

# Aluminium Sheet, Coil, Plate and Treadplate





# Aluminium



## Advantages of using Aluminium

- Light weight – approximately  $\frac{1}{3}$  the density of steel.
- Strength – some alloys can be substantially strengthened by work or by heat treatment.
- Workability – easy formability, machinability and readily welded.
- Corrosion resistance – varies depending on the alloy; the best resist marine exposure.
- Non-toxic – often used in contact with food.
- Non-magnetic and non-sparking.
- Electrical conductivity – very high; sometimes used for electrical conductors.
- Thermal conductivity – high.
- Reflectivity – bright finish options available.

## Specifications

Generally in accordance with the specifications as outlined in the manual “*Aluminium Standards and Data*” published by The Aluminium Association, USA. Australian and other national specifications are generally in line with AA specifications.

Aluminium is identifiable by alloy and temper, which indicates chemical and mechanical properties. This assists with possible applications for the product.

The following alloys are those commonly stocked in the Atlas Steels aluminium flat products program.

## Aluminium alloy compositions

Typical compositions of some common alloys. All values are percent.

Alloy	Al	Si	Cu	Mn	Mg	Cr	Others
1050	99.5 min						
1145	99.45 min						
1200	99.0 min						
2011	rem		5.5				Pb & Bi 0.4% each
3003	rem		0.12	1.2			
3004	rem			1.2	1.0		
3105	rem			0.6	0.50		
5005	rem				0.8		
5052	rem				2.5	0.25	
5083	rem			0.7	4.4	0.15	
5186	rem			0.4	3.3		
5251	rem			0.3	2.0		
5383	rem			0.8	4.6		
5454	rem			0.8	2.7	0.1	
6005	rem	0.8			0.5		
6060	rem	0.5			0.5		Fe 0.2%
6061	rem	0.6	0.28		1.0	0.20	
6063	rem	0.4			0.7		
6106	rem	0.4		0.1	0.6		
6262	rem	0.6	0.28		1.0	0.09	Pb & Bi 0.55% each
6351	rem	1.0		0.6	0.6		

Only major alloying elements are listed.

Normal impurities are also present.

Refer to specifications for limits to both major elements and impurities.

**Alloy Characteristics and Forms**

Alloy	Typical Application	Characteristics <sup>1</sup>				Commercial Form			
		Corrosion Resistace <sup>4</sup>	Machina-bility	Welda-bility <sup>3</sup>	Anodising <sup>2</sup>	Plate	Sheet	Coil	Extrusions
1050	Chemical & process plant & equipment	A,A	D,C	A,A	B,B	✓	✓	✓	
1145 & 1200	Commercial pure aluminium. Used in cooking utensils and for deep frying	A,A	D,C	A,A	B,B	✓	✓	✓	
2011	Screw machine products not requiring decorative anodising	D,D	A,A	D,D	D,D				✓
3003	Chemical equipment, sheet metal work, rigid foil containers & closures	A,A	D,C	A,A	B,B	✓	✓	✓	
3004	Sheet metal work, car bodies, seam welding tubing, roofing sheet	A,A	D,C	A,A	B,B	✓	✓	✓	
3105	Painted sheet products	A,A	D,C	A,A	B,B	✓	✓	✓	
5005	Appliances & utensils, general sheet metal work & high-strength foil	A,A	D,C	A,A	B,B	✓	✓	✓	
5052/5251	Sheet metal work, appliances, marine applications	A,A	C,B	A,A	C,C	✓	✓	✓	
5083	High strength alloy used in transport, marine & structural applications	A,C	C,B	A,A	C,C	✓	✓		
5383	Specific to the marine industry with characteristics similar to 5083 with enhance weldability	A,C	C,B	A,A	C,C	✓	✓		
5454	Welded structures, pressure vessels for use at elevated temperatures, marine applications	A,A	C,B	A,A	C,C	✓	✓		
6005	Good strength for structural applications	A,A	B,C	A,A	B,B				✓
6061 & 6351	Structural applications where strength & corrosion resistance is needed. Used in transport applications.	B,B	B,C	A,A	B,B				✓
6063 & 6060	General purpose extrusion alloy for architectural applications where additional strength is required & for structural applications not involving welding	A,A	C,C	A,A	A,A				✓
6106	Medium strength alloy used for architectural applications where additional strength is required & for structural applications not involving welding	A,A	C,C	A,A	A,A				✓
6262	Screw machining products suitable for decorative anodising	B,B	A,A	B,B	B,B				✓

