

3D Metal Printing (SLM process) material performance manual

3D金属打印(SLM工艺)材料性能手册

Nickel-based alloy GH4169 material (镍基合金GH4169材料)

1. **Material characteristics:** Nickel-based alloy GH 4169, also known as IN718, is a precipitation-strengthened high temperature alloy with excellent tensile strength, fatigue strength, creep and lasting strength at 700°C operating temperature. It is commonly used in gas turbine components.

材料特点: 镍基合金GH4169, 也称IN718, 是一种沉淀强化型高温合金。在700°C使用温度下具有优秀的拉伸强度、疲劳强度、蠕变和持久强度。常用于燃气轮机部件;

1. Powder property^a (粉末性能^a)

Element / 元素	Ni	Cr	Mo	Nb	Ti	Al	Co	Si	Mg	Mn	P
Min value wt% / 最小值 wt%	50.0	17.0	2.8	4.75	0.65	0.2	0	0	0	0	0
Max value wt% / 最大值 wt%	55.0	21.0	3.3	5.5	1.15	0.8	1.0	0.35	0.01	0.35	0.015
Element / 元素	Cu	C	S	O	H	B	Fe				
Min value wt% / 最小值 wt%	0	0	0	0	0	0	Bal.				
Max value wt% / 最大值 wt%	0.3	0.08	0.015	0.05	0.05	0.006	Bal.				
Particle size distribution ^b / 粒度分布 ^b		15-53 μm									
a. Test standard(检测标准) & Density(密度): GB/T 14992-2005											
b. Surface roughness(表面粗糙度): GB/T 19077-2016											

2. Component performance (制件性能)

Density / 密度	~8.15g/cm ³
Density (metallographic method) ^c / 致密度(金相法) ^c	>99.9%
Surface roughness-in the sandblasted state ^d / 表面粗糙度-喷砂态 ^d	≥ 6μm

4. Mechanical property^e (力学性能^e)

State 状态	Test condition 测试条件	Yield strength /MPa 屈服强度/MPa	Tensile strength /MPa 抗拉强度/MPa	Extensibility / % 延伸率/%	Hardness / HRC 硬度/HRC
Print state 打印态	indoor temperature	770±80	1080±80	25±3	30±3
Heat treatment ^f 热处理 ^f	indoor temperature	1150±100	1400±100	18±5	45±3
	650°C	1000±50	1150±50	20±5	-

e. Test standard(检测标准): GB/T228.1-2015, GB/T228.2-2015

f. Heat treatment process(热处理工艺): 1070°C hold for 1h, air cooling, 720°C hold for 8h, furnace cooling to 620°C, 620°C hold for 8h, air cooling.
1070°C 保温1h, 空冷, 720°C 保温8h, 炉冷至620°C, 620°C 保温8h, 空冷