What is A356 Aluminum - A356 Aluminum Composition, Properties, Uses & A356 Aluminum vs 6061

In casting alloys collection, A356 aluminum is a typical material for aircraft applications. Unlike wrought alloys, cast aluminum has a different designation system. In this article, we'll focus on A356 (A356.0) aluminum alloy, explain what is A356 aluminum, list its composition, properties, tempers, and uses, as well as 6061 vs A356. For superior quality A356 aluminum casting parts, we're capable of **aluminum die casting** for a wide range of industries.

What is A356 Aluminum? - Introduction to A356 Aluminum Names and Properties

A356 is a type of aluminum alloy for casting. In **cast aluminum alloy** designation system, there are 1xx.x, 2xx.x, 3xx.x, 4xx.x, 5xx.x, 6xx.x, 7xx.x, 8xx.x, and 9xx.x series. The 3xx.x series means the principal alloying element is silicon plus copper and/or magnesium. The second and third digits reveal the minimum percentage of aluminum. The number following the decimal point indicates whether the alloy is a casting (.0) or an ingot (.1 or .2). The A in front of an alloy designation denotes a higher purity version of the chemical composition. A356.0 is the designation for this material from Aluminum Association (AA). In UNS standard, it is A13560 and the SAE designation is 336. A356 aluminum die casting alloy has good casting and machining performance, suitable for use in aircraft, pump housings, impellers, high-velocity blowers, and other structural castings that require high strength. A356 aluminum often used to manufacture intricate and complex aluminum castings, which provides lightweight, pressure tightness and great mechanical properties. Sometimes, A356 used as an alternative for 6061 aluminum.

A356 (A356.0) Aluminum Composition

– Cu: 0.20% (max)
– Mg: 0.25 to 0.45%
– Mn: 0.10% (max)
– Si: 6.5 to 7.5%
– Fe: 0.20% (max)
– Zn: 0.10% (max)
– Ti: 0.20% (max)
– Others (total): 0.15% (max)
– Al: balance

A356 (A356.0) Aluminum Properties - Physical and Mechanical Properties of A356 Aluminum

The properties of A356.0 aluminum including 5 variations (tempers), they are A356.0-F, A356.0-T6, A356.0-T51, A356.0-T61, and A356.0-T71. T6 heat treatment of A356 aluminum castings offers improved hardness and other mechanical properties. Here we create a chart that shows some properties of A356.0 aluminum in the T51, T6, and T71 temper.

	A356.0-T51	A356.0-T6	A356.0-T71
Yield Tensile Strength	120 MPa	200 MPa	140 MPa
Ultimate Tensile Strength	180 MPa	270 MPa	210 MPa
Shear Modulus	26 GPa	26 GPa	26 GPa
Fatigue Strength	53 MPa	90 MPa	50 MPa
Elongation at Break	3.0%	6.0%	3.0%
Elastic Modulus	70 GPa	70 GPa	70 GPa
Density	2.6 g/cm3	2.6 g/cm3	2.6 g/cm3
Melting Completion	610 ℃	610 ℃	610 ℃
Melting Onset	570 ℃	570 ℃	570 ℃
Thermal Conductivity	150 W/m-K	150 W/m-K	150 W/m-K
Thermal Expansion	21 µm/m-K	21 µm/m-K	21 µm/m-K

A356.0 Aluminum Uses/Applications

The typical applications of A356.0 cast aluminum including aircraft structures and engine controls, nuclear energy installations, high strength airframe and space frame structural parts, machine parts, truck chassis parts, high-velocity blowers, and impellers, and other applications where high-strength permanent mold or investment castings are required

A356 Aluminum vs 6061

Why A356 can be used as a substitute for 6061 aluminum? Let’s take a look at the comparison between 6061-T6 aluminum and A356.0 aluminum. They have 94% of their average alloy composition in common. Check out the difference between 6061 and A356 properties.

	6061-T6 Aluminum	A356.0 Aluminum
Elongation at Break	10%	3-6%
Fatigue Strength	96 MPa	50-90 MPa
Shear Modulus	26 GPa	26 GPa
Ultimate Tensile Strength	310 MPa	160-270 MPa
Yield Tensile Strength	270 MPa	83-200 MPa
Melting Onset	580 ℃	570 ℃
Thermal Conductivity	170 W/m-K	150 W/m-K
Thermal Expansion	24 µm/m-K	21 µm/m-K
Density	2.7 g/cm3	2.6 g/cm3