VDM Metals

A company of ACERINOX

VDM® Powder 738LC

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VDM® Powder 738LC

VDM® Powder 738LC is the low carbon powder variant of a precipitation hardenable nickel-base alloy for use in additive manufacturing. The alloy is strengthened mainly through the precipitation of γ'-phase with Ni_3(Al, Ti).

VDM® Powder 738LC is characterized by:

- spherical particles with low level of satellites
- high purity and reproducibility level
- low oxygen content
- small amount of porosity
- good flowability
- high apparent and tap density

Designations and standards

Standard	Material designation
SAE AMS	5410 C*

Table 1 – Designations and standards, *only chemical analysis except Zr.

Chemical composition

	Ni	C	Cr	Co	Mo	W	Ta	Nb	Al	Ti	B	Zr	Fe	Mn	Si	S	N	O
min.	Bal.	0.09	15.70	3.00	1.50	2.40	1.50	0.60	3.20	3.20	0.007	0.01						
max.		0.13	16.30	9.00	2.00	2.80	2.00	1.10	3.70	3.70	0.012	0.08	0.10	0.02	0.30	0.015	0.02	0.03

Table 2 – Chemical composition (%)

Depending on the use conditions, stricter analysis limits apply to certain alloy elements.

Physical properties

Particle size distribution [µm]	Flowability		Apparent density		Tap density
	ASTM B213	ASTM B964	ASTM B212	ASTM B417	ASTM B527
15-53	●	●	●	●	●

● the test can be performed

Table 3 – Selection of possible testing methods

Standard inspection certificate contains particle size distribution and chemical analysis. Additional tests can be performed on request.

Density	Melting range
8.11 g/cm^3 at 20 °C	1,230-1,315 °C
0.293 lb/in^2 at 68 °F	2,250-2,400° F

Table 4 – Density and melting range of VDM® Alloy 738

Microstructural properties

VDM® Powder 738LC microstructure consists primarily out of a γ-phase matrix and the γ′ intermetallic phase of the form Ni_3Al. The solid solution elements present are chromium, cobalt, tungsten and tantalum; these equally contribute to the structural stability of the alloy. Carbides and borides form the main grain boundary strengtheners.

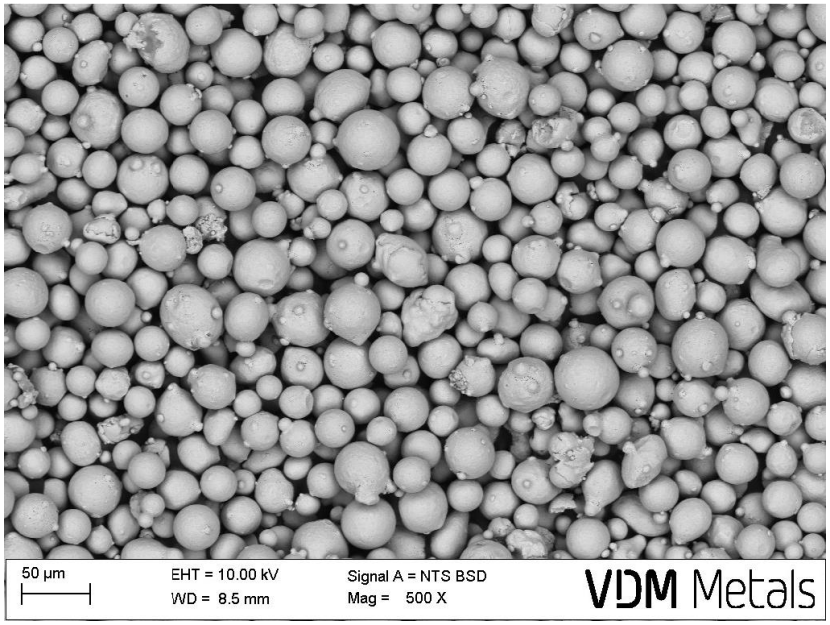

Image 1: Exemplary morphology of VDM® Powder 738LC. Particle size: 15-53µm

Applications

VDM® Powder 738LC can be used for a wide range of processes:

- Laser based additive manufacturing
- Electron beam based additive manufacturing
- Coatings
- Direct energy deposition
- Overlay welding
- Cold and hot isostatic pressing (CIP / HIP)

VDM® Powder 738LC can be used for many demanding applications. Originally, it was developed and used for static and rotating components in aircraft turbines such as housings, mounting elements and turbine blades and vanes because of the excellent oxidation resistance.

Availability

According to the requirements of the powder based processes, VDM® Powder 738LC is available in a wide range of particle fractions from 15 to 250 µm. The typical powder atomization yield ranges from 0.1 to 300 µm. After atomization, the powder is sieved and air classified according to customers specifications. All production and handling operations are carried out under protective atmosphere (argon).

Standard particle fractions

Particle size distribution [µm]	**Fine particle**	**D10** [µm] (tolerance +/-5 µm)	**D50** [µm] (tolerance +/-5 µm)
15-53	<15 µm max. 3%	22	35

Table 6 – Standard particle size distribution

Other powder size range distributions are available on request.
The determination of the PSD is done by laser diffraction according to ASTM B822. Sieve analysis according to ASTM B214 can also be offered on request.

Packaging

The whole production and packaging process at VDM Metals is under argon and the powder has no contact to atmosphere. The standard powder is packed in plastic bags (5 kg/10 kg/20 kg) under argon inside of sealed plastic drums (6l). Other packaging are available on request.

Handling

Please note that powder transportation may result in segregation of particle sizes.
Do not open the container in humid environment.
After contact with air the powder has limited storability.
Humidity can influence the powder properties.

Legal notice

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Disclaimer
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