PROCESS DATA SHEET

EOS ToolSteel 1.2709 for EOS M 290 | 40 µm

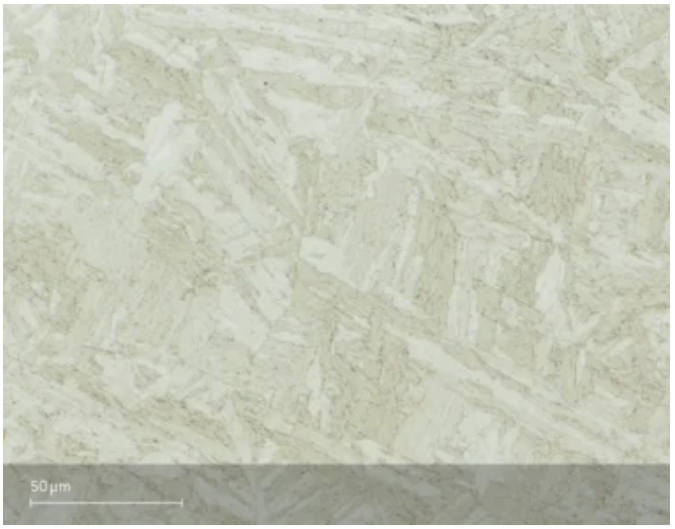
EOS M 290 - 40 µm - TRL 7

System Setup	EOS M 290
EOS Material set	1.2709_040_HiPerM291_1.00
Software Requirements	EOSPRINT 2.7 or newer
Recoater Blade	Ceramic
Nozzle	EOS Grid Nozzle
Inert gas	Argon
Sieve	75 µm

Additional Information	
Layer Thickness	40 µm
Volume Rate	4.1 mm^3/s
Typical Dimensional Change after HT [%]	+ 0.1 %

Chemical and Physical Properties of Parts

Chemical composition of built parts is compliant to EOS ToolSteel 1.2709 powder chemical composition.



Heat treated microstructure. Etched according to ASTM E407-07, recipe 94.

Microstructure of the Produced Parts

Defects	Thickness	Result	Number of Samples
Average Defect Percentage	40 µm	0.03 %	55

Density EN ISO 3369	Thickness	Result	Number of Samples
Average Density	60 µm	> 8.05 g/cm³	20

Mechanical Properties

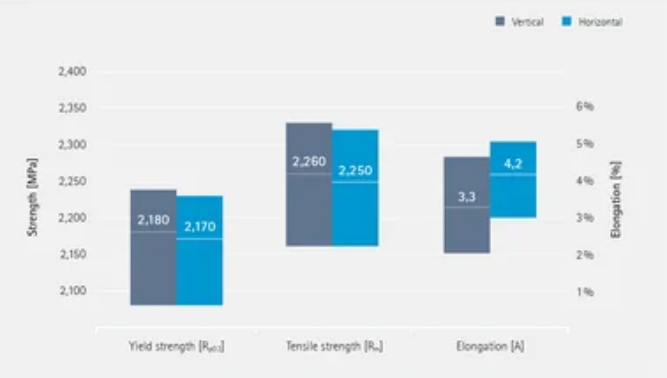
Mechanical Properties Heat Treated

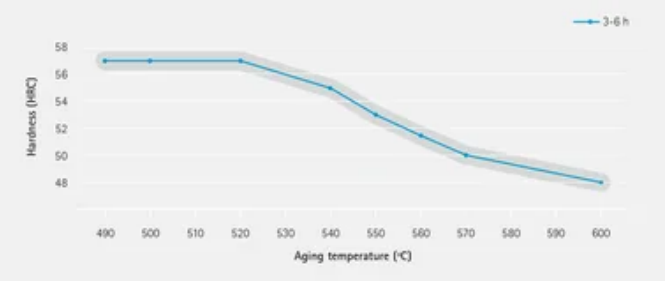
EN ISO 6892-1 Room Temperature | 60 µm	Yield Strength [MPa]	Tensile Strength [MPa]	Elongation at Break [%]	Reduction of Area Z [%]	Modulus of elasticity [GPa]	Number of Samples
Vertical	2180	2260	3.3	-	-	188
Horizontal	2170	2250	4.2	-	-	162

EOS ToolSteel 1.2709 can be heat treated to match various needs of different applications. The two step heat treatment can be performed under vacuum or inert gas atmo sphere. First step is solution annealing to minimize amount of austenite in the martensitic matrix. The needed hardness and strength is achieved through aging treatment where hardening takes place through forming of intermetallic phases and precipitates.

Solution Annealing: 2 h at 940 °C (±10 °C) measured from the part followed by rapid air cooling to room temperature (below 32 °C). Cooling rate 10-60 °C/min. Reaching room temperature before starting aging treatment is required to achieve desired microstructure.

Aging: For peak hardness and strength 3-6 h at 510 °C (±10 °C) measured from the part followed by air cooling. Mechanical properties presented in this document achieved through this aging procedure. For bulky parts ensure uniformity of properties by increasing hold time up to 6 h. Also, to maximize fatigue strength, a hold time of 6 h is recommended.





If lower hardness and improved toughness is required, aging temperature can be increased according to figure above.

Hardness

EN ISO 6508 Heat Treated	
Value	57
Unit	HRC

Impact Toughness

EN ISO 148-1, Charpy-V Heat Treated	
Typical Impact Toughness [J]	10

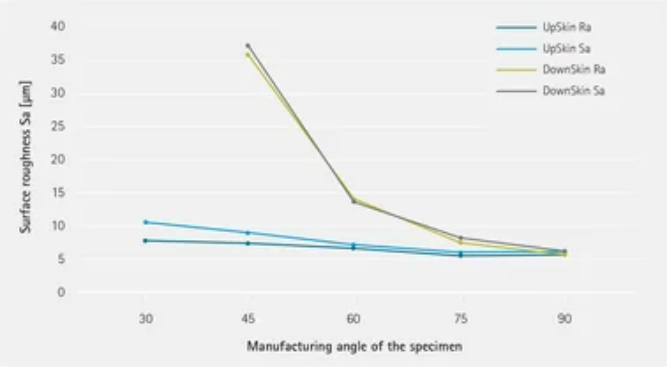
Fatigue

Heat Treated	
Fatigue strength [MPa]	732

Fatigue strength at 1 x 10 million cycles in heat treated state

Fatigue strength determines a stress level where specimen fails at a defined number of stress cycles [ISO 12107]. Fatigue strength was estimated statistically according to ISO 12107. Testing was performed according to ASTM E466. Fatigue results typically show large deviations due to the nature of the fatigue process [ISO 12107].

Surface Roughness



As manufactured. The surface quality was characterized by optical measurement method according to internal procedure. The 90 degree angle corresponds to vertical surface.

Coefficient of Thermal Expansion

ASTM E228	Temperature
10.72*10^{-6}/K	25 – 100 °C
11.15*10^{-6}/K	25 – 200 °C
11.5*10^{-6}/K	25 – 300 °C
11.51*10^{-6}/K	25 – 400 °C

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Status as of 04.09.2025. Subject to technical modifications. EOS is certified according to ISO 9001.