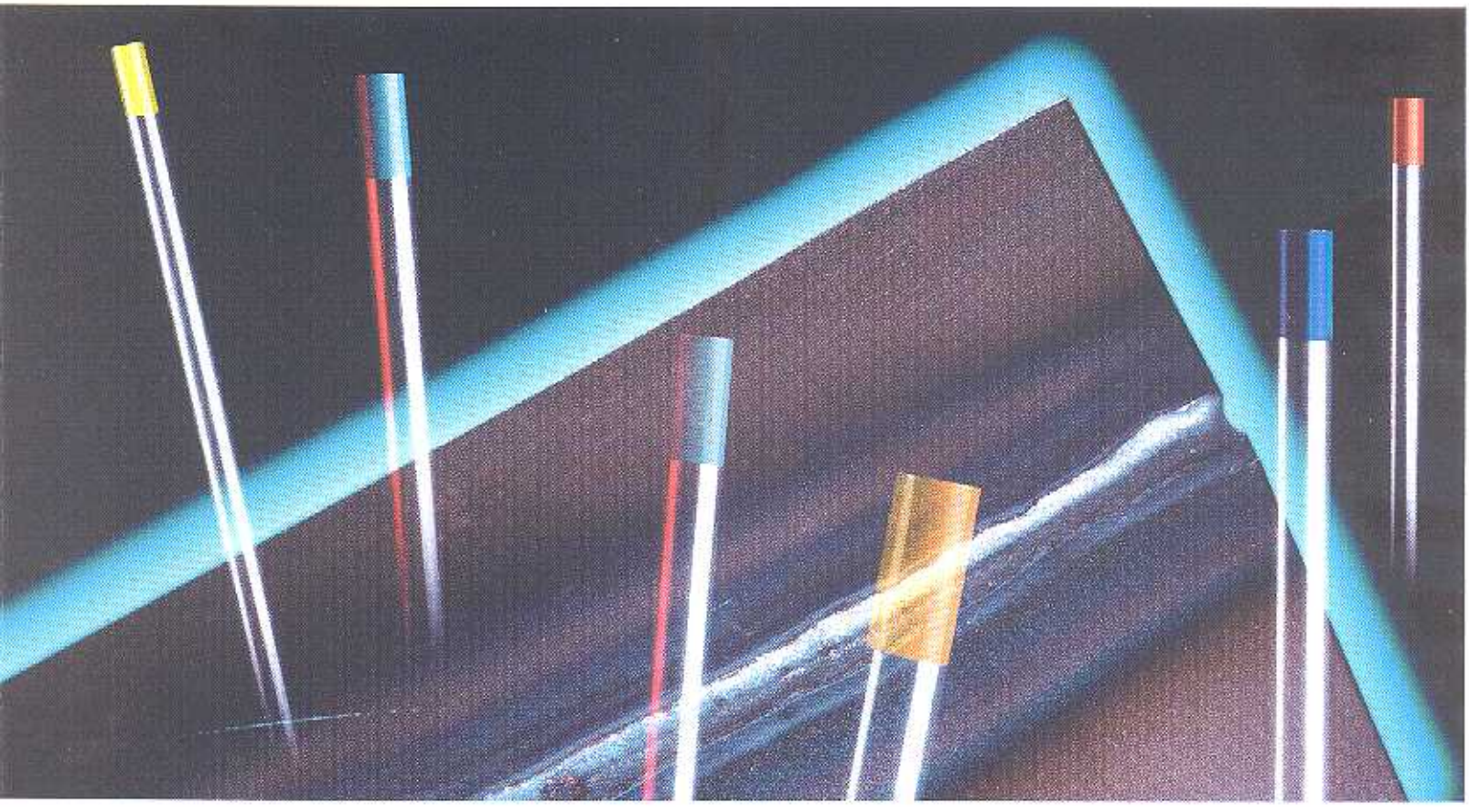
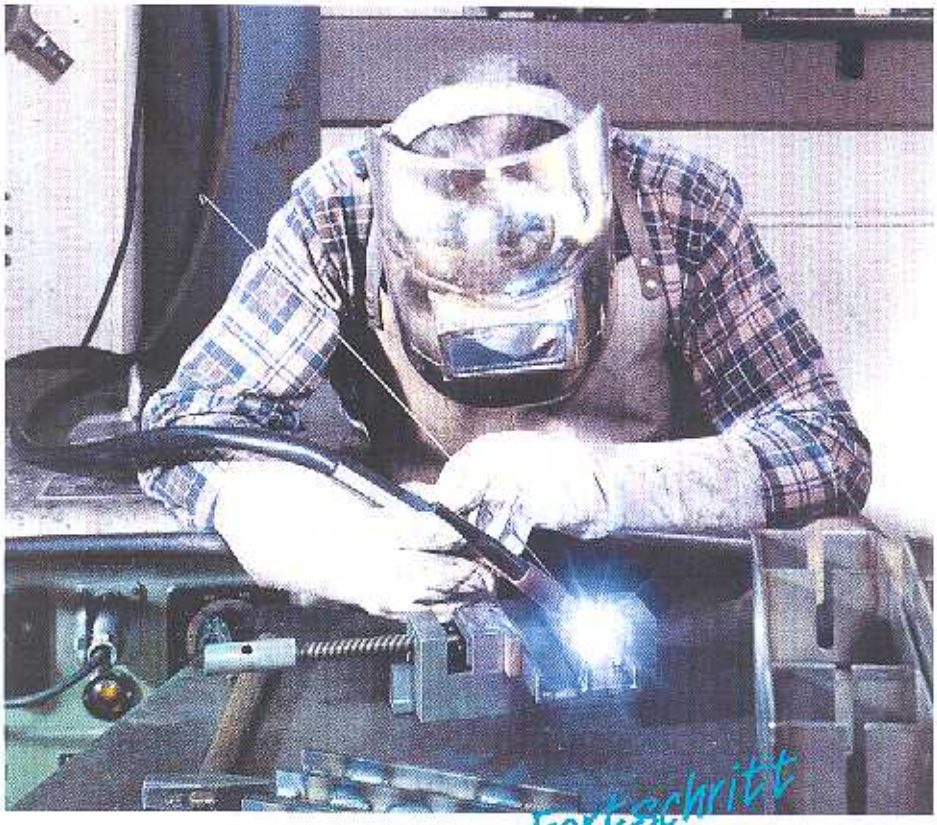
Tungsten electrodes for TIG-Welding



