



Ti6Al4V Grade 23 ELI

Coarse powder 45–106µm

ASTM B348 / ASTM F136 / ASTM F3001

MATERIAL DATA SHEET



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MATERIAL

Nikon SLM Solutions Ti6Al4V Grade 23 offers an excellent strength-to-density ratio and corrosion resistance, making it widely used across industries. However, it can be costlier than other alloys. By shifting the particle size distribution to a coarse range (45–106 μm), significant economic and operational benefits are achieved. Coarse Ti6Al4V Grade 23 powder is more affordable than standard 20–63 μm powder yet delivers comparable mechanical properties, ideal for cost-sensitive applications. Its lower surface area improves recycling robustness, reducing degradation and enhancing sustainability. These advantages make coarse Ti6Al4V Grade 23 powder a smart choice for industries seeking both performance and cost efficiency.

CHEMICAL COMPOSITION

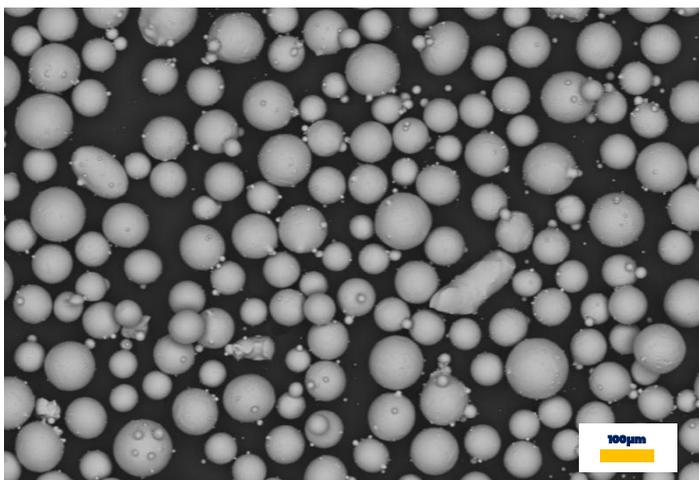
ASTM B348 ¹											
	Ti	Al	V	Fe	O	C	N	H	Y	Total each	Total others
Min.	Bal.	5.50	3.50								
Max.	Bal.	6.50	4.50	0.25	0.13	0.08	0.03	0.0125	-	0.10	0.40

ASTM F136 ¹											
	Ti	Al	V	Fe	O	C	N	H	Y	Total each	Total others
Min.	Bal.	5.50	3.50								
Max.	Bal.	6.50	4.50	0.25	0.13	0.08	0.05	0.012	-	-	-

ASTM F3001 ¹											
	Ti	Al	V	Fe	O	C	N	H	Y	Total each	Total others
Min.	Bal.	5.50	3.50								
Max.	Bal.	6.50	4.50	0.25	0.13	0.08	0.05	0.012	0.005	0.10	0.40

POWDER PROPERTIES

- Particle Size¹ 45 - 106 μm
- Mass Density² ≈ 4.43 g/cm³
- Particle Shape^{3,4} Spherical, typical batch morphology displayed below



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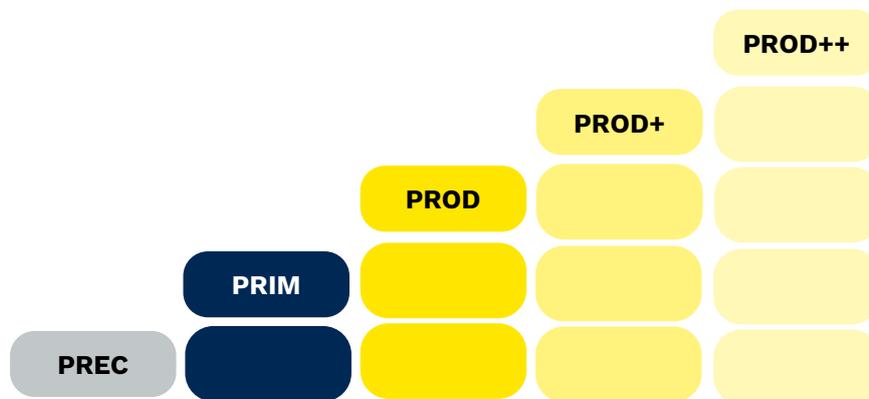
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NIKON SLM® PARAMETERS

It only takes 3 tools to make you successful with metal additive manufacturing:

1. The **NIKON SLM® machine** fitting your needs,
2. The **metal powder** that defines the later purpose and functionality of a part,
3. Precisely engineered **NIKON SLM® parameters** as the missing link.

Our open parameters are the result of our vast experience in multi-laser technology and a diligent development and qualification procedure. They are key to produce fully functional parts with properties you can expect and rely on – whether you are new to AM or a large-scale production operator. We offer them to you in the following categories: **Precision (PREC)** for high-resolution complex details, **Prime (PRIM)** for balanced properties with improved productivity and **Productivity (PROD)** for the highest build rates. Pushing boundaries is in our work culture, we can also offer a new dimension of productivity on selected materials with **Productivity+ (PROD+)** and **Productivity++ (PROD++)** parameters.