<sup>1</sup> Relative ratings in decreasing order of merit = A B C D (where A = most applicable). Two ratings e.g. AC are for annealed and hardest tempers.  
<sup>2</sup> Rating indicates suitability of alloy for decorative quality anodising; all aluminium alloys can be anodised for increased corrosion and wear resistance. See separate note "Anodising Quality".  
<sup>3</sup> Weldability rating quoted is for arc welding. Some alloys have lesser weldability by gas processes.  
<sup>4</sup> General corrosion resistance rating. resistance to stress corrosion cracking can be less.



# Aluminium sheet, coil, plate and treadplate

## Alloy systems

Alloy series	Major alloying element
1??? =	Pure aluminium (99.0% min. and greatest)
2??? =	Copper is major addition
3??? =	Manganese is major addition
4??? =	Silicon is major addition
5??? =	Magnesium is major addition
6??? =	Magnesium and Silicon are major additions
7??? =	Zinc is major addition
8??? =	Alloys not covered above

## Understanding an Alloy code

An alloy code is made up of 4 digits, e.g:

**5**



Major alloying element

**0**



Indicates changes to minor alloying elements

**52**



Alloy identification number

Therefore 5052 means:

- 5 = Magnesium is the major alloying element
- 0 = No changes to original alloy since it was introduced
- 52 = Identifies the chemical composition of this alloy

## Heat treatable and non-heat treatable Alloys

Alloy	Treatable/non-treatable
1??? =	Non-heat treatable
3??? =	Non-heat treatable
5??? =	Non-heat treatable
6??? =	Heat treatable

Non-heat treatable alloys can be hardened by cold work. The degree of work hardening is designated by the Temper. Heat treatable alloys (the 2000, 6000 and 7000 series) are able to be solution treated and then age-hardened. These have "T" tempers.

## Temper designation systems

Strain hardened alloys

Temper	Hardness
0	Soft
H?2	¼ hard
H?4	½ hard
H?6	¾ hard
H?8	Hard

Where "?" can be:

- 1 = As rolled - no final annealed e.g. H12
- 2 = Strain hardened and then partially annealed (200°C - 260°C) e.g. H24
- 3 = Strain hardened and then stabilized (150°C) e.g. H36

## Understanding a cold rolled temper code

### Plate temper codes

Code	Description
H111	Strain hardened less than the amount required for a controlled H11 temper.
H112	No special control over amount of strain hardening. Some minimum strength limits set.
H321	Strain hardened less than amount required for a controlled H32 temper.
H116	Acceptable resistance to stress cracking and exfoliation attack. Strain hardened less than amount required for a controlled H32 temper.
H321/H116	Plate can be supplied with a dual temper from select mills.
H32	Strain hardened by rolling and then stabilising heat treatment to ¼ hard.

Note: Plate tempers generally restricted to ½ hard maximum owing to heavy gauge – cannot get sufficient cold work for higher tempers.

### Plate standards

Standard	Description
ASTM B928	Typically a marine standard requiring exfoliation corrosion testing but also inter-granular resistance. Material for marine application is typically ordered as tempers H116 and/or H321 and possibly referenced to an international recognised testing authority. All material to this standard is line marked with manufacturing traceability.
ASTM B209	A non-marine application where additional corrosion testing is not required. This is typically applied to plate for the transport industry where surface finish and bright levels are critical. Material is ordered to a standard “H” temper i.e. H32, which mechanical properties are very similar to H321. The material does not require identification line marking from the manufacturer.
DNV/Lloyds	Plate for marine applications can be supplied with testing certified by Det Norske Veritas (DNV).

