



Mill Test Certificate

Inspection certificate, according to EN 10204, type 3.1

Trade name: EOS CobaltChrome SP2 (EOS art.-no.: 9011-0018)
Lot number: H101601
Manufacturer: Electro Optical Systems Finland Oy
Lemminkäisenkatu 36
FI - 20520 Turku
FINLAND

Supplier: EOS GmbH
Robert-Stirling-Ring 1
D-82152 Krailling Germany
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EOS CobaltChrome SP2 (REF: 9011-0018) is a cobalt based metal-ceramic alloy intended for production of Porcelain-Fused to Metal dental restorations in EOSINT M270 Standard system.

The composition and properties correspond to "Type 4" dental material according to standard EN ISO 22674:2006.

Sampling

Sampling procedures are performed according to ASTM B215-08 and ISO 2859-1.

Sieve size analysis of powder

Sieve analysis is performed according to practices described in ASTM B 214-07, except for section "5.2 Sieve shaker" where Retsch AS200 Digit sieving system is used.

Specification for sieves is ASTM E11.

Property	Test method	Units	Specification Upper Limit	Result
Particle size analysis	Sieve analysis: > 45 µm	wt-%	2	0.1



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Chemical analysis of powder

Property	Analysis method	Specification	Specification	Result
Chemical composition		Lower Limit (wt-%)	Upper Limit (wt-%)	
Co	ICP	61.8	65.8	64.1
Cr	ICP	23.7	25.7	24.4
W	ICP	4.9	5.9	5.3
Mo	ICP	4.6	5.6	4.9
Si	ICP	0.8	1.2	1.1
Fe	ICP	0	0.50	0.11
Mn	ICP	0	0.10	0.03

Free of nickel, beryllium and cadmium according to standard DIN EN ISO 22674:2006.

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Properties of laser processed EOS CobaltChrome SP2 material after stress relieving, oxide and ceramic firing heat treatments, applied in accordance with the Instructions for Use of EOS CobaltChrome SP2

The following properties have been determined on laser processed, stress relieved, oxide and ceramic fired EOS CobaltChrome SP2 lot H081401 when processed in accordance with the Instructions for Use of EOS CobaltChrome SP2 (REF: 9071-0649) in the following setup:

- EOSINT M270 Standard installation mode machine S/N SI-979
- PSW3.3.84
- Default Job: "CC20_SP2_020_default.job" dated 20100301
- LAS control voltage: 1.5 V

Property	Test method	Units	Specification	Result
Density	Weighing in air and water acc. to ISO 3369, tolerances acc. to EN ISO 22674:2006	g/cm ³	8.5 ± 0.425	8.667
Tensile properties in heat treated condition* Samples built in vertical orientation	Tensile testing acc. to EN ISO 22674:2006			
Proof strength Rp0.2%		MPa	850 ± 85	850
Ultimate tensile strength Rm		MPa	-	1325
Percentage elongation after fracture A ₁₅		%	min. 3	5
Coefficient of thermal expansion (25 -500 °C)	Testing of coefficient of thermal expansion acc. to EN ISO 22674:2006	m/mK x 10E-6	14.3 ± 0.5	14.2

* Heat treatment: stress relieving and ceramic firing simulations applied acc. Instructions for Use of EOS CobaltChrome SP2 (REF: 9071-0649), stress relieving performing holding 1 hour at 750 °C, followed by oxide firing 5 minutes at 950 °C, followed by 4 times ceramic firing 2 minutes at 930 °C each,

Specimen for tensile testing: Test specimen with radial shoulders acc. EN ISO 22674:2006, cylindric, d=6 mm in neck region, vertical orientation.



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This document confirms that the material defined above has been tested and is in compliance with the product specification for use in EOSINT M270 Standard for direct metal laser sintering of Porcelain-Fused to Metal dental restorations following the Instructions for Use of EOS CobaltChrome SP2. The data correspond to our knowledge and experience at the time of publication. The data provided here does not on its own represent a sufficient basis for any part design outside valid dental restoration design rules issued by EOS for EOS CobaltChrome SP2. Neither do data provided here provide any agreement about or guarantee the specific properties of a product or part or the suitability of a product or part outside the intended use defined in Instructions for Use of EOS CobaltChrome SP2. The EOS CobaltChrome SP2 properties provided here are valid only for EOSINT M270 Standard machines that are operated following the Instructions for Use of EOS CobaltChrome SP2 and maintained regularly following maintenance program of EOS defined for preventive maintenance of EOSINT M270 Standard machines.

Date:

20.03.2014
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Approved by:

Toni Kosunen
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Toni Kosunen

Quality Engineer

Electro Optical Systems Finland Oy