AUBERT&DUVAL

STELLAR
Metal powders by AUBERT & DUVAL

Stellar Ni625

Powder for Additive Manufacturing

MATERIAL OVERVIEW

Stellar Ni625 is a Nickel-based superalloy with:

- Very good resistance to oxidation
- Good creep properties and ductility until 900°C
- Excellent corrosion resistance
- Good low temperature toughness.

STANDARDS

- European standards
  - 22Mo9Nb
  - 2.4856
- US Standards
  - UNS N06625
  - ASTM F3056

KEY PROPERTIES

Property	Unit	20°C	600°C
Density	g/cm^3	8.4	8.3
Thermal conductivity	W/(m*K)	9.7	18.1
Thermal expansion	10^{-6} K^{-1}	13.0	14.4

[2] Source: data sheet (by conventional metallurgy)
https://www.aubertduval.com/wp-media/uploads/sites/2/2017/06/PER625_FR.pdf

CHEMICAL COMPOSITION

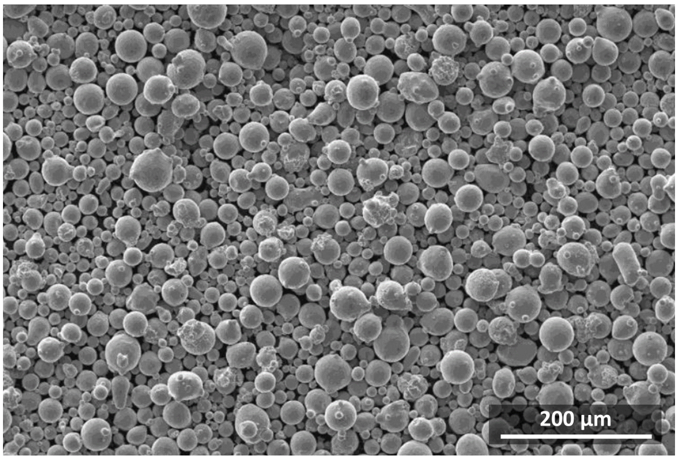
	Ni	Cr	Mo	Nb	Fe	Mn	Si	Ti
Mini	Bal.	20.00	8.00	3.15	-	-	-	-
Maxi		23.00	10.00	4.15	5.00	0.50	0.50	0.40

	Al	Co	C	O	N	P	S
Mini	-	-	-	-	-	-	-
Maxi	0.40	0.10	0.10	0.03	0.03	0.015	0.015

POWDER CHARACTERISTICS

Particle size distributions:

Laser Powder Bed Fusion (LPBF): 15-53 µm
Electron Beam Melting (EBM): 45-106 µm
Directed Energy Deposition (DED): 45-106 µm
Custom size distributions available on request



Stellar Ni625 is developed for VIM gas atomization and available for R&T and full production.
Typical powder morphology.