### Anodising Quality Aluminium Sheet

Atlas standard stock is not classified as “anodising quality” and as such is not guaranteed to give acceptable anodising appearance in any particular conditions. Much of this standard stock has been shown by considerable production experience to anodise well, particularly in smaller items and where exact colour consistency is not required. The acceptability of anodising outcomes should be established by trial on a case by case basis with this product.

Atlas can source anodising quality aluminium sheet, usually in grade 5005. Where exact colour matching is required across a batch or even between batches this should be discussed with Atlas sales staff.

## Product range

### Aluminium Sheet

Note: Through our processing facilities (Atlas Metals Processors), all sheet product can be slit and cut to length for specific requirements. Linishing is also available.

Alloys	5005, 5052/ 5251
Tempers	0, H32, H34, H38, H321/H116
Thickness range (mm)	0.15 to less than 6
Width range (mm)	900, 1200, 1500
Length range (mm)	1800, 2400, 3000, 3600

Other grades available on request.

### Aluminium Coil/Strip

Note: Through our processing facilities (Atlas Metals Processors), all coil product can be slit and cut to length for specific requirements. Linishing is also available.

Alloys	3003, 3004, 3105, 5005, 5052/5251
Tempers	0, H32, H34, H38, H321/H116
Thickness range (mm)	0.15 to less than 6
Width range (mm)	25 to 1525

### Aluminium Plate

Note: Through our processing facilities (Atlas Metals Processors), all plate product can be slit and cut to length for specific requirements.

Alloys	5083, 5005, 5052, 5454, 5186
Tempers	H32, H34, H321/H116
Thickness range (mm)	6 to 25
Width range (mm)	1200 to 2500
Length range (mm)	2400 to 12000

### Aluminium Treadplate

Note: Mill orders can be supplied to a customer's desired width and length.

Alloys (Commonly stocked)	5052/5251, 3003
Tempers	0, H112, H114
Finish	Standard 5 bar Mill Finish (Alloy 5052/5251 Temper 0)
	Propeller Pattern Bright (Alloy 3003 Temper H114)
Thickness range (mm)	1.6 to 8
Width range (mm)	1200 to 1525
Length range (mm)	2400 to 6100

### Extrusions

Standard and industry specific shapes are stocked in select Atlas branches. Please enquire at your local sales office.

### Non Standard Product Range

Aluminium product can be sourced outside the standard stock range nominated above. For such inquiries please contact the local Atlas sales office.

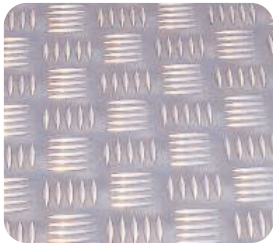
### Finishes

#### Aluminium Plate

- Elval Bright Transport Plate: this material is sourced from a select mill. Atlas market and stock this quality of plate in Alloy 5083, temper H32.
- Mill Finish: this refers to plate supplied ex mill with a commercial finish. This material is typically used in the marine industry, general engineering and transport industry where bright plate is not critical.

#### Tread Plate

Pattern - 5 Bar  
available in Alloy 5052



Pattern - Propeller or 1 Bar  
available in Alloy 3003



### Bending radius chart

Recommended minimum inside bending radii for 90 degree cold forming of sheet and plate <sup>123</sup> (bending transverse to rolling direction).

