VDM® Powder 625
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)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Material designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN</td>
<td>2.4856 - NiCr22Mo9Nb</td>
</tr>
<tr>
<td>ISO</td>
<td>NC22DNb</td>
</tr>
<tr>
<td>UNS</td>
<td>N06625</td>
</tr>
<tr>
<td>AFNOR</td>
<td>NC22DNb</td>
</tr>
</tbody>
</table>

Table 1 – Designations

Chemical composition

<table>
<thead>
<tr>
<th></th>
<th>Ni</th>
<th>Cr</th>
<th>Fe</th>
<th>C</th>
<th>Mn</th>
<th>Si</th>
<th>Co</th>
<th>Al</th>
<th>Ti</th>
<th>P</th>
<th>S</th>
<th>Mo</th>
<th>Nb + Ta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>58</td>
<td>21</td>
<td></td>
<td>0.03</td>
<td>0.5</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.01</td>
<td>0.01</td>
<td>8</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>Max</td>
<td>71</td>
<td>23</td>
<td>5</td>
<td>0.03</td>
<td>0.5</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.01</td>
<td>0.01</td>
<td>10</td>
<td>3.8</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Density</th>
<th>Melting range</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.47 g/cm³ (0.306 lb/in³)</td>
<td>1,290-1,350 °C (2,354-2,462 °F)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Particle size distribution (μm)</th>
<th>Oxygen content (%)</th>
<th>Porosity &lt; 10μ (pore area) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-53</td>
<td>&lt; 0.03</td>
<td>&lt; 0.5</td>
</tr>
<tr>
<td>53-150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:


Legal notice

Date of publication
July 31, 2019

Publisher
VDM Metals International GmbH
Plettenberger Straße 2
58791 Werdohl
Germany

Disclaimer
All information contained in this data sheet are based on the results of research and development work carried out by VDM Metals International GmbH, and the data contained in the specifications and standards listed available at the time of printing. The information does not represent a guarantee of specific properties. VDM Metals reserves the right to change information without notice. All information contained in this data sheet is compiled to the best of our knowledge and is provided without liability. Deliveries and services are subject exclusively to the relevant contractual conditions and the General Terms and Conditions issued by VDM Metals International GmbH. Use of the most up-to-date version of this data sheet is the responsibility of the customer.

VDM Metals International GmbH
Plettenberger Straße 2
58791 Werdohl
Germany

Tel +49 (0)2392 55 0
Fax +49 (0)2392 55 22 17
marketing.vdm@vdm-metals.com
www.vdm-metals.com