

EOS StainlessSteel 254 Material Data Sheet

EOS StainlessSteel 254

EOS StainlessSteel 254 is an austenitic stainless steel for extreme conditions. The high chromium, molybdenum and nitrogen alloying give excellent corrosion resistance in many difficult environments. The general pitting resistance equivalent PREN for 254 is 43 ($PREN = \%Cr + 3.3 \times \%Mo + 16 \times \%N$).

Main Characteristics:

- Excellent resistance to uniform, pitting and crevice corrosion
- High resistance to stress corrosion cracking
- Higher strength than conventional austenitic stainless steels

Typical Applications:

- Chlorinated seawater handling equipment
- Pulp and paper manufacturing devices
- Chemical handling equipment

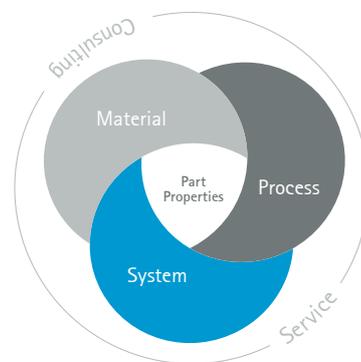
The EOS Quality Triangle

EOS uses an approach that is unique in the AM industry, taking each of the three central technical elements of the production process into account: the system, the material and the process. The data resulting from each combination is assigned a Technology Readiness Level (TRL) which makes the expected performance and production capability of the solution transparent.

EOS incorporates these TRLs into the following two categories:

- Premium products (TRL 7-9): offer highly validated data, proven capability and reproducible part properties.
- Core products (TRL 3 and 5): enable early customer access to newest technology still under development and are therefore less mature with less data.

All of the data stated in this material data sheet is produced according to EOS Quality Management System and international standards.



Powder Properties

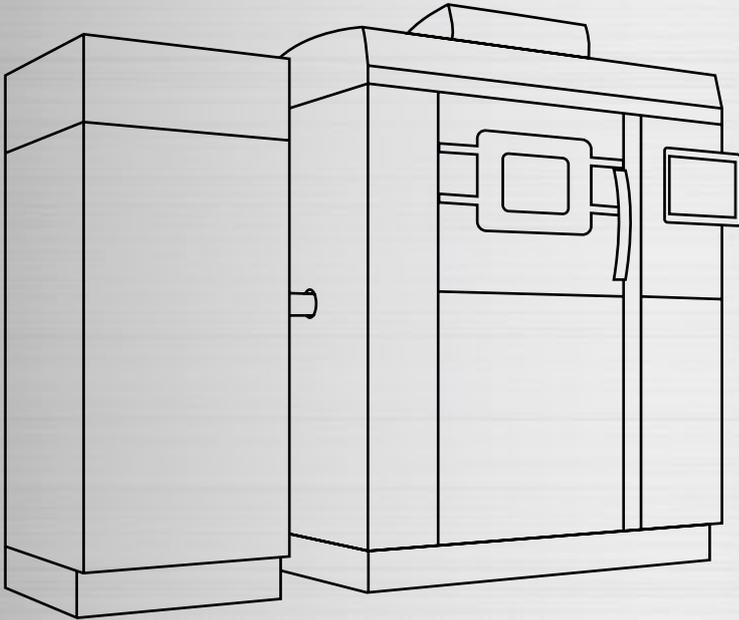
EOS StainlessSteel 254 powder
material is in accordance with
DIN EN 10088-3, EN 1.4547

Powder chemical composition (wt.-%)

Element	Min.	Max.
Cr	19.5	20.5
Ni	17.5	18.5
Mo	6.0	7.0
Cu	0.5	1.0
N	0.18	0.25

Powder particle size

Generic particle size distribution	20-65 μm
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EOS StainlessSteel 254 for EOS M 290 | 40 μm

Process Information
Physical Part Properties
Heat Treatment
Additional Data

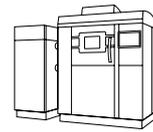
EOS StainlessSteel 254 for EOS M 290 | 40 µm

Process Information

System set-up		EOS M 290
EOSPAR name		254_040_CoreM291_100
Software requirements		EOSPRINT 2.8 or newer EOSYSTEM 5.20 or newer
Powder part no.		9030-0007
Recoater blade		HSS
Nozzle		EOS grid nozzle
Inert gas		Argon
Sieve		75 µm

Additional information	
Layer thickness	40 µm
Volume rate	4.1 mm ³ /s

Chemical and Physical Properties of Parts



Micrograph etched as manufactured
Etchant: ASTM E407-07, etchant 12

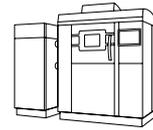
Defects	Result
Porosity	0.01 %
Density, ISO3369	≥ 8.07 g/cm ³

