

AN EASY WAY TO FIND OUT IF THE WHITE METAL YOU HAVE IS MAGNESIUM (OR NOT) IS TO PUT A DROP OF STAY-CLEAN SOLDERING FLUX ON THE METAL. IF IT TURNS BLACK (INSTANTLY) YOU HAVE A HIGH LEVEL OF MAGNESIUM IN YOUR METAL. IF THE DROP STAYS CLEAR, LIKE WATER, THEN YOU HAVE ANOTHER WHITE METAL.

TIPS FOR WELDING WITH MAGNESIUM

Cleanliness of both the base metal and filler metal is extremely important when welding with magnesium.

Chemical or mechanical cleaning of the joint area and filler metal, to remove any surface oxidation, should precede any welding. This can be accomplished using a solution of 24 oz. chromic acid, 5-1/3 oz. ferric nitrate and 1/16 oz. potassium fluoride in enough water to make one gallon. Bring the solution to 70-90°F, then immerse the part for 3 minutes, rinse in hot water, then air dry. Mechanical cleaning can be done using an aluminum or stainless steel wire brush, steel wool or an aluminum-oxide abrasive cloth. Gloves should be worn when handling cleaned filler metal.

GAS TUNGSTEN ARC (TIG) AND GAS METAL ARC (MIG) WELDING

Flux is not required for TIG or MIG welding processes. Although this is convenient, it means that cleanliness of the base metal and filler metal is even more critical.

Argon is the recommended shielding gas, however, an argon-helium mixture can increase filler metal flow and penetration. Do not use pure helium as this will create undesirable results. TIG welding can be done with AC current, DC reverse polarity or DC straight polarity. AC current will give good penetration. DC reverse polarity (electrode positive) will give shallow penetration but wide weld deposits. DC straight polarity (electrode negative) will give deep penetration but narrow weld deposits.

MIG welding is done with DC reverse polarity (electrode positive). MIG welding will increase weld speed by 2 to 4 times faster than TIG welding. MIG welding is the best process for heavy gage parts.

OXYACETYLENE WELDING

Oxyacetylene welding of magnesium is not commonly used. This process should only be considered for single-pass welding on thin gauges of magnesium. A fluoride or chloride flux should be used on the base metal and filler metal in order to clean and protect the weld pool. However, be sure to remove any flux residue by washing in hot water, pickle for 2 minutes in a chrome pickle solution, then boil in a 6% solution of sodium dichromate for 2 hours.

References: American Welding Society ANSI/AWS A5.19-80
Penton Publishing Co. Welding & Fabricating Data Book 1990/91.

MAGNESIUM

WASHINGTON ALLOY AZ61A
AWS/SFA 5.19-80
MIL R6944

TYPICAL CHEMICAL ANALYSIS (%)

Mg	Remainder
Al	5.8-7.2
Be	.0002-.0008
Mn	0.15 max.
Zn	0.40-1.5
Cu	0.05 max.
Fe	0.005 max.
Ni	0.005 max.
Si	0.05 max.
Others	0.30 max.

AVAILABLE PACKAGING AND DIAMETERS

WASHINGTON ALLOY AZ92A
AWS/SFA 5.19-80
MIL R6944 AMS 4395C

TYPICAL CHEMICAL ANALYSIS (%)

Mg	Remainder
Al	8.3-9.7
Be	.0002-.0008
Mn	0.15 max.
Zn	1.7-2.3
Cu	0.05 max.
Fe	0.005 max.
Ni	0.005 max.
Si	0.05 max.
Others	0.30 max.

AVAILABLE PACKAGING AND DIAMETERS



MAGNESIUM SPOOLS & CUT LENGTHS

3/4 lb. SPOOLS

PRODUCT and DESCRIPTION	SIZE	STOCK NUMBER	PRICE PER SPOOL
AZ61A - Magnesium	1/16"	AZ61A3U	\$175.00
AZ92A - Magnesium	1/16"	AZ92A3U	\$343.00

10 lb. SPOOLS

PRODUCT and DESCRIPTION	SIZE	STOCK NUMBER	PRICE PER LB
AZ61A - Magnesium	1/16"	AZ61A35	\$161.75
	3/32"	AZ61A55	\$85.50
AZ92A - Magnesium	1/16"	AZ92A35	\$315.00
	3/32"	AZ92A55	\$145.00

36" lb. CUT LENGTHS

PRODUCT and DESCRIPTION	SIZE	STOCK NUMBER	PRICE PER LB
AZ61A - Magnesium Alloy	1/16"	AZ61T30	\$135.50
For Tig or Torch 36" Cut Lengths.	3/32"	AZ61T50	\$85.50
	1/8"	AZ61T60	\$59.50
	5/32"	AZ61T70	\$55.50
	3/16"	AZ61T80	\$49.50
AZ92A - Magnesium Alloy	1/16"	AZ92T30	\$276.56
For Tig or Torch 36" Cut Lengths.	3/32"	AZ92T50	\$139.95
	1/8"	AZ92T60	\$88.78
	5/32"	AZ92T70	\$77.18
	3/16"	AZ92T80	\$76.18

JOINING MAGNESIUM ALLOYS WITH AZ92A FILLER METAL

TABLE 1 *JOINING CAST TO CAST ALLOYS (AZ92A ONLY)									
Cast Alloys	AZ63A	AZ81A	AZ91E	AZ92A	EZ33A	HK31A	HZ32A	K1A	QE22A
AZ63A	Y								
AZ81A		Y							
AZ91E		Y	Y						
AZ92A		Y	Y	Y					
EZ33A		Y	Y	Y					
HK31A		Y	Y	Y					
HZ32A		Y	Y	Y					
K1A		Y	Y	Y	Y	Y	Y		
QE22A		Y	Y	Y				Y	
ZE41A		Y	Y	Y	Y	Y	Y	Y	Y

JOINING MAGNESIUM ALLOYS WITH AZ61A AND AZ92A FILLER METALS

Table 2 *JOINING WROUGHT ALLOYS			
Alloys	AZ31B	AZ61A	AZ80A
AZ31B	Y		
AZ61A	Y	Y	
AZ80A	Y	Y	Y
HK31A	Y	Y	Y
HM21A	Y	Y	Y
HM31A	Y	Y	Y

TABLE 3 *JOINING CAST TO WROUGHT ALLOYS						
Alloys	AZ31B	AZ61A	AZ80A	HK31A	HM21A	HM31A
AZ81A	Y	Y	Y	Y	Y	Y
AZ91E	Y	Y	Y	Y	Y	Y
AZ92A	Y	Y	Y	Y	Y	Y
EZ33A	Y	Y	Y			
HK31A	Y	Y	Y			
HK32A	Y	Y	Y			
K1A	Y	Y	Y	Y	Y	Y
QE22A	Y	Y	Y			
ZE41A	Y	Y	Y	Y	Y	Y

*"Y" indicates Alloy combinations that may be joined with AZ92A or AZ61A. (AZ61A is not applicable to Table 1 alloy combinations).

REMEMBER BURNING MAGNESIUM IS CLASSIFIED AS A CLASS "D" FIRE AND CAN NOT BE EXTINGUISHED BY CLASS A, B OR C AGENTS. SHAVINGS ARE HANDY FOR STARTING CAMPFIRES IN WET CONDITIONS