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 NickelAlloy powder (EOS art.-no. 9011-0020) on the following specifications:

- EOS DMLS system: M400 SF
- EOSYSTEM: EOSPRINT v.1.2/HCS v.2.2.40
- EOS Parameter set IN718_040_FlexM400_1.11

Description

Parts built from EOS NickelAlloy IN718 have chemical composition corresponding to UNS N07718, AMS 5662, AMS 5664, W.Nr 2.4668, DIN NiCr19Fe19NbMo3. 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).

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.

Parts built from EOS NickelAlloy IN718 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.

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Technical Data

Powder properties

Material composition		
Element	**Min**	**Max**
Ni	50	55
Cr	17.0	21.0
Nb	4.75	5.5
Mo	2.8	3.3
Ti	0.65	1.15
Al	0.20	0.80
Co	-	1.0
Cu	-	0.3
C	-	0.08
Si, Mn	-	0.35
P, S	-	0.015
B	-	0.006
Fe	-	Balance

Max. particle size	
Particles > 63µm [1]	max. 0.3 wt.-%

[1] Sieve analysis according to DIN ISO 4497 or ASTM B214.

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General process data

Layer thickness	40 µm
Volume rate [2]	4.2 mm³/s (15.2 cm³/h)

[2] The volume rate is a measure of build speed during laser exposure of the skin area. The total build speed depends on this volume rate and many other factors such as exposure parameters of contours, supports, up and downskin, recoating time, Home-In or LPM settings.

Physical and chemical properties of parts*

Part density [3]	min. 8.15 g/cm3
Surface roughness after shot peening [4]	Ra < 6.5 µm; Rz < 50.0 µm

[3] Weighing in air and water according to ISO 3369.
[4] 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.

Tensile data at room temperature* [5, 6]

	As built	Heat treated [7]
Ultimate tensile strength, Rm	1040 MPa	1470 MPa
Yield strength, Rp0.2	710 MPa	1200 MPa
Elongation at break A	26 %	15 %

[5] The numbers are average values and are determined from samples with horizontal and vertical orientation.
[6] Tensile testing according to ISO 6892-1:2009 (B) Annex D, proportional test pieces, diameter of the neck area 5 mm (0.2 inch), original gauge length 25 mm (1 inch).
[7] Heat treatment procedure conform to Aerospace Material Specification AMS 2774D and AMS 5662:
1. Solution Anneal at 954 °C (1750 °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.

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Abbreviations

min. minimum

max. maximum

wt. weight

*Part properties are provided for information purposes only and EOS makes no representation or warranty, and disclaims any liability, with respect to actual part properties achieved. Part properties are dependent on a variety of influencing factors and therefore, actual part properties achieved by the user may deviate from the information stated herein. This document does not on its own represent a sufficient basis for any part design, neither does it provide any agreement or guarantee about the specific properties of a material or part or the suitability of a material or a part for a specific application.

This powder has not been developed, tested or certified as a medical device according to Directive 93/42/EEC (MDD) or Regulation (EU) 2017/745 (MDR) and is not intended to be used as a medical device, in particular for the purposes specified in Art. 2 No. 1 MDR. Insofar as you intend to use the powder as raw material for the manufacture of pharmaceutical products or medical devices (e.g. as raw material which as a material must meet the requirements of Annex 1, Chapter II MDR), the responsibility and liability for all analyses, tests, evaluations, procedures, risk assessments, conformity assessments, approval and certification procedures as well as for all other official and regulatory measures required for this purpose shall lie solely with you both with regard to the pharmaceutical product and/or medical device manufactured by you and with regard to the properties, suitability, testing, evaluation, risk assessment, other requirements for use of the powder as raw material.
This also applies to applications with food contact. In this respect, the limitations of liability pursuant to our General Terms and Conditions and the system sales or material contracts shall apply.

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