Magnesium

Magnesium alloys are in 3 groups. They are: (1) aluminum-zinc-magnesium, (2) aluminum-magnesium and (3) manganese-magnesium. Since magnesium will absorb a number of harmful ingredients and oxidize rapidly when subjected to welding heat, TIG welding in an inert gas atmosphere is distinctly advantageous. The welding of magnesium is similar, in many respects, to the welding of aluminum. Magnesium was one of the first metals to be welded commercially by the inert-gas nonconsumable process (TIG).

Aluminum

The use of TIG welding for aluminum has many advantages for both manual and automatic processes. Filler metal can be either wire or rod and should be compatible with the base alloy. Filler metal must be dry, free of oxides, grease or other foreign matter. If filler metal becomes damp, heat for 2 hours at 250˚ F before using. Although AC high-frequency stabilized current is recommended, DC reverse polarity has been successfully used for thicknesses up to 3/32".

Stainless Steel

In TIG welding of stainless steel, welding rods having the AWS-ASTM prefixes of E or ER can be used as filler rods. However, only bare uncoated rods should be used. Stainless steel can be welded using AC high frequency stabilized current, however, for DC straight polarity current recommendations must be increased 25%. Light gauge metal less than 1/16" thick should always be welded with DC straight polarity using argon gas. Follow the normal precautions for welding stainless such as: clean surfaces; dry electrodes; use only stainless steel tools and brushes; carefully remove soap from welds after pressure testing; keep stainless from coming into contact with other metals.

Deoxidized Copper

Where extensive welding is to be done, the use of deoxidized (oxygen-free) copper is preferred over electrolytic tough pitch copper. Although TIG welding has been used occasionally to weld zinc-bearing copper alloys, such as brass and commercial bronzes, it is not recommended because the shielding gas does not suppress the vaporization of zinc. For the same reason, zinc bearing filler rods should not be used. There is some preference of helium for the inert atmosphere in welding thicknesses above 1/8" because of the improved weld metal fluidity. Preheating recommendations should be followed. Naturally, work must be free of oxides, dirt, oil and moisture.

Titanium

Small amounts of impurities, particularly oxygen and nitrogen, cause embrittlement of molten or hot titanium. The molten weld metal in the heat-affected zones must be shielded by a protective blanket of inert gases. Titanium requires a strong, positive pressure of helium as a backup on the root side of the weld, as well as a long, trailing, protective tail of inert gas to protect the metal while cooling.

Puretung® (AWS ASTM: EWP) **Color Code: Green**

Pure tungsten welding electrodes. They are good general purpose electrodes for less critical operations in which less expensive electrodes are desired. They give good results on a variety of metals under many different operating conditions.

1% Thoria (AWS ASTM: EWTh-1) **Color Code: Yellow**

Thorium dioxide doped tungsten electrodes containing 0.8% to 1.2% THO_2. They provide easy arc starting, stable arc, good current capacity, and resistance to weld pool contamination.

Lanthana One Point Five™ (AWS ASTM: EWLa-1.5) **Color Code: Black**

The Sylvania designation for lanthanum oxide doped tungsten electrodes containing 1.2% to 1.6% La_2O_3 by weight. These electrodes can be used as a nonradioactive substitute for 2% thoriated tungsten. They will provide very similar performance with a minimum amount of adjustment of operation conditions required.

2% Ceria (AWS ASTM: EWCe-2) **Color Code: Orange**

Cerium dioxide doped tungsten electrodes containing 1.8% to 2.2% CeO_2. Can be used instead of 2% thoria in many applications. They provide easy arc starting, good arc stability, long life and high current carrying capacity.

2% Thoria (AWS ASTM: EWTh-2) **Color Code: Red**

Thorium dioxide doped tungsten electrodes containing 1.8% to 2.2% THO_2. They have a longer life than 1% Thoria while providing easy arc starting, stable arc, higher current capacity and increased resistance to weld pool contamination.

Zirtung® (AWS ASTM: EWZr) **Color Code: Brown**

Zirconium dioxide doped tungsten electrodes containing less than 1% ZrO_2. They have longer operation for certain types of welding with AC high-frequency stabilized current.

Electrodes	Ground Part No.	Dia. (inches)	Length (inches)
Pure	0407G	.040	7
	1167G	1/16	7
	3327G	3/32	7
	187G	1/8	7
	5327G	5/32	7
1.5% Lanthanated	0407GL	.040	7
	1167GL	1/16	7
	3327GL	3/32	7
	187GL	1/8	7
Ceriated	0407GC2	.040	7
	1167GC2	1/16	7
	3327GC2	3/32	7
	187GC2	1/8	7
2% Thoriated	0407GT2	.040	7
	1167GT2	1/16	7
	3327GT2	3/32	7
	187GT2	1/8	7
	5327GT2	5/32	7
Zirconiated	0407GZ	.040	7
	1167GZ	1/16	7
	3327GZ	3/32	7
	187GZ	1/8	7
	5327GZ	5/32	7

All tungsten electrodes are packaged 10 pieces per box.

ANSI AWS A5.12-92 Classification System

Tungsten electrodes are classified on the basis of their chemical compositions.

E: stands for an electrode
W: stands for the chemical symbol for tungsten (also called Wolfram)

The final letter indicates the alloying element or oxide additions.

P: Pure
La: Lanthanated
Ce: Ceriated
Th: Thoriated
Zr: Zirconiated
G: stands for unspecified oxide additions

The numbers specify the nominal alloying composition (in weight - percent). For instance, EWTH-2 is a thoriated tungsten electrode that contains nominally 2 wt - % thoria.