

PREPARING THE ELECTRODE TIP

The geometry of the electrode end definitely does have an effect on the TIG arc. In any application, the type and the shape of tungsten helps determine the arc quality and welding performance you will achieve. The three geometries for the electrode tip are balled, pointed, and truncated.

BALLED TIP

A **balled tip** generally is used on pure tungsten and zirconiated electrodes and is suggested for use with the AC process on sine wave and conventional square wave GTAW machines. To ball the end of the tungsten properly, simply apply the AC amperage recommended for a given electrode diameter, and a ball will form on the end of the electrode. The diameter of the balled end should not exceed 1,5 times the diameter of the electrode (for example, a 2,4mm electrode should form a 3,6mm diameter end). A larger sphere at the tip of the electrode can reduce arc stability and can fall off and contaminate the weld.

POINTED and/or TRUNCATED TIP

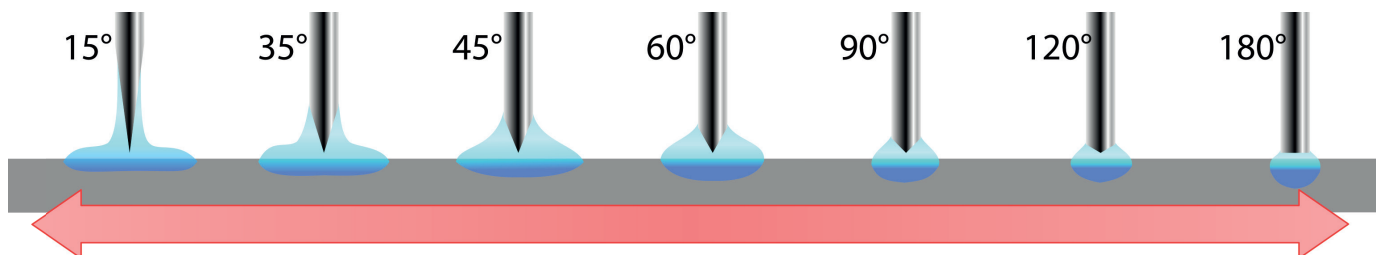
A **pointed** and/or **truncated tip** (for pure tungsten, ceriated, lanthanated, and thoriated types) should be used for inverter AC and DC welding processes. Grinding the electrode to a conical shape eases the arc ignition and creates a more focused arc for better welding performance. Choosing a proper geometry and the right grinding angle for the electrode is strategic to obtain the best performance. The right choice depends on the result you want to obtain.



Pointed tip



Truncated tip



SHARP TIP

- Improves the stability of your arc
- While welding with Less amps
- Less weld penetration
- Shorter electrode life
- Wider weld bead
- Easier arc starting

BLUNT TIP

- Higher chance of the arc wandering
- While welding with more amps
- Better weld penetration
- Longer electrode life
- Narrower weld bead
- Harder arc starting

When welding with low current on thin materials (from 0,1 mm to 1,0 mm), it is recommended to grind the electrode end to a pointed tip. A pointed tip allows the welding current to transfer in a focused arc and helps prevent thin metals (such as aluminium) from becoming distorted.

For higher-current applications, it is recommended to grind the electrode end to a truncated tip.

A truncated geometry prevents the high current to blow off the tip causing weld puddle contamination.

Using a pointed tip for higher-current applications is not recommended.

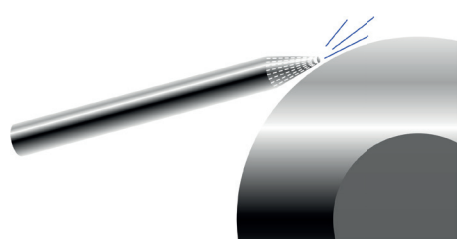


SHARPENING THE ELECTRODE

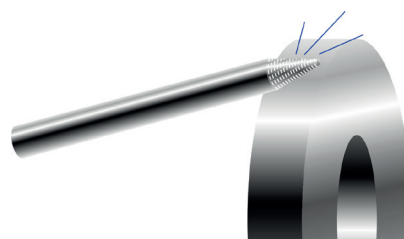
To grind the tungsten properly and to prevent contamination, it is preferable to use a grinding wheel especially designed for tungsten grinding, resistant to tungsten's hardness. Grind the electrode straight on the direction of the wheel at a 90° angle and make sure that the grind marks are lengthwise. This way you reduce the presence of ridges on the tungsten that could create arc wandering or contamination into the weld puddle.

Note: Grinding thoriated tungsten, make sure to collect the dust and have an adequate ventilation system. Follow the manufacturer's MSDS.

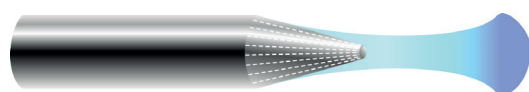
To achieve the proper shape, first grind the tungsten to a taper as explained above, then grind 0,2-0,5 mm the tip of the electrode to obtain a flat end. The flat end helps to prevent the tungsten is transferred through the arc and the formation of a ball end.



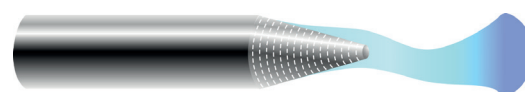
Correct grinding



Incorrect grinding



Straight marks → stable arc



Radial marks → wandering arc

RECOMMENDED AMPERAGE (according to ISO 6848: 2015)

Electrode Diameter (mm)	Direct Current (DC)			Alternative		
	Electrode negative (-)	Electrode positive (-)		Arc Balance 50% electrode (+) 50% electrode (-)		Arc Balance 30% electrode (+) 70% electrode (-)
		Tungsten with oxide additives	Tungsten with oxide additives	Pure Tungsten	Pure Tungsten	Tungsten with oxide additives
1,0 mm	10-75 A	not applicable	not applicable	25-60 A	25-75 A	25-80 A
1,6 mm	45-150 A	10-20 A	10-20 A	50-100 A	40-110 A	40-125 A
2,0 mm	60-200 A	15-25 A	15-25 A	60-130 A	60-130 A	60-150 A
2,4 mm	75-220 A	15-30 A	15-30 A	70-130 A	65-150 A	60-175 A
3,2 mm	85-330 A	20-35 A	20-35 A	90-150 A	75-170 A	75-250 A
4,0 mm	100-400 A	35-50 A	35-50 A	95-170 A	85-210 A	85-310 A
4,8 mm	120-480 A	50-70 A	50-70 A	100-240 A	90-300 A	95-340 A