VDM Metals

VDM® Powder 625

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VDM® Powder 625

VDM® Powder 625 is the powder variant of a nickel-chromium-molybdenum-niobium alloy for use in additive manufacturing with excellent resistance to a variety of corrosive media.

VDM® Powder 625 is characterized by:

- Spherical particles
- High purity
- Low oxygen content

Designations (based on VDM® Alloy 625)

Standard	**Material designation**
EN	2.4856 - NiCr22Mo9Nb
ISO	NC22DNb
UNS	N06625
AFNOR	NC22DNb

Table 1 – Designations

Chemical composition

	Ni	**Cr**	**Fe**	**C**[1)]	**Mn**	**Si**	**Co**	**Al**	**Ti**	**P**	**S**	**Mo**	**Nb + Ta**
Min.	58	21										8	3.2
Max.	71	23	5	0.03	0.5	0.4	1	0.4	0.4	0.01	0.01	10	3.8

1) The chemical analysis may differ slightly in some elements in other specifications and contain additional elements; according to DIN EN 10095 for example, the value for C is 0.03 to 0.10 wt.-% and the value for Cu is 0.50 wt.-% max; UNS specifies C as 0.10 wt-% max. and other elements are also different.

Table 2 – Chemical composition (wt.-%) according to VdTÜV data sheet 499

VDM® Powder 625 contains low amounts of oxygen of up to 0.03%.

Physical properties

Density	Melting range
8.47 g/cm^3 (0.306 lb/in^3)	1,290-1,350 °C (2,354-2,462 °F)

Microstructural properties

VDM® Alloy 625 has a cubic face centered lattice.

Corrosion resistance

The corrosion resistance depends on the processing and heat treatment of the material. The conventionally produced VDM® Alloy 625 usually has excellent corrosion resistance to a variety of corrosive media in the soft annealed condition (grade 1):

- Excellent resistance to pitting and crevice corrosion in chloride-containing media
- Virtual immunity to chloride-induced stress corrosion cracking
- High resistance to corrosion attack by mineral acids such as nitric, phosphoric, sulfuric, and hydrochloric acid; as well as by concentrated alkalis and organic acids, both under oxidizing as reducing conditions
- Very good resistance in seawater and brackish water, even at elevated temperatures
- High resistance to intergranular corrosion after welding and heat treatment
- High resistance to erosion corrosion

In the solution annealed variant VDM® Alloy 625 (grade 2) is usually highly resistant to many corrosive gas atmospheres:

- Good resistance to carburizing and scaling under static and cyclic conditions
- Resistance to nitriding

Applications

The soft annealed version of VDM® Alloy 625 (grade 1) is used in the oil and gas industry, the chemical process industry, marine engineering and environmental engineering. Typical applications include:

- Equipment for the production of super phosphoric acid
- Plants for the treatment of radioactive waste
- Production pipe systems and linings of risers in oil production
- Offshore industry and seawater exposed equipment
- Sea water piping in shipbuilding
- Stress corrosion cracking resistant compensators
- Furnace linings

The solution annealed variant of VDM® Alloy 625 (grade 2) is used for high temperature applications up to 1,000 °C (1,832 °F). Typical applications include:

- Flaring systems in refineries and offshore platforms
- Recuperators and compensators for hot exhaust gases

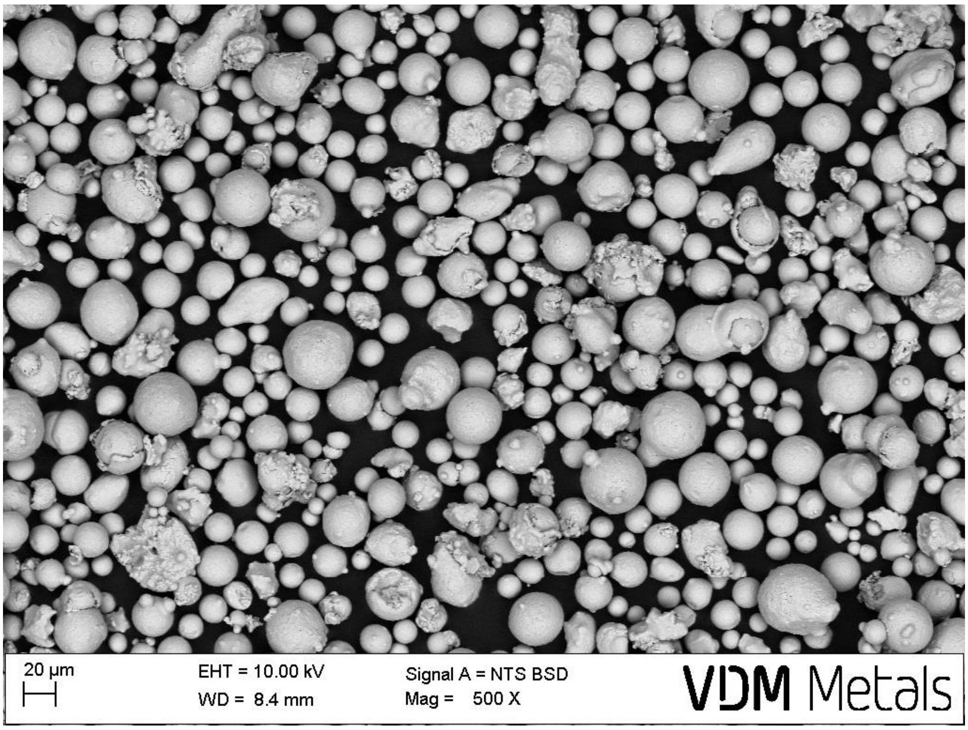
Availability

According to the AM process requirements of our customers, VDM® Powder 625 is available in a wide range of particle fractions from 15 to 250 µm.

Standard particle fractions

Particle size distribution µm	Oxygen content %	Porosity < 10µ (pore area) %
15-53	< 0.03	< 0.5
53-150		

Additional particle fractions are available on request. Please contact us.



The picture shows a typical micrograph of VDM® Powder 625 as an example.

Technical publications

The following articles were published on VDM® Alloy 625:

M. Köhler, U. Heubner: “Time-Temperature - Sensitization and Time-Temperature – Precipitation Behaviour of Alloy 625” in “NACE CORROSION ‘96”, Houston, Texas, 1996, S. 427/1-10.

M. Köhler: “Effect of Elevated-Temperature-Precipitation in Alloy 625 on Properties and Microstructure, Superalloys 718, 625 and Various Derivates”, TMS 1991, S. 363 – 374.

U. Brill, U. Heubner, K. Drehfahl, J. Henrich: „Zeitstandwerte von Hochtemperaturwerkstoffen“, Ingenieurwerkstoffe 3 1991, S. 59 – 62.

U. Brill, U. Heubner, M. Rockel: „Hochtemperaturkorrosion handelsüblicher hochlegierter austenitischer Werkstoffe im geschweißten und ungeschweißten Zustand“, Metall 44 1990, S. 936 – 946.

U. Heubner, M. Köhler: “Effect of Carbon Content and Other Variables on Yield Strength, Ductility and Creep Properties of Alloy 625, Superalloys 718, 625, 706 and Various Derivates”, TMS 1994, S. 479 – 488.

U. Heubner, M. Köhler: „Das Zeit-Temperatur-Ausscheidungs- und das Zeit-Temperatur-Sensibilisierungs-Verhalten von hochkorrosionsbeständigen Nickel-Chrom-Molybdän-Legierungen“, Werkstoffe und Korrosion 43 1992, S. 181 – 190.

Legal notice

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