





Material
Data Sheet



EOS Aluminium Al5X1



High Strength & High Elongation



EOS Aluminium Al5X1

High Strength & High Elongation Aluminum for AM

EOS Aluminium Al5X1 is a heat-treatable aluminum alloy designed for AM to offer a compelling combination of high strength and high elongation. Al5X1 exhibits excellent mechanical properties with a strength above 400 MPa and an elongation exceeding 13% after heat treatment. The recommended single-step heat treatment does not require a water quench and enables robust part production.

Main Characteristics:

- Excellent combination of strength & elongation
- Good corrosion resistance
- Parts can be anodized

Typical Applications:

- Aerospace
- Automotive
- Marine
- Lightweight designs

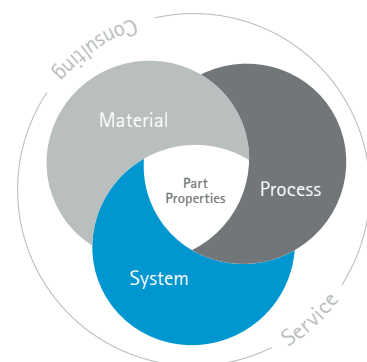
The EOS Quality Triangle

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.

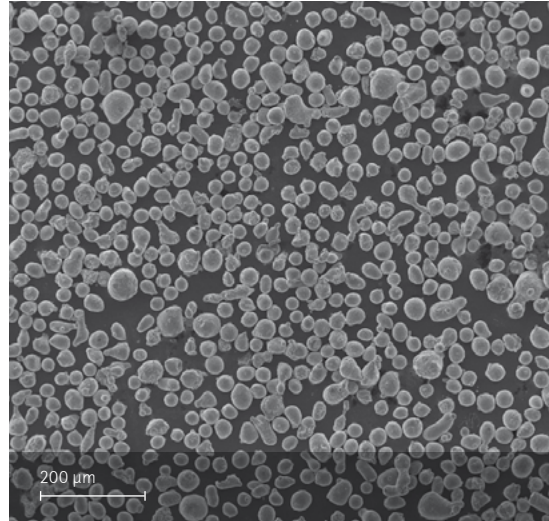


Powder Properties

The chemical composition of EOS Aluminium Al5X1 is specially designed for AM.

Approximate powder chemical composition (wt.-%)

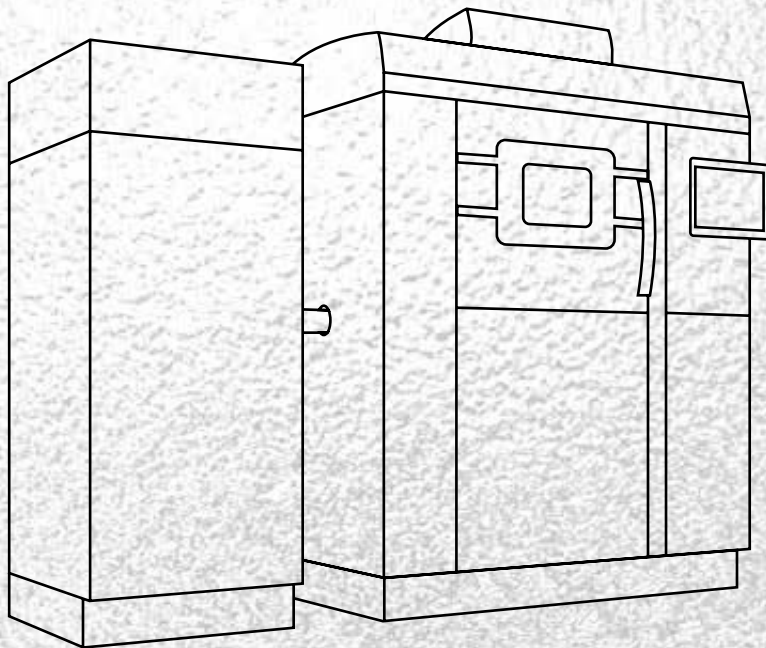
Element	Min	Max
Al	Balance	
Mg	2.5	4.2
Zr	0.6	1.8
Mn	0.1	1.0
Fe	-	1.0
Si	-	1.0
Ti	-	1.0



SEM micrograph of EOS Aluminium Al5X1 powder.

Powder particle size

Generic particle size distribution	20-63 µm
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EOS Aluminium Al5X1 for EOS M 290 | 40 μm

Process Information
Heat Treatment
Physical Part Properties
Mechanical Properties
Additional Data

EOS Aluminium Al5X1 for EOS M 290 | 40 µm

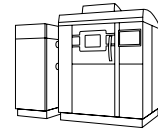
Process Information

System set-up	EOS M 290
EOSPAR name	Al5X1_040_CoreM291
Software requirements	EOSPRINT 2.11 or newer EOSYSTEM 2.15 or newer
Powder part no.	9030-0017
Recoater blade	HSS / Silicone
Nozzle	EOS grid nozzle
Inert gas	Argon
Sieve	75 µm

