KAISER ALUMINUM

Best in Class

Tube & Pipe Alloy 6061

Technical Data

ALLOY DESCRIPTION

A good all purpose alloy for applications requiring good corrosion resistance, medium strength, and good machining characteristics. Appearance after anodizing is excellent.

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

*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]		
	General[1]	Stress[2]					Gas	Arc	Spot
0	B	A	A	D	A	A	A	A	B
T4	B	B	B	C	A	A	A	A	A
T6	B	A	C	C	A	A	A	A	A

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.

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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 ℉/20 ℃) *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 ℉/100 ℃)			0.214 BTU/lb. - °F	0.896 J/kg - °K
Coefficient of Thermal Expansion *English: micro in./in.-°F* *Metric: micro m/m -°K*	Linear 68 ℉-212 ℉ 20 ℃-100 ℃		13.1 micro in./in.-°F	23.6 micro m/m -°K
Thermal Conductivity (68 ℉/20 ℃) *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 ℉/20 ℃) *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