

Datasheet Duplex stainless steels



Osprey<sup>®</sup> 2507 is a super-duplex stainless steel with excellent resistance to SCC and very high resistance to pitting and crevice corrosion. It has high resistance to general corrosion and very high mechanical strength.



## **Product description**

Osprey<sup>®</sup> 2507 is a super-duplex (austenitic-ferritic) stainless steel characterized by excellent resistance to stress corrosion cracking (SCC), very high resistance to pitting and crevice corrosion, high resistance to general corrosion and very high mechanical strength.



#### Main characteristics of Osprey<sup>®</sup> 2507

Excellent resistance to stress corrosion cracking (SCC) in chloride-bearing environments (PRE no. [43]

Excellent resistance to pitting and crevice corrosion

High resistance to general corrosion, erosion and corrosion fatigue

Very high mechanical strength

Good weldability

This metal powder is manufactured by Inert Gas Atomization (IGA), producing a powder with a spherical morphology which provides good flow characteristics and high packing density. In addition, the powder has a low oxygen content and low impurity levels, resulting in a metallurgically clean product with enhanced mechanical performance.



# Chemical composition (nominal), %

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| Fe    | Bal.   |
|-------|--------|
| Cr    | 25     |
| Ni    | 7      |
| Мо    | 4      |
| С     | ≤0.030 |
| Si    | ≤0.8   |
| Mn    | ≤1.2   |
| Р     | ≤0.025 |
| S     | ≤0.015 |
| Ν     | 0.3    |
| Other | Cu 0.5 |

# Powder characteristics and morphology

## Powder for Additive Manufacturing

Osprey<sup>®</sup> metal powder for Additive Manufacturing is characterized by a spherical morphology and high packing density, which confer good flow properties. For powder bed processes these are essential when applying fresh powder layers to the bed to ensure uniform and consistent part build.

For blown powder processes, such as Direct Energy Deposition (DED), good flow ensures uniform build rates. Tight control of the particle size distribution also helps ensure good flowability. Low oxygen powders result in clean microstructures and low inclusion levels in the finished parts.

### Powder for Hot Isostatic Pressing (HIP)

Osprey<sup>®</sup> HIP powder has a spherical morphology, resulting in high packing density. In addition, the powder has a low oxygen content and low impurity levels, resulting in a metallurgically clean product with enhanced mechanical performance.

### Powder for Metal Injection Moulding (MIM)

Osprey<sup>®</sup> MIM powder has a spherical morphology, resulting in high packing density. This enables

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the manufacture of feedstocks with high powder loading, which not only minimizes binder costs but also reduces part shrinkage during debinding and sintering. Spherical powder also has excellent flow characteristics, resulting in reduced tool wear and consistent mould filling.

Osprey® MIM powder's low oxygen content allows better control of carbon and consistency during sintering. Low oxygen levels, together with high packing density, also facilitate faster sintering.

## Particle size distribution **Powder for Additive Manufacturing**

Osprey® metal powder for Additive Manufacturing is available in a wide range of particle size distributions that are tailored to the individual Additive Manufacturing systems. They can also be tailored to the particular requirements of the end application, both in terms of mechanical performance and surface finish.



Microns (µm)

| Process technology                | Size (µm)                    |
|-----------------------------------|------------------------------|
| Binder jetting                    | ≤ 16, ≤ 22, ≤ 32, ≤ 38, ≤ 45 |
| Laser - Powder Bed Fusion (L-PBF) | 15 to 53 and 10 to 45        |



| Electron beam - Powder Bed Fusion (E-PBF) | 45 to 106 |
|---|-----------|
| Direct Energy Deposition (DED)            | 53 to 150 |

#### Powder for Hot Isostatic Pressing (HIP)

Osprey<sup>®</sup> powder for Hot Isostatic Pressing (HIP) is available in a broad size range, typically <250 microns, resulting in a high packing density and tap density. Low oxygen levels, together with high packing density, also facilitate faster sintering.

#### Powder for Metal Injection Moulding (MIM)

Osprey<sup>®</sup> metal powder for Metal Injection Moulding (MIM) is available in a wide range of particle size distributions, from under 5  $\mu$ m up to 38  $\mu$ m. The table shows our standard particle size distributions for MIM powders.

| Size (µm) | D10 (µm) | D50 (µm) | D90 (µm) |
|-----------|----------|----------|----------|
| ≤ 38      | 5.5      | 13.0     | 31.0     |
| ≤ 32      | 5.0      | 12.0     | 29.0     |
| 80% ≤ 22  | 4.5      | 11.5     | 27.0     |
| 90% ≤ 22  | 4.0      | 10.5     | 22.0     |
| 90% ≤ 16  | 3.5      | 8.0      | 16.0     |

\* Particle size measurements performed using a Malvern laser particle size analyzer, typical D10, D50 and D90 provided.

Tailor-made particle size distributions are available on request. Contact us to discuss your specific requirements.

## Microstructure

A suitable heat treatment is carried out on the as-built parts in order to achieve the desired austenitic and ferritic microstructure in the final parts. Typically solution annealing between 1,040–1,110 °C (1,904–2,030 °F) followed by air or water cooling is performed.

Micrographs of Osprey<sup>®</sup> 2507



# Mechanical properties

Typical mechanical properties of material produced by Laser - Powder Bed Fusion (L-PBF) in heattreated condition.

| Direction  | Temperature<br>(T), °C | Yield strength<br>(Rp0.2), MPa | Tensile<br>strength (Rm),<br>MPa | E-modulus,<br>GPa | Elongation (A),<br>% |
|------------|------------------------|--------------------------------|----------------------------------|-------------------|----------------------|
| Horizontal | 20                     | 627                            | 956                              | 207               | 39                   |
| Vertical   | 20                     | 626                            | 923                              | 202               | 43                   |
| Horizontal | 100                    | 548                            | 878                              | 205               | 33                   |
| Vertical   | 100                    | 546                            | 854                              | 205               | 36                   |
| Horizontal | 200                    | 505                            | 823                              | 196               | 30                   |
| Vertical   | 200                    | 504                            | 797                              | 195               | 31                   |
| Horizontal | 300                    | 517                            | 857                              | 190               | 30                   |
| Vertical   | 300                    | 505                            | 832                              | 190               | 31                   |
| Direction  | Temperature<br>(T), °F | Yield strength<br>(Rp0.2), ksi | Tensile<br>strength (Rm),<br>ksi | E-modulus, ksi    | Elongation (A),<br>% |
| Horizontal | 68                     | 90                             | 138                              | 30                | 39                   |
| Vertical   | 68                     | 90                             | 133                              | 29                | 43                   |
| Horizontal | 212                    | 79                             | 127                              | 30                | 33                   |
| Vertical   | 212                    | 79                             | 123                              | 30                | 36                   |
| Horizontal | 392