WOLFRAM INDUSTRIE®

Tungsten and molybdenum products - Special alloys

TIG-Welding with WOLFRAM INDUSTRIE®



Fortschritt im Dienste Ihrer Sicherheit

Tungsten Inert-Gas **(TIG) Welding** is a modern bonding process which is primarily used for high-quality metals such as:

- rust, acid and heat resistant steels
- aluminium and its alloys
- magnesium and its alloys
- titanium and its alloys
- zirconium, molybdenum, tantalum and niobium

Plasma cutting and welding is also technologically related to WIG welding. The welding heat is produced by an electric arc which is struck between an electrode and the work piece in all of these processes.
The arc and electrode are hereby shielded by an inert gas which also surrounds the weld pool. The electrode must not melt despite the very high temperature at its tip.

Tungsten meets these requirements with a melting point of 3410° C. However, this high melting point also means that tungsten metal cannot be produced by normal smelting. It can only be produced by powder metallurgical methodes, i.e. by sintering pressed blanks.

Safety through progress

An exact knowledge of and control over the manufacturing parameters determines the quality of the product and thus the tungsten electrodes produced by this method.

You benefit from our experience

The WOLFRAM INDUSTRIE in Traunstein and Dachau has over 80 years of experience in the manufacture and processing of products made from the refractory metals tungsten and molybdenum.

The experience gained over these years of specialisation coupled with the latest manufacturing and test facilities in the WOLFRAM INDUSTRIE form the basis for a control over the processes which take place during metal production and further treatment and are your guarantee for consistently high-quality products.

Your expertise is decisive

Welding high-quality materials represents a challenge to the experienced welder and to welding technology. The fulfillment of quality requirements depends on the precise matching of material, manufacturing and design parameters. The safety of the structural component itself depends on a high weld quality and reproducible welding parameters.

The choice of the right electrode plays a decisive role in determining the form of the arc during TIG and plasma welding.

Consistency of striking, arc stability, low electrode consumption and thus the quality of the welding process depend to a large extent on this choice. **Only the TIG welder** with his experience and expert knowledge **can make the right choice.**

The choice is yours

Our range of products covers all internationally standardised tungsten electrodes in respect of chemical composition and dimensions.

Apart from these standardised TIG electrodes we can also supply our own developments with their high-grade welding properties, as i.e. the WITSTAR .

