713.0 (7.5Zn-0.7Cu-0.35Mg) Aluminum Alloy

- Former designation. 613, Tenzalloy
- Former ASTM. B26 ZC81A
- Former SAE. 315
- UNS number. A07130
- Government. QQ-A-601, QQ-A-596
- Description: 713 is commonly not heat treated. We typically always use 713.1 aluminum alloy. 713 is a high-strength aluminum casting alloy that has tensile, yield and elongation properties equivalent to the common heat treated alloys such as 355-T6 and 319-T6. The impact strength of 713 is greater than any of these alloys, and in several instances, the elongation is higher. 713 attains its strength by a natural aging process that gradually takes place at room temperature. The typical properties are reached after 10-14 days, and when testing for specification purposes, a 21-day period is used. Some slight further aging and strengthening takes place up to six months, at which time the alloy is stable and no further change of any kind takes place.

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Typical Properties & Characteristics of Aluminum Sand Castings

Typical Aluminum Alloys (a)					Approx. Weight, lb./in.3	Resistance to Corrosion (b)		Relative Machinability (c)	Castability (k)	Weldability (Arc) (d)	Typical Mechanical Properties					
AA	Former AA Designation	ASTM Spec. No.	Federal Spec. No.	SAE Alloy No.		General	Stress Corrosion Cracking				Ultimate Tensile Strength, ksi (i)	Yield Strength Tension, ksi (e) (i)	Elongation, Percentage in 2 in. (Round Specimen, 1/2" Dia.) (f) (i)	Shear Strength, ksi (g)	Fatigue Endurance Limit, ksi (h)	Brinell Hardness (500-kg Load, 10-mm Ball) (j)
713.0-T5	613, Tenzaloy	B26	QQ-A-601	315	0.102	2	B	1	4	4	35	25	4	26	9	74

Footnotes:

(a) For all Alcoa casting alloys, the following data apply: (a) Young's modulus of elasticity may be taken as 10,300,000 pounds per square inch (710 gram-pascals); (b) Modulus of rigidity may be taken as 3,800,000 pounds per square inch (262 gram-pascals); (c) Poisson's ratio is 33; (d) Bearing strength is equal to 1.8 times tensile strength, provided edge distance, in direction of stressing, is not less than twice the diameter of the hole.

(b) Relative ratings of general corrosion resistance 1 through 5 are in decreasing order of merit, based on exposures to sodium chloride solution intermittent spray or immersion. Relative ratings of resistance to stress corrosion cracking are based on service experience and on laboratory tests of specimens exposed to the 3.5 percent sodium chloride alternate immersion test.

A – No known instance of stress corrosion cracking in service when properly manufactured; B – Stress corrosion cracking not anticipated in service from residual stresses or from design and assembly stresses kept below about 45 percent of the minimum guaranteed yield strength given in applicable specifications; C – Stress corrosion failures have occurred in service with either the specific alloy and temper or with alloys and tempers of this type. Designers should be aware of the potential stress corrosion cracking problem that exists when using these alloys and tempers under adverse conditions.

(c) Composite rating based on ease of cutting, chip characteristics, quality of finish and tool life. 1 – indicates best; 5 – indicates not recommended

(d) Based on ability of alloy to be fusion welded prior to heat treatment with filler rod of same alloy. 1 – indicates best; 5 – indicates welding not recommended

(e) Yield strength is the stress at which the material exhibits a permanent set of 0.2 percent.

(f) For die casting alloys, 1/4 inch (6.35 mm) diameter.

(g) Shearing strengths are single-shear values obtained from double-shear tests.

(h) Fatigue endurance values are based on withstanding 500 million cycles of completely reversed stress using the R.R. Moore type of machine and specimen.

(i) Mechanical properties are obtained on separately cast ASTM specimens. Since minimum guaranteed values vary with the applicable specifications, they are not given on this table.

(j) From tests made approximately 30 days after casting.

(k) Castability is rated on a scale of 1 through 5, in which higher numbers indicate lower merit. For sand and permanent-mold alloys, the ratings take into account resistance to hot cracking, fluidity and feeding ability. For die castings, the resistance to hot cracking, fluidity, die soldering and cast surface finish are considered. Even the alloys with the lowest rating of 5 may be successfully used with the proper techniques to produce commercial castings.

Designations and nominal compositions of common aluminum alloys used for sand casting							
AA Number	Former AA designations	Former ASTM number	Cu	Mg	Mn	Si	Others
713.0	T5	210	30	150	22	180	26

Characteristics of common aluminum alloys used in sand casting										
Alloy	Fluidity	Resistance to hot cracking	Pressure tightness	Heat Treatment	Strength at elevated temperatures	General corrosion resistance	Machining	Polishing	Anodizing Appearance	Weldability
713.0	3	4	4	No	4	3	1	1	1	4

Alloy	Uses
713.0	General-purpose casting alloy for applications that require strength without heat treament or that involve brazing

Typical Tensile Properties for separately cast test bars of comon aluminum casting alloys										
Alloy	Temper	Tensile strength		Yield strength		Shear strength		Compressive yield strength		Elongation %
		Mpa	ksi	Mpa	ksi	Mpa	ksi	Mpa	ksi	
713.0	T5	210	30	150	22	180	26	170	25	3

Other Aluminum Specs:

- 319
- A356
- C355
- 535

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