POWERED BY qualloy

MATERIAL DATA SHEET

17-4PH 15-53μm

For Machines: M300 & Larger

2026/09/08

OVERVIEW

17-4 PH stainless steel is a precipitation-hardening martensitic alloy renowned for its 17% chromium and 4% nickel composition, alongside other elements like copper and niobium. This alloy offers a unique blend of high strength, hardness, and toughness, coupled with good corrosion resistance in various environments. Its heat-treatable nature allows for the adjustment of mechanical properties through aging processes, enabling tailored strength levels. Despite its machinability in the annealed state, post-heat treatment machining becomes more challenging due to increased hardness. Welding is feasible, although it may necessitate subsequent heat treatment.

316L stainless steel is widely embraced in the pharmaceutical industry for equipment and storage due to its corrosion resistance and suitability for sterilization processes. It remains a top choice in marine applications, particularly shipbuilding, owing to its durability in harsh saltwater conditions. Additionally, in the food and beverage sector, 316L ensures hygiene standards in the production of tanks, piping systems, and fittings.

POWDER COMPATABILITY

- DIN EN 10088 1.4548 / ASTM A564

Disclaimer: Recommendations are for guidance only and the suitability of the material for any application can only be confirmed upon getting to know the actual service conditions. Continuous development may cause changes in technical data without any prior notice.

CHEMICAL COMPOSITION OF POWDER

Element	Min [wt.%]	Max [wt.%]
C		0,07
Si		0,70
Mn		1,00
P		0,040
S		0,015
Cr	15,0	17,0
Mo		0,60
Ni	3,0	5,0
Cu	3,0	5,0
Nb	0,15	0,45
Fe	Bal.	
O		0,06
N		0,1

POWDER PROPERTIES

PARTICLE SIZE DISTRIBUTION

Parameter	Min [µm]	Max [µm]	Standard
D10	17	23	ISO 13320:2020-01
D50	31	37	ISO 13320:2020-01
D90	51	57	ISO 13320:2020-01

Parameter	Min [%]	Max [%]	Standard
p3 [%] -15µm		5,0	ISO 13320:2020-01

FLOWABILITY AND DENSITIES

Parameter	Min	Max	Standard
Hall flow		20,0 s/50g	ISO 4490
Apparent density	3,9 g/cm³		ISO 3923-1

Disclaimer: Recommendations are for guidance only and the suitability of the material for any application can only be confirmed upon getting to know the actual service conditions. Continuous development may cause changes in technical data without any prior notice.

PROCESS PROPERTIES

M300-500W-A-17-4PH-0.05-EP2.1-HIGH QUALITY BORDER-V1.0

Parameter Information	M300-500W-A-17-4PH-0.05-EP2.1-High Quality Border-V1.0
Layer thickness [µm]	50
Theoretical productivity per laser [CC/hr]	14,85
Minimum Relative Density	> 99.9 %
Machine compatibility	M300, M400, M450, M650, M825, M1250, M1550



Figure 1: Metallographic Sample 17-4PH, 50µm

Disclaimer: Recommendations are for guidance only and the suitability of the material for any application can only be confirmed upon getting to know the actual service conditions. Continuous development may cause changes in technical data without any prior notice.

MECHANICAL PROPERTIES

- The test samples were printed in the EP-M300 with the 50μm process.
- DIN EN ISO 6892-1: 2020-06 B
- DIN 50125:2022-08: B6x30

Test condition	Orientation	Tensile Strength		Yield Strength		Elongation at break		Young's Modulus	
		Rm [MPa]		Rp0.2 [MPa]		A5 [%]		E [GPa]	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
As-built	XY	957	±10	464	±10	29	±5	151	±12
	Z	980	±10	575	±12	26	±5	168	±5

HEAT TREATMENT

The heat treatment process for 17-4 PH stainless steel involves initial solution treatment, heating the material to 1010-1065°C (1850-1950°F) to dissolve its alloying elements, followed by rapid quenching to form a martensitic microstructure. Subsequent aging or precipitation hardening occurs at a lower temperature, typically around 480-620°C (900-1150°F), for a specific duration, which allows the precipitation of fine particles within the material, enhancing its strength and hardness.

Disclaimer: Recommendations are for guidance only and the suitability of the material for any application can only be confirmed upon getting to know the actual service conditions. Continuous development may cause changes in technical data without any prior notice.

DISCLAIMER

All test data has been created with a well-maintained machine with well-maintained powder if machine is operated incorrectly or the feed material is not maintained performance of the material may not be seen.

Alterations to the parameter sets after they have been provided to the customer may also affect the overall performance of the material.

Additional Information:

- All tensile testing carried out to (DIN EN ISO 6892-1: 2020-06 B, DIN 50125:2022-08: B6x30). Orientation Z defined as vertical perpendicular to the build plate. XY orientation defined as Parallel to the plate in the X or Y direction of the top view of the plate.

- All Hardness measurements carried out to standard (ISO 6508-1:2016).

- Theoretical productivity or build rate of each parameter has been calculated using the industry standard methodology. Theoretical productivity = Scan speed x Hatch distance x layer thickness. This provides a standardized value but does not consider application variables which are influenced by part geometry or number of lasers in the system. This is used to enable comparison between system manufacturers.

- All test data collected on systems is transferrable to the machines listed on the capability section of each parameter set. Material performance is achieved within the tolerance bandwidth stated in this document.