

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 | | | | Representative Values of Physical Properties | | | |
|-----------------------------------|--|--|--|----------------------|-------------|---------------|--|--------------------------|--------------------------------------|--|
| | | | Tensile Strength (N/mm²) | Proof Stress (N/mm²) | Elongation | Hardness | Specific Gravity (at 20°C) (g/cm3) | Conductivity (20°C) IACS | Thermal Conductivity (at 20°C)(C/GS) | Linear Expansion Coefficient (20-100°C) (x10-6/°C) |
| Structural Steel | 1018 Carbon Steel | - | 400~510 | 215 or More | 21% or More | - | 7.87 | - | - | 11.7 |
| Carbon Steel | 1049 Carbon Steel | 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 | | | | |
| | 1055 Carbon Steel (Normalized) | 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 Tool Steel (JIS) | Hardened 820 Oil-cooled | - | - | - | 63HRC or More | 7.87 | - | - | 11.7 |
| | | Tempered 180 Air-cooled | | | | | | | | |
| | O1 Tool Steel | Hardened 800~850 Oil-cooled | - | - | - | 58~63HRC | 7.85 | - | 0.083 | 12.2 |
| | | Tempered 150~200 Air-cooled | | | | | | | | |
| | D2 Tool Steel | Hardened 1000~1050 Air-cooled | - | - | - | 58~63HRC | 7.8 | - | 0.07 | 12 |
| | | Tempered 150~200 Air-cooled | | | | | | | | |
| | DC53 Die Steel | Hardened 1020~1040 Air-cooled | - | - | - | 56~63HRC | 7.87 | - | 0.057 | 12.2 |
| | | Tempered 180~200 Air-cooled | | | | | | | | |
| | 4140 Alloy Steel | 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 | | | | | | | | |
| | M2 Tool Steel | 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 | 303 Stainless Steel | 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 |
| | 304 Stainless Steel | 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 |
| | 316 Stainless Steel | 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 |
| | 316L Stainless Steel | 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 |
| | 430 Stainless Steel | Annealed 780~850 Air-cooled | 450 or More | 205 or More | 22% or More | 183HB or More | 7.7 | - | 0.063 | 10.4 |
| | 440C Stainless Steel | Hardened 1010~1070 Oil-cooled | - | - | - | 58HRC or More | 7.7 | - | 0.058 | 10.2 |
| 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 Pre-Hardened Tool Steel (JIS) | - | 1255 | 981 | 15% | 37~43HRC | 7.8 | - | 0.093 | 12.5 |
| Aluminum Alloy | 5052-H112 Aluminum Alloy | - | 225 | 125 | 18% | 65HB | 2.68 | 35% | 0.33 | 23.8 |
| | 5052-H112 Aluminum Alloy (Precision Rolled Type) | - | 215 | 120 | 21% | 58HB | 2.68 | 35% | 0.33 | 23.8 |
| | 6061 Aluminum Alloy-T651 | - | 309 | 274 | 12% | 95HB | 2.7 | 43% | 0.52 | 23.6 |
| | 2017-T351 Aluminum Alloy | - | 390 | 250 | 13% | 105HB | 2.79 | 34% | 0.32 | 23.6 |
| | ANP79 Aluminum Alloy (JIS-T651) | - | 560 | 500 | 12% | 165HB | 2.77 | 32% | 0.31 | 22.1 |
| | 7075-T651 Aluminum Alloy | - | 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 | - | 355~440 | - | 25% or More | - | 8.43 | - | - | - |
| | C28000 Brass | | | | | | | | | |
| Pure Titanium Class 2 | TP340H Titanium (JIS) | 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 | 5052-H112 Aluminum Alloy | ALN_PN_ | Good | Good | Average | Average | Good |
| | 5052-H112 Aluminum Alloy (Precision Rolled Type) | ALA_PH_ | Good | Good | Average | Average | Good |
| Al-Mg-Si Alloy | 6061 Aluminum Alloy-T6 6061 Aluminum Alloy-T651 | A6061 | Average | Good | Average | Good | Good |
| Al-Cu Alloy (Duralmin) | 2017-T351 Aluminum Alloy | ALD_ALJ PD_ | Inferior | Not for Practical Use | Good | Inferior | Inferior |
| Al-Zn-Mg Alloy (Ultra super Duralmin) | ANP79 Aluminum Alloy (JIS)-T651 | P79_ | Inferior | Inferior | Very Good | Inferior | Inferior |
| | 7075-T651 Aluminum Alloy | ALP_PP_ | Inferior | Not for Practical Use | Good | Inferior | Inferior |

High Precision Plates, ALA_ / ANP79 Aluminum Alloy (JIS) Plates, P79_ are internal stress relieved during cold rolling process. Since residual stress is little, machining distortion will smaller compared to general 5052 Aluminum Alloy / 7075 Aluminum Alloy materials.

