

## Aluminum Welding Alloys

J.W. Harris manufactures aluminum welding wire and rod using the most advanced production techniques. Our aluminum wire is thoroughly cleaned to ensure removal of all surface oxides and residual lubricants. Then, Harris pays strict attention to level-layer-winding procedures and control of cast and helix to guarantee uniform feeding through automatic and semiautomatic welding equipment.

Aluminum welding wire is available in the following alloys: 1100, 4043, 4047 (718), 5356 and 5556. Other alloys are available on request.



All alloys are produced with closely controlled chemical analyses, with the welding test laboratory located beside the wire line and conducting weld tests on a time frame in excess of "standards". This investigating procedure is a tradition at Harris, to ensure the end user receives a high quality pure wire/weld.

### Technical Data

Choice of the proper filler metal is most important. The molten alloy in the weld puddle is an intermixture of the filler metal and the base alloy. In this dilution, the welding alloy should provide the strength, ductility, resistance to cracking and corrosion resistance to achieve the necessary results.

Aluminum alloys can be particularly susceptible to hot-short cracking during the welding and cooling processes. Obviously, proper edge preparation and joint design can be factors in cracking due to contracting stresses set up by the cooling strains.

If welding assemblies are to be anodized, it should be kept in mind that filler alloys containing silicon, (e.g. 4043), will discolor to an undesirable gray hue in the anodizing process. To minimize discoloration in anodizing, an appropriate aluminum-magnesium alloy filler alloy should be used.

Suggested Filler Metals for Specific Requirements				
Material Welded	Strength	Ductility	Color Match After Anodizing	Least Crack Tendency
1100	4043	1100	1100	4043
2219	2319	2319	2319	2319
3003	4043	1100	1100	4043
5052	5356	5654	5356	5356
5083	5183	5356	5183	5356
5086	5356	5356	5356	5356
5454	5356	5554	5554	5356
5456	5556	5356	5556	5356
6061	5356	5356	5654	4043
6063	5356	5356	5356	4043
7005	5356	5356	5356	5356
7039	5356	5356	5356	5356

## Relative Weldability of Aluminum Alloys

While selecting the most appropriate filler alloy, one will wish to consider the relative weldability of the base alloy involved. In a broad sense, the non-heat-treatable, wrought alloys have good weldability with the inert gas processes. Following are ratings for welding some of the heat treatable wrought aluminum alloys using inert gas processes:

### Legend:

A - Readily Weldable;

B - Reasonably Weldable (trial first);

C - Limited Weldability (develop procedure)

Heat-Treatable wrought alloys	Rating	Heat-Treatable wrought alloys	Rating
2014	C	6101	A
2017	C	6201	A
2024	C	6951	A
2218	C	7005	A
2219	C	7039	A
2618	C	7075	C
6061	A	7079	C
6063	A	7178	C
6070	A		

## Aluminium TIG and MIG Alloys

J.W. HARRIS Aluminum Cut Lengths and Spooled Wires are methodically manufactured to meet the rigid requirements of AWS A5.10. Cleanliness, density and temper of the wires are precisely controlled.

Available Grades, Sizes and Packaging are as Follows:

36" Cut Lengths

Grade	10 lb. Boxes		50 lb. Bulk Cartons	
	Size	Stock No.	Size	Stock No.
R1100	1/16"	0110030		
	3/32"	0110050		
	1/8"	0110060		
R4043	1/16"	0404330	1/16"	A404330
	3/32"	0404350	3/32"	A404350
	1/8"	0404360	1/8"	A404360
	5/32"	0404370	5/32"	A404370
	3/16"	0404380		
	1/4"	0404390		
R4047 (718)	1/16"	0071830		
	3/32"	0071850		
	1/8"	0071860		
R5356	1/16"	0535630	1/16"	A535630
	3/32"	0535650	3/32"	A535650
	1/8"	0535660	1/8"	A535660
	5/32"	0535670		
	3/16"	0535680		
R5556	1/16"	00555630		
	3/32"	00555650		
	1/8"	00555660		

Packaging:

- 10 lb. boxes, four per carton
- 5 lb. boxes are available on request
- Flat 36" lengths available on request
- Grade is repeatedly etched on 36" cut lengths - eliminate errors

