



TECHNICAL DATA SHEET

PRODUCT: A92024 ALUMINUM ALLOY PLATE

2024 is an aluminum alloy with copper as the primary alloying element and is the most popular of 2000-series aluminum alloys. It is used in applications requiring high strength to weight ratio, as well as good fatigue resistance. It is weldable only through friction welding, and has average machinability. Due to poor corrosion resistance, it is often clad with aluminum or Al-1Zn for protection, although this may reduce the fatigue strength. In older systems of terminology, 2XXX series alloys were known as duralumin. It is commonly extruded, and also available in clad sheet and plate forms. It is not commonly forged.

PRODUCT BASIC INFORMATION:

Alloy:	2024		
Form:	Plate		
Temper:	O, T3, T351		
Dimension:	Thickness:	6.0mm to 150mm	
	Width:	1,000mm to 2,500mm	
	Length:	3,000mm to 10,000mm	
Surface Finish:	Mill Finish		
Standard Specification:	GB/T 3880, EN 485, ASTM B209		
Application:	General Use		

CHEMICAL COMPOSITION:

Element		Percentage (%)
Aluminum	(Al)	Remainder
Silicon	(Si)	0.50 max
Iron	(Fe)	0.50 max
Copper	(Cu)	3.8~4.9
Manganese	(Mn)	0.3~0.9
Magnesium	(Mg)	1.2~1.8
Chromium	(Cr)	0.10 max
Zinc	(Zn)	0.25 max
Titanium	(Ti)	0.15 max
Remainder Each		0.05 max
Remainder Total		0.15 max

MECHANICAL PROPERTIES:

Temper	Thickness	Ultimate Strength Rm/MPa	Yield Strength Rp0.2/MPa	Elongation Min.%	Bend Radius (90°)
O	≥ 6.0~9.0mm	≤ 220	≥ 140	≥ 13%	2.5t
	≥ 9.0~12.5mm	≤ 220	≥ 140	≥ 13%	4.0t
	≥ 12.5~25mm	≤ 220	-	≥ 11%	-
T3 T351	≥ 6.0~12.5mm	≥ 440	≥ 290	≥ 13%	8.0t
	≥ 12.5~40mm	≥ 430	≥ 290	≥ 11%	-
	≥ 40~80mm	≥ 420	≥ 290	≥ 8%	-
	≥ 80~100mm	≥ 400	≥ 285	≥ 7%	-
	≥ 100~120mm	≥ 380	≥ 270	≥ 5%	-
	≥ 120~150mm	≥ 360	≥ 250	≥ 5%	-

PHYSICAL DATA:

Density (20°C):	2,780	kg/m ³
Melting Point:	502°C	
Thermal Expansion (20°C ~100°C):	22.9 x10 ⁻⁶	/K
Modulus of Elasticity:	72.4	GPa
Thermal conductivity (Temper O):	190	W·m-1·K-1
Electrical Resistivity (Temper O):	0.034 x10 ⁻⁶	Ω .m
Conductivity (Temper O):	50	%IACS
Magnetic performance:	No	
Color:	Silver	
Odour:	No	

TOLERANCE ON FORMS AND DIMENSIONS:

Thickness Tolerance:	Thickness	Width			
		≤1250mm	>1250~1600mm	>1600~2000mm	>2000~2500mm
	≥ 6~8mm	± 0.35mm	± 0.40mm	± 0.40mm	± 0.50mm
	> 8~10mm	± 0.45mm	± 0.50mm	± 0.50mm	± 0.55mm
	> 10~15mm	± 0.50mm	± 0.60mm	± 0.65mm	± 0.65mm
	> 15~20mm	± 0.60mm	± 0.70mm	± 0.75mm	± 0.80mm
	> 20~30mm	± 0.65mm	± 0.75mm	± 0.85mm	± 0.90mm
	> 30~40mm	± 0.75mm	± 0.85mm	± 1.00mm	± 1.10mm
	> 40~50mm	± 0.90mm	± 1.00mm	± 1.10mm	± 1.20mm
	> 50~60mm	± 1.10mm	± 1.20mm	± 1.40mm	± 1.50mm
	> 60~80mm	± 1.40mm	± 1.50mm	± 1.70mm	± 1.90mm
	> 80~100mm	± 1.70mm	± 1.80mm	± 1.90mm	± 2.10mm
	> 100~150mm	± 2.10mm	± 2.20mm	± 2.50mm	± 2.60mm

