

CASTING ALLOYS

ALLOYS: 206.0, A356.0 (4010, 4008), 357.0 and C355.0 (4009)

Alloy R-206.0⁽¹⁾ Filler Metal

Chemistry (Single values shown are maximum %):

Si	Fe	Cu	Mn	Mg	Ni	Zn	Sn	Ti	Other Each	Total	Aluminum Remainder
.10	15	4.2-5.0	.20-.50	15-.35	.05	.10	.05	.15-.30	.05	.15	

⁽¹⁾ Be content of R-206.0 is 0.0003% maximum.

Physical Properties:

Approximate Melting Range:	1060 ⁰ F-1200 ⁰ F
Density - Pounds/Cubic Inch:	.101
Post Anodize - Color Tint:	Golden
Standard Sizes Available:	TIG: 1/1 6, 3/32.1/8, 5/32, 3/16 MIG: .030, .035, 3/64, 1/16

Alloy R-A356.0, ER and R4010⁽²⁾ Filler Metal

Chemistry (Single values shown are maximum %):

Si	Fe	Cu	Mn	Mg	Zn	Ti	Other Each	Total	Aluminum Remainder
6.5-7.5	.20	.20	.10	.25-.45	.10	.20	.05	.15	

Alloy ER and R4008⁽²⁾ Filler Metal

Chemistry (Single values shown are maximum %):

Si	Fe	Cu	Mn	Mg	Zn	Ti	Other Each	Total	Aluminum Remainder
6.5-7.5	.09	.05	.05	.30-.45	.05	.04-.15	.05	.15	

⁽²⁾ Be content of ER4008, R4008, ER4010 and R4010 is 0.0003% maximum.

Physical Properties:

Approximate Melting Range	1035-1135 ⁰ F
Density - Pounds/Cubic Inch	.097
Post Anodize - Color Tint	Gray
Standard Sizes Available	TIG: 1/16, 3/32, 1/8, 5/32, 3/16 MIG: .030, .035, 3/64, 1/16

Alloy R-A357.0 and R401 I Filler Metal

Note: This alloy is no longer available as a filler alloy because of its controlled Beryllium (Be) content.

Alloy R-357.0⁽³⁾ Filler Metal

Chemistry (Single values shown are maximum %):

Si	Fe	Cu	Mn	Mg	Zn	Ti	Other Each	Total	Aluminum Remainder
6.5-7.5	.15	.05	.03	.45-.6	.05	.20	.05	.15	

⁽³⁾ Be content of R-357.0 is 0.0003% maximum.

Physical Properties:

Approximate Melting Range:	1030-1135 ⁰ F
Density - Pounds/Cubic Inch:	.097
Post Anodize - Color Tint:	Gray
Standard Sizes Available:	TIG: 1/16, 3/32, 1/8, 5/32, 3/16 MIG: (357.0 only) .030, .035, 3/64, 1/16

NOTE: AlcoTec controls the R-357.0 chemistry to also meet the tighter limits of 357.1 base metal.

AlcoTec Wire Corporation

Alloy R-C355.0, ER and R4009⁽⁴⁾

Chemistry (Single values shown are maximum %):

<u>Si</u>	<u>Fe</u>	<u>Cu</u>	<u>Mn</u>	<u>Mg</u>	<u>Zn</u>	<u>Ti</u>	<u>Other</u>		<u>Aluminum</u>
							<u>Each</u>	<u>Total</u>	<u>Remainder</u>
4.5-5.5	.20	1.0-1.5	.10	.40-.6	.10	.20	.05	.15	

⁽⁴⁾ Be content of ER and R4009 is 0.0003% maximum.

NOTE: Alcotec controls the Fe, Mn, Zn & Mg to allow the weldment to meet the limits of A355.0 base chemistry.

Physical Properties:

Approximate Melting Range 1015-1150°F

Density Pounds/Cubic Inch .098

Post Anodize - Color Tint Gray

Standard Sizes Available TIG: 1/16, 3/32, 1/8, 5/32, 3/16 MIG: .030, .035, 3/64, 1/16

Background:

The Aluminum Silicon Alloy Family is the most frequently used for commercial castings due to its superior casting characteristics. These alloys have high resistance to hot cracking, high pressure tightness, high fluidity, low shrinkage, high resistance to corrosion, a low specific gravity and good weldability.

Alloy 206.0 (Al-Cu-Mn-Mg) is alloyed with copper to provide high tensile properties in a heat treated condition. Disadvantages include limited fluidity and poor resistance to hot cracking. The alloy is also susceptible to stress corrosion cracking in a fully hardened (heat treated) condition.

This filler wire is designed for joining or repairing aluminum copper alloy castings. In this application, the weld zone will respond to heat treatment, properties, and corrosion resistance comparable to those of the casting. Alcotec produces alloy 206.0 in both spooled and straight length form.

Alloys 356.0 and A356.0 (Al-Si-Mg) are used in large quantities for sand and permanent mold castings. A variety of heat treatments can be used to produce the desired combinations of mechanical properties. Alloy A356.0 has a lower iron content than 356.0 which, in effect, affords higher tensile properties in premium quality castings.

Alcotec Wire Corporation manufactures premium quality, low iron Alloy A356.0 Almigweld and Altigweld filler wire in various sizes. Alloy A356.0 filler wire is optimum for joining and repairing both 356.0 and A356.0 castings. Alloy A356.0, when fabricated as a wrought wire product, is registered by the Aluminum Association as Alloy 4010 and can be spooled for GMAW. Alloy 4008 is a tightly controlled chemistry version of A356.0 (4010). It is a product generally fabricated to meet the chemistry requirements of AMS 4181 specification and is available from Alcotec.

Alloy 357.0 (Al/Si-Mg-B.) was designed to produce a tensile strength greater than that normally found using Alloy A356.0. The higher properties, when compared in the -T6 temper, are a result of the chemistry differences. Specifically Alloy 357.0 has an average magnesium content of .5%. These premium castings are typically marketed for aerospace applications.

Alcotec Wire Corporation produces premium quality, low iron 357.0 filler wire. Alloy 357.0 has a maximum beryllium content of 0.0003%.

Alloys 355.0, A355.0 and C355.0 (Al-Si-Cu-Mg) are alloyed with copper to afford a greater response to heat treating (higher strength) but inversely sacrifices ductility and corrosion resistance. Alloy C355.0 contains a low amount of iron to create higher tensile properties in premium quality castings.

Alcotec Wire Corporation produces premium quality, low iron Alloy C355.0 filler wire. This filler wire is designed for joining and repairing 355.0, A355.0 and C355.0 castings and is available in both spooled and straight length form. Alloy A355.0 when fabricated as a wrought wire product, is registered by the Aluminum Association as Alloy 4009.

SUMMARY

Joining castings or repairing castings for structural applications requires matching the filler wire alloy to the base alloy. Traditional filler wire alloys produce inferior welds and weld cracking due to the weld puddle freezing prior to the base metal. The proper solidification sequence requires the weld puddle to freeze last, thus relieving shrinkage stresses. Therefore, the filler wire must have an identical or lower freezing temperature than the base alloy. In addition to weld quality considerations, the welded joint must also exhibit uniform mechanical properties after heat treating. For these reasons, the repair or joining of castings requires specifically selected filler metals.

Alcotec Wire Corporation

2750 Aero Park Dr., Traverse City, MI 49686-9263 U.S.A. 1-800-228-0750 FAX: 616-941-9154

E-mail: sales@alcotec.com

Website: www.alcotec.com