MATERIAL QUALIFICATION

As one of the inventors of the selective laser melting process, we impose the most comprehensive test procedures on ourselves: hundreds of samples, multiple systems, various powder batches, numerous heat-treatments, machined vs. near-net-shape tensile specimens, several surface roughness conditions and angles, fatigue behavior, corrosion investigation, creep testing... Did we miss anything? Get in touch with us!

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SLM® 500 PRODUCTIVITY

Parameter Set	Ti6Al4V G23_45_106_SLM500_PROD_MBP3_V1 (90 µm)
Machine Compatibility	SLM®500 (700 W)
Validated Data Preparation	Materialise SLM Build Processor
Theoretical System Build Rate ⁵	220 cm ³ /h (Quad)
Minimum Relative Density ^{6,8}	99.9 %

MECHANICAL PROPERTIES⁷

M: Mean | MIN: Minimum (95 % population coverage / 95 % confidence level)⁸

Non-heat-treated

	Tensile strength R _m [MPa]		Yield strength R _{p0.2} [MPa]		Elongation at break A [%]	
	M	MIN	M	MIN	M	MIN
Machined						
Horizontal	1205	1180	1080	1040	7	5
Vertical	1190	1155	1095	1060	9	7
Near-Net-Shape						
Vertical	1145	1120	1010	985	7	4

HARDNESS⁹

M: Mean | MIN: Minimum (95 % population coverage / 95 % confidence level)⁸

	Vickers hardness HV10	
	M	MIN
As built	357	347

SURFACE ROUGHNESS¹⁰

M: Mean | MAX: Maximum (95 % population coverage / 95 % confidence level)⁸

	Roughness average Ra [µm]		Mean roughness depth Rz [µm]	
	M	MAX	M	MAX
As built	15	22	94	57

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DISCLAIMER

The properties and mechanical characteristics apply to powder that is tested and sold by Nikon SLM Solutions, and that has been processed on Nikon SLM Solutions machines using the original Nikon SLM Solutions parameters in compliance with the applicable operating instructions (including installation conditions and maintenance). The part properties are determined based on specified procedures. More details about the procedures used by Nikon SLM Solutions are available upon request.

The specifications correspond to the most recent knowledge and experience available to us at the time of publication and do not form a sufficient basis for component design on their own. Certain properties of products or parts or the suitability of products or parts for specific applications are not guaranteed. The manufacturer of the products or parts is responsible for the qualified verification of the properties and their suitability for specific applications. The manufacturer of the products or parts is responsible for protecting any third-party proprietary rights as well as existing laws and regulations.

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NOTES

¹ With respect to powder material. Compositions stated as mass or weight percent.

² Material density varies within the range of possible chemical composition variations.

³ According to DIN EN ISO 3252:2023.

⁴ Secondary Electron Image of a typical powder batch

⁵ Theoretical system build rate = layer thickness x scan speed x hatch distance x number of lasers. The value represents a comparable indicator but remains a theoretical value after all. It does expressively not reflect true build rates, which are influenced by part geometry, ratio between hatch and contour areas, area of exposure, recoating times, and more.

⁶ Optical density determination at test specimens by light microscopy according to internal specification. Relative density may vary depending on part geometry, orientation, volume, and other process factors. Population coverage: 99 %, confidence level: 99 %.

⁷ Tensile testing was performed in accordance to DIN EN ISO 6892-1:2020 B and conducted at room temperature. Samples are either machined before testing or tested in near-net-shape without any surface finishing (geometry according to DIN 50125:2022-08 D6x30 and DIN 50125:2022-08 C6x30). Values include overlap samples, i.e. multiple lasers work simultaneously on one specimen. All data is derived from standardized Nikon SLM Solutions qualification jobs. Samples are built out of both virgin powder as well as used powder.

⁸ Minimum and maximum values are set by using tolerance interval method, which is a statistical approach based on the input of population coverage (PC) and confidence level (CL). Tolerance intervals ensure that a certain percentage of samples within a batch will be above the minimum or maximum value with a certain probability, e.g. the probability that 95 % of all samples will be above or below the stated minimum or maximum value (within a defined batch and tested according to mentioned specifications) is 95 %.

⁹ Hardness testing according to DIN EN ISO 6507-1:2024. Measurement direction "2" according to VDI 3405 2.1. Values include overlap samples, i.e. multiple lasers work simultaneously on one specimen. All data is derived from standardized Nikon SLM Solutions qualification jobs. Samples are built out of both virgin powder as well as used powder.

¹⁰ Roughness measurement on vertical walls according to DIN EN ISO 21920-3:2022; $\lambda_c = 2.5$ mm. Glass bead blasting is an additional post-processing step after corundum blasting. Values include overlap samples, i.e. multiple lasers work simultaneously on one specimen. All data is derived from standardized Nikon SLM Solutions qualification jobs. Samples are built out of both virgin powder as well as used powder.