

Material & Process Capability

HASTELLOY-X

HASTELLOY® X alloy (UNS N06002) is widely used in high-temperature and corrosive atmosphere applications. The alloy is commonly used in the hot section of gas turbine engines, and its corrosion resistance makes it an excellent candidate for applications in petrochemical and energy generation applications. HASTELLOY X offers outstanding localized corrosion resistance along with excellent stress corrosion crack resistance. It is easy to weld and fabricate. All data is based on parts built using VELO^{3D} standard 50 µm layer thickness parameters, using Praxair TruForm HXLC, a VELO^{3D}-approved HASTELLOY X powder.

HASTELLOY is a registered trademark of Haynes International, Inc.

General Process Data

Accuracy, Small Parts	±0.050 (±0.002)	mm (in)
Accuracy, Large Parts	±0.2	percent
Minimum Wall Thickness; up to 500:1 aspect ratio	0.200 (0.008)	mm (in)
Typical Volume Rate ¹	60	cc per hr
Density	8.22 (0.297)	g/cc (lbs/in ³)
Relative Density	99.9+	percent
Surface Finish, Sa ²	6 (240)	µm (µin)

Mechanical Properties at Room Temperature

Property ³	As Printed		After Heat Treatment ⁴		After Hot Isostatic Pressing ⁵		
	Mean-3σ/Min	Average	Mean-3σ/Min	Average	Mean-3σ/Min	Average	
Modulus of Elasticity	131 (19)	179 (25.9)	132 (19.1)	227 (32.9)	148 (21.5)	204 (29.5)	GPa (MSI)
Ultimate Tensile Strength	665 (96.4)	674 (97.7)	625 (90.7)	644 (93.5)	643 (93.2)	658 (95.4)	MPa (KSI)
Yield (0.2% Offset)	461 (66.8)	487 (70.6)	320 (46.5)	336 (48.8)	303 (44.0)	323 (46.9)	MPa (KSI)
Elongation At Break	40.0	45.6	52.6	57.8	51	57.7	percent

Notes

1. Geometry-dependent.
2. Depends on orientation and process selected.
3. Mechanical & test samples printed in vertical orientation.
4. Solution annealed at 1177°C for 2 hours followed by rapid air cool.
5. HIP at 1177°C & 14.5 KSI for 3-5 hrs, followed by cooling at 150-200°C/min, processed at Quintus Technologies.