Instructions for use
EOS CobaltChrome SP2

CE 0537

e-Manufacturing Solutions

Technical Data — EN 1641 / ISO 22674 — Rx Only

Intended Use / Indications:
EOS CobaltChrome SP2 (REF: 9011-0018) is cobalt based metal-ceramic alloy intended for production of Porcelain-Fused to Metal (PFM) dental restorations (crowns, bridges) in EOSINT M 270 Standard installation mode and in EOS M 100. EOS CobaltChrome SP2 powder is class IIa medical device in accordance with annex IX rule 8 of the MDD 93/42/EEC. Composition corresponds to "type 4" CoCr dental material according to ISO 22674.

Contraindications:
EOS CobaltChrome SP2 is contraindicated for patients and users with a history of sensitivity to one or more of the metals contained in the alloy. In case of occlusal or approximal contact of different alloys electrochemically based reactions may very rarely occur.

Storaging:
Store metal powder in closed containers. Keep away from food and beverages.

Warnings: Metal powder or dust may cause sensitization by inhalation and skin contact. When grinding, shot peening, grit blasting the dental restorations or handling the metal powder, use adequate ventilation, protective eyewear, protective gloves, protective clothing and respirator mask with type P3 fine dust particle filter (e.g. type FFP3-EN149:2001). Wash hands after handling the powder or restorations.

Material properties after stress relieving (1 hour at 750 °C), oxide fire simulation (5 min at 950 °C) and ceramic fire simulation (4 x 2 min at 930 °C) procedures according to ISO 22674:

Material composition		Relative density	approx. 100 %
Co:	63.8 wt-%	Density	8.5 g/cm^3
Cr:	24.7 wt-%	Proof strength (Rp 0.2 %)	850 MPa
Mo:	5.1 wt-%	Ultimate tensile strength	1350 MPa
W:	5.4 wt-%	Percent elongation	3 %
Si:	1.0 wt-%	Young's Modulus	approx. 200 GPa
Fe:	max. 0.50 wt-%	Vickers hardness HV10	420 HV
Mn:	max. 0.10 wt-%	Coefficient of thermal expansion (25 - 500 °C)	14.3 x 10E-6 m/m°C
		Coefficient of thermal expansion (20 - 600 °C)	14.5 x 10E-6 m/m°C
Free of Ni, Be and Cd according to ISO 22674		Melting interval	1410 - 1450 °C

Processing

Dental laboratory step 1: To be performed by dental technician

Part design:
Design the restorations with a minimum wall thickness of 0.4 mm to 0.5 mm. Take care of adequate connection between crowns and pontics (T-design). Follow the design rules provided. If patient suffers from bruxism apply extra material thickness on the design.

Restoration manufacturing step: To be performed by trained personnel

File preparation:
Perform the file preparation of restorations using M 270 or M 100 module of CAMbridge software. Follow the instructions of CAMbridge manual.

Part building in EOSINT M 270: To be performed by trained EOSINT M 270 operator
Process parts following the Operation Manual of the EOSINT M 270 Standard installation mode using the CC20_SP2_020_default_job (dated 20100301). Use undamaged ceramic recoater blade (EOS Item number 2200-3013) in EOSINT M 270. Use 1.5 V setting in recirculating filter unit (RFS) of EOSINT M 270. Sieve the EOS CobaltChrome SP2 powder before each job using -63 µm ultrasonic sieve of IPCM-M or -80 µm powder sieve for M 270. EOS recommends to follow maintenance procedure of M 270 Dental.

Part building in EOS M 100: To be performed by trained EOS M 100 operator
Process parts following the Operation Manual of the EOS M 100 using the SP2_030_DentalM100_120.eosjob default job. Use undamaged ceramic recoater blade (EOS Item number 300008659) in EOS M 100. Use 65 % flow rate setting in recirculating filter unit (RFS) of EOS M 100. Sieve the EOS CobaltChrome SP2 powder before each job using -63 µm ultrasonic sieve of IPCM-M or -63 µm powder sieve (EOS Item number 300016768) for M 100. EOS recommends to follow maintenance procedure of EOS M 100.

Part building in EOSINT M 270 or EOS M 100, General: To be performed by trained machine operator
Use only powder containers that have fully readable labels, no smearing of text sections. Clean up all the surfaces of building platform before placing it inside M 270 or M 100. Clean up the protection window of f-Theta lens before each job. Replace filters of recirculating filter system of M 270 or M 100 when they get filled up. If the job to be built up gets interrupted (e.g. power cut or running out of powder during the job), reject the job and redo it. If the restoration has broken off the support during the job, redo the restoration using stronger supporting style. Do not use powder contaminated by different type powders. If machine reports the same error message constantly and cause of error cannot be cleared following operation manual, contact EOS Service hotline.

