

3D Metal Printing (SLM process) material Performance Manual

3D金属打印(SLM工艺)材料性能手册

Titanium alloy TC4 material (钛合金TC4材料)

1. **Material characteristics:** Titanium alloy TC4, also known as Ti64 or Ti6Al4V, belongs to the $\alpha+\beta$ type of titanium alloys and is the most widely used grade of titanium alloy. Titanium alloys have a low density and high specific strength, offering excellent mechanical properties and corrosion resistance. The maximum long-term service temperature is generally 400°C.

材料特点: 钛合金TC4, 也称Ti64、Ti6Al4V, 属于 $\alpha+\beta$ 型钛合金, 是最广泛应用的钛合金牌号; 钛合金密度低, 比强度高, 具有优异的机械性能和耐腐蚀性。最高长期使用温度一般为400°C;

2. Powder property^a (粉末性能^a)

Element / 元素	Ti	Al	V	Fe	N	C	H	O
Min value wt% / 最小值 wt%	Bal .	5.5	3.5	0	0	0	0	0
Max value wt% / 最大值 wt%	Bal .	6.5	4.5	0.25	0.05	0.08	0.01 2	0.13
Particle size distribution ^b / 粒度分布 ^b	15-53μ m							
a. Test standard(检测标准) & Material composition(材料成分): GB/T 3620.1-2016								
b. Particle size distribution(粒度分布): GB/T 19077-2016								

3. Component performance (制件性能)

Density / 密度	~4.4g/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	$\geq 7\mu$ m
c. Test standard (检测标准) : Density (密度) : GB/T 3850-2015	
d. Surface roughness (表面粗糙度) : GB/T 40389-2021	

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	1050 $\pm$ 50	1230 $\pm$ 50	7 $\pm$ 3	38 $\pm$ 3
Heat treatment ^f 热处理 ^f	indoor temperature	950 $\pm$ 50	1015 $\pm$ 50	13 $\pm$ 3	35 $\pm$ 3
	400°C	585 $\pm$ 30	700 $\pm$ 30	14 $\pm$ 3	/
e. Test standard(检测标准): GB/T228.1-2015, GB/T228.2-2015, GB/T230.1-2018					
f. Heat treatment process(热处理工艺): Heat treatment process: 800°C hold for 4h, furnace cooling. 热处理工艺: 800°C保温4h, 炉冷					