

Material Information



Stainless Steel 316L

Introduction

Stainless Steel 316L is an austenitic stainless steel known for its excellent corrosion resistance, good ductility, and reliable mechanical properties. In metal Binder Jetting, 316L stainless steel powder is selectively bonded layer by layer and then undergoes debinding and sintering to form the final metal part. Its combination of corrosion resistance, strength, and ductility makes it suitable for functional components, complex metal parts, and production applications.

Advantages

Excellent corrosion resistance. Good ductility and elongation. Good mechanical strength. Non-magnetic in the annealed condition. Suitable for complex geometries and internal features. Well suited for batch production with Binder Jetting.

Disadvantages

Parts undergo dimensional shrinkage during sintering, which must be considered during part design and process preparation. Printed green parts are relatively fragile before sintering and require careful handling during depowdering and debinding. Surface roughness and dimensional accuracy may also require post-processing depending on the application.

Tolerance

±300µm or 0.3%

Recommendation

Stainless Steel 316L is recommended for functional parts and prototypes that require good corrosion resistance, ductility, and reliable mechanical performance. It is particularly suitable for industrial components, automotive parts, medical components, consumer products, jewelry, and other applications where complex geometries and batch production are important.

Material Specifications		
Ultimate tensile strength (MPa)	ASTM E8	µ=583 (min=575)
Yield strength (MPa)	ASTM E8	µ=242 (min=206)

Elongation (%)	ASTM E8	μ =60% (min=58%)
Elastic modulus (GPa)	ASTM E8	μ =225
Surface roughness (Ra)	/	4–6 μ m
Hardness (HRB)	ASTM E18	μ =68 (min=65)
Density (g/cc)	ASTM B311	μ =7.83 (min=7.79)
Density (%)	/	$\geq$ 96%–98%

Attention

Although 316L is highly corrosion-resistant and ductile, metal Binder Jetting involves debinding and sintering, which can cause dimensional shrinkage and potential distortion. We recommend carefully considering the selected Binder Jetting process, part geometry, wall thickness, feature size, and sintering requirements when designing 316L stainless steel components.

Applications

3DSPRO finds people using Stainless Steel 316L to make functional parts and prototypes in the following industries and applications.

Industrial:

Machine components, brackets, housings, fixtures, tooling components, and other complex functional parts.

Automotive:

Automotive components, brackets, housings, fluid-handling components, and other production-oriented metal parts.

Medical:

Medical device components, surgical instrument components, and other parts requiring corrosion resistance and biocompatibility considerations where applicable.

Consumer Products:

Functional consumer-product components, hardware, customized metal parts, and decorative components.

Jewelry:

Detailed jewelry components, pendants, decorative accessories, and other complex metal designs.