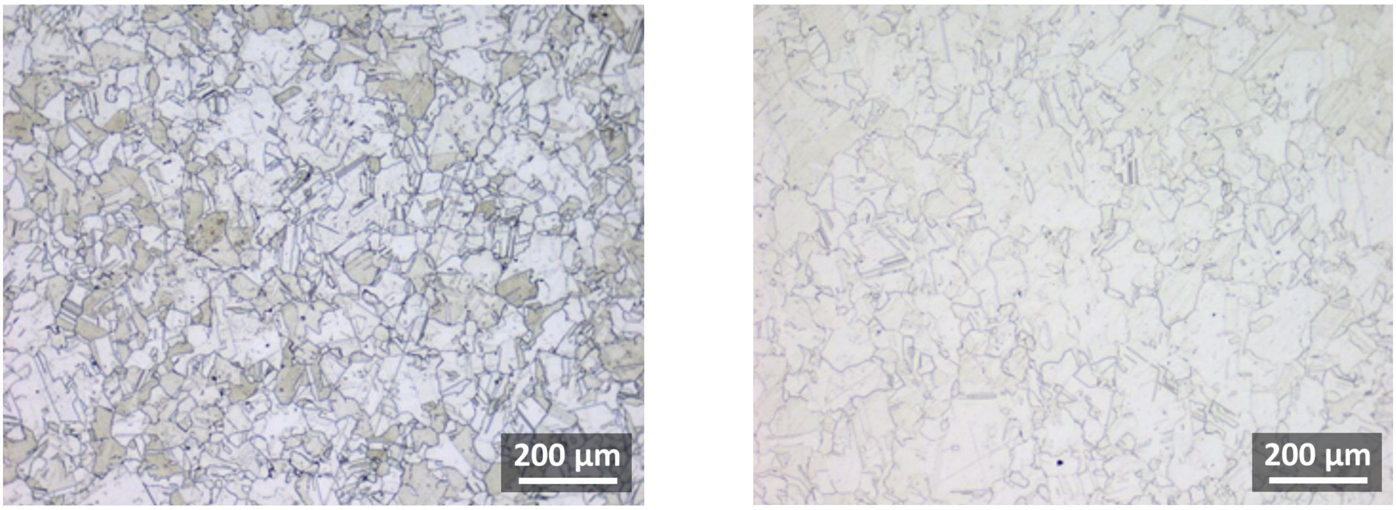
PDS_231025_Ni625-Stellar_EN_V2

Contact: powder@aubertduval.com / www.aubertduval.com

CASE STUDY: Ni625 HIP

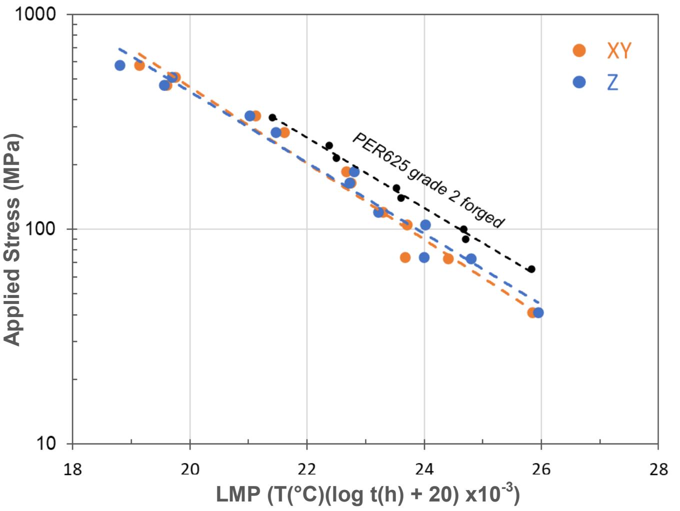
PRINTABILITY & MICROSTRUCTURE AFTER HEAT TREATMENT

Excellent metallurgical health after SLM process and HIP with Stellar Ni625 powders (Reference EOS M400-4, 625 standard parameters, layer thickness: 40µm). No preheating of the base plate needed for production. No cracks observed after building the sample.



Microstructure for Stellar Ni625 obtained after HIP at 1160°C 1020 bars 3h.
Etching made using Kalling reagent (left) and MAC4 reagent (right).

STRESS RUPTURE PROPERTIES



Stress rupture properties of additively manufactured Stellar Ni625 after HIP. Tested in accordance to ISO 204. Larson Miller Parameter evaluated with Temperature (T) in Celsius and Time (t) in hours.

CORROSION RESISTANCE

Thermal treatment	Orientation	Corrosion rate (mm/year)
HIP 1160°C	XY	0.3
1020 bars 3h	Z	0.3

Intergranular corrosion in ferric sulfate according to ASTM G28 for Stellar Ni625 after HIP in the two directions: XY and Z.

