oerlikon
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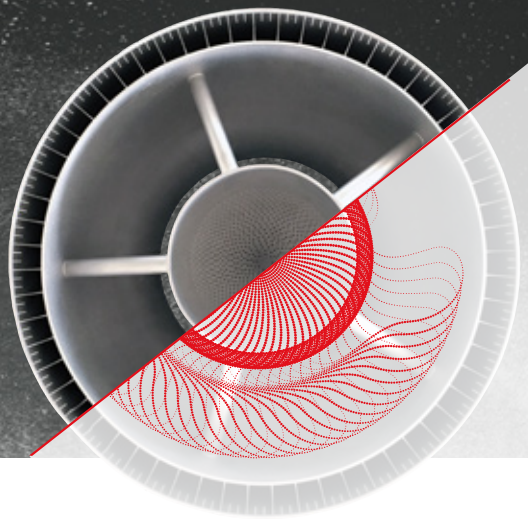
Additive Manufacturing

Ti-6Al-4V Grades 5 and 23 (ELI)



Designed for Processing in Laser Powder Bed Fusion (PBF-LB), Electron Beam Powder Bed Fusion (PBF-EB) or Directed Energy Deposition (DED) Systems

MetcoAdd™ Ti64 is a family of alpha-beta Ti-6Al-4V powders with chemistry per ASTM B348 Grades 5 or 23 (ELI). The powder has been manufactured from bar stock using an EIGA process which ensures alloy powder with high purity and spherical morphology. These alloys are known for high strength to weight ratio and excellent corrosion resistance.

Room temperature static properties of PBF-LB processed and heat treated material coupons have been shown to be comparable to those of ASTM F2924 and F3001 for respective Grades.

For reference purposes Oerlikon has processed MetcoAdd Ti64 G5-B and G23-A using PBF-LB with default parameters and 60 µm layer thickness to provide data below. Parameters for Ti-64 G23-E may be developed to enable use in the PBF-EB or DED processes.

Applications

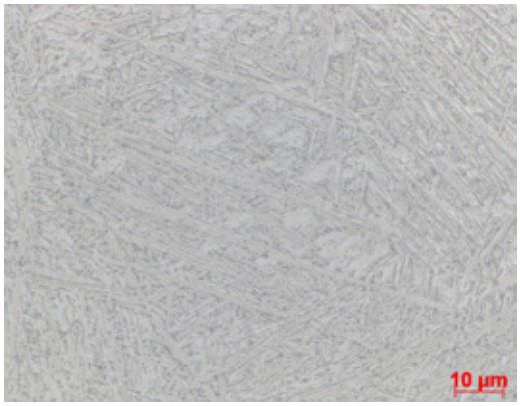
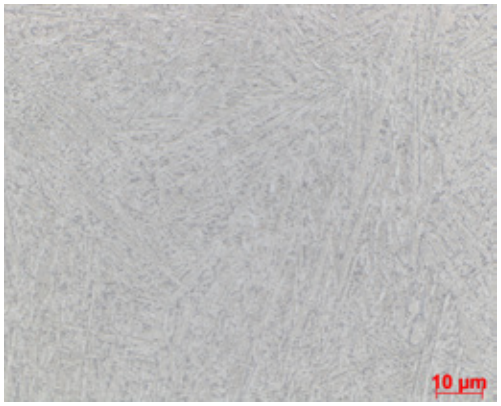
- Aerospace and defense
- Automotive and racing
- Medical and dental
- Maritime
- High-end sports equipment
- Jewelry and art

Typical Post Heat Treatment Properties (Ti-64 G5-B, Ti-64 G23-A) [1] [2] [3]

	G5-B, EOS M290	G23-A, EOS M290	Test Method
Ultimate Tensile Strength (MPa), XY/Z	1075±5 / 1089±4	996±8 / 1008±9	ASTM E8
Yield Strength (MPa), XY/Z	972±4 / 1006±5	889±6 / 992±15	
Elongation at break (%), XY/Z	15±0.5 / 17±1	17±0.4 / 17.5±0.4	
Hardness HRC	36	34	ASTM E384-17
Density, g/cc	4.3	4.3	Archimedes

