TECHNICAL DATA SHEET

PRODUCT: A92011 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 alclad sheet and plate forms. It is not commonly forged.

PRODUCT BASIC INFORMATION:

Alloy:	**2011**	
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:	BS EN 573-3:2009 - BS EN 755-2:2008	
Application:	General Use	

CHEMICAL COMPOSITION:

Element		**Percentage (%)**
Aluminum	**(Al)**	Balance
Silicon	**(Si)**	0.40 max
Iron	**(Fe)**	0.70 max
Copper	**(Cu)**	5.00 - 6.00
Manganese	**(Mn)**	--
Magnesium	**(Mg)**	--
Bismuth	**(Bi)**	0.20 - 0.60
Zinc	**(Zn)**	0.30 max
Lead	**(Pb)**	0.20 - 0.40
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%	--
	≥ 9.0~12.5mm	≤ 220	≥ 140	≥ 13%	--
	≥ 12.5~25mm	≤ 220	-	≥ 11%	-
T3 T4 T6 T8	≥ 6.0~12.5mm	≥ 440	≥ 290	≥ 13%	--
	≥ 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):	2,83	kg/m^3
Melting Point:	535°C	
Thermal Expansion (20°C ~100°C):	22.9 $x10^{-6}$	/K
Modulus of Elasticity:	70.0	GPa
Thermal conductivity (Temper O):	138	W·m-1·K-1
Electrical Resistivity (Temper O):	38	nΩ .m
Conductivity (Temper O):	45	%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	--
Machinability	Aluminum 2011 alloy is a free-machining alloy. High-speed tool steel tooling and carbide tooling can be used for this alloy. Rake angles should be 32° cutting edge, 10° clearance, 50° for top rake and 15° side rake. Light cutting can be done dry and heavy cutting can be carried out by using oils. **Machinability**: Excellent - **Deep drawing**: Poor – **Spinning**: Poor – **Extruding**: Good
Forming	Conventional methods are used to form, bend and shape Aluminium / Aluminum 2011 alloy. The alloy is age-hardened after being cold-worked in order to improve its strength properties.
Weldability	Welding is not recommended for Aluminium / Aluminum 2011 alloy.

Heat Treatment	Aluminum 2011 alloy is heat treated at 510°C (950°F) to obtain optimum strength. After being completely heat treated, this alloy is water quenched and cold worked to a desired shape. It is finally heated at 160°C (320°F) for 15 hours and then cooled in air.
Hot Working	Aluminum 2011 alloy is hot worked at 288 to 482°C (550 to 900°F).
Cold Working	Aluminum 2011 alloy can be cold-worked by conventional methods. This alloy has free-machining capability. Optimum strength for this alloy can be achieved by an aging heat treatment after the cold working process.
Annealing	Aluminum 2011 alloy is held for 2 to 3 h at 413°C (775°F) and then it is cooled in a controlled manner at a rate of 10°C (50°F) per hour down to 260°C (500°F) and finally cooled in air.
Aging	Aluminum 2011 alloy is age-hardened at 510°C (950°F) and then water quenched. This alloy can also be heated to 160°C (320°F) for 14 hours after being solution heated in order to produce T8 temper.
Hardening	Aluminum 2011 alloy is age-hardened at 510°C (950°F) for 3 hours and then water quenched.

APPLICATIONS

Typical Applications	Aluminum: Aluminum 2011 alloy is used in the manufacture of machine parts, screw machine products, tube fittings, pipe stems, hose and atomizer parts and cigarette holders.

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.