Material Data Sheet
Balanced Parameter

IN 718

Typical Mechanical Properties
(Heat Treated)

Ultimate tensile strength	1007 (1470) MPa
Yield strength	685 (1230) MPa
Elongation at break	31% (14%)

Process Parameter

Quality — Balanced — Productivity

Nickel Based Alloy

This well-known nickel chromium alloy is characterized by having excellent mechanical properties and oxidation resistance. The age-hardenable alloy can be readily printed. The good tensile, fatigue, creep, and rupture strength, have resulted in its use in a wide range of applications.

Highlights

- Good tensile, fatigue and creep performance
- Suited to components in high temperature environments such as aircraft engines, rocket casings and industrial gas turbines
- Applications in aerospace and energy sectors

- Layer thickness: 80µm
- Density >99.8%
- ASTM standard mechanical properties
- Good productivity
- Minimum controlled features 0.5mm

Additive Industries

Process Readiness Level (PRL)

R&D				Foundation		Production		
1	2	3	4	5	6	7	8	9

IN 718

Nickel Based Alloy

To learn more, contact us: info@additiveindustries.com

or visit: additiveindustries.com

Powder Chemistry[2,3]

Composition	Al	Ti	S	Si	Se	P	O	N	Nb+Ta	Ni	Mo	Mn
Min (wt%)	0.3	0.75	0	0	0	0	0	0	4.75	50	2.8	0
Max (wt%)	0.7	1.15	0.015	0.35	0.005	0.015	0.02	0.03	5.5	55	3.3	0.35
Composition	Mg	Fe	Cu	Co	Cr	C	Ca	B				
Min (wt%)	0	Bal	0	0	17	0.02	0	0				
Max (wt%)	0.01	Bal	0.3	1.0	21	0.08	0.01	0.006				

Process details

Layer thickness	80	[µm]
Build rate[8] (per laser)	30.24	[cm3/hr]
Optical density[4]	≥ 99.8	[%]
Volumetric density[11]	≥ 8.19	[g/cm3]

Mechanical properties[5]	Orientation	As-built (Mean)	Standard Dev.	Heat-treat (Mean)	Standard Dev.	Units
Ultimate tensile strength	Horizontal	1007	15	1470	15	[MPa]
	Vertical	930	15	1330	15	[MPa]
Yield strength	Horizontal	685	10	1230	10	[MPa]
	Vertical	570	10	1150	10	[MPa]
Elongation at break	Horizontal	31	2	14	1	[%]
	Vertical	35	2	16	1	[%]
Youngs modulus	Horizontal	176	15	210	5	[GPa]
	Vertical	153	15	193	5	[GPa]
Vickers Hardness[6]		280	10	470	5	[HV10]

Surface Roughness[7]	Mean	Standard Deviation	Units
Vertical Surface Roughness (Ra)	5	1	[µm]
Vertical Surface Roughness (Rz)	25	5	[µm]
45° Surface Roughness (Ra)	13	4	[µm]
45° Surface Roughness (Rz)	68	15	[µm]

Notes

1. The material is processed under Argon shielding atmosphere.
2. Powder Chemistry as per Additive Industries specification O1128 Rev. 2.0.
3. Additive Industries consolidated material is in compliance with ASTM F3055-14
4. Density measured by Optical Measurement Method as per internal process. This is the minimum guaranteed value that is achieved under standard processing conditions, manufactured using Additive Industries' qualification jobs.
5. Tensile test samples were produced as round blanks. These were machined to size and tested in accordance with ASTM E8m at a NADCAP approved supplier.
6. Hardness measured in accordance with DIN EN ISO6507-1:2018 as per internal process. Hardness values measured in XY and XZ planes from components manufactured using Additive Industries' qualification jobs.
7. Surface Roughness measured in as-printed condition in accordance with internal process. Roughness measurement conducted on specimens with varying unsupported manufacturing angle.
8. Build Rate stated is a typical value per laser. It is calculated using the formula: Layer Thickness x Laser Scan Speed x Hatch Distance.
9. Parameter released: IN718_80_BAL_MF1A55_4.1.
10. Heat Treatment : Solution at 980C for 2h, cool to RT and Precipitate at 720C for 8hr, cool to 620C, 620C for 8hr, cool to RT.
11. Volumetric density measured according to ASTM B962. This is a minimum volumetric density measurement achieved on samples manufactured using Additive Industries' qualification jobs.

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Disclaimer

The data presented in this material datasheet is valid only for Additive Industries' released powder, machine, and parameter sets, processed under the defined shielding atmosphere. The properties of the printed parts have been measured on test coupons according to industry standards where available, and the data correspond to our state-of-the-art at the time of publication. These results are based on Additive Industries' signoff build layout and reflect material performance under the specified conditions; for more information, please contact Additive Industries. Users should be aware that variations in the presented values may arise due to differences in process conditions, including but not limited to thermal management, build plate temperature, job-specific heat accumulation, inter-layer time, part positioning, and overall machine calibration. The data provided do not warrant any guarantee for printed parts, and it remains the responsibility of the producer or purchaser to verify the ultimate properties of the printed material for their specific application. The listed data are subject to change without notice as we continuously strive to develop and improve our machine performance and the properties of printed materials. Users are advised to exercise caution and consider material selection, build layout, and machine configuration when interpreting and applying this information.

Specifications are subject to change without notice. Additive Industries is certified in accordance with ISO 9001

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