## Aluminium TIG and MIG Alloys

### Spooled Aluminum Wires

Product and Description	Stock Number	Size
ER1100 - 16 lb. Spools	0110027	3/64"
	0110037	1/16"
ER4043 - 16 lb. Spools	04043D6	.025
	04043E6	.030
	04043F6	.035
	0404327	3/64"
	0404337	1/16"
	0404357	3/32"
ER4047 (718) - 16 lb. Spools	0071827	3/64"
	0071837	1/16"
ER5356 - 16 lb. Spools	05356D6	.025
	05356E6	.030
	05356F6	.035
	0535627	3/64"
	0535637	1/16"
	0535657	3/32"
ER5556 - 16 lb. Spools	05556E6	.030
	0555627	3/64"

Product and Description	Stock Number	Size
ER1100 - 1 lb. Spools	01100E1	.030
	01100F1	.035
	0110021	3/64"
ER4043 - 1 lb. Spools	04043D1	.025
	04043E1	.030
	04043F1	.035
	0404321	3/64"
	0404331	1/16"
ER4047 (718) - 1 lb. Spools	0071821	3/64"
ER5356 - 1 lb. Spools	05356D1	.025
	05356E1	.030
	05356F1	.035
	0535621	3/64"
	0535631	1/16"
ER5556 - 1 lb. Spools	05556F1	.035
	0555621	3/64"

#### Packaging:

- 10 lb. spool .025, .030
- 16 lb. spool .035, 3/64, 1/16, 3/32
- Other specific weights per spool available upon request.

#### Packaging:

- Packed 20 - 1 lb. spools in a 20 lb. carton.
- Each container has an identification label showing grade, size, weight and heat number. Conformance certifications can be furnished on request.
- Note: Other types and sizes available as special quotation.
- Aluminum Production Pak - 150 pound drums

### Chemical Compositions:

Product	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others	Al
1100	← 0.95 →		0.05-0.20	0.05	-	-	0.10	-	0.15	99.90 min
4043	4.5-6.0	0.8	0.30	0.05	0.05	-	0.10	0.20	0.15	Rem.
4047 (718)	11.0-13.0	0.8	0.30	0.15	0.10	-	0.20	-	0.15	Rem.
5356	0.25	0.40	0.10	0.05-0.20	4.5-5.5	0.05-0.20	0.10	0.06-0.20	0.15	Rem.
5556	0.25	0.40	0.10	0.50-1.0	4.7-5.5	0.05-0.20	0.25	0.05-0.20	0.15	Rem.

(Single values shown are maximum percentages)

**Don't Gamble ..... Choose Harris Quality!**

## Aluminium TIG and MIG Alloys

Working Temperatures:

Product	Solidus	Liquidus	Plastic Range
1100	1205°F	1215°F	10°F
4043	1055°F	1155°F	100°F
4047 (718)	1035°F	1050°F	15°F
5356	1055°	1180°F	125°F
5556	1055°	1180°F	125°F

### Shielding Gas Considerations for J.W. HARRIS Aluminum Cut Lengths and Spooled Wires

◆ **TIG** - For manual AC welding, argon is generally preferred because the arc has good stability. On heavier sections, the addition of helium may be considered, and arc penetration will increase significantly; however, gas rates must be increased when helium is added.

◆ **MIG** - Spray Transfer - Argon is suggested for thicknesses up to approximately 3/4" - 1", yielding best metal transfer and arc stability with least spatter. For thicknesses of 1" - 3", addition of 35% to 65% helium must be considered for higher heat input than with straight argon. Over 3", the commercially available mix of 25% argon-75% helium gives highest heat input and minimizes porosity in these heavier sections.

#### MIG Welding Parameters Aluminum and Aluminum Alloys

Spray Transfer:  
Settings based on Ar shielding gas.

Electrode Diameter, inches	Welding Current, Amperage	Arc Voltage	Wire Feed Speed, ipm
0.030"/.8mm	95 - 200	22 - 28	470 - 680
0.035"/.9mm	110 - 220	22 - 28	350 - 475
3/64"/1.2mm	130 - 290	22 - 28	235 - 375
1/16"/1.6mm	160 - 360	24 - 30	180 - 300
3/32"/2.4mm	190 - 450	24 - 32	100 - 210

Settings based on Argon shielding gas.