Range of products

Code	Oxide additives Wt. %	Colour code	Standard
WP		green	
WT 10	0.90 .. 1.20 ThO_2	yellow	
WT 20	1.80 .. 2.20 ThO_2	red	
WT 30	2.80 .. 3.20 ThO_2	purple	
WT 40	3.80 .. 4.20 ThO_2	orange	DIN/EN 26 848
WZ 8	0.70 .. 0.90 ZrO_2	white	
WL 10	0.90 .. 1.20 La_2O_3	black	
WC 20	1.80 .. 2.20 CeO_2	grey	
WL 20	1.80 .. 2.20 La_2O_3	blue	
WS 2	rare earths	turquoise	

Diameter in mm		
0.5 - 0.05	3.0 ± 0.1	6.0 ± 0.1
1.0 ± 0.05	3.2 ± 0.1	6.4 ± 0.1
1.6 ± 0.05	4.0 ± 0.1	8.0 ± 0.1
2.0 ± 0.05	4.8 ± 0.1	10.0 ± 0.1
2.4 ± 0.05	5.0 ± 0.1	12.0 ± 0.1

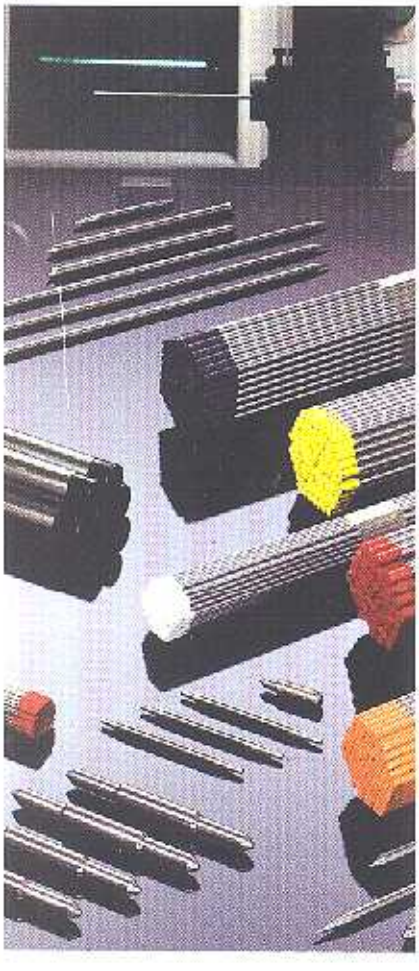
Length in mm

50 ———

75 ———

150 ———————

175 ———————



Thoriated tungsten electrodes acc. to DIN/EN 26 848

The ease of striking tungsten electrodes is primarily determined by the electron emission power of their admixtures. It has long been known in electron tube and filament lamp technology that the electron emission can be improved with thoriated tungsten filaments. The striking characteristics of thoriated welding electrodes are also superior to those of pure tungsten electrodes. Moreover, the oxide particles counteract the formation of coarse grains at the extremely hot electrode tip, thus reducing consumption.
These favourable properties of the **WT** thoriated tungsten electrodes explain their widespread use, particularly for d.c. welding.
Thorium oxide is slightly radioactive, the admixture of this to the compact tungsten electrodes, however, can be regarded as safe. If such electrodes are used, an effective extraction system should be provided during grinding and possibly welding fume extractors together with normal hand and eye protection.

Thorium-free tungsten electrodes acc. to DIN/EN 26 848

The pure tungsten **(WP)** and zirconium oxide **(WZ)** electrode is ideal for welding light metals and their alloys with alternating current, though it can also be used with low direct currents.
Tungsten electrodes with oxide additives other than thorium such as lanthanum oxide **(WL)** and cerium oxide **(WC)** are increasingly being used for d.c. welding.
Experienced welders can make the optimum choice from our extensive range of products.

The thorium-free tungsten electrode with more power

WS 2 WITSTAR®

Since progress does not stop at standardisation WOLFRAM INDUSTRIE has developed the thorium-free tungsten electrode WS 2 WITSTAR® and included it in its range of products following extensive testing.
It causes:

- **no contamination**
  of the atmosphere through radioactive particles
- **no radiation exposure**
  e.g. during storage

The **WS 2 WITSTAR®** with various admixtures of rare earths convinces through **excellent welding properties.** This has been **proven** in welding tests and **through practical use.**
For further information please don't hesitate to ask for our special WITSTAR® brochure.

