

Finding the right TIG tungsten electrode

The table below shows the most common types of tungsten electrodes, including their suitability and properties. This overview will surely help you to find the right TIG welding electrode for your own welding process.

The illustration clearly shows that the E3® can be used universally and has the best properties in all directions:

	E3® purple	WLa 15 gold	WLa 20 blue	WCe 20 grey	WP green	WZr 08 white
Direct current minus pole	+++	++	+++	+	-	-
Alternating current	+++	+	+	+	+	++
Arc stability	++	+	++	+	-	++
Ignitability	++++	++	+++	+	-	+
Lifetime	++++	++	+++	+	+	++
High alloy steels weldable	++++	+++	+++	+++	-	-
Aluminum weldable	++++	+	+	+	++	++



WP electrodes are not suitable for alternating current welding with the rectangular pulse waveform. In contrast, E3® electrodes achieve best welding results with high service life if the following parameters are complied with:

Rectangular/sinusoidal pulse

■ Grinding angle: 60°

■ Smallest possible igniting current

Rectangular pulse

■ Frequency: max. 75 Hz

■ Balance: 25% + / 75% -



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The TIG welder's pride and joy: the right tungsten electrode

... because without it, there's no spark!



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Tungsten electrodes

Wherever finely crafted weld seams are created, high-quality materials are welded and precisely welded joints are to be created, TIG welding is required – and good tungsten electrodes. With tungsten inert gas welding (TIG), in addition to the torch, the power source and the shielding gas, the non-melting, temperature-resistant tungsten electrode is an essential factor for optimal results. Making the right choice is just as important for TIG welding as using the right contact tip for MAG welding.

The range of TIG welding electrodes is very extensive. At the latest when it comes to choosing the right TIG electrode for your own welding task, you will be confronted with colour coding of the tungsten electrodes. The individual electrode types are marked with different colours. The individual colours stand for the respective doping element, i.e. which components other than tungsten are added to the TIG electrode. Depending on the welding process or material, one doping variant is more suitable than another.

Tungsten electrodes acc. to DIN EN ISO 6848 (PU=10)

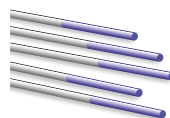
175 mm length ¹ Electrodes-Ø	E3 [®] purple	WLa 10 black	WLa 15 gold	WLa 20 blue	WCe 20 grey	WP green	WZr 08 white
1.0 mm	700.0304.10	700.0157.10	700.1183.10	700.0219.10	700.0166.10	700.0003.10	700.0028.10
1.6 mm	700.0306.10	700.0158.10	700.1184.10	700.0220.10	700.0167.10	700.0007.10	700.0030.10
2.0 mm	700.0307.10	700.0159.10	700.1185.10	700.0221.10	700.0168.10	700.0009.10	700.0032.10
2.4 mm	700.0308.10	700.0160.10	700.1186.10	700.0222.10	700.0169.10	700.0012.10	700.0034.10
3.2 mm	700.0310.10	700.0162.10	700.1187.10	700.0223.10	700.0170.10	700.0016.10	700.0036.10
4.0 mm	700.0311.10	700.0163.10	700.0255.10	700.0242.10	700.0171.10	700.0018.10	700.0037.10

¹ Tungsten electrodes in 150 mm length on request.

² Acc. to DIN EN ISO 6848:2015

TIG welding electrodes and their colour coding or doping – tungsten electrode types

E3[®]

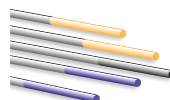


The tungsten electrode E3[®] (purple) developed by ABICOR BINZEL with **oxides of rare earths** as doping elements is suitable for both direct current (DC) and alternating current (AC) welding. Practically any metal can be welded with it. Because of its excellent ignition properties, it is therefore also often used for automated processes. During the welding process, the electrode temperature remains consistently low, which in turn ensures better current carrying capacity and a longer service life compared to thoriated electrodes. The latter may only be used in exceptional cases because of their extremely harmful effects.

Colour coding with oxides of rare earths:

■ Purple = E3[®]

WLa



This tungsten electrode is mainly used for welding unalloyed and high-alloy steels, aluminum, titanium, copper and magnesium alloys. Its doping element, **lanthanum oxide**, makes it suitable for direct current as well as alternating current welding, just like the E3[®]. The golden TIG welding electrode is also used in micro-plasma welding.

Colour coding with lanthanum oxide:

- Black = WLa 10 – with 0.8 to 1.2% lanthanum oxide
- Gold = WLa 15 – with 1.3 to 1.7% lanthanum oxide
- Blue = WLa 20 – with 1.7 to 2.2% lanthanum oxide

WCe

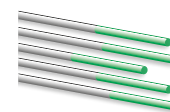


The doping element **cerium oxide** makes this TIG welding electrode more resilient than an electrode with pure tungsten – but less than the E3[®] and lanthanum electrodes. This type of tungsten electrode is used primarily in the medium and lower current range for welding unalloyed and high-alloy steels as well as aluminum, copper, nickel, titanium and magnesium alloys. They can be used for both alternating current welding and direct current welding – however, less well than the E3[®] electrode from ABICOR BINZEL.

Colour coding with cerium oxide:

■ Grey = WCe 20 – with 1.8 to 2.2% cerium oxide

WP



The green undoped tungsten electrode was developed for welding with sinusoidal alternating current especially for light metals. It is not suitable for direct current welding. As the green **pure tungsten** electrode prevents the formation of a square wave due to its inertia and high work function, it is not recommended to use this welding electrode with inverter power sources. The ideal replacement for the green tungsten electrode is the E3[®].

Colour coding with pure tungsten:

■ Green = W – made of pure tungsten without any oxide component

WZr



With its doping element **zirconium oxide** this tungsten electrode reduces the risk of contaminating the weld pool. This TIG welding electrode is mainly used for AC welding, because it is not only suitable for DC welding to a limited extent. In AC welding, this doping element ensures a very stable dome. On the other hand, a tungsten electrode with zirconia does not ignite as well.

Colour coding with zirconium oxide:

■ White = WZr 08 – with 0.7 to 0.9% zirconium oxide