

Material Product Data Sheet

Coarse Grained or Coarse Tetrahedral Grained Tungsten Carbide and Copper Alloy Matrix Sintered Welding Rod

Welding Products:

WokaDur SA 100, WokaDur SA 100-T

1 Introduction

WokaDur SA 100 is sintered welding rod that consists of coarse grained, sintered tungsten carbide and a ductile “nickel-silver” (CuNiZn) alloy matrix.

WokaDur SA 100-T is sintered welding rod consisting of large-scale, sharp-edged cemented tetrahedral tungsten carbide particles that excel in cutting operations and a ductile “nickel-silver” (CuNiZn) alloy matrix.

Both products are designed for application of hardface deposits using oxy-acetylene welding.

1.1 Typical Uses and Applications:

WokaDur SA 100 is used to protect surfaces against extreme sliding wear in deep drilling and tunnel drilling applications such as:

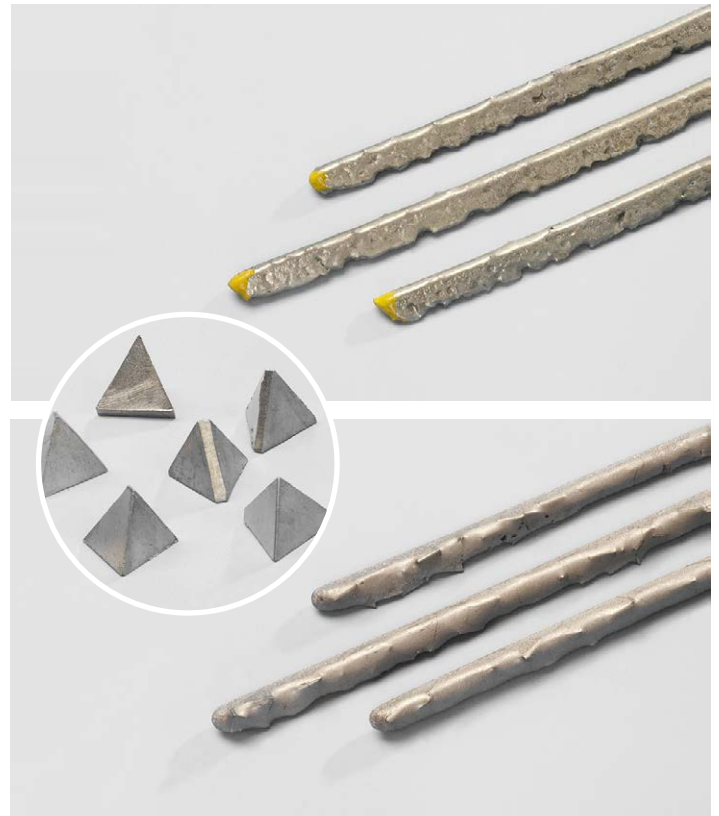
- Drill bits used in earth or stone
- Gimlet bits
- Rotating crests of drills

WokaDur SA 100-T was specifically designed for use on fishing tools in deep drilling applications. It can also be used for mining applications and in foundries. Typical deep drilling components where WokaDur SA 100-T is used include:

- Fishing tools
- Stabilizers
- Tap drills

Quick Facts

Classification	Rod, tungsten carbide
Chemistry	54W 20Cu 16Zn 4Ni 3Co 3C
Manufacture	Sintered Rod
Carbide Hardness	1300 – 1600 HV0.1
Weld Deposit Density	12.15 – 12.20 g/cm ³
Service Temperature	≤ 500 °C (930 °F)
Purpose	Cutting / wear resistance
Process	Oxy-acetylene welding



Top: WokaDur SA 100. Bottom: WokaDur SA 100-T. Inset: Tetrahedral carbides used in WokaDur SA 100-T.

2 Material Information

2.1 Chemical Composition

Product	Nominal Chemical Composition (wt.%)						Carbide Hardness HV0.1	Hard Phase wt. %
	C _{TOTAL}	W	Cu	Zn	Ni	Co		
WokaDur SA 100	3	54	20	16	4	3	1300 – 1600	58 – 62
WokaDur SA 100-T	3	54	20	16	4	3	1300 – 1600	58 – 62