Tungsten electrodes for orbital welding: thoriated and thorium-free

The complete range of WOLFRAM INDUSTRIE's tungsten electrodes is excellently suited for orbital welding.
We deliver the welding electrodes both in the standard length of 50/75/150/175 mm and exactly cut to length with a grinded point, according to the customer's specific welding needs.
Basing on the many years of experience in the development and application of thoriated and thorium free tungsten electrodes as well as the continuous work of our special welding engineers (SWE) with the TIG-technique we guarantee with our tungsten electrodes:

- **optimum adaptability of the necessary electrode type to the welding need**
- **exact reproducibility of the welding process**
- **safe and long service life**

Quality from WOLFRAM INDUSTRIE

Quality you can depend on

The correct and uniform microstructure with no internal cracks is decisive for the quality of a tungsten electrode and thus for its

- **easy striking**
- **arc stability**
- **service life**

The electrode parameters are constantly being optimised and controlled for various applications **in cooperation with renowned research institutions.**

Quality in detail

The tungsten metal powder and oxide additives are checked for grain size and good miscibility even before **mixing.** The intensive mixing ensures a homogeneous distribution of the materials.

The subsequent **compression** of the metal powder is carried out hydraulically or isostatically, whereby piping is avoided by the correct build up of pressure, thus ensuring a uniform microstructure.

The pressed rods are then converted into metal by **sintering.**
The exact observance of sintering parameters such as temperature, time and inert-gas purity guarantees a homogeneous distribution of the admixtures. This greatly improves the subsequent burn-off rate and ease of striking.

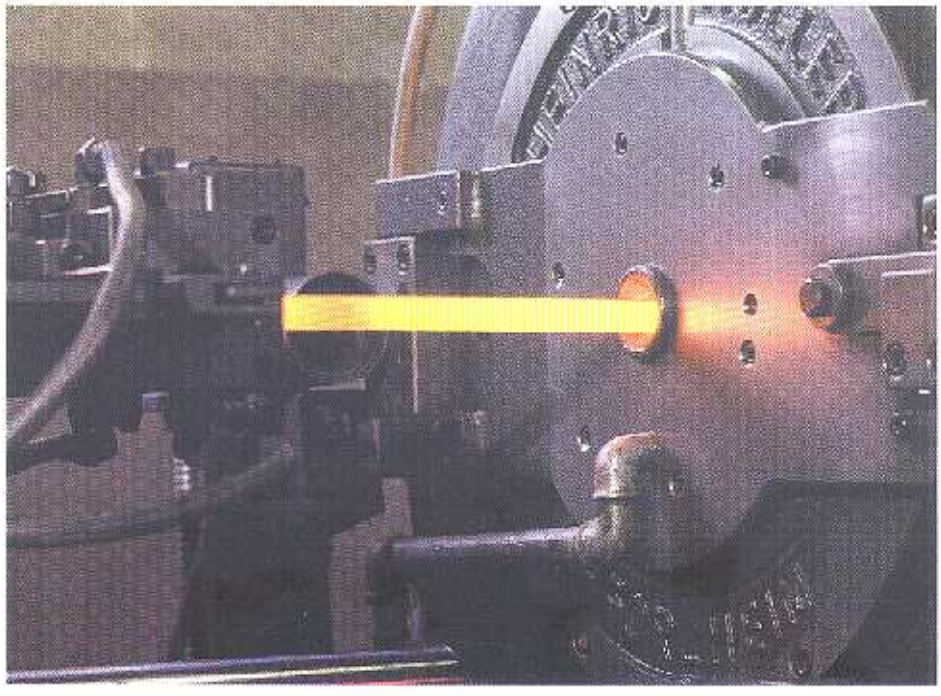
During the **rotary swaging** of the sintered tungsten bars, the microstructure is selectively optimised by varying the process temperature.

In accordance with **EN 26 848** and **AWS A5.12-80** the tungsten electrodes shall display no surface faults such as microcracks and scale. Moreover, the surface must be free of oil, grease or other impurities.

Finally the electrodes are individually checked using inductive test methods to ensure conformity with internal standards.

This **100% test** guarantees that only top quality tungsten electrodes are supplied.

The WOLFRAM INDUSTRIE also ensures product and process quality through a **quality assurance system according to DIN/ISO 9002.**
This specifies a controlled process during preparation for and performance of the individual stages of production.



Rotary swaging of sintered tungsten bars

Ges. für Wolfram Industrie mbH
Permanederstraße 34
D-83278 Traunstein
Phone + 49/8 61/9 87 90
Fax + 49/8 61/83 50
Email wolfram.industrie@t-online.de

Bayerische Metallwerke GmbH
Leitenweg 5
D-85221 Dachau
Phone + 49/81 31/70 30
Fax + 49/81 31/70 31 01