

Sapa Industrial Extrusions

Among Sapa Industrial Extrusions' structural 6xxx series alloys, 6005 and 6105 are medium strength alloys that are very similar to alloy 6061 except they contain higher amounts of silicon. These alloys are used in designs that require moderate strength, but are generally not recommended for applications where the structure may be susceptible to impact or overloading.

When bending is required, the naturally aged -T1 temper is preferred. However, due to the excess silicon content, properties may increase more rapidly with room temperature natural aging than typically experienced with 6063 and 6061 alloys. In comparison to 6061, alloys 6005 and 6105 are easier to extrude and are less quench sensitive, allowing them to be used for more complex shapes. Alloys 6005 and 6105, when produced to a -T5 temper, have the same minimum tensile and yield strength as 6061-T6. In comparison to 6063, alloys 6005 and 6105 in -T5 tempers have better machinability and strength properties than 6063-T6.

Alloys 6005 and 6105 can also be welded or brazed using various commercial methods (caution: direct contact with dissimilar materials can cause galvanic corrosion), although the heat from welding can reduce strength. Consult the Material Safety Data Sheet (MSDS) for proper safety and handling precautions when using 6005 and 6105 alloys.

These alloys also offer good finishing characteristics and respond well to common anodizing methods such as clear, clear and color dye, and hardcoat.

Typical applications for alloys 6005/6105 include:

- Automotive connector stock
- Structural members
- Hand rail tubing
- Seamless and structural tubing
- Ladder structures

6005/6105 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.
T1	Cooled from an elevated temperature shaping process and naturally aged. (See Note A.)
T5	Cooled from an elevated temperature shaping process & artificially aged. (See Note A.)

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

CHEMICAL COMPOSITION

Melting Temperature Range 6005: 1125-1210 °F
 6105: 1110-1200 °F

Density: 0.097 lb./in.³

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	
									Each	Total
6005	0.6-0.9	0.35	0.10	0.10	0.40-0.6	0.10	0.10	0.10	0.05	0.15
6105	0.6-1.0	0.35	0.10	0.15	0.45-0.8	0.10	0.10	0.10	0.05	0.15

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

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

Aluminum = Remainder

6005/6105 EXTRUDED MECHANICAL AND PHYSICAL PROPERTY LIMITS¹

Alloy	Standard Tempers	Wall Thickness ² Inches (min.)	Tensile Strength Ksi (min.)	Yield Strength Ksi (min.)	Elongation ³ % (min.)	Typical Thermal Conductivity, @77°F, BTU-in./ft. ² hr.°F	Typical Electrical Conductivity, @68°F, % IACS
6005	-T1	.500 max.	25.0	15.0	16	1250	46
	-T5	.124 max.	38.0	35.0	8	1310	50
		0.125 - 1.000	38.0	35.0	10	1310	46
	-T51	0.201 - 0.625	35.0	30.0	8	-	-
6105	-T1	.500 max.	25.0	15.0	16	1220	40
	-T5	.500 max.	38.0	35.0	8	1340	43

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.

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
6005	-T1	N/A				N/A				N/A				██████████				██████████				██████████			
	-T5	N/A				N/A				N/A				██████████				██████████				██████████			
6105	-T1	N/A				N/A				N/A				██████████				██████████				██████████			
	-T5	N/A				N/A				N/A				██████████				██████████				██████████			
6061	-T4	██████████				██████████				██████████				██████████				██████████				██████████			
	-T6	██████████				██████████				██████████				██████████				██████████				██████████			
6063	-T4	██████████				██████████				██████████				██████████				██████████				██████████			
	-T6	██████████				██████████				██████████				██████████				██████████				██████████			
6262	-T6	██████████				██████████				██████████				██████████				██████████				██████████			

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

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