



Alloy 2024

Understanding Cold Finished Aluminum Alloys

Alloy 2024, a cold finished aluminum wrought product, is a high strength aluminum screw machine stock alloy. Typical tensile strengths in the -T351 and -T4 temper equal or exceed those of mild steels. The alloy has good machinability, surface finish capabilities and deep drilling characteristics.

The high mechanical property levels of alloy 2024 make it ideal for applications requiring high strength. Typical applications include aircraft fittings and structures, computer parts, gears, shafts, hinge pins, valve blocks and valve parts, bolts, nuts, fasteners, truck parts and brake components. The -T6 and -T851 tempers offer both an increase in strength and improved stress-corrosion cracking resistance over the -T4 and -T351 tempers.

Machining

Alloy 2024 offers good machinability when machined using single-point or multi-spindle carbide tools on screw machines. The use of a chip breaker is recommended. The alloy is rated “B” on the Aluminum Association machinability rating system, giving curled or easily broken chips with good to excellent surface finish.

Anodizing

Anodizing response is rated moderate for the alloy. Alloy 2024 can accept all types of anodic coatings.

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 alloy 2024.

2024 Temper Designations and Definitions

Standard Tempers	Standard Temper Definitions*
T351	Solution heat-treated, cold worked, and naturally aged to a substantially stable condition. Applies to products that are cold worked to improve strength after solution heat-treatment, or in which the effect of cold work in flattening or straightening is recognized in mechanical property limits.
T4	Solution heat-treated and naturally aged to a substantially stable condition. 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 property limits.
T6	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 property limits.
T851	Solution heat-treated, cold worked, and then artificially aged. Applies to products that are cold worked to improve strength, or in which the effect of cold work in flattening or 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](#).

2024 Chemical Analysis Liquidus Temperature: 1180°F Solidus Temperature: 935°F Density: 0.101 lb./in.³

Percent Weight	Elements									Others Each	Others Total	Aluminum
	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti				
Minimum	—	—	3.8	.30	1.2	—	—	—		—	—	
Maximum	.50	.50	4.9	.9	1.8	.10	.25	.15		.05	.15	Remainder

Average Coefficient of Thermal Expansion (68° to 212° F per °F) = 12.8×10^{-6} (inch per inch per °F)

Alloy 2024 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.	Min.				
Standard Tempers ¹							
T351	0.500-6.500	62.0	45.0	10	120	41.0	30.0
T4	Up thru .499	62.0	45.0	10	120	41.0	30.0
	.500 thru 4.500	62.0	42.0	10	120	41.0	30.0
	4.501 thru 6.500	62.0	40.0	10	120	41.0	30.0
	6.501 thru 8.000	58.0	40.0	10	120	41.0	30.0
T6	Up thru 6.500 ⁵	62.0	50.0	5	125	41.0	38.0
T851	.500 thru 6.500 ⁵	66.0	58.0	5	128	43.0	38.0

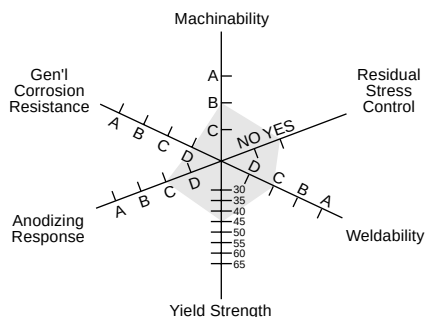
① The mechanical property limits for standard tempers are listed in the "standards section" of the Aluminum Association's Aluminum Standards and Data manual and Tempers for Aluminum and Aluminum Alloy Products. ② The thickness of the cross section from which the tension test specimen is taken determines 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 For square, rectangular, octagonal and hexagonal sections, property limits apply to a maximum thickness of 4" and a maximum cross-sectional area of 36 sq. in.

Comparative Characteristics of Related Alloys/Tempers¹

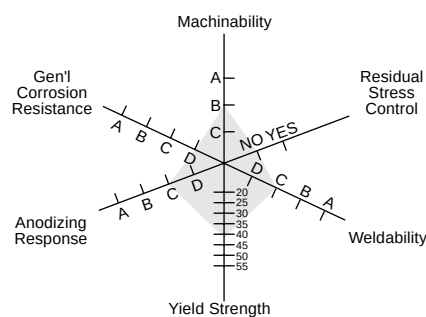
Alloy	Temper	Formability		Machinability				General Corrosion Resistance				Weldability (Arc with Inert Gas)				Brazeability				Anodizing Response				Stress Corrosion Cracking ²			
		Low	High	D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A
2024	-T351																										
	-T4																										
	-T6																										
	-T851																										
6061	-T6, -T651																										
7075	-T6, -T651																										
	-T73, -T7351																										

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.

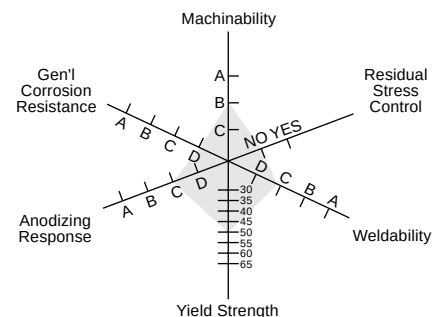
2024-T351



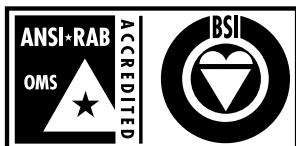
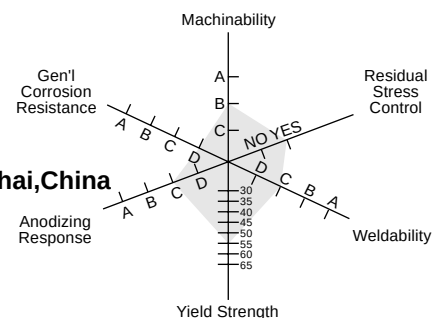
2024-T4



2024-T6



2024-T851



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