[1] Disclaimer: All data published in this datasheet has been shared for reference purposes only and is not sufficient to design or certify parts. No warranty or guarantee is made against these results.
[2] Bounds are based on one standard deviation of each population with ten samples per orientation. Test specimens were 6.35 mm diameter round bars machined from coupons 75×13×75mm (x,y,z). Direction XY data is an average of both X and Y horizontal build orientations.
[3] Vacuum Heat Treatment of all Ti-6Al-4V batches shall be conducted in accordance to AMS 2801, under vacuum (1.3x10-3 to 1.3x10-5 mbar) at a temperature of 800±10°C; hold at temperature for 2 hours ± 30 minutes, followed by cooling under inert argon atmosphere at a rate equivalent to air cool or faster

Post Heat Treatment Microstructure (×100 magnification, Vertical Build Direction)

	MetcoAdd Ti64 G23-A (100×, Etched)	MetcoAdd Ti64 G5-B (100×, Etched)
MetcoAdd Ti-64 G23-A MetcoAdd Ti-64 G5-B		

Chemical Composition

	Weight percentage (nominal)										
	Ti	Al	V	O_2	N_2	C	H_2	Fe	Y	other elements each	total all others
MetcoAdd Ti64 G23-A	Balance	5.5–6.5	3.5–4.5	<0.13	≤0.05	≤0.08	≤0.015	≤0.25	≤0.005	≤0.10	≤0.40
MetcoAdd Ti64 G23-E	Balance	5.5–6.5	3.5–4.5	<0.13	≤0.05	≤0.08	≤0.015	≤0.25	≤0.005	≤0.10	≤0.40
MetcoAdd Ti64 G5-B	Balance	5.5–6.75	3.5–4.5	≤0.20	≤0.05	≤0.08	≤0.015	≤0.40	≤0.005	≤0.10	≤0.40

Particle Size Distribution

	Nominal Range [µm]	D90 [µm]	D50 [µm]	D10 [µm]
MetcoAdd Ti64 G23-A	-45+15	50	32	18
MetcoAdd Ti64 G23-E	-106+45	—	—	—
MetcoAdd Ti64 G5-B	-63+20	60	43	25

For the nominal range, particle size analysis 45 µm or above measured by sieve (ASTM B214), analysis below 45 µm by laser diffraction (ASTM C 1070, Microtrac).
Fractional analysis (D90, D50, D10) are nominal values by laser diffraction.

Product Information

Classification	Alpha-beta alloys, Titanium Base
Chemistry	Ti-6Al-4V
Manufacture	EIGA (Electrode Induction Melting Gas Atomization)
Morphology	Spherical
Apparent Density	>2.0 g/cm³ (typical)
Process	Laser Powder Bed Fusion (PBF-LB), Electron Beam Powder Bed Fusion (PBF-EB), Directed Energy Deposition (DED)
Safety Data Sheet	Ti64 G23-A: 50-2100 Ti64 G23-E: 50-2106 Ti64 G5-B: 50-2100 www.oerlikon.com/metco
Package size	2.5 kg/5.5 lb approx. (stock)
Distribution	Global; See export control requirements
Order No.	Ti64 G23-A: 1315894 Ti64 G23-E: 1315895 Ti64 G5-B: 1315896

Usage Recommendations

- Blend and dry contents prior to use to prevent segregation and flowability issue
- Keep in the original container, or an approved alternative, tightly closed when not in use
- Powder from previously opened containers should be stored in a humidity-controlled environment

Export Control

MetcoAdd Ti-6Al-4V powder and printed products are subject to the U.S. Export Administration Regulation (EAR). These products are classified as ECCN 1C002.b.3 with NS Column 2, NP Column 1, AT Column 1 controls within the regulation. All shipments of MetcoAdd Ti-6Al-4V powder and printed products outside of the United States, in any quantity, may require an export license through BIS (Bureau of Industry and Security, U.S. Department of Commerce). Complete information regarding licensing requirements and policies, as well as the full EAR text, can be found at www.bis.doc.gov.