

MATERIAL CERTIFICATE No: MC-18-0234

Material Description: Ti-6Al-4V grade 23 powder
Size: 15-53 μm
Specification: ASTM B348, grade 23 & ASTM F136

Lot #: 18-E296/15-53
Laboratory No: 18-1575

POWDER COMPOSITION (weight percent)					
Element	ASTM B348, grade 23	ASTM F136	Measured	Testing method	Status
Carbon, max.	0.08	0.08	0.02	ASTM E1941	Conforming
Oxygen, max.	0.13	0.13	0.09	ASTM E1409	Conforming
Nitrogen, max.	0.03	0.05	0.01	ASTM E1409	Conforming
Hydrogen, max.	0.0125	0.012	0.0058	ASTM E1447	Conforming
Iron, max.	0.25	0.25	0.21	ASTM E2371	Conforming
Aluminum, range	5.5 - 6.5	5.5 - 6.50	6.48	ASTM E2371	Conforming
Vanadium, range	3.5 - 4.5	3.5 - 4.5	3.9	ASTM E2371	Conforming
Other each, max.	0.1	Not specified	< 0.1	ASTM E2371	Conforming
Other total, max.	0.4	Not specified	< 0.4	ASTM E2371	Conforming
Titanium	Balance	Balance	Balance	ASTM E2371	Conforming

Chemical analysis laboratory: Luvak Inc. (722 Main Street, P.O. Box 597, Boylston MA, 01505). Report 0-84164-A

POWDER CHARACTERIZATION			
Description	Required	Measured	Status / Comments
Particle size distribution per ASTM B214			
Particle Size (μm)	% By Mass	% By Mass	
> 53	Max. 5.0	4.1	Conforming
\leq 53	Min. 95.0	95.9	Conforming
Particle size distribution per ASTM B822 (Coulter® LS Particle Size Analyzer)			
D ₁₀	Not specified	18 μm	NA
D ₅₀	Not specified	36 μm	NA
D ₉₀	Not specified	52 μm	NA
< 15 μm	Not specified	5 % by volume	NA
Flow Rate per ASTM B964 (Carney Flowmeter)			
Flow Rate (sec. for 50 g)	Not specified	Not flowing	NA
Apparent Density per ASTM B417 (Carney Flowmeter)			
Apparent Density (g/cm^3)	Not specified	2.45	NA

Analyses were done by AP&C at their location and reported results are rounded following ASTM E29.

We hereby certify that the above values conform to the requirements of ASTM B348, grade 23 & ASTM F136.

2018-03-27
Date

Catherine Lavoie


Quality department