GENERAL DESCRIPTION
Osprey® Alloy 625-AM is a solution hardened nickel-based alloy for demanding applications with high demand on low concentrations of residual elements, characterized by:
- Extremely good corrosion resistance in widely varying acidic and chloride containing environments
- High strength
- Excellent fabrication properties

Osprey® Alloy 625-AM can be used in a wide range of temperatures from -196°C to 815°C (-321°F to 1500°F). However, it should be noted that prolonged exposure to temperatures above 600°C (1100°F) may lead to embrittlement.

APPLICATIONS
Alloy 625 is an extremely versatile nickel alloy, suitable for use in both oxidizing and reducing acidic environments, such as:
- Hydrochloric acid
- Nitric acid
- Phosphoric acid
- Chloride containing environments

The grade can also be used for a wide range of temperatures from -196°C to 815°C (-321°F to 1500°F). Typical areas of use include hydraulic systems, heat-exchangers and high-temperature applications.
Some industrial examples are:
- High temperature aerospace
- Chemical process industry
- Power industry

STANDARDS
- ASTM: F3056 14e1
- UNS: N06625

CHEMICAL COMPOSITION
Chemical composition (nominal), wt%

<table>
<thead>
<tr>
<th></th>
<th>Ni</th>
<th>Cr</th>
<th>Fe</th>
<th>Mo</th>
<th>Nb + Ta</th>
<th>C</th>
<th>Mn</th>
<th>Si</th>
<th>P</th>
<th>S</th>
<th>Al</th>
<th>Ti</th>
<th>Co</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>58.0 min</td>
<td>20.0-23.0</td>
<td>&lt; 5.0</td>
<td>8.0 – 10.0</td>
<td>3.15–4.15</td>
<td>&lt; 0.10</td>
<td>&lt; 0.50</td>
<td>&lt; 0.50</td>
<td>&lt; 0.015</td>
<td>&lt; 0.015</td>
<td>&lt; 0.40</td>
<td>&lt; 0.40</td>
<td>&lt; 1.0</td>
</tr>
</tbody>
</table>

Powder manufactured by Vacuum Inert Gas Atomisation typically has an oxygen and nitrogen level both < 250ppm
POWDER MORPHOLOGY

The powder morphology of Osprey® Alloy 625-AM powder is typically spherical in morphology.

POWDER SIZE DISTRIBUTION

Available in a range of customised powder sizes suitable for different AM platforms:

- Metal Injection Moulding
  < 32 µm, < 22 µm, < 16 µm, < 10 µm & < 5 µm
- Binder Jet
  <45 µm, <38 µm, <22 µm, <16 µm
- Laser beam - Powder Bed Fusion, (L-PBF)
  e.g. 53 to 15 µm & 45 to 20 µm
- Electron Beam - Powder Bed Fusion, (E-PBF)
  106 to 45 µm
- Direct Energy Deposition (DED)
  150 to 53 µm & 90 to 45 µm

Other powder size range distributions are available by request.

MECHANICAL PROPERTIES

The table below displays typical mechanical properties for Osprey® Alloy 625-AM L-PBF material evaluated in room temperature.

Metric units

<table>
<thead>
<tr>
<th>Condition</th>
<th>Direction</th>
<th>Proof strength</th>
<th>Tensile strength</th>
<th>E-modulus</th>
<th>Elongation</th>
</tr>
</thead>
<tbody>
<tr>
<td>As built</td>
<td>Horizontal</td>
<td>664</td>
<td>891</td>
<td>144</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>420</td>
<td>915</td>
<td>190</td>
<td>46</td>
</tr>
<tr>
<td>Heat Treated</td>
<td>Horizontal</td>
<td>590</td>
<td>945</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vertical</td>
<td>544</td>
<td>842</td>
<td>51</td>
<td></td>
</tr>
</tbody>
</table>

Imperial units

<table>
<thead>
<tr>
<th>Condition</th>
<th>Direction</th>
<th>Proof strength</th>
<th>Tensile strength</th>
<th>E-modulus</th>
<th>Elongation</th>
</tr>
</thead>
<tbody>
<tr>
<td>As built</td>
<td>Horizontal</td>
<td>96</td>
<td>129</td>
<td>21</td>
<td>60</td>
</tr>
</tbody>
</table>
Impact toughness (J) for heat treated Osprey® Alloy 625-AM L-PBF material (1048 °C, 1 Hour, air cooled): 145 J (horizontal) 163 J (vertical)

Typical Vicker’s Hardness levels (ASTM E92, ISO 6507-1, JIS Z2244, GB/T 4340.1), for Osprey® Alloy 625-AM L-PBF material.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Hardness HV 0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>As-Built</td>
<td>299</td>
</tr>
<tr>
<td>Solution Annealed 1)</td>
<td>238</td>
</tr>
<tr>
<td>Solution Annealed 2)</td>
<td>231</td>
</tr>
</tbody>
</table>

1) Heat treated material (1048 °C, 1 Hour, air cooled).
2) Heat treated material (1048 °C, 1 Hour, water cooled).

**PHYSICAL PROPERTIES**

Wrought material data:

- Density: 8.44 g/cm³, 0.30 lb/in³
- Thermal conductivity: 9.2 W/mK to 10.7 W/mK
- Coefficient of thermal expansion: 12.8 10⁻⁶ K⁻¹
- Melting point: 1290°C to 1350°C (2354°F to 2462°F)

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Disclaimer: Data and recommendations are provided for information and guidance only, and the performance or suitability of the material for specific applications are not warranted or guaranteed. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Sandvik materials.