

**ALLOY DESCRIPTION**

This alloy is used in aircraft structural parts. The alloy has characteristics of high strength coupled with good resistance to exfoliation and stress corrosion cracking. The alloy also has good fracture toughness and fatigue resistance.

**TYPICAL MECHANICAL PROPERTIES (LONGITUDINAL)**

Temper	Tensile (.500" Dia. Specimen)					Hardness Brinell 500kg 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 x 10 <sup>3</sup>	Gpa	
T7651	80	552	71	489	11	150	47	324	-	-	10.2	70.3
T7451	76	524	68	469	11	140	44	303	-	-	10.2	70.3

\*5 x 10E8 cycles of reversed stress

**COMPARATIVE CHARACTERISTICS**

Temper	Corrosion Resistance		Cold Workability <sup>3</sup>	Machinability <sup>3</sup>	Anodize Response <sup>3</sup>	Brazeability <sup>4</sup>	Weldability <sup>4</sup>		
	General <sup>1</sup>	Stress <sup>2</sup>					Gas	Arc	Spot
T7651	C	B	D	B	B	D	D	D	B
T7451	C	B	D	B	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 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
- 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.

Continued Page 2 of 2

**CHEMICAL COMPOSITION LIMITS**

Weight %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Zr	Others	
										Each	Total
Minimum	-	-	2.0	-	1.9	-	5.7	-	0.08	-	-
Maximum	0.12	0.15	2.6	0.10	2.6	0.04	6.7	0.06	0.15	0.05	0.15

**TYPICAL PHYSICAL PROPERTIES**

Characteristic		English	Metric
Nominal Density (68 °F/20 °C)		0.102 lbs./in. <sup>3</sup>	2.83 Mg/m <sup>3</sup>
Melting Range		870 °F - 1175 °F	524 °C - 635 °C
Specific Heat (212 °F/100 °C)		0.21 BTU/lb. - °F	860 J/kg - °K
Coefficient of Thermal Expansion	Linear 68 °F-212 °F 20 °C-100 °C	13.1 micro in./in.-°F	23.5 micro m/m -°K
	Volumetric 68 °F/20 °C	3.78 x 10 <sup>-5</sup> in. <sup>3</sup> /in. <sup>3</sup> -°F	68 x 10 <sup>-6</sup> m <sup>3</sup> /m <sup>3</sup> -°K
Thermal Conductivity (68 °F/20 °C)	T7651	89 BTU/ft. - hr. - °F	154 W/m - °K
	T7451	91 BTU/ft. - hr. - °F	157 W/m - °K
Electrical Conductivity (68 °F/20 °C)	Equal Volume	T7651	39.5% IACS
		T7451	40.5% IACS