

6xxx Plate

6xxx

6XXX contain magnesium and silicon as the major alloying elements.

Strength:

Moderately high levels of strength are obtained through heat treating to the T651 condition, giving higher strength levels than 5XXX series alloys.

Machinability:

6XXX plate alloys in the T651 condition are easier to machine than 5XXX alloys.

Forming:

6XXX plate alloys can be cold formed in the T651 or T451 temper. Formability is better in the T451 than the T651 temper and increases with decreasing thickness (see overleaf).

Corrosion resistance:

6XXX alloys, in the T651/T652/T6 temper, have good corrosion resistance. Unlike some 5XXX alloys, 6XXX do not suffer degradation in corrosion resistance after exposure to elevated temperatures.

Welding:

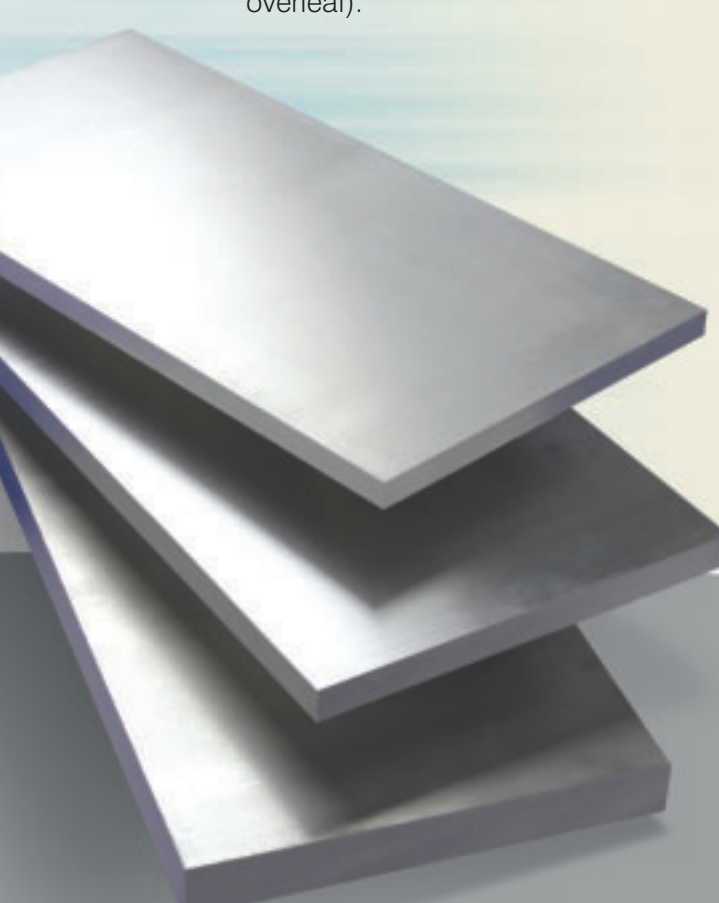
6XXX are readily weldable by either GTA-W or GMA-W processes provided that a suitable filler material is used. Welding reduces the tensile strength to 165-200 MPa in the heat affected area. In special circumstances, a post weld heat treatment can be applied to restore some of the lost strength in this area.

6XXX Applications:

The principle 6XXX plate alloys are 6082 and 6061.

6082-T651 and 6061-T651 are now superseding low-carbon steels in structural applications where the benefits of lightness, specific stiffness, corrosion resistance and ease of fabrication can be exploited:

- Machined components
- Structural members
- Cargo containers



6xxx series alloys technical data

STANDARD DIMENSIONAL AVAILABILITY

Alloy	Temper	Thickness (mm)		Width (mm)	Length (mm)
		Min	Max	Max	Max
6082	Mill finish				
	T451	6.35	19	3150	20000
	T651	>19	105	2978	
		>105	203.2	2973*	
	T452 T652	>203.2	305	1220**	3000
	T6	>203.2	404	2080	3000
	F	>6.35	590	2080	3000
	Brushed Finish (available one or two side film coated - on request)				
	T451 T651	8	50	1600*	8000
T4 T6	8	70	2000*	8000	
6061	Mill finish				
	T451	6.35	25	3150	20000
	T651	>25	138	2978	
		>138	203.2	2973*	
	T452 T652	>203.2	305	1220**	3000
	T6	>203.2	404	2080	3000
	F	>6.35	590	2080	3000
	Brushed Finish (available one or two side film coated - on request)				
	T451 T651	8	70	1600*	8000
T4 T6	8	70	2000*	8000	

Material in the T6 temper has not been stress relieved by either controlled stretching or cold compression. Consequently, this product may be liable to distortion and/or cracking during any metal machining or metal removing process. Alcoa does not accept any liability for such distortion or cracking and will not accept any consequential costs, losses or personal injury claims from such.

1. These dimensions show only the range of capabilities and cannot necessarily be provided in every combination of these sizes. Other sizes may be available, subject to enquiry.

2. Where indicated, both Mill Finish and Brushed Finish are available

3. * denotes maximum width decreases with increasing thickness

4. ** denotes wider widths may be available on request

FORMABILITY

Alloy	Temper	Thickness		
		6 mm	9 mm	12 mm
6061	T451	3t	3.5t	4t
6061	T651	3.5t	4.5t	5t
6082	T451	3t	3.5t	4t
6082	T651	3.5t	4.5t	5t

Radii expressed as thickness (t) are minimum recommended for bending plates in a standard press brake with air bend dies. Minimum permissible radii will also vary with design and condition of tooling. Forming over smaller radii is possible immediately after solution heat treatment and quenching.

TYPICAL PHYSICAL PROPERTIES

Alloy	Temper	Relative Density	Co-efficient or Linear Expansion (20°C-100°C) 10 ⁻⁶ /°C	Thermal Conductivity (0-100°C) W/m°C	Electrical Resistivity (20°C) micro-Ohm cm	Melting Range °C	Young's Modulus (GPa)
6061	T651	2.7	24	156	4	570-650	69
6082	T651	2.7	23	184	3.7	570-660	69