



Alloy 6063

Alloy 6063, one of the most popular alloys in the 6000 series, provides good extrudability and a high quality surface finish. Hydro produces 6063 for use in standard architectural shapes, custom solid shapes and heatsinks, as well as seamless and structural tube and pipe. This alloy is often used for electrical applications in the -T5, -T52 and -T6 conditions due to its good electrical conductivity.

In the heat-treated condition, alloy 6063 provides good resistance to general corrosion, including resistance to stress corrosion cracking. It is easily welded or brazed by various commercial methods (caution: direct contact by dissimilar metals can cause galvanic corrosion). Since 6063 is a heat-treatable alloy, strength in its -T6 condition can be reduced in the weld region. Selection of an appropriate filler alloy will depend on the desired weld characteristics. Consult the Safety Data Sheet (SDS) for proper safety and handling precautions when using alloy 6063.

Alloy 6063 offers excellent response for anodizing in its -T5, -T52, -T53 (“matte finish”), -T54, -T6 (“lustrous” finish) tempers. The most common methods are clear, clear and color dyeing, and bright dipping and hard coat. Bright dipping provides an economical alternative to mechanical polished finishes while offering improved surface durability.

Since 6063 is the alloy of choice for aesthetic applications, special packaging may be required to protect critical exposed surfaces. Alloy 6063 is not typically ink-stenciled in order to preserve its surface finish quality. If stenciling and/or special packaging is required, it should be specified at the time of quotation.

Hydro offers alloy 6063 in a variety of standard tempers, as well as special tempers developed for unique applications.

Typical applications for 6063 alloy:

- Architectural and building products
- Railings and furniture
- Door and window frames
- Pipe and tube for irrigation systems
- Electrical components and conduit
- Heatsinks

6063 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.
T1	Cooled from an elevated temperature shaping process and naturally aged. (See Note A.)
T4	Solution heat-treated and naturally aged. (See Note B.)
T5, T52, T53, T54, T55	Cooled from an elevated temperature shaping process and artificially aged. (See Note A.)
T6, T65	Solution heat-treated and artificially aged. (See Note B.)

Special Tempers	Special Temper Definitions**
T4S6	For 6063 extrusions requiring maximum formability in the naturally aged condition. This temper is intended for use when extrusions will be formed by the customer in the naturally aged condition and subsequently aged to -T6. May not meet -T4 minimum mechanical properties, but will meet -T6 minimum when properly aged. Test reports will state -T6 properties to demonstrate heat treat capabilities, but product will be supplied in the naturally aged condition. (See Note C.)
T6S5	For 6063 extrusions requiring good formability; meets standard 6063 -T6 minimum properties. (See Note B.)

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

** Hydro Special Temper Designations are unregistered tempers for reference only, not recognized by the Aluminum Association, and are provided for customer use to identify unique processing, material or end use application characteristics.

Note A: Applies to products that are not cold worked after cooling from an elevated temperature shaping process, or in which the effect of cold work in flattening or straightening may not be recognized in mechanical properties.

Note B: Applies to products that are not cold worked after solution heat-treatment, or in which the effect of cold work in flattening or straightening may not be recognized in mechanical properties.

Note C: The specified temper will not conform to military, Federal, ASTM, ASME and AMS specifications.

Chemical Composition

Melting Temperature Range: 1140-1210 °F

Density: 0.097 lb./in.³

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
6063	0.20-0.6	0.35	0.10	0.10	0.45-0.9	0.10	0.10	0.10	0.05	0.15

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

Aluminum = Remainder

Average Coefficient of Thermal Expansion (68° to 212°F) = 13.0 x 10⁻⁶ (in./in.°F)



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6063 Extruded Mechanical and Physical Property Limits¹

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
			Ultimate (min.)	Yield - 0.2% offset (min.)			
	inches	mm					
O	All	All	19.0 (130) max.	—	18	1510 (218)	58
T1	up thru .500	up thru 12.50	17.0 (115)	9.0 (60)	12	1340 (193)	50
	.501 - 1.000	>12.50 - 25.00	16.0 (110)	8.0 (55)	12	1340 (193)	50
T4	up thru .500	up thru 12.50	19.0 (130)	10.0 (70)	14	1340 (193)	50
	.501 - 1.000	>12.50 - 25.00	18.0 (125)	9.0 (60)	14	1340 (193)	50
T5	up thru .500	up thru 12.50	22.0 (150)	16.0 (110)	8	1450 (209)	55
	.501 - 1.000	>12.50 - 25.00	21.0 (145)	15.0 (105)	8	1450 (209)	55
T52	up thru 1.000	up thru 25.00	22.0-30.0 (150-205)	16.0-25.0 (110-170)	8	1450 (209)	55
T53	up thru .249	up thru 6.30	13.0-21.0 (90-145)	5-13 (30-90)	14	—	—
T54	up thru .124	up thru 3.20	33.0 (225)	30.0 (205)	8	—	—
	.125 - .499	>3.20 - 12.50	33.0 (225)	30.0 (205)	10	—	—
T55	up thru .124	up thru 3.20	28.0 (195)	23.0 (160)	8	—	—
	.125 - .249	>3.20 - 6.30	27.0 (185)	22.0 (150)	10	—	—
	.250 - .499	>6.30 - 12.50	26.0 (180)	21.0 (145)	12	—	—
T6	up thru .124	up thru 3.20	30.0 (205)	25.0 (170)	8	1390 (201)	53
	.125 - 1.000	>3.20 - 12.50	30.0 (205)	25.0 (170)	10	1390 (201)	53
T65	up thru 0.182	up thru 5.00	36.0 (250)	33.0 (225)	8	—	—
Hydro Special Tempers*							
T6S5	up thru .124	up thru 3.20	30.0 (205)	25.0 (170)	8	1390 (201)	53
	.125 - 1.000	>3.20 - 12.50	30.0 (205)	25.0 (170)	10	1390 (201)	53

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.
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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
6063	-O	██████████				██				██████████				██████████				██████████				██████████			
	-T1, -T4	██████████				██				██████████				██████████				██████████				██████████			
	-T5, T52	██████████				██				██████████				██████████				██████████				██████████			
	-T53	██████████				██				██████████				██████████				██████████				██████████			
	-T54, -T6, -T65	██████████				██				██████████				██████████				██████████				██████████			
	-T6S5	██████████				██				██████████				██████████				██████████				██████████			
6061	-T4	██████████				██				██████████				██████████				██████████				██████████			
	-T6, -T6511	██████████				██				██████████				██████████				██████████				██████████			
6101	-T6, -T63	██████████				██				██████████				██████████				██████████				N/A			
	-T61, -T64	██████████				██				██████████				██████████				██████████				N/A			
6463	-T5	██████████				██				██████████				██████████				██████████				██████████			

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

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