

Material Product Data Sheet

Dip-Coated, Tungsten Carbide-Filled Steel Electrodes

Welding Products:

WokaDur E, WokaDur E-Plus

1 Introduction

WokaDur™ E is a dip-coated electrode consisting of low-alloyed tubular steel filled with acicular fused tungsten carbide (CTC).

WokaDur E-Plus is a dip-coated electrode consisting of low-alloyed tubular steel filled with spherical cast tungsten carbide (CTC-S). The shape and hardness of the spherical cast tungsten carbide produces deposits with much higher wear resistance compared to standard cast and crushed carbide.

WokaDur E and WokaDur E-Plus produce hardface overlay deposits with maximum abrasion resistance and higher impact resistance than previously possible with other hardfacing products. A proprietary dip coating aids the welding process and ensures adherence to the substrate.

1.1 Typical Uses and Applications:

WokaDur E and WokaDur E-Plus can be used on mild steel, low-alloyed steel and cast steel substrates with up to 0.5 % carbon content. They are choice products for top-quality work for oil drilling, mining, processing of abrasive media, earth moving equipment and construction equipment. Typical applications where these products are used include:

- Drill bits and roller bits
- Conveyor screws
- Mixer blades
- Jaw crusher plates
- Brick manufacturing and clay processing equipment
- Oil drilling equipment

Quick Facts

Classification	Electrode, tungsten carbide filled
Chemistry	56.3W 40Fe 3.7C
Manufacture	Dip-coated tubular rod
Deposit Hardness	50 – 65 HRC
Carbide Hardness	2000 – 3100 HV0.1
Weld Deposit Density	12.4 – 12.6 g/cm ³
Service Temperature	≤ 500 °C (930 °F)
Purpose	Wear resistance
Process	Manual metal arc welding



WokaDur E 5 mm tungsten carbide-filled electrode.

2 Material Information

2.1 Chemical Composition

Product	Nominal Chemical Composition (wt.%)			Carbide Hardness HV0.1	Hard Phase wt. %
	C _{TOTAL}	W	Fe		
WokaDur E	3.7	balance	40.0	2000 – 2300 (CTC)	58 – 62
WokaDur E-Plus	3.7	balance	40.0	2700 – 3100 (CTC-S)	58 – 62

2.2 Primary Carbide Grain Size and Type, Available Lengths and Diameters

Product	Primary Carbide Type	Primary Carbide Grain Size mm	Available Product Forms	Available Diameters
WokaDur E	Cast	0.3 – 0.7	350 mm (13.75 in)	4.0 mm (0.16 in) 5.0 mm (0.20 in) 6.0 mm (0.24 in)
WokaDur E-Plus	Spherical Cast	0.3 – 0.7	350 mm (13.75 in)	5.0 mm (0.20 in) 6.0 mm (0.24 in)

Other primary carbide grain sizes, lengths and diameters are available on request and can be tailored for on-site conditions and special applications.

2.3 Key Selection Criteria

The main selection criteria for choice of product are:

- WokaDur E is an excellent product to produce hardface deposits for applications where maximum abrasion resistance and fair impact resistance are required.
- WokaDur E meets DIN EN 14700: E Fe20.
- Choose WokaDur E-Plus for applications where the additional hardness and wear resistance achieved by the use of the spherical cast tungsten carbide material is required.
- Badly worn components should first be dimensionally restored with a suitable buildup material before applying a final hardface layer of WokaDur E or WokaDur E-Plus.

2.4 Related Products

Oerlikon Metco offers a wide variety of carbide-containing hardfacing welding products in a number of forms designed for convenient application. Products are available for oxy-acetylene welding, MIG / open arc welding and powders for PTA welding. These products are available with different carbide types and hardness, matrix materials and matrix materials so customers can choose a product that is suitable for both their budget and surface application. Please contact your Oerlikon Metco Account Representative for additional information.

3 Coating Information

3.1 Key Welding Recommendations

- The surface to be welded should be free from grease, oil, fats, lipids, rust and other foreign matter
- Use AC or DC; DC+ (reverse polarity) is preferred
- Use welding position PA (DIN EN ISO 6947)
- Multilayer deposits are possible (1 to 2 passes)
- Weld immediately after opening package (see section 4.2 Handling Recommendations)
- It is essential to slowly and uniformly preheat complex shapes of high carbon and alloy steel substrates to a temperature of approximately 250 to 400 °C (480 to 750 °F)
- When necessary, nearly vertical welding can be accomplished
- Current intensity is dependent on the core rod diameter of the electrode (see Section 3.2)
- Avoid excessive puddling during processing using a short arc beam
- Back thin sections to avoid burn-through
- The thickness of the deposit can be controlled by the electrode diameter chosen
- A slow cool down phase under moisture-free conditions is required after welding
- Deposits are not machinable or forgeable, but can be ground to dimension or finish with diamond tools

3.2 Recommended Welding Amperage for Various Diameter Electrodes

Rod Diameter	Current Intensity (A)	
	Direct Current (DC)*	Alternating Current (AC)
4.0 mm (0.16 in)	70 – 90	90 – 130
5.0 mm (0.20 in)	90 – 110	100 – 150
6.0 mm (0.24 in)	110 – 130	140 – 180

Above parameters are for welding on a mild steel substrate with a carbon content of 0.1 % and a thickness of 15 mm (0.59 in).

* When using DC current, reverse polarity (+) is preferred

3.3 Welding Parameter Development

For specific application needs, Oerlikon Metco can provide parameter advice and parameter development services may be available.

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Rod Length	Rod Diameter	Carbide Grain Size (mm)
WokaDur E	1065186	5 kg (11 lb)	350 mm (13.75 in)	4.0 mm (0.16 in)	0.3 – 0.7
WokaDur E	1065187	5 kg (11 lb)	350 mm (13.75 in)	5.0 mm (0.20 in)	0.3 – 0.7
WokaDur E	1065920	5 kg (11 lb)	350 mm (13.75 in)	6.0 mm (0.24 in)	0.3 – 0.7
WokaDur E-Plus	1068733	5 kg (11 lb)	350 mm (13.75 in)	5.0 mm (0.20 in)	0.3 – 0.7
WokaDur E-Plus	1065921	5 kg (11 lb)	350 mm (13.75 in)	6.0 mm (0.24 in)	0.3 – 0.7

Please note: All materials are globally available on a Special Order basis. Please allow adequate lead time.

4.2 Handling Recommendations

- Store in the original, closed container in a dry location.
- Open containers should be stored in a drying oven to prevent moisture pickup.
- If the container has been opened and not used immediately, bake in an oven for 2 hours at 250 °C (480 °F) prior to use.

4.3 Safety Recommendations

See SDS 50-1087 (Safety Data Sheet) in the version localized for the country where the material will be used. SDS are available from the Oerlikon web site at www.oerlikon.com/metco (Resources – Safety Data Sheets).

Information is subject to change without prior notice.