Width Tolerance:	Thickness	Width		
		≤ 1000mm	> 1000~2000mm	> 2000~2500mm
	≥ 6~12mm	+ 6mm	+ 7mm	+ 8mm
	> 12~50mm	+ 6mm	+ 7mm	+ 9mm
	> 50~150mm	+ 8mm	+ 8mm	+ 9mm

Length Tolerance:	Thickness	Length			
		≤ 2000mm	> 2000~3000mm	> 3000~4000mm	> 4000
	≥ 6~150mm	+ 7mm	+ 8mm	+ 9mm	+ 10mm

Flatness Tolerance:	Thickness	Total Deviation %		
		On Length	On Width	Partial Deviation
	≥ 6~50mm	≤ 0.2%	≤ 0.4%	≤ 0.3%
	> 50~150mm	≤ 0.2%	≤ 0.2%	By agreement

Lateral Curvature Tolerance:	Width	Lateral Curvature Tolerance for Specified Length			
		≤ 2000mm	> 2000~3000mm	> 3000~5000mm	> 5000mm
	≤1250mm	≤ 4mm	≤ 7mm	≤ 10mm	≤ 0.2% of Specified Length
	>1250~1500mm	≤ 3mm	≤ 6mm	≤ 8mm	
	>1500~2000mm	≤ 3mm	≤ 6mm	≤ 7mm	
	>2000mm	-	≤ 5mm	≤ 6mm	

Squareness Tolerance:	Length	Squareness Tolerance for Specified Width			
		≤ 1000mm	>1000~1500mm	>1500~2000mm	> 2000mm
	≤2000mm	≤ 6mm	≤ 7mm	≤ 8mm	-
	>2000~3000mm	≤ 7mm	≤ 7mm	≤ 9mm	≤ 10mm
	>3000~3500mm	≤ 7mm	≤ 8mm	≤ 10mm	≤ 10mm
	>3500~5000mm	≤ 8mm	≤ 10mm	≤ 10mm	≤ 12mm
	>5000mm	≤ 12mm	≤ 12mm	≤ 15mm	≤ 15mm

OTHER PROPERTIES:

Principal Design Features	An age hardening, high strength aluminum alloy. Useful for optimum strength to weight ratio structures.
Machinability	The machining characteristics of 2024 are fair in the heat treated condition, which is the condition in which most machining is done. Machinability in the annealed condition is good. Use of oil lubricants is recommended for all machining operations.
Forming	The alloy may be formed by conventional methods, except that hot forming should be avoided - see "Hot Working".
Weldability	Welding may be done by use of resistance welding or inert gas consumable electrode arc method. Welding by any means is NOT recommended for this alloy because of the degradation of corrosion resistance that occurs as a result of weld heat. A repeat heat treatment should be done if welded.

Heat Treatment	This is an age-hardening alloy and responds to heat treatment to accomplish the strengthening (aging). The T4 condition is attained by a 493°C heating followed by cold water quench and aging at room temperature.
Hot Working	Hot forming should be avoided if possible because of the harmful effect of heating upon corrosion resistance.
Cold Working	Cold working of this alloy is readily done by conventional methods. Ductility in the annealed condition is best and bend radii of 1/2 to 1 times thickness are possible for sheet 1/4 " thick, or thinner. For T3 or T4 conditions bend radii of 5 to 6 times thickness are required.
Annealing	Annealing is done at 400°C to 425°C F for at least 2 hours at temperature, followed by slow cooling in the furnace. This will anneal the alloy from a heat treated condition. Annealing between cold work operations may be done at 343°C for 2 hours, followed by air cooling.
Aging	The T4 condition is attained by a 493°C heating and cold water quench. Aging then occurs at room temperature.
Hardening	Hardening, or strengthening, occurs from a solution anneal and aging at room temperature or varying amounts of cold working,

APPLICATIONS

Typical Applications	Manufacture of truck wheels, aircraft structures, especially wing and fuselage structures under tension, screw machine products, scientific instruments, veterinary and orthopedic braces and equipment, and in rivets. Additionally, since the material is susceptible to thermal shock, 2024 is used in qualification of liquid penetrant tests outside of normal temperature ranges.
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PACKAGING, HANDING & STORAGE:

Package:	Packed in waterproof Kraft, fastened by steel straps on wood pallets, suitable for handling, loading and unloading from the trunks or containers, suitable for export ocean forwarding.
Handling:	Prevent the goods hurting the people who are moving, loading, unloading, especially pay attention to the rolling and dropping for the coils.
Storage:	Stored in indoor area on plain floor, free away from moisture, water, snow, animal oils and dye wastes, avoid storing with acid or basic chemical goods.

