

AFM PURE TUNGSTEN

AWS/SFA A5.12 EWP

Description:

AFM Pure Tungsten electrodes are unalloyed tungsten electrodes (99.5% tungsten minimum). Their current-carrying capacity is lower than that of other electrodes. They provide good stability when used with alternating current, either balanced wave or continuously high frequency stabilized. They may be used with direct current and also with either argon or helium, or a combination of both, as a shielding gas. They maintain a clean, balled end, which is preferred for aluminum and magnesium welding. These electrodes have reasonably good resistance to contamination of the weld metal by the electrode, although the oxide containing electrodes are superior in this respect. Pure tungsten electrodes are generally used on less critical applications, except for welding aluminum and magnesium. The lower cost pure tungsten electrodes can be used for less critical applications where some tungsten contamination of welds is acceptable. Tip color is **green**.

Chemical Composition Requirements (%):

W Min.	99.5
Total Other	0.5

Typical Current Ranges:

Diameter	Alternating Current Unbalance Wave (amps)	Alternating Current Balanced Wave (amps)
	.040 (1.0)	20-60
1/16 (1.6)	50-100	30-80
3/32 (2.4)	100-160	60-130
1/8 (3.2)	150-200	100-180
5/32 (4.0)	200-275	160-240

All values are based on the usage of argon gas.

AFM 2% THORIATED

AWS/SFA A5.12 EWTh-2

Description:

AFM 2% thoriated tungsten electrodes have been designed for direct current applications. They have the thoria content dispersed evenly throughout their entire length. They maintain a sharpened point well, which is desirable for welding steel. They can be used on alternating current work, but a satisfactory balled end, which is desirable for the welding of nonferrous metals, is difficult to maintain.

Should it be desired to use these electrodes for alternating current welding, then balling can be accomplished by briefly, and carefully, welding with direct current electrode positive prior to welding with alternating current. During alternating current welding, the balled end does not melt and so emission is not as good as from a liquid ball on a pure tungsten (EWP) electrode. Tip color is **red**.

Chemical Composition Requirements (%):

W	97.3
ThO ₂	1.7-2.2
Total Other	0.5

Typical Current Ranges:

Diameter	DCEN (DCSP) (amps)	DCEP (DCRP) (amps)
	.040 (1.0)	15-80
1/16 (1.6)	70-150	10-20
3/32 (2.4)	150-250	15-30
1/8 (3.2)	250-400	25-40
5/32 (4.0)	400-500	40-55

All values are based on the usage of argon gas.

Statement of Commission VIII on Health Aspects in the Use of Thoriated Tungsten Electrodes:

"Thorium oxides are found in Thoriated Tungsten Electrodes up to 4.2% (ISO 6858-WT 40 electrode). Thorium is radioactive and may present hazards by external and internal exposure. If alternatives are technically feasible, they should be used.

Several studies carried out on Thoriated Electrodes have shown that due to the type of radiation generated, external radiation risks-during storage, welding, or disposal of residues-are negligible under normal conditions of use.

On the contrary, during the grinding of electrode tips there is generation of radioactive dust, with the risk of internal exposure. Consequently, it is necessary to use local exhaust ventilation to control the dust at the source, complemented if necessary by respiratory protective equipment. The risk of internal exposure during welding is considered negligible since the electrode consumed at a very slow rate.

Precautions must be taken in order to control any risks of exposure during the disposal of dust from grinding devices.

The above statement is based on a considered view of the available reports. Commission VIII will continue to keep these aspects under review."

AFM 2% CERiated

AWS/SFA A5.12 EWCe-2

Description:

AFM 2% Ceriated electrodes are tungsten electrodes containing about two percent cerium oxide, referred to as ceria. The 2% Ceriated electrodes were first introduced into the US market in 1987. Several other grades of this type electrode are commercially practical, including electrodes containing one percent CeO, but only one grade, EWCe-2, has been incorporated in this specification as having commercial significance.

The advantages of tungsten electrodes containing ceria, compared to pure tungsten, include increased ease of starting, improved arc stability and reduced rate of vaporization or burn-off. Unlike thoria, ceria is not a radioactive material. These advantages increase with increased ceria content. These electrodes operate successfully with alternating current or direct current, either polarity. Tip color is **orange**.

Chemical Composition Requirements (%):

W	97.3
CeO ₂	1.8-2.2
Total Other	0.5

Typical Current Ranges:

Diameter	Alternating Current Unbalance Wave (amps)	Alternating Current Balanced Wave (amps)
.040 (1.0)	15-80	20-60
1/16 (1.6)	70-150	60-120
3/32 (2.4)	140-235	100-180
1/8 (3.2)	225-325	160-250
5/32 (4.0)	300-400	200-320

All values are based on the usage of argon gas.

Diameter	DCEN (DCSP) (amps)	DCEP (DCRP) (amps)
.040 (1.0)	15-80	Not applicable
1/16 (1.6)	70-150	10-20
3/32 (2.4)	150-250	15-30
1/8 (3.2)	250-400	25-40
5/32 (4.0)	400-500	40-55

All values are based on the usage of argon gas.

AFM 1.5% LANTHANATED

AWS/SFA A5.12 EWLa-1.5

Description:

AFM 1.5% Lanthanated tungsten electrodes which contain 1.3-1.7 wt.-% of dispersed lanthanum oxide (La₂O₃) for enhanced arc starting and stability, reduced tip erosion rate, and extended operating range. These electrodes can be used as nonradioactive substitutes for 2% thoriated tungsten as the operating characteristics are very similar. Lanthanated tungsten can be used for both dcen and ac applications. Tip color is **gold**.

Chemical Composition Requirements (%):

W	97.8
La ₂ O ₃	1.3-1.7
Total Other	0.5

Typical Current Ranges:

Diameter	Alternating Current Unbalance Wave (amps)	Alternating Current Balanced Wave (amps)
.040 (1.0)	15-80	20-60
1/16 (1.6)	70-150	60-120
3/32 (2.4)	140-235	100-180
1/8 (3.2)	225-325	160-250
5/32 (4.0)	300-400	200-320

All values are based on the usage of argon gas.

Diameter	DCEN (DCSP) (amps)	DCEP (DCRP) (amps)
.040 (1.0)	15-80	Not applicable
1/16 (1.6)	70-150	10-20
3/32 (2.4)	150-250	15-30
1/8 (3.2)	250-400	25-40
5/32 (4.0)	400-500	40-55

All values are based on the usage of argon gas.