

forAM 939® 15-45 VG

Advanced nickel superalloy for additive manufacturing

forAM 939 VG is a vacuum induction melted, argon gas atomized, and spherical powder for additive manufacturing. The strengthening mechanism is a combination of precipitation hardening of gamma prime phases (Ni₃ (AI, Ti)) phases and the carbides, also solid solution strengthening. With a service temperature of up to 700 °C and a good balance of mechanical properties, like fatigue and creep is the forAM 939 a good candidate for high temperature applications like aerospace and land-based gas turbine components with high service temperatures.

Equivalent materials: Ni-SA 939LC

For more information on forAM product line and other of Höganäs products, please contact your local sales representative.



Powder properties

Chemical composition, (typical values)				
Element	Content, %			
Cr	22			
Co	19			
Ti	4			
AI	2			
C	<0.2			
Nb	1			
Та	1.4			
W	1.9			
Ni	Balance			



öganäsAB 10.0kV x250 SE 2021-08-05

Typical powder properties					
Nominal particle range	15-45 µm (max 5% over and under size)	MPIF05, ASTM B214, ISO4497			
Hall flow	15 s/50 g	MPIF03, ASTM B213, ISO4490			
Apparent density	4.1 g/cm ³	MPIF04, ASTM B212, ISO3923/1			

Mechanical properties

Surface condition is machined						
Heat treatment	As printed ⁽¹⁾	Heat Treated ⁽²⁾	HIP ⁽³⁾ URC [®]			
Printed in Z-direction – Build direction						
UTS (MPa)	1,080	1,380	1,430			
YS (MPa)	710	910	960			
Elongation (%)	32	20	16			
IE Notch in Y direction (J)	72	27	19			

Heat treatment	As printed ⁽¹⁾	Heat Treated ⁽²⁾	HIP ⁽³⁾ URC [®]			
Printed in X/Y-direction – Perpendicular						
UTS (MPa)	1,150	1,415	1,460			
YS (MPa)	850	945	1,000			
Elongation (%)	28	21	16			
IE Notch in Z direction (J)	64	19	17			
Hardness (HV10)	350	420	440			

100 µm

As polished



As printed - Build direction



Heat treated - Build direction

(1) No heat treatment

(2) Solutionized at 1,190 °C for 4h followed by fast cooling. Aged at 1,000 °C for 6h followed by fast cooling. Aged at 800 °C for 4h cooled in still Ar to 300 °C followed by forced cooling.
(3) HIP 1,190 °C/150 MPa for 4h followed by URC[®], aged according to (2) under pressure in HIP Quintus QIH21

Standard packaging:

30 kg (6x5 kg, 2.5 L PE bottles packed in cardboard box)

200 kg/500 kg Flexbag

(Other tailored particle sizes and packaging are available under conditions)

