



Material data sheet - FlexLine

EOS NickelAlloy IN718

EOS NickelAlloy IN718 is a heat and corrosion resistant nickel alloy powder intended for processing on EOS DMLS™ systems.

This document provides information and data for parts built using

- EOS Powder: EOS NickelAlloy IN718 (EOS art.-no. 9011-0020)
- EOS Laser Sintering Machine: EOS M400-4
 - HSS Recoater Blade (EOS art.-no. 300007610)
 - DirectBase S40 Building Platform (EOS art.-no. 300000729)
 - Argon atmosphere
 - 63 µm mesh for powder sieving recommended (EOS art.-no. 9044-0032 for IPCM M Extra Sieving Module or EOS art.-no. 200001059 for IPM M Powder Station L)
 - EOSYSTEM v. 2.6 or higher
- EOS Software:
 - EOSPRINT v. 1.6 (EOS art.-no. 7501-4031) / 2.0 (EOS art.-no. 7012-0119) or higher
- EOS Process:
 - IN718 ParameterEditor (EOS art.-no. 7500-3084)
 - Name of the Default Job: IN718_040_FlexM404_100.eosjob

Description

EOS NickelAlloy IN718 chemical composition corresponds to UNS N07718, AMS 5662, AMS 5664, W.Nr 2.4668, DIN NiCr19Fe19NbMo3. This material is ideal for many high temperature applications such as gas turbine parts, instrumentation parts, power and process industry parts etc. It also has excellent potential for cryogenic applications. This kind of precipitation-hardening nickel-chromium alloy is characterized by having good tensile, fatigue, creep and rupture strength at temperatures up to 700 °C (1290 °F).

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Parts can be easily post-hardened by precipitation-hardening heat treatments. In both as-built and age-hardened states the parts can be machined, spark eroded, welded, micro shot-peened, polished and coated if required. Due to the layerwise building method, the parts have a certain anisotropy.

Technical Data

Powder properties

The chemical composition of the powder is reported in the table below.

Material composition

Element	Min	Max
Ni	50	55
Cr	17	21
Nb	4.75	5.5
Mo	2.8	3.3
Ti	0.65	1.15
Al	0.20	0.80
Co	-	1.0
Cu	-	0.30
C	-	0.08
Si, Mn	-	0.35
P, S	-	0.015
B	-	0.006
Fe	-	Balance

Max. particle size

> 63µm [1] max 0.3 wt.-%

[1] Sieve analysis according to ASTM B214.



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General process data

Layer thickness	40 μm
Volume rate [2]	Up to 4 x 4.2 mm ³ /s (4 x 15.1 cm ³ /h)

[2] The volume rate is a measure of build speed during laser exposure of the skin area per laser scanner. The total build speed depends on this volume rate and other factors such as exposure parameters of contours, supports, up and downskin, recoating time, Home-In or LPM settings, Job design (load, part geometry or overlap settings).

Physical properties of parts

Part density [3]	min. 8.15 g/cm ³
Min. wall thickness [4]	Approx. 0.3 - 0.4 mm
Surface roughness after shot peening [5]	Ra < 6.5 μm ; Rz 50 μm

[3] Weighing in air and water according to ISO 3369.

[4] Mechanical stability is dependent on geometry (wall height etc.) and application.

[5] Measurement according to ISO 4287. The numbers were measured at the horizontal (up-facing) and all vertical surfaces of test cubes. Due to the layerwise building the roughness strongly depends on the orientation of the surface, for example sloping and curved surfaces exhibit a stair-step effect.

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Tensile data at room temperature [6]

	Heat treated [7] [8]	
	Horizontal	Vertical
Ultimate tensile strength, Rm	1510 MPa	1420 MPa
Yield strength, Rp0.2	1305 MPa	1215 MPa
Elongation at break, A [9]	15 %	16 %

[6] Tensile testing according to ISO 6892-1 B10, proportional test pieces, diameter of the neck area 5 mm, original gauge length 25 mm.

[7] Heat treatment procedure conform to Aerospace Material Specification AMS 5662:

1. Solution Anneal at 980 °C (1796 °F) for 1 hour per 25mm (0.98 inch) of thickness, air (/argon) cool.

2. Ageing treatment; hold at 718 °C (1325 °F) 8 hours, furnace cool to 621 °C (1150 °F) and hold at 621 °C (1150 °F) for total precipitation time of 18 hours., air (/argon) cool.

[8] The numbers are average values determined from samples with horizontal and vertical orientation respectively

[9] Elongation values are averaged and subject to variations depending on process conditions



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Abbreviations

min. minimum

max. maximum

wt. weight

The quoted values refer to the use of this material with above specified EOS DMLS system, EOSYSTEM software version, parameter set and operation in compliance with parameter sheet and operating instructions. All measured values are average numbers. Part properties are measured with specified measurement methods using defined test geometries and procedures and. Further details of the test procedures used by EOS are available on request. Any deviation from these standard settings may affect the measured properties.

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