: Cal/°C, cm, sec

Property Comparison of Aluminum Alloy

Type	Material Code	Part Number	Corrosion Resistance	Weldability (Argon)	Machinability	Solderability	Anodize Finish
Al-Mg Alloy	A5052P-H112	ALN□ PN□□□	Good	Good	Average	Average	Good
	A5052P-H112 (Precision Rolled Type)	ALA□ PH□□□	Good	Good	Average	Average	Good
Al-Mg-Si Alloy	A6061P-T6	A6061□□□	Average	Good	Average	Good	Good
	A6061P-T651						
Al-Cu Alloy (Duralmin)	A2017P-T351	ALD□ ALJ PD□□□	Inferior	Not for Practical Use	Good	Inferior	Inferior
Al-Zn-Mg Alloy (Ultra super Duralmin)	ANP79-T651	P79□□□	Inferior	Inferior	Very Good	Inferior	Inferior
	A7075P-T651	ALP□ PP□□□	Inferior	Not for Practical Use	Good	Inferior	Inferior

High Precision Plates, ALA□ / ANP79 Plates and P79□□□ are internal stress relieved during cold rolling process. Since residual stress is little, machining distortion will smaller compared to general A5052 / A7075 materials.

Metal Plate Materials

Characteristics Comparison of Metal Plate Materials

Structural Steel		SS400	The most general steel grade. Widely used as it has strength and high machinability and is low price.
		SS400 Annealed Material	SS400 is annealed to relieve its internal stress. It is effective for prevention of warp by machining.
Carbon Steel		S50C	Carbon steel with adequate level of toughness and durability
		S55CN	Normalized S55C, which relieves its internal stress. Added free-cutting elements enhance its machinability. It has higher mechanical strength than S50.
Chrome Molybdenum Steel		SCM440	A chrome steel with a small amount of molybdenum. Increased temper softening resistance and higher toughness.
Special Steel		SKS93	Carbon steel for oil hardening which excels in toughness and abrasion resistance.
		SKS3	It has good machinability as spheroidizing annealing is applied. Has higher hardenability and less heat-treating distortion than SKS93.
		SKD11	Can be air or vacuum hardened due to its high hardenability. Very little heat treat distortion and has high abrasion resistance.
		DC53	Tougher than SKD11. Good machinability and grindability. Hardness equal to SKD11 is obtained by low-temperature tempering, and hardness equal to 62HRC is obtained by high-temperature tempering.
		SKH51	Excels in toughness and abrasion resistance. Very little heat-treatment distortion.
Stainless Steel	Austenite	SUS303	Has better machinability than SUS304. However, corrosion resistance is somewhat inferior. No magnetic permeability.
		SUS304	The most general stainless steel. Excels in corrosion resistance and is widely used. No magnetic permeability.
		SUS303 Annealed Material	SUS303 is treated with stress-relief heat-treatment to relieve internal stress. It is effective for prevention of warp by machining. Has somewhat inferior corrosion resistance compared to SUS303. No magnetic permeability.
		SUS304 Annealed Material	SUS304 is treated with stress-relief heat-treatment to relieve internal stress. It is effective for prevention of warp by machining. Has somewhat inferior corrosion resistance compared to SUS304. No magnetic permeability.
		SUS316	SUS304 to which Molybdenum is added. Superior in corrosion resistance and acid resistance to SUS304. No magnetic permeability.
		SUS316L	SUS316 ultra-low carbon stainless steel categorized within austenitic stainless steel. Suitable for the operations requiring corrosion resistance or good weldability.
	Ferrite	SUS430	A stainless steel with excellent corrosion resistance. It is effective for prevention of warp by machining. Its tempering hardenability is low. Magnetically permeable.
	Martensite	SUS440C	Has high strength and hardness because of the heat treatment applied. Has high abrasion resistance and is hardest in stainless steel. Magnetically permeable.
Pre-Hardened Steel	Martensite Free-Cutting Stainless Steel	G-STAR	Has corrosion resistance and excels in machinability. Has high hardness because of the heat treatment applied. (1030°C Hardening Hardness 48HRC)
	SCM	PX5	Excels in machinability and has toughness. Good weldability.
	Precipitation Hardening	NAK55	Excels extremely in machinability. Smooth machined surfaces facilitate grinding machining afterward.
Aluminum Alloy	A5000	A5052P	The most general aluminum alloy. Excels in corrosion resistance and weldability.
	A2000 (Duralmin)	A2017P	Though it inferiors in corrosion resistance and weldability, it has high strength and forging is possible.
	A6000	A6061P	Heat-treatable alloy, excelling in strength and corrosion resistance.
	A7000 (Ultra super Duralmin)	ANP79	Compared with Iron 15C, it is harder and its machinability is at least 10 times higher. Compared with 7075 material, it has about the same hardness, higher uniformity and lower internal stress.
		A7075P	Has the highest strength in aluminum alloy. Extremely strong and be widely used for aircrafts or mechanical parts.
Rolled Copper	Tough Pitch Copper	C1100P	The most widely used copper, and excellent in electrical and thermal conductivity.
	Oxygen Free Copper	C1020P	Highest purity copper commercially available. The oxygen free nature prevents hydrogen embrittlement.
	Chromium Copper	Z3234	Excellent in mechanical strength and abrasion resistance at high temperature.
	Brass Board	C2801P	Excellent in strength and ductile.
Pure Titanium Class 2		TP340H	Most common titanium material categorized into Pure Titanium Class 2, and well-balanced in machinability and strength. Light weight (Specific gravity 4.51) and excellent corrosion resistance.