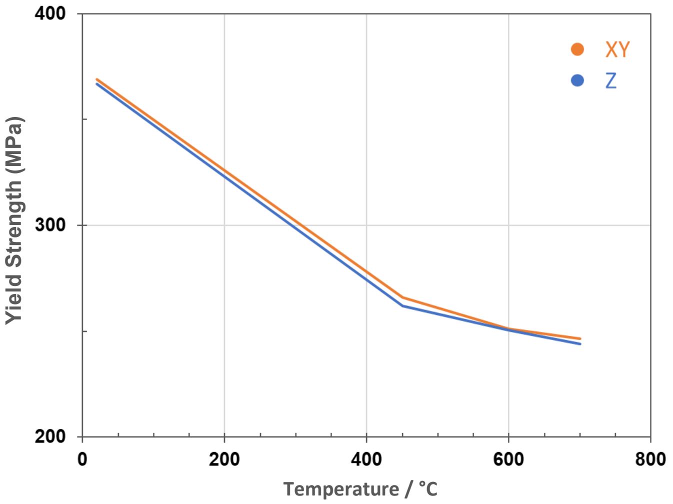
CHARPY V

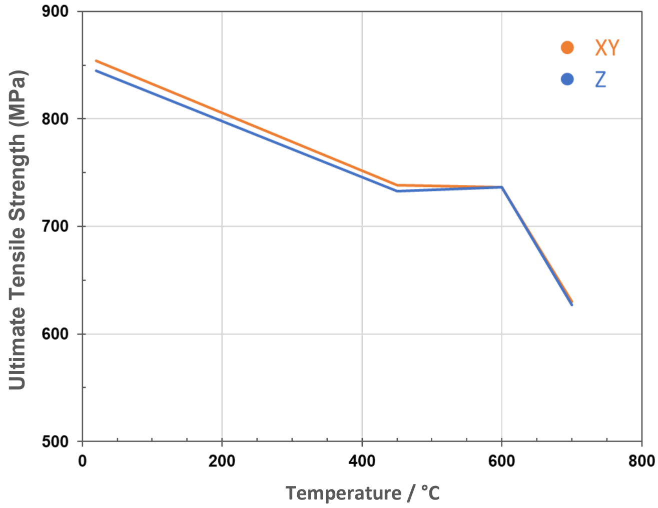
Thermal treatment	Orientation	KCV moy (J/cm^2)
HIP 1160°C	XY	243
1020 bars 3h	Z	254

Resilience test according to ISO 1481 for Stellar Ni625 after HIP in the two directions: XY and Z.

PDS_231025_Ni625-Stellar_EN_V2

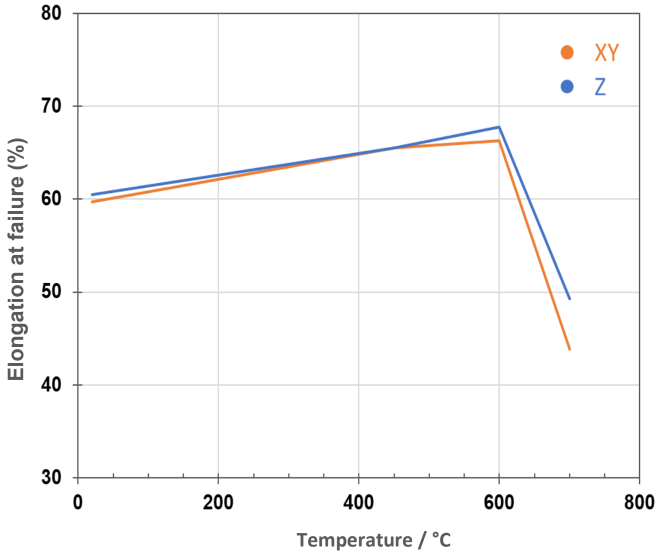
TENSILE PROPERTIES

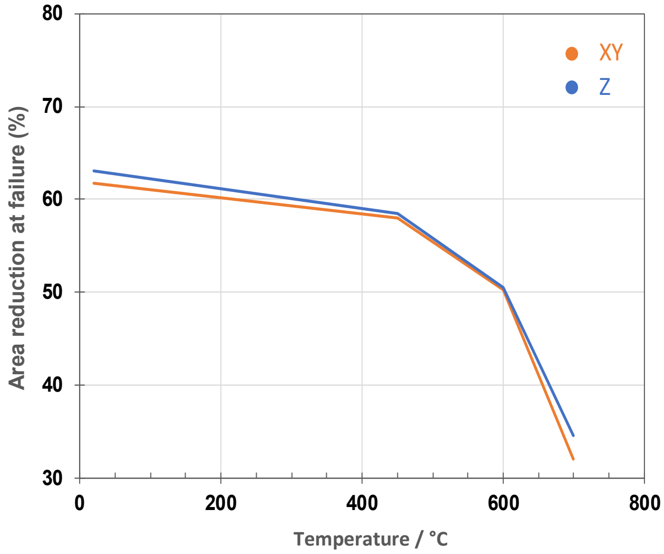




Tensile properties of additively manufactured Stellar Ni625 after HIP treatment. Properties evaluated at a strain rate of $10^{-4}\,s^{-1}$, all other test conditions in accordance to NF EN 2002-1 and NF EN 2002-2. Yield Strength (YS) shown is Rp0.2% stress, Ultimate Tensile Strength (UTS) is stress at maximum force.

TENSILE DUCTILITY & REDUCTION OF AREA





Tensile properties of additively manufactured Stellar Ni625 after HIP treatment. Properties evaluated at a strain rate of $10^{-4}\,s^{-1}$, all other test conditions in accordance to NF EN 2002-1 and NF EN 2002-2. Elongation and area reduction were measured after failure as per the standards.

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