

ROD & BAR ALLOY 7075

ALLOY DESCRIPTION

This alloy offers the highest strength of the common screw machine alloys. The superior stress corrosion resistance of the T73 and T7351 tempers makes it a logical replacement for 2024, 2014 and 2017 in many of the most critical applications. The T6 and T651 tempers have fair machinability, resistance welding and corrosion resistance ratings. This alloy is heavily utilized by the aircraft and ordnance industries because of its superior strength.

TYPICAL MECHANICAL PROPERTIES

| Temper | Tensile (.500" Dia. Specimen) | | | | | Hardness Brinell 500 kg 10 mm | Shear | | Fatigue* | | Modulus | |
|------------|-------------------------------|-----|-------|-----|--------------------|--|----------------------------|-----|-----------------------------------|-----|-----------------------|------|
| | Ultimate | | Yield | | Elongation/4D % | | 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 | 33 | 228 | 15 | 103 | 17 | 60 | 22 | 152 | | | 10.3 | 71.0 |
| T6, T651 | 83 | 572 | 73 | 503 | 11 | 150 | 48 | 331 | 23 | 158 | 10.3 | 71.0 |
| T73, T7351 | 73 | 503 | 63 | 434 | 13 | | 44 | 303 | 23 | 158 | 10.3 | 71.0 |

*5 x 10E8 cycles of reversed stress

COMPARATIVE CHARACTERISTICS

| Temper | Corrosion Resistance | | Cold Workability ³ | Machinability ³ | Anodize Response ³ | Brazeability ⁴ | Weldability ⁴ | | |
|------------|----------------------|---------------------|-------------------------------|----------------------------|-------------------------------|---------------------------|--------------------------|-----|------|
| | General ¹ | Stress ² | | | | | Gas | Arc | Spot |
| T6, T651 | C | C | D | C | B | D | D | D | B |
| T73, T7351 | C | B | D | C | B | D | D | D | B |

- 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.
- Stress-corrosion cracking ratings are based on service experience and on 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 areas.
- 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.
- 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 Finished | Extruded |
|----------------|-----------------|
| ASTM B211 | ASTM B221 |
| AMS-QQ-A-225/9 | AMS-QQ-A-200/11 |
| AMS 4187 | AMS 4154 |
| | AMS 4166 |
| AMS 4122 | AMS 4167 |
| AMS 4123 | AMS 4168 |
| AMS 4124 | AMS 4169 |

CHEMICAL COMPOSITION LIMITS

| | | | | | | | | | Others | |
|----------|------|------|------|------|------|------|------|------|--------|-------|
| Weight % | Si | Fe | Cu | Mn | Mg | Cr | Zn | Ti | Each | Total |
| Minimum | | | 1.20 | | 2.10 | 0.18 | 5.10 | | | |
| Maximum | 0.40 | 0.50 | 2.00 | 0.30 | 2.90 | 0.28 | 6.10 | 0.20 | 0.05 | 0.15 |

TYPICAL PHYSICAL PROPERTIES

| Characteristic | | | English | Metric |
|---|--|------------|---|---|
| Nominal Density (68 °F / 20 °C) | | | 0.101 lbs./in. ³ | 2.80 Mg/m ³ |
| Melting Range | | | 990 °F - 1175 °F | 532 °C - 635 °C |
| Specific Heat (212 °F / 100 °C) | | | 0.23 BTU/lb. - °F | 960 J/kg - °K |
| Coefficient of Thermal Expansion | Linear 68 °F - 212 °F 20 °C - 100 °C | | 13.0 micro in./in. - °F | 23.4 micro m/m - °K |
| | Volumetric 68 °F / 20 °C | | 3.78 x 10 ⁻⁵ in. ³ /in. ³ - °F | 68 x 10 ⁻⁶ m ³ /m ³ - °K |
| Thermal Conductivity (68 °F / 20 °C) | T6, T651 | | 75 BTU/ft. - hr. - °F | 130 W/m - °K |
| | T73, T7351 | | 90 BTU/ft. - hr. - °F | 155 W/m - °K |
| Electrical Conductivity (68 °F / 20 °C) | Equal Volume | T6, T651 | 33% IACS | |
| | | T73, T7351 | 40% IACS | |
| | Equal Weight | T6, T651 | 105% IACS | |
| | | T73, T7351 | | |