



Alloy 1xxx

Hydro markets several alloys in the 1xxx series for many specialty applications. This non-heat treatable aluminum alloy series is available in extruded sections with a minimum purity of 99.0% aluminum for 1100 alloy and as high as 99.6% minimum aluminum for 1060 alloy.

This alloy group offers the best corrosion resistance of any alloy group and displays excellent forming, welding, brazing and finishing characteristics. Excellent forming characteristics permit these alloys to be easily impacted, cold drawn, deep drawn and bent into various configurations. These alloys can be extruded as profiles, rod, bar and tubing. Common alloys available from Hydro are: 1050, 1060, 1100, and 1350.

Alloy 1060 is a high purity alloy with a 99.6% minimum aluminum content. Typical applications include chemical and food handling equipment, as well as containers for food, pharmaceuticals and liquids. Alloy 1100, slightly stronger, shares some of the same applications as alloy 1060, plus fin stock, spun hollowware, impacted fire extinguisher bottles and tubing. This alloy contains slight additions of silicon, iron, and copper for strength. Alloy 1350 is used primarily for electrical conductors, and -H111 temper exhibits the highest electrical conductivity of all extruded aluminum conductor grades, meeting or exceeding 61.0% IACS.

Consult the Safety Data Sheet (SDS) for proper safety and handling precautions when using 1050, 1060, 1100 and 1350 alloys.

Typical applications for 1xxx alloy:

- Heat exchange tubing
- Medical/chemical instrumentation
- Electrical conductors
- Food handling equipment
- Impact stock
- Pharmaceutical containers
- Cable sheathing

1XXX Temper Designations and Definitions

Standard Tempers	Standard Temper Definitions*
F	As fabricated. There is no special control over thermal conditions and there are no mechanical property limits.
O	Annealed. Applies to products that are annealed to obtain the lowest strength temper.
H112	Strain hardened temper via the extrusion process to develop minimum property requirements.
H111	Strain hardened temper via the extrusion process to develop minimum property requirements.

* For further details of definitions, see Aluminum Association's Aluminum Standards and Data manual and Tempers for Aluminum and Aluminum Alloy Products.

Chemical Composition

Melting Temperature Range 1050, 1060, 1350: 1195-1215 °F
1100: 1190-1215 °F

Density: 0.0975 lb./in.³
Density: 0.098 lb./in.³

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others		Aluminum (min.)
									Each	Total	
1050	0.25	0.40	0.05	0.05	0.05	—	0.05	0.03	0.03 ¹	—	99.50
1060	0.25	0.35	0.05	0.03	0.03	—	0.05	0.03	0.03 ¹	—	99.60
1100	0.95 Si + Fe		0.05-0.20	0.05	—	—	0.10	—	0.05	0.15	99.00
1350	0.10	0.40	0.05	0.01	—	0.01	0.05	—	0.03 ²	0.10	99.50

1. Vanadium 0.05 percent maximum.

2. Vanadium plus Titanium 0.02 percent maximum; Boron 0.05 percent maximum; Gallium 0.03 percent maximum

Chemical composition in weight percent maximum unless shown as a range or minimum.

Average Coefficient of Thermal Expansion 1050, 1060 and 1100: (68° to 212°F) = 13.1×10^{-6} (in./in.°F)

1350: (68° to 212°F) = 13.2×10^{-6} (in./in.°F)



Alloy 1xxx

Flatwise Bending Radius – 90° Bends (Bus bar only)

Alloy-Temper	Thickness		Minimum Bend Radius
	inches	mm	
1350-H111	All thicknesses	All	1 x Thickness ¹ = Minimum bend radius

1. Applicable to widths up through 12"

1XXX Extruded Mechanical and Physical Property Limits¹

Alloy	Standard Tempers	Wall Thickness ² (min.)		Tensile Strength ksi (MPa)		Elongation ³ % (min.)	Typical Thermal Conductivity, @77°F, BTU-in./ft. ² hr.°F (W/m-K@25°C)	Typical Electrical Conductivity, @68°F, % IACS
		inches	mm	Ultimate (min. - max.)	Yield - 0.2% offset (min.)			
1060	-F	All	All	No Properties Apply				
	-O	All	All	8.5-14.0 (60-95)	2.5 (15)	25.0	1625 (234)	62
	-H112	All	All	8.5 (60)	2.5 (15)	25.0	—	—
1100	-F	All	All	No Properties Apply				
	-O	All	All	11.0-15.5 (75-105)	3.0 (20)	25.0	1540 (222)	59
	-H112	All	All	11.0 (75)	3.0 (20)	25.0	—	—
1350	-F	All	All	No Properties Apply				
	-H111	All	All	8.5 (60)	3.5 (25)	— ⁴	1625 (234)	62 (61.0 min.)

1. Minimum property levels unless shown as a range or indicated as a maximum (max.)

2. The thickness of the cross section from which the tension test specimen is taken determines the applicable mechanical properties.

3. For materials of such dimensions that a standard test specimen cannot be taken, or for shapes thinner than .062", the test for elongation is not required. Elongation percent is minimum in 2" or 4 times specimen diameter.

4. Elongation values are not required for this particular alloy.

Comparative Characteristics of Related Alloys/Tempers¹

Alloy	Temper	Formability				Machinability				General Corrosion Resistance				Weldability				Brazeability				Anodizing Response			
		D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A	D	C	B	A
1060	-O																								
	-H112																								
1100	-O																								
	-H112																								
1350	-H111																								
6101	-T6																								
	-T63																								
6101	-T61																								
	-T64																								

1. Rating: A = Excellent B = Good C = Fair D = Poor

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