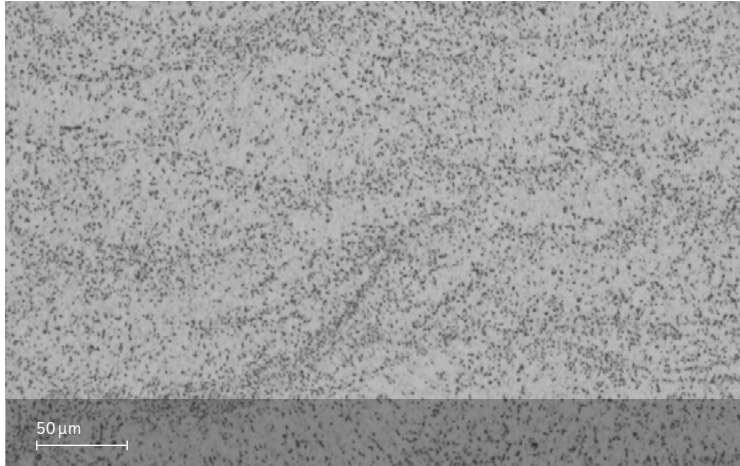
Additional information

Layer thickness	40 µm
Volume rate	4.8 mm ³ /s

Chemical and Physical Properties of Parts¹



The chemical properties of the parts are the same as that of the powder.



Etched micrograph in heat treated state

Defects	Result
Average defect percentage	0.15 %
Density, ISO3369	2.69 g/cm ³

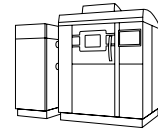
Typical mechanical properties

	Yield strength R _{p0.2} [MPa]	Tensile strength R _m [MPa]	Elongation at break A [%]
Heat treated vertical	380	415	14.5
Heat treated horizontal	385	415	14.5
As manufactured vertical	240	310	23
As manufactured horizontal	260	310	23

Tensile testing as per ASTM E8, strain rate 0.00762 mm/s

Typical hardness	Brinell	Rockwell
Heat treated	127 HBW 2.5/62.5	71 HRB
As manufactured	86 HBW 2.5/62.5	40 HRB

Heat Treatment



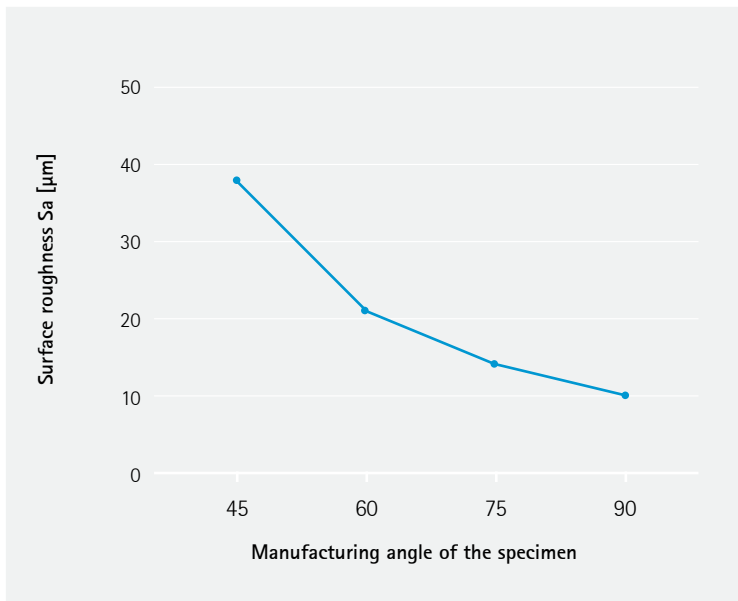
Direct ageing heat treatment

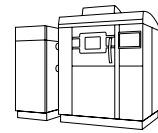
6 hours at 400 °C. Immediate gas quenching (air cooling with maximal air flow).

Preferred inert atmosphere during furnace treatment.

Additional Data¹

Surface roughness





Specific heat capacity (at 25 °C) AST E1269-11 (2018)

Heat treated	0,87 J/g/°C
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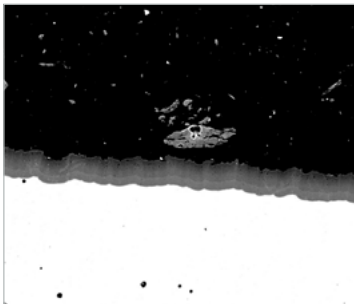
Thermal conductivity ASTM E1461-13 (2022)

Heat treated	132 W/m·K
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Electrical conductivity ASTM E1004

Heat treated	34 % IACS
As manufactured	23 % IACS

Anodization



Thickness of anodization layer depends on used anodization process.

*SEM image of the anodizing layer.
Anodized according to Mil-A-8625 Type III*

Headquarters

EOS GmbH
Electro Optical Systems
Robert-Stirling-Ring 1
D-82152 Krailling/Munich
Germany
Phone +49 89 893 36-0
info@eos.info

www.eos.info

in EOS

✂ EOS3Dprinting

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Further Offices

EOS France
Phone +33 437 497 676

EOS Greater China
Phone +86 21 602 307 00

EOS India
Phone +91 443 964 8000

EOS Italy
Phone +39 023 340 1659

EOS Japan
Phone +81 45 670 0250

EOS Korea
Phone +82 2 6330 5800

EOS Nordic & Baltic
Phone +46 31 760 4640

EOS of North America
Phone +1 877 388 7916

EOS Singapore
Phone +65 6430 0463

EOS UK
Phone +44 1926 675 110

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Cover: This image shows a possible application.

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