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

Product	Primary Carbide Type	Primary Carbide Grain Size mm	Available Rod Length	Available Rod Weight (per rod)
WokaDur SA 100	Sintered	1.6 – 3.2	350 mm (13.75 in)	250 g (8.8 oz)
		3.2 – 4.8	450 mm (17.75 in)	500 g (17.6 oz)
		4.8 – 6.4		
		6.4 – 8.0		
		8.0 – 9.5		
		9.5 – 11.0		
WokaDur SA 100-T	Cemented, Tetrahedral	10 x 9.5 x 8.4	450 mm (17.75 in)	500 g (17.6 oz)

Other primary carbide grain sizes, lengths and weights 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 SA 100 has coarse carbides that are homogeneously embedded in a special ductile matrix of copper, zinc and nickel. This results in overlay deposits that are highly wear resistant and particularly suitable for use in drilling of earth and stone environments.
- WokaDur SA 100-T is specifically designed for those applications where the sharp-edged, tetrahedral carbides in WokaDur SA 100-T excel in cutting operations. Unlike standard composite rods, WokaDur SA 100-T is composed of hard metals that have a defined shape and a unique chemical composition. The sintered tungsten carbide, which is produced from virgin raw materials) is embedded in a nickel-silver type matrix (CuNiZn). The tetrahedral shape was chosen because it allows excellent cutting regardless of the orientation of the carbide particle in the matrix. The chemical composition of the hard metal

was especially created for complicated cutting operations. WokaDur SA 100-T welds very well with good wettability.

- These products can be used to produce hardface deposits on nearly all types of steel and cast iron substrates.

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 welding positions PA or PB (DIN EN ISO 6947).
- Multilayer welding is not possible.
- It is essential to slowly and uniformly preheat the substrate to a temperature of approximately 400 to 600 °C (750 to 1110 °F), depending on the type of base material.
- A thin layer of nickel-silver (CuNiZn) can be applied to the surface, but is not absolutely necessary, prior to the application of WokaDur SA 100 or WokaDur SA 100-T.
- Use a neutral flame but with plenty of heat, so that the carbide chips can be placed properly before the nickel silver freezes.
- Extreme care must be taken not to overheat the carbide particles to the point that the nickel-silver evaporates as this will prevent bonding of the carbide particles to the substrate.
- It is recommended (but not absolutely necessary) to generously use a good grade of brazing flux during the application of the nickel-silver pre-deposit and the WokaDur SA 100 or WokaDur SA 100-T to greatly assist in application and ensure a good bond to the substrate.
- Deposits are not machinable or forgeable, but can be ground to dimension or finish with diamond tools.

3.2 Recommended Welding Parameters

Parameter	Recommended Setting	
Carrier Gas	Oxygen	
Carrier Gas Pressure	5 – 7 bar	70 – 100 psi.
Fuel Gas	Acetylene	
Fuel Gas Pressure	0.7 – 1.0 bar	10 – 14
Nozzle Size	6 – 9 mm	

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).

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	Weight per Rod	Rod Length	Carbide Grain Size (mm)	Color Code
WokaDur SA 100	1065201	10 kg (22 lb)	500 g (17.6 oz)	450 mm (17.75 in)	1.6 – 3.2	Blue
WokaDur SA 100	1065476	10 kg (22 lb)	250 g (8.8 oz)	350 mm (13.75 in)	1.6 – 3.2	Blue
WokaDur SA 100	1065202	10 kg (22 lb)	500 g (17.6 oz)	450 mm (17.75 in)	3.2 – 4.8	Green
WokaDur SA 100	1065477	10 kg (22 lb)	250 g (8.8 oz)	350 mm (13.75 in)	3.2 – 4.8	Green
WokaDur SA 100	1065203	10 kg (22 lb)	500 g (17.6 oz)	450 mm (17.75 in)	4.8 – 6.4	Yellow
WokaDur SA 100	1072422	10 kg (22 lb)	250 g (8.8 oz)	350 mm (13.75 in)	4.8 – 6.4	Yellow
WokaDur SA 100	1065204	10 kg (22 lb)	500 g (17.6 oz)	450 mm (17.75 in)	6.4 – 8.0	Red
WokaDur SA 100	1065205	10 kg (22 lb)	500 g (17.6 oz)	450 mm (17.75 in)	8.0 – 9.5	White
WokaDur SA 100	1065206	10 kg (22 lb)	500 g (17.6 oz)	450 mm (17.75 in)	9.5 – 11.0	Black
WokaDur SA 100-T	1065494	10 kg (22 lb)	500 g (17.6 oz)	450 mm (17.75 in)	10.0 x 9.6 x 8.4	---

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.

4.3 Safety Recommendations

See SDS 50-1091 (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).