Metal Plate Materials

Characteristics Comparison of Metal Plate Materials

| | | | |
|-------------------------|---|---------------------------------------|---|
| Structural Steel | | 018 Carbon Steel | The most general steel grade. Widely used as it has strength and high machinability and is low price. |
| | | 1018 Carbon Steel (Annealed) | 1018 Carbon Steel is annealed to relieve its internal stress. It is effective for prevention of warp by machining. |
| Carbon Steel | | 1049 Carbon Steel | Carbon steel with adequate level of toughness and durability. |
| | | 1055 Carbon Steel (Normalized) | Normalized 1055 Carbon Steel, which relieves its internal stress. Added free-cutting elements enhance its machinability. It has higher mechanical strength than S50. |
| Chrome Molybdenum Steel | | 4140 Alloy Steel | A chrome steel with a small amount of molybdenum. Increased temper softening resistance and higher toughness. |
| Special Steel | | SKS93 Tool Steel (JIS) | Carbon steel for oil hardening which excels in toughness and abrasion resistance. |
| | | O1 Tool Steel | It has good machinability as spheroidizing annealing is applied. Has higher hardenability and less heat-treating distortion than SKS93 Tool Steel (JIS). |
| | | D2 Tool Steel | Can be air or vacuum hardened due to its high hardenability. Very little heat treat distortion and has high abrasion resistance. |
| | | DC53 Die Steel | Tougher than D2 Tool Steel. Good in milling and grinding. Strength equal to D2 Tool Steel is obtained by low-temperature annealing; strength equal to 62HRC is obtained by high-temperature annealing. |
| | | M2 Tool Steel | Excels in toughness and abrasion resistance. Very little heat-treatment distortion. |
| Stainless Steel | Austenite | 303 Stainless Steel | Has better machinability than 304 Stainless Steel. However, corrosion resistance is somewhat inferior. No magnetic permeability. |
| | | 304 Stainless Steel | The most general stainless steel. Excels in corrosion resistance and is widely used. No magnetic permeability. |
| | | 303 Stainless Steel Annealed Material | 303 Stainless Steel 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 303 Stainless Steel. No magnetic permeability. |
| | | 304 Stainless Steel (Annealed) | 304 Stainless Steel 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 304 Stainless Steel. No magnetic permeability. |
| | | 316 Stainless Steel | 304 Stainless Steel to which Molybdenum is added. Superior in corrosion resistance and acid resistance to 304 Stainless Steel. No magnetic permeability. |
| | | 316L Stainless Steel | 316 Stainless Steel ultra-low carbon stainless steel categorized within austenitic stainless steel. |
| | Ferrite | 430 Stainless Steel | A stainless steel with excellent corrosion resistance. Recommended as a counter measure for bows when milling. Its tempering hardenability is low. Magnetically permeable. |
| | Martensite | 440C Stainless Steel | 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 Hardened Hardness 48HRC) |
| | SCM | PX5 | Excels in machinability and has toughness. Good weldability. |
| | Precipitation Hardened | NAK55 Pre-Hardened Tool Steel (JIS) | Excels extremely in machinability. Smooth machined surfaces facilitate grinding machining afterward. |
| Aluminum Alloy | A5000 | 5052 Aluminum Alloy | The most general aluminum alloy. Excels in corrosion resistance and weldability. |
| | A2000 (Duralmin) | 2017 Aluminum Alloy | Though it inferiors in corrosion resistance and weldability, it has high strength and forging is possible. |
| | A6000 | 6061 Aluminum Alloy | Heat-treatable alloy, excelling in strength and corrosion resistance. |
| | A7000 (Ultra super Duralmin) | ANP79 Aluminum Alloy (JIS) | 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. |
| | | 7075 Aluminum Alloy | 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 | C28000 Brass | Excellent in strength and ductile. |
| Pure Titanium Class 2 | | TP340H Titanium (JIS) | 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. |