

**Excalibar® 6013**

Understanding Cold Finished Aluminum Alloys

Excalibar® 6013, a cold finished aluminum wrought product, is ideal for applications which require high strength along with good corrosion resistance and anodizing response. Additionally, this alloy demonstrates machinability and joining superior to that of 6061 alloy.

Strength

In the -T8 temper, Excalibar® 6013 has typical yield strength properties which are higher than other 6xxx cold alloy finished rod and bar products: 15-20% more than 6262-T9 and 40-50% more than 6061-T6.

With its excellent compressive properties, Excalibar® 6013 is used in ABS braking systems, hydraulic applications, valve bodies and components, recreational products and munitions.

Machining

When used on multi-spindle screw machines, this alloy offers moderate to good machinability—the -T8 temper has a “B” machinability rating.

Although Excalibar® 6013 has better chipping characteristics than alloy 6061, the use of a chip breaker is recommended.

Corrosion Resistance

Excalibar® 6013 alloy is virtually immune to stress-corrosion cracking and exfoliation corrosion and is comparable to 6061 alloy. On very thin sections (less than .250 inch in diameter), some intergranular attack has been similar to that observed with 6061 alloy. Alloy 6013 is easily joined by all welding and brazing methods. (Caution: direct contact by dissimilar metals can cause galvanic corrosion.)

The properties listed in this Alloy Data Sheet represent the best current information for this alloy. In each specific application, the user is expected to evaluate and test the alloy, temper and finishing method. Consult the Material Safety Data Sheet (MSDS) for proper safety and handling precautions when using Excalibar® 6013 alloy.

Excalibar® 6013 Temper Designations and Definitions

Standard Tempers	Standard Temper Definitions*
T651 ¹	Solution heat-treated and then artificially aged. Applies to products that are not cold worked after solution heat-treatment, or in which the effect of cold work in flattening or straightening may not be recognized in mechanical properties. Temper-T651 applies to products that are stress-relieved by stretching.
T8	Solution heat-treated, cold worked, then artificially aged. Applies to products that are cold worked to improve strength, or in which the effect of cold work in flattening and straightening is recognized in mechanical property limits.

*For further details of definitions, see Aluminum Association's Aluminum Standards and Data manual and Tempers for Aluminum and Aluminum Alloy Products.

① Rounds above 3.250" and all hexes, squares and rectangles in sizes from 0.250" up to 4.000" are available in -T651 temper for 6013 alloy.

Excalibar® 6013 Chemical Analysis **Approximate Melting Temperature:** 1075°F **Density:** 0.098 lb./in.³

Percent Weight	Elements									Others Each	Others Total	Aluminum
	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti				
Minimum	.6	—	.60	.20	.8	—	—	—		—	—	
Maximum	1.0	.5	1.1	.8	1.2	.10	.25	.10		.05	.15	Remainder

Average Coefficient of Thermal Expansion (68° to 212° F per °F) = 13.0×10^{-6} (inch per inch per °F)

Excalibar® 6013 Global Cold Finished Products Capabilities and Mechanical Property Limits

Temper	Specified Section or Wall Thickness ² (inches)	Tensile Strength (ksi)				Elongation ³	Typical Brinell Hardness (500 kg load/ 10 mm ball)	Typical Ultimate Shearing Strength (ksi)	Typical Electrical Conductivity (%IACS)
		Ultimate		Yield (0.2% offset)		Percent Min. in 2 inch or 4D ⁴			
		Min.	Max.	Min.	Max.				
Standard Tempers ¹									
T651 ⁵	0.500 up thru 4.000	56.0	—	52.0	—	7	125	36	38
T8	0.125 up thru 0.749	60.0	—	57.0	—	5	130	N/A	38
	0.750 up thru 1.500	58.0	—	56.0	—	8	130	N/A	38
	1.501 up thru 3.250	57.0	—	55.0	—	7	130	N/A	38

① The mechanical property limits for standard tempers are listed in the "standards section" of the Aluminum Association's Aluminum Standards and Data manual and Tempers for Aluminum and Aluminum Alloy Products. ② The thickness of the cross section from which the tension test specimen is taken determines the applicable mechanical properties. ③ For material of such dimensions that a standard test specimen cannot be obtained, or for shapes thinner than 0.062", the test for elongation is not required. ④ D = Specimen diameter. ⑤ Rounds above 3.250" and all hexes, squares and rectangles in sizes from 0.250" up to 4.000" are available in -T651 temper only for 6013 alloy.

Compressive Properties, Typical (Longitudinal)

Alloy/Temper Yield Strength (ksi)

6013-T8	65
6262-T9	53
6061-T6, T651 (CF)	45
6061-T6, T6511 (EXT)	37

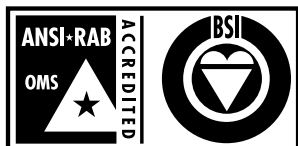
(CF) = Cold Finished (EXT) = Extruded

Comparative Characteristics of Related Alloys/Tempers¹

			Formability		Machinability				General Corrosion Resistance				Weldability (Arc with Inert Gas)				Brazeability				Anodizing Response				Stress Corrosion Cracking ²			
			Low	High	D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A
Excalibar®	6013	(CF) -T651																										
	6061	(CF) -T6, -T651																										
	6061	(EXT) -T6, -T6511																										
	6262	(CF) -T6, -T651																										
6262	(EXT) -T6, -T651																											

(CF) = Cold Finished; (EXT) = Extruded

① Rating: A=Excellent B=Good C=Fair D=Poor For further details of explanation of ratings, see Aluminum Association's Aluminum Standards and Data manual. ② Ratings A, B and C are relative ratings based on stress applied transversely with respect to the direction of fabrication after controlled exposure to sodium chloride solution by alternate immersion: A - No known instances of failure in service or laboratory tests. B - No known instances of failure in service, laboratory failures only. C - Service and laboratory failures under special conditions.



Everlead Material Co.,Ltd
East Tower,21D-07,High-Tech King World,Shanghai,China
Phone: +8621-53080572
Fax: +8621-53081131
Email: eshan@elmaterial.com.cn
Http://www.elmaterial.com.cn