Instructions for Use
Starbond CoS Powder 16, 30, 45, 55

Product: Cobalt-Chromium bonding alloy powder for the manufacturing of removable and fixed restorations by Selective Laser Melting (SLM). The alloy is a type 5 alloy according to ISO 22674. Free of nickel, beryllium, cadmium and lead. This alloy should be used by qualified and trained personnel for the designated scope of application.

Indications: Dental prosthesis

Composition in % by mass:

Co	Cr	W	Mo	Si	C, N, Fe, Mn
59.0	25.0	9.5	3.5	1.0	<1.0

Technical Properties*:

Proof stress (Rp0.2)	720–1130 MPa	Density	8.8 g/cm³
Ultimate tensile strength	990–1250 MPa	Solidus-liquidus interval	1305–1400°C
Elongation	2–10%	Thermal expansion coefficient 20–600°C	14.4 x $10^{-6}K^{-1}$
Elastic modulus	195–200 GPa	Laser weldable	Yes
Vickers hardness	345–490 HV 10	Type (DIN EN ISO 22674)	5

* Standard values, dependent on specific machine settings

Model:
The walls of the virtual model shall be at least 0.4 mm so that the final wall thickness after finishing or before ceramic and acrylic veneering will be at least 0.3 mm. Dental prothesis are to be designed in accordance with the anatomical form of the teeth to provide for a consistent ceramic layer. Avoid sharp edges and undercut areas. Connectors of dental prosthesis are to be designed as thick and high as possible (at least 3 mm x 3 mm).

Processing in SLM Systems:
The current instructions of use of the manufacturer of the SLM-system have to be observed. Parameters are to be fine tuned to Starbond CoS Powder. It has to be ensured that the system used is not contaminated.

Stress relieving heat treatment:
The process of laser melting can produce residual stress in the workpiece. We recommend to conduct relief-firing for dental prostheses larger than 4 connectors. Relief-firing should be carried out under a protective atmosphere of argon or nitrogen gas.

For fixed dental prostheses:

1. The fixed dental prosthesis on the production plate is placed inside a protective gassing box into the furnace.
2. Heat furnace to 450°C within 60 minutes.
3. Hold temperature for 45 minutes.
4. Heat furnace to 800°C within 45 minutes.
5. Hold temperature for 60 minutes.
6. Finish heating process.
7. Open furnace door after temperature has decreased to 600°C.
8. Stop argon/nitrogen flow to the protective gassing box after temperature decreased to 300°C.

For removable partial dentures:

1. The removable partial dentures on the production plate is placed inside a protective gassing box into the furnace which has been preheated to 800°C.
2. Reheat furnace to 800°C.
3. Hold temperature for 20 minutes.
4. Let furnace cool to 550°C within 15 minutes.
5. When 550°C is reached, finish heating process and remove protective gassing box from the furnace while maintaining a steady flow of argon/nitrogen.
6. Stop argon/nitrogen flow to the protective gassing box after temperature decreased to 300°C.

Finishing and Cleaning:
Sandblast frameworks after separation using aluminium oxide (approx. 110–250 µm) at 2–4 bar. Trim frameworks with clean carbide burs suitable for CoCr alloys or with diamond burs. Only trim in one direction in order to avoid overlapping that might result in bubbles during the subsequent ceramic build-up. Clean the surfaces to be veneered afterwards with fresh aluminium oxide (approx. 110–250 µm) at a pressure of 2–4 bar. Thoroughly steam clean framework or clean under running tap water. Degrease with ethyl alcohol.

Oxide-firing:
No oxide-firing necessary. If oxide-firing is optionally performed in order to visually check the metal surface, sandblast again with fresh aluminium oxide (approx. 110–250 µm). Clean framework again.

Veneering:
As long as the used ceramic allows for it, Starbond CoS Powder does not require long-time cooling. Please observe indications of ceramics manufacturer.
The thermal expansion coefficient is 14.4 x $10^{-6}K^{-1}$.
Further processing has to be performed according to the ceramic manufacturer's instructions, especially what the cooling-time after firing is concerned.

Soldering:
To avoid a mix of materials, soldering should generally be avoided. Should nevertheless soldering be necessary, the soldering model should be kept as small as possible; preheat model in furnace for 10 min at 600°C. Already before heating, the surfaces to be soldered should be covered with flux. The gap should not be larger than 0.2 mm (Recommended solder: Starbond Lot). Let soldered objects cool down slowly. After opaque firing no soldering should be performed anymore. Alternative joining techniques such as laser welding or gluing are to be applied.

Laser welding:
As filler wire commonly available laser welding wires suitable for the alloy (e.g. S&S Scheftner Starwire) are to be used. Observe the welding parameters recommended by the manufacturer of the welding laser.

Polishing:
Smooth out the visible metal surfaces by grinding with ceramic bonded stones. Finish with rubber polishers, pre-polish with S&S Scheftner Black Diamond pre-polishing paste and polish with S&S Scheftner DiaStar polishing paste until high-polish effect is reached. Finally carefully steam clean or clean with ultrasonic cleaner.

Security notes:
The inhaling of Starbond CoS Powder is to be avoided. Please observe medical security data sheet for Starbond CoS Powder and indications of SLM-system manufacturers.

Secondary effects :
such as allergies to contents of the alloy or electrochemically based reactions may very rarely occur.

Reciprocal actions:
In case of occlusal or approximal contact of different alloys electrochemically based reactions may very rarely occur.

Reactions:
In case of known incompatibilities and allergies to contents of the alloy.

Warranty:
Our recommendations for use whether given verbally, in writing or by practical instructions, are based on our own trials and experience and can only be considered as standard values. Our products are subject to constant further development. Therefore alterations in construction and composition are reserved.

Packaging:

Starbond CoS Powder 16	5 kg	REF 133716
Starbond CoS Powder 30	5 kg	REF 133730
Starbond CoS Powder 45	5 kg	REF 133715
Starbond CoS Powder 55	5 kg	REF 133755

Applied standards:
DIN EN ISO 14971, DIN EN ISO 22674, DIN EN 15223, DIN EN 1641

CE 0482

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