CARPENTER ADDITIVE®

DATASHEET

PowderRange 939W

Type analysis

Single figures are maximum except where noted.

Nickel	Balance	**Chromium**	22.0–23.0 %	**Cobalt**	18.0–20.0 %
Titanium	3.00–4.50 %	**Aluminum**	1.00–3.00 %	**Tungsten**	1.00–3.00 %
Tantalum	1.00–1.80 %	**Niobium**	0.50–1.50 %	**Manganese**	0.50 %
Silicon	0.50 %	**Carbon**	0.15 %	**Zirconium**	0.10 %
Boron	0.01 %				

Forms manufactured

Powder

Description

PowderRange 939W is a high-temperature alloy with excellent strength and wear resistance properties at high temperature. This is an additive manufacturing variant of cast alloy IN939, typically used in hot gas path components inside gas turbines, for example, vanes, blades, and shrouds. 939W has high resistance to both high-temperature oxidation and corrosion, as well as good high temperature mechanical properties, such as creep resistance and thermally induced, low cycle fatigue. The alloy may also be hardened using precipitation-hardening heat treatments.

Key Properties:

- High-temperature tensile strength
- High-temperature wear resistance
- High-temperature oxidation resistance
- High-temperature corrosion resistance

Markets:

- Aerospace
- Energy
- Industrial

Applications:

- Engine components
- Hot gas path turbine components

> PowderRange 939W

Powder properties

CATEGORY	Product Properties
PART NUMBER	PowderRange 939W F
APPLICATION	L-PBF[1]
MAXIMUM PARTICLE SIZE	Max 1 wt% > 53 µm[2]
MINIMUM PARTICLE SIZE	Max 10 vol% < 15 µm[3]
LSD PERCENTILE	D10, D50, D90[3], reported
ATOMIZATION	Vacuum Induction Melted, Argon Gas Atomized
APPARENT DENSITY (G/CM³)	Measured according to ASTM B212[4] and reported
HALL FLOW (S/50G)	Measured according to ASTM B213[5] and reported

[1] ASTM/ISO 52900: Laser—Powder Bed Fusion (L-PBF), Electron-Beam Powder Bed Fusion (EB-PBF), Directed Energy Deposition (DED)
[2] ASTM B214 Standard Test Method for Sieve Analysis for Metal Powders
[3] ASTM B822 Standard Test Method for Particle Size Distribution of Metal Powders and Related Compounds by Light Scattering
[4] ASTM B212 Standard Test Method for Apparent Density of Free-Flowing Metal Powders Using the Hall Flowmeter Funnel
[5] ASTM B213 Standard Test Method for Flow Rate of Metal Powders Using the Hall Flowmeter Funnel
Testing of powder will fulfill certification requirements to Nadcap Materials Testing and ISO/IEC 17025 Chemical, per relevant ASTM procedures

Similar materials

COMPANY	ALTERNATIVE TITLE
Other generic names	CM 939 Weldable
3D Systems	—
GE Additive (Concept Laser)	—
EOS	Nickel Alloy IN939
DMG Mori (Realizer)	—
Renishaw	—
SLM Solutions	Ni-Alloy IN939

For additional information, please contact your nearest sales office:
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The mechanical and physical properties of any additively-manufactured material are strongly dependent on the processing conditions used to produce the final part. Significantly differing properties can be obtained by utilizing different equipment, different process parameters, different build rates and different geometries. The properties listed are intended as a guide only and should not be used as design data.

The information and data presented herein are typical or average values and are not a guarantee of maximum or minimum values. Applications specifically suggested for material described herein are made solely for the purpose of illustration to enable the reader to make his/her own evaluation and are not intended as warranties, either express or implied, of fitness for these or other purposes. There is no representation that the recipient of this literature will receive updated editions as they become available.

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