

Tube & Pipe Alloy 6063

Technical Data

ALLOY DESCRIPTION

Magnesium/Silicon alloy. One of the most popular of the Heat Treatable alloy group. Excellent corrosion resistance and weldability. Finer grain structure than 6061 lends itself to more aesthetically pleasing anodize results. Target applications include air cylinder tubing, electrical bus conductor, and architectural applications.

TYPICAL MECHANICAL PROPERTIES

Temper	Tensile (.0625" Dia. Specimen)					Hardness Brinnell 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	MPa	KSI x 10 ³	Gpa
O	13	90	7	50	..	25	10	70	8	55	10.0	69
T1	22	150	13	90	20	42	14	95	9	60	10.0	69
T4	25	170	13	90	22	..	...		...		10.0	69
T5	27	185	21	145	12	60	17	115	10	70	10.0	69
T52	..	..	..	..	..	..	..	..	..	..	..	..
T6	35	240	31	215	12	73	22	150	10	70	10.0	69
T832	42	290	39	270	12	95	27	185	..	..	10.0	69

COMPARATIVE CHARACTERISTICS

Temper	Corrosion Resistance		Cold Workability ³	Machinability ³	Anodize Response ³	Brazeability ⁴	Weldability ⁴		
	General ¹	Stress ²					Gas	Arc	Spot
T1	A	A	B	D	A	A	A	A	A
T4	A	A	B	D	A	A	A	A	A
T6	A	A	C	C	A	A	A	A	A

- 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.

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APPLICABLE SPECIFICATIONS

Cold Drawn	Extruded
ASTM B210	ASTM B221
ASTM B483	ASTM B241
	ASTM B345
	ASTM B429

CHEMICAL COMPOSITION LIMITS

Weight %	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
Maximum	.020	..	..	..	0.45	..	..	..	..	..
Minimum	0.6	0.35	0.10	0.10	0.9	0.10	0.10	0.10	0.05	0.15

TYPICAL PHYSICAL PROPERTIES

Characteristic		English	Metric	
Nominal Density (68 °F/20 °C) <i>English: lbs./in.³</i> <i>Metric: g/cm³</i>		0.097	2.70	
Melting Range		1140 °F - 1210 °F	615 °C – 655 °C	
Specific Heat (212 °F/100 °C)		..	..
Coefficient of Thermal Expansion <i>English: micro in./in.-°F</i> <i>Metric: micro m/m-°K</i>	Linear 68 °F-212 °F 20 °C-100 °C	13.0	23.4	
Thermal Conductivity (68 °F/20 °C) <i>English: BTU-in/ft²hr°F</i> <i>Metric: W/m x K</i>	O	1510	218	
	T1	1340	193	
	T6	1390	201	
Electrical Conductivity (68 °F/20 °C) <i>English: %IACS @ 68°F</i> <i>Metric: MS/M @ 20°C</i>	Equal Volume	O Temper	58	34
		T1	50	29
		T5	55	32
		T6	53	31
	Equal Weight	O Temper	191	111
		T1	165	96
		T5	181	105
		T6	175	102