Shot peening prior stress relieving:
Shot-peen the restorations standing on the platform using fine, spherical ceramic media (0.125 – 0.250 mm in diameter, e.g. Iepco C type or Zirblast B60) at 2.5 - 3.5 bar pressure. Shot-peen the fitting surface until visual saturation has been reached.

Stress relieving:
The stress relieving should be done in stress relieving furnace under argon atmosphere. The furnace stress relieving sequence is following:
Place the building platform inside the protective gas box. Apply 1-2 l/min argon flow into protective gas box. Place the box inside the furnace before heating up the furnace. Wear heat protection gloves and heat protection clothing when unloading the hot furnace.

1. Heat furnace from room temperature to 450 °C in 60 minutes.
2. Hold at 450 °C temperature for 45 minutes.
3. Heat furnace to 750 °C in 45 minutes.
4. Hold at 750 °C temperature for 60 minutes (holding temperature and time tolerance inside the box: 740 °C +/- 10 °C, 60 minutes +/- 20 minutes).
5. Switch off the heating.
6. When temperature has dropped down to approx. 600 °C, open the furnace door.
7. When furnace has cooled down to approx. 300 °C remove the protective gas box from furnace and shut down the argon flow.

Utilization of higher stress relieving temperature or longer holding time than instructed may lead to increased brittleness of metal material. Do not utilize forced cooling. Forced cooling may lead to increased brittleness of restorations.

Removal of restorations from platform:
After stress relieving and cooling down of the platform, remove the parts from building platform using band saw, rotary cutter or pliers. Remove the remains of the supports using pliers. Do not remove ID-tags before restorations are packed and labelled individually.

Dental laboratory step 2: To be performed by dental technician

Surface preparation for veneering:
Finish the surface for ceramic veneering with a cross-cut drill. Make sure that the all surfaces to be veneered have been ground thoroughly. The remaining wall thickness of the restorations after grinding should not be less than 0.3 mm. After finishing, blast the veneering surface with corundum of approx. 125-250 µm particle size (e.g. Korox 250) at 3-4 bar. Steam clean the restorations thoroughly. After cleaning the restorations, hold them with artery clamps or similar instruments. Do not touch them again.

Veneering:
Use only the veneering materials and processes suitable for coefficient of thermal expansion of EOS CobaltChrome SP2.
Recommended ceramic veneering materials are VITA VM13 and Wieland Reflex. Always follow the Instructions for Use of the ceramic manufacturer. Make sure that the restorations are properly supported and positioned on the ceramic firing plate during all firing steps.

Oxide Firing:
Oxide firing prior ceramic firing is recommended. You can carry out the oxide firing to check the surface at 950 °C for 5 minutes with vacuum. The oxide layer should have consistent colour all around the ground surfaces. Always blast the oxide after firing with fresh corundum 125 - 250 µm (e.g. Korox 250) media at 3 - 4 bar and steam clean it.

Ceramic Firing:
Always apply the opaque material in two firing operations. Apply a thin first layer (Washbrand) and the second layer opaque. Steam clean the part before applying the next ceramic layer. Long term cooling phase (down to approximately 600°C) is recommended for firing steps. Remove ceramic only mechanically. Warning: Hydrofluoric acid (HF) and strong mineral acids may corrode the metal.

Finishing work:
Blast metal surfaces with fine corundum of approx. 50 µm particle size, (e.g. Korox 50). Polish all non-veneered metallic surfaces (e.g margin line) by rubber polishing and using cobalt-chromium polishing paste to reach the high end gloss. Steam clean the finished restorations thoroughly.

Soldering:
Use only the soldering materials and processes suitable for coefficient of thermal expansion of EOS CobaltChrome SP2. Always follow the instructions for use of the soldering material manufacturer. To do soldering prior to firing with the flame BEGO Wirobond solder and Fluxsol flux are most recommended. To do soldering after firing in the furnace BEGO WGL solder and Minoxyd flux are most recommended. Long-term cooling recommended (cooling phase down to approx. 600 °C).

Laser welding:
Use only the welding materials and processes suitable for coefficient of thermal expansion of EOS CobaltChrome SP2. Always follow the instructions of the soldering material manufacturer. To do laser welding filler material BEGO Wiroweld wire 0.35 mm diameter or 0.50 mm diameter are recommended.