Radii for various thickness expressed in terms of thickness t									
Alloy	Temper	t=0.4mm	t=0.8mm	t=1.6mm	t=3.0mm	t=4.0mm	t=6.0mm	t=10.0mm	t=12.0mm
1080A	0	0t	0t	0t	0t	0t	0.5t	0.5t	1t
1050	H12	0t	0t	0t	0t	0t	0.5t	1t	1.5t
1350	H14	0t	0t	0t	0.5t	0.5t	1t	1.5t	2t
1150	H16	0t	0t	0.5t	1t				
	H18	0.5t	1t	1.5t	2t				
1100	0	0t	0t	0t	0t	0t	1t	1t	1.5t
1200	H12	0t	0t	0t	0.5t	1t	1t	1.5t	2t
	H14	0t	0t	0t	1t	1t	1.5t	2t	2.5t
	H16	0t	0.5t	1t	1.5t	1.5t	2.5t	3t	4t
	H18	1t	1.5t	2t	3t				
2024 <sup>2</sup>	0	0t	1t	1t	1t	1t	1t	2.5t	4t
	T42	2.5t	3t	4t	5t	5t	6t	7t	8t
3003	0	0t	0t	0t	0t	0.5t	1t	1t	1.5t
3203	H12	0t	0t	0t	0.5t	1t	1t	1.5t	2t
3005	H14	0t	0t	0t	1t	1t	1.5t	2t	2.5t
5005	H16	0.5t	1t	1t	1.5t				
	H18	1t	1.5t	2t	3t				
	H32	0t	0t	0t	0.5t	1t	1t	1.5t	2t
	H34	0t	0t	0t	1t	1.5t	1.5t	2t	2.5t
	H36	0.5t	1t	1t	1.5t	2.5t	3t	3.5t	4t
	H38	1t	1.5t	2t	2.5t	3.5t	4.5t	5.5t	6.5t
3004	0	0t	0t	0t	0.5t	1t	1t		
	H32	0t	0t	0.5t	1t	1t	1.5t		
	H34	0t	1t	1t	1.5t	1.5t	2.5t		
	H36	1t	1t	1.5t	2.5t				
	H38	1t	1.5t	2.5t	3t				
5050A	0	0t	0t	0t	0.5t	1t	1t		
	H32	0t	0t	0t	1t	1t	1.5t		
	H34	0t	0t	1t	1.5t	1.5t	2t		
	H36	1t	1t	1.5t	2t				
	H38	1t	1.5t	2.5t	3t				
5052	0	0t	0t	0t	0.5t	1t	1t	1.5t	1.5t
5251	H32	0t	0t	1t	1.5t	1.5t	1.5t	1.5t	2t
	H34	0t	1t	1.5t	2t	2t	2.5t	2.5t	3t
	H36	1t	1t	1.5t	2.5t	3t	3.5t	4t	4.5t
	H38	1t	1.5t	2.5t	3t	4t	5t	5.5t	6.5t
5154A	0	0t	0t	0.5t	1t	1t	1t	1.5t	1.5t
5454	H32	0t	0.5t	1t	1.5t	1.5t	2t	2.5t	3.5t
	H34	0.5t	1t	1.5t	2t	2.5t	3t	3.5t	4t
	H112						2t	2.5t	3t
5083	0			0.5t	1t	1t	1t	1.5t	1.5t
	H321		1.5t	1t	1.5t	1.5t	1.5t	2t	2.5t
5086	0	0t	0t	1.5t	1t	1t	1t	1.5t	1.5t
	H32	0t	1.5t	1.5t	2t	2t	2t	2.5t	3t
	H34	0.5t	1t	1.5t	2t	2.5t	3t	3.5t	4t
	H36				3t	3.5t			
	H112					1.5t	2t	2t	2.5t
6061 <sup>2</sup>	0	0t	0t	0t	1t	1t	1t	1.5t	2t
	T4 & T42	0t	0.5t	1t	1.5t	2.5t	3t	3.5t	4t
	T6 & T62	1t	1t	1.5t	2.5t	3t	4t	4.5t	5t

<sup>1</sup> The radii listed are the minimum recommended for bending sheets and plates without fracturing in a standard press break with air bend dies. Other types of bending operations may require larger radii or permit smaller radii. The minimum permissible radii will also vary with the design and condition of tooling.

<sup>2</sup> Heat-treatable alloys can be formed over appreciable smaller radii immediately after solution heat treatment.

<sup>3</sup> The H112 temper (applicable to non-heat treatable alloys) is supplied in the as-fabricate condition without special property control, but usually can be formed over radii applicable to the H14 (or H34) temper or smaller.

