# TUBE AND PIPE
# TECHNICAL DATA

# 6061

ALFINITI

## ALLOY DESCRIPTION

A good all-purpose alloy for applications requiring good corrosion resistance, medium strength, and good machining characteristics. Appearance after anodizing is excellent. Good choice for hydraulic and pneumatic tubing, transportation, structural tube and pipe, furniture applications, handrails where moderate strength is required.

## TYPICAL MECHANICAL PROPERTIES

| Temper | Tensile (.0625" Dia. Specimen) | | | | | Hardness | Shear | | Fatigue*1 | | Modulus*2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ultimate | | Yield | | Elongation/ 4D | Brinnell 500kg 10 mm | Ultimate Shearing Strength | | Endurance Limit - R.R. Moore Type | | Modulus of Elasticity | |
| | KSI | MPa | KSI | MPa | % | | KSI | MPa | KSI | MPa | KSI x $10^3$ | Gpa |
| 0 | 18 | 124 | 8 | 55 | 25 | 30 | 12 | 83 | 9 | 62 | 10.0 | 68.3 |
| T4 | 35 | 241 | 21 | 145 | 22 | 65 | 24 | 165 | 14 | 97 | 10.0 | 68.3 |
| T6 | 45 | 310 | 40 | 276 | 12 | 95 | 30 | 207 | 14 | 97 | 10.0 | 68.3 |
| T8 | 50 | 345 | 46 | 317 | 10 | 100 | 33 | 227 | - | - | 10.0 | 68.3 |

*1 - 5 x 10E8 cycles of reversed stress, *2 – Average Tension and Compression

## COMPARATIVE CHARACTERISTICS

| Temper | Corrosion Resistance | | Cold Workability[3] | Machinability[3] | Anodize Response[3] | Brazeability[4] | Weldability[4] | | | Formabiliy |
|---|---|---|---|---|---|---|---|---|---|---|
| | General[1] | Stress[2] | | | | | Gas | Arc | Spot | |
| 0 | B | A | A | D | A | A | A | A | B | B |
| T4 | B | B | B | C | A | A | A | A | A | B |
| T6 | B | A | C | C | A | A | A | A | A | C |
| T8 | B | A | C | C | A | A | A | A | A | C |

1- Ratings A through E are relative ratings in decreasing order of merit, based on exposures to sodium chloride solution by intermittent spraying or immersion. Alloys with A and B ratings can be used in industrial and seacoast atmospheres without protection. Alloys with C, D and E ratings generally should be protected at least on faying surfaces.
2- Stress-corrosion cracking ratings are based on service experience and laboratory tests of specimens exposed to the 3.5% sodium chloride alternate immersion test.
A= No known instance of failure in service or in laboratory tests.
B= No known instance of failure in service; limited failures in laboratory tests of short transverse specimens.
C= Service failures with sustained tension stress acting in short transverse direction relative to grain structure; limited failures in laboratory tests of long transverse specimens.
D= Limited service failures with sustained longitudinal or long transverse
3- Ratings A through D for Workability (cold), A through E for Machinability and A through C for Anodize Response, are relative ratings in decreasing order of merit.
4- Ratings A through D for Weldability and Brazeability are relative ratings defined as follows:
A= Generally weldable by all commercial procedures and methods.
B= Weldable with special techniques or for specific applications that justify preliminary trials or testing to develop welding procedure and weld performance.
C= Limited weldability because of crack sensitivity or loss in resistance to corrosion and mechanical properties.
D= No commonly used welding methods have been developed.

## APPLICABLE SPECIFICATIONS

| Cold Drawn | Extruded |
|---|---|
| ASTM B210, B234, B241, B483 | ASTM B221 |
| ASME SB210 | ASTM B241 |
| AMS 4079, 4080, 4081, 4082, 4083 | ASME SB241 |
| AMS-WW-T-700/6, AMS-T-7081 | AMS-QQ-A-200/8 |
| MIL-P-25995 | |

## CHEMICAL COMPOSITION LIMITS

| | | | | | | | | | Others | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Weight %** | Si | Fe | Cu | Mn | Mg | Cr | Zn | Ti | Each | Total |
| **Minimum** | 0.40 | .. | 0.15 | .. | 0.8 | 0.04 | .. | .. | .. | .. |
| **Maximum** | 0.8 | 0.7 | 0.40 | 0.15 | 1.2 | 0.35 | 0.25 | 0.15 | 0.05 | 0.15 |

## TYPICAL PHYSICAL PROPERTIES

| Characteristic | | | English | Metric |
|---|---|---|---|---|
| **Nominal Density (68 °F/20 °C)**<br>*English: lbs./in.$^3$ Metric: g/cm3* | | | 0.098 lbs./in.$^3$ | 2.70 Mg/m$^3$ |
| **Melting Range** | | | 1080 °F - 1206 °F | 582 °C - 652 °C |
| **Specific Heat (212 °F/100 °C)** | | | 0.214 BTU/lb. - °F | 0.896 J/kg - °K |
| **Coefficient of Thermal Expansion**<br>*English: micro in./in.-°F Metric: micro m/m -°K* | Linear 68 °F-212 °F<br>20 °C-100 °C | | 13.1 micro in./in.-°F | 23.6 micro m/m -°K |
| **Thermal Conductivity (68 °F/20 °C)**<br>*English: BTU-in/ft2hr°F Metric: W/m x K* | | O Temper | 1250 BTU-in/ft$^2$hr°F | 180 W/m - °K |
| | | T4 | 1070 BTU-in/ft$^2$hr°F | 154 155 W/m - °K |
| | | T6 | 1160 BTU-in/ft$^2$hr°F | 167 W/m - °K |
| **Electrical Conductivity (68 °F/20 °C)**<br>*English: %IACS @ 68ºF Metric: MS/M @ 20ºC* | Equal Volume | O Temper | 47 | 27 |
| | | T4 | 40 | 23 |
| | | T6 | 43 | 25 |
| | Equal Weight | O Temper | 155 | 90 |
| | | T4 | 132 | 77 |
| | | T6 | 142 | 82 |