MATERIAL DATA SHEET

17-4 PH STAINLESS STEEL

The alloy chemical composition complies with UNS S17400 and AMS 5604

General Material and Process Specification

17-4 PH is a martensitic precipation hardening stainless steel wih Cr, Ni and Cu as major alloying elements. This material offers excellent mechanical properties when heat-treated. Due to its high strength and relatively good corrosion resistance, it is widely used in a variety of applications such as aerospace, medical, oil and gas, and food industries.

This data sheet specifies the expected mechanical properties and characteristics of this alloy when manufactured on a FormUp 350 system. All data is based on parts built with AddUp standard 60 µm layer thickness parameters, using 15-45 µm spherical powder.

Physical Properties	Results
Density (%)[1]	Typical 99.95
Theoretical density (g/cm³)[2]	7.8

[1] Relative density analysis was carried out using optical microscopy
[2] Values based on literature

Surface Roughness Ra [3,4,5]	As-built	Bead blasted[5]
Vertical surface	5 to 8	4 to 5

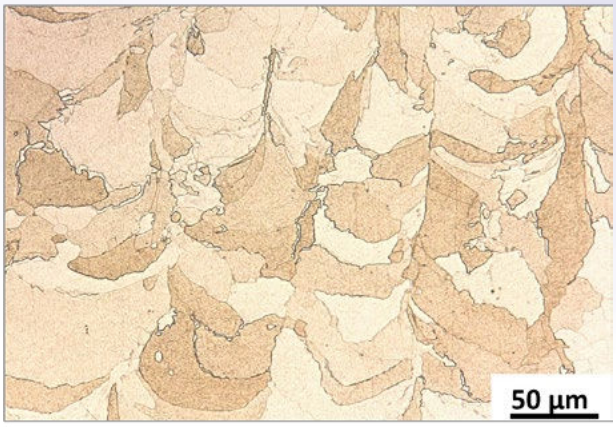
[3] Depends on orientation and testing method
[4] Tested using optical profilometer, cutoff wavelength λc=2.5 mm
[5] Surface treatment performed with glass blasting medium at 4 bar

Mechanical Properties[6]	Test Method	Thermal State: As-built	Thermal State: Heat-treated[7]
Tensile strength (MPa)	ASTM E8		
Horizontal direction (XY)		-	1325±7
Vertical direction (Z)		939±23	1306±16
Yield strength (MPa)	ASTM E8		
Horizontal direction (XY)		-	1207±7
Vertical direction (Z)		825±28	1192±17
Elongation at failure (%)	ASTM E8		
Horizontal direction (XY)		-	14±1
Vertical direction (Z)		18±1	15±1
Reduction of area (%)	ASTM E8		
Horizontal direction (XY)		-	42±2
Vertical direction (Z)		66±3	52±2

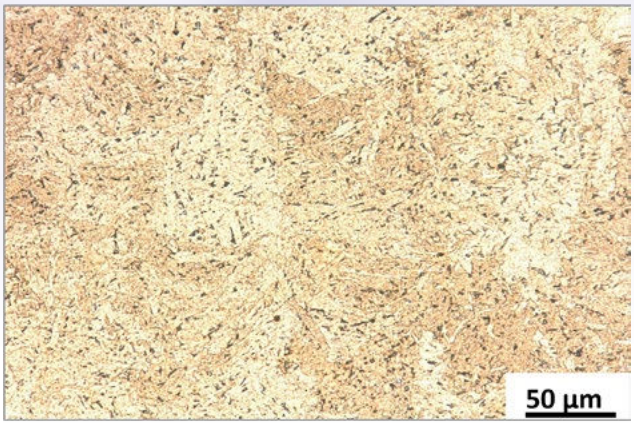
Mechanical Properties[6] (cont.)	Test Method	Thermal State	
		As-built	Heat-treated[7]
Modulus of Elasticity (GPa)	ASTM E8		
Horizontal direction (XY)		-	191±7
Vertical direction (Z)		177±4	191±7
Rockwell hardness (HRC)	ASTM E18		
Horizontal direction (XY)		25±8	44±5
Vertical direction (Z)		30±3	43±3

[6] Tested at ambient temperature to ASTM E8. Machined before testing. Values based on a sample size of a minimum 9 across the build plate
[7] Specimens were solution annealed at 1040°c for 1 hour then hardened at 480°C for 1 hour and air cooled to ambient temperature

Microstructures



As-built



Stress relieved

Generic Data[8]

Thermal and Electrical Properties	Results
Thermal conductivity (W/mk) at 25°C	18 - 23
Melting Range (°C)	1404 -1440
Coefficient of thermal expansion (µm/(m .°C)) at 21 to 93°C	10.8

[8] Based on the literature data

Chemical Composition[9]

Element	Fe	Cr	Ni	Cu	Si	Mn	P	S	Nb+Ta	Other total
Weight (%)	Balance	15-17.5	3.0-5.0	3.0-5.0	≤1.0	≤1.0	≤0.04	≤0.03	0.15-0.45	≤ 0.10

[9] Based on the manufacturer material datasheet

CONNECT WITH US

AddUp SAS
13-33 Rue Verte
ZI de Ladoux, 63118 Cébazat
France
+33 (0)4 73 15 25 00

AddUp Inc
5101 Creek Rd,
Cincinnati, OH 45242
USA
+1 (513) 745-4510

AddUp GmbH
Campus-Boulevard 30
52074 Aachen
Germany
+49 241 4759 8581

AddUp Solutions Pte. Ltd.
2 Cleantech Loop
#04-06 JTC Launchpad
@ Jurong Innovation District
Singapore 637144
+65 6909 9345