Mill Test Certificate

Inspection certificate, according to EN 10204, type 3.1

Trade name:	EOS StainlessSteel PH1 (EOS order.-no.: 9011-0019)
Lot number:	J281601
Manufacturer:	Electro Optical Systems Finland Oy Lemminkäisenkatu 36 FI – 20520 Turku FINLAND
Supplier:	EOS GmbH Robert-Stirling-Ring 1 D-82152 Krailling Germany Telephone: +49 (0)89 / 893 36-0 Telefax: +49 (0)89 / 893 36-285
Customs tariff code:	7205 2100 00

Analyses of powder

Property	Test method	Units	Specification	Result
Particle size analysis			Upper Limit	
	Sieve analysis > 53µm	%	8.0	3.5
	Sieve analysis > 63µm	%	1.0	0.0

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FI-20520 Turku, Finland.
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Analyses of powder

Property	Analysis method	Specification	Specification	Result
Chemical composition		Lower Limit	Upper Limit	
Iron		bal	-	bal
Chromium	ICP	14.0	15.5	14.9
Nickel	ICP	3.5	5.5	4.3
Copper	ICP	2.5	4.5	3.9
Manganese	ICP	-	1.0	0.1
Silicon	ICP	-	1.0	0.5
Molybdenum	ICP	-	0.3	<0.1
Niobium	ICP	0.15	0.45	0.30
Carbon	Combustion	-	0.07	0.02
Sulfur	Combustion	-	0.03	<0.01
Phosphorus	ICP	-	0.04	<0.01
Oxygen	Fusion	-	-	0.03
Nitrogen	Fusion	-	-	0.04

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Properties of laser processed EOS StainlessSteel PH1 material

Following properties have been determined on laser processed EOS StainlessSteel PH1 lot J281601 when processed in following setup:

- EOSINT M290 machine
- EOS Parameter Set PH1_020_SurfaceM291

Property	Test method	Units	Specification	Result
Density	Weighing in air and water acc. to ISO 3369	g/cm³	≥ 7.75	7.77
Tensile properties in as manufactured condition	Tensile testing acc. to DIN EN ISO 6892-1:2009 B10			
Yield strength $Rp_{0.2\%}$		MPa	≥ 700	920
Tensile strength Rm		MPa	≥ 1100	1190
Percentage elongation after fracture A_{25}		%	≥ 10	13

Specimen for tensile testing: cylindric, d=5 mm, 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 M Systems for direct metal laser sintering following the operation instructions. The data correspond to our knowledge and experience at the time of publication. They do not on their own represent a sufficient basis for any part design, neither do they provide any agreement about or guarantee the specific properties of a product or part or the suitability of a product or part for a specific application. It is the responsibility of the producer or customer of a part to check its properties as well as its suitability for a particular purpose. This also applies regarding the consideration of possible intellectual property rights as well as laws and regulations. The data are subject to change without notice as part of EOS' continuous development and improvement processes. EOS has not FDA cleared this product for medical device manufacturers to use this material in FDA sensitive applications.

Date: 2.8.2016

Approved by: .....

Teemu Kantola

Quality Engineer

Electro Optical Systems Finland Oy

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