Typical mechanical properties

	Yield strength $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Elongation at break A [%]
Heat treated horizontal	360	700	43
Heat treated vertical	360	660	48
As manufactured horizontal	680	810	29
As manufactured vertical	600	720	35

Tensile testing as per ISO 6892-1

Heat Treatment



Optional solution annealing

At 1180 °C for 2 h after parts have fully heated through, water quenching

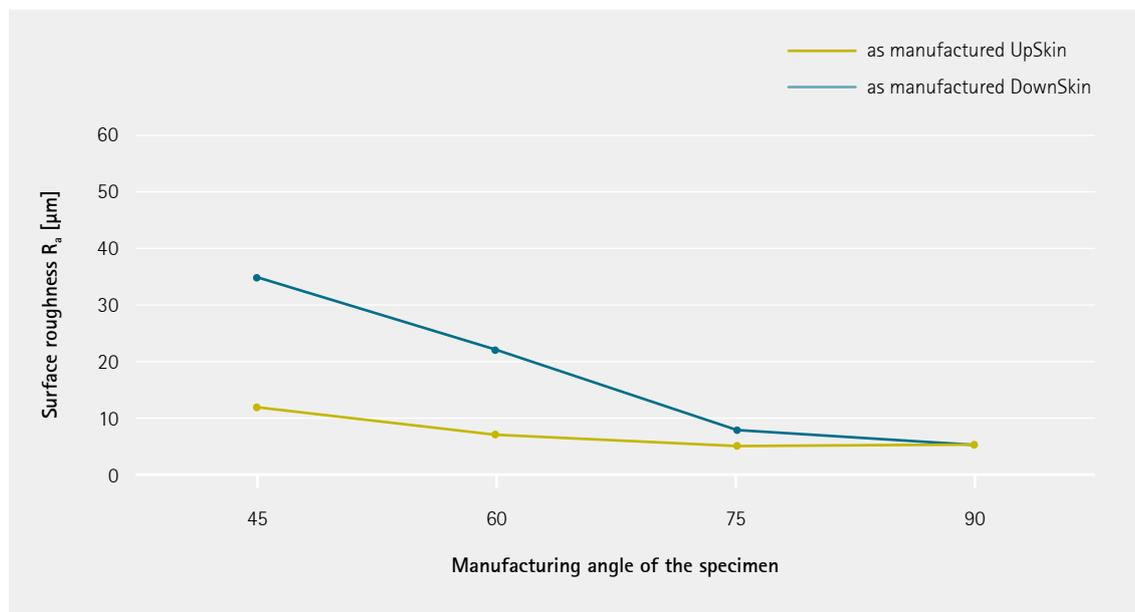
Typical dimensional change after heat treatment: 0.06 %

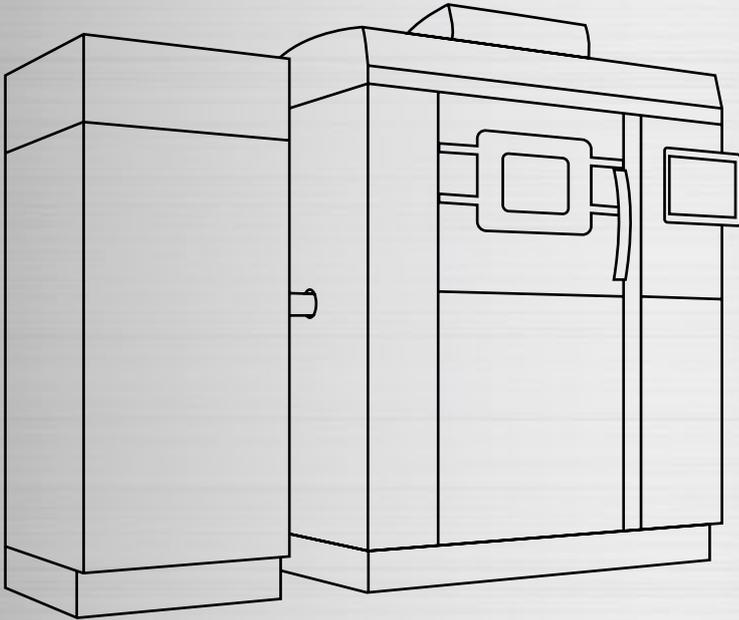
Additional Data

Coefficient of Thermal Expansion ASTM E228

Temperature	25 – 100 °C	25 – 200 °C	25-300 °C	25-400 °C
CTE	14.8*10 ⁻⁶ /K	15.7*10 ⁻⁶ /K	16.3*10 ⁻⁶ /K	16.7*10 ⁻⁶ /K

Surface Roughness





EOS StainlessSteel 254 for EOS M 290 | 60 μm

Process Information
Physical Part Properties
Heat Treatment
Additional Data

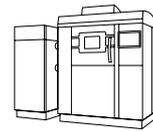
EOS StainlessSteel 254 for EOS M 290 | 60 µm

Process Information

System set-up		EOS M 290
EOSPAR name		254_060_CoreM291_100
Software requirements		EOSPRINT 2.8 or newer EOSYSTEM 5.20 or newer
Powder part no.		9030-0007
Recoater blade		HSS
Nozzle		EOS grid nozzle
Inert gas		Argon
Sieve		75 µm

Additional information	
Layer thickness	60 µm
Volume rate	6.1 mm ³ /s

Chemical and Physical Properties of Parts



Micrograph etched as manufactured
Etchant: ASTM E407-07, etchant 12

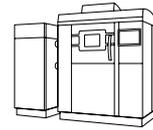
Defects	Result
Porosity	0.02 %
Density, ISO3369	≥ 8.07 g/cm ³

Typical mechanical properties

	Yield strength R _{p0.2} [MPa]	Tensile strength R _m [MPa]	Elongation at break A [%]
Heat treated horizontal	360	700	44
Heat treated vertical	360	660	48
As manufactured horizontal	660	800	30
As manufactured vertical	580	730	36

Tensile testing as per ISO 6892-1

Heat Treatment



Optional solution annealing

At 1180 °C for 2 h after parts have fully heated through, water quenching

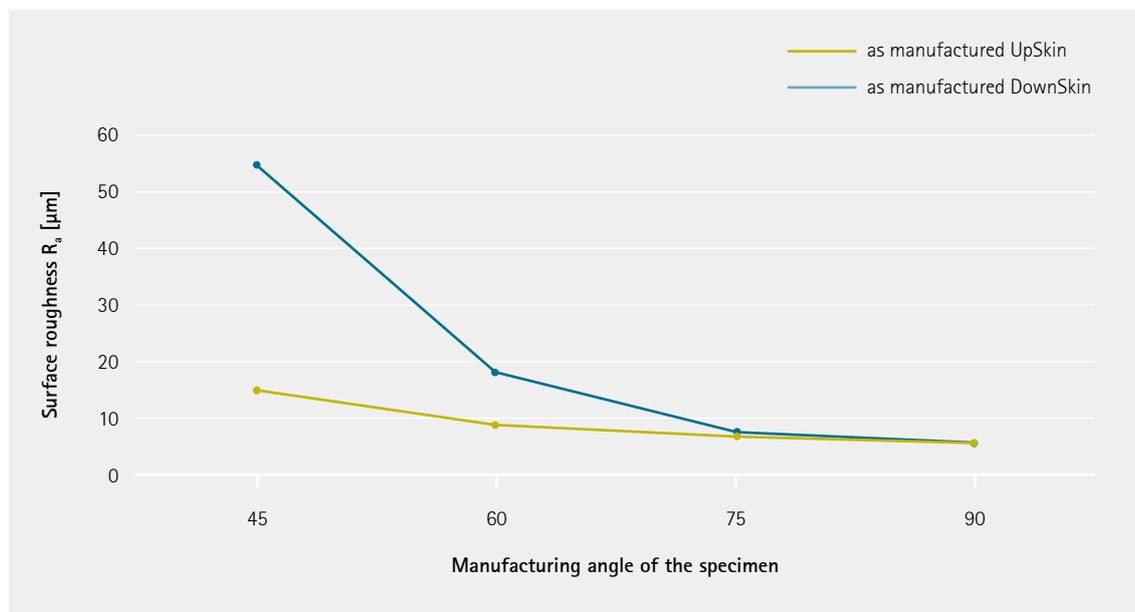
Typical dimensional change after heat treatment: 0.06 %

Additional Data

Coefficient of Thermal Expansion ASTM E228

Temperature	25 – 100 °C	25 – 200 °C	25-300 °C	25-400 °C
CTE	$14.8 \cdot 10^{-6}/K$	$15.7 \cdot 10^{-6}/K$	$16.3 \cdot 10^{-6}/K$	$16.7 \cdot 10^{-6}/K$

Surface Roughness



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Status 02/2021

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Cover: This image shows a possible application.

The quoted values refer to the use of this material with above specified type of EOS DMLS system, EOSYSTEM and EOSPRINT software version, parameter set and operation in compliance with parameter sheet and operating instructions. Part properties are measured with specified measurement methods using defined test geometries and procedures. Further details of the test procedures used by EOS are available on request. Any deviation from these standard settings may affect the measured properties. The data correspond to EOS knowledge and experience at the time of publication and they are subject to change without notice as part of EOS' continuous development and improvement processes. EOS does not warrant any properties or fitness for a specific purpose, unless explicitly agreed upon. This also applies regarding any rights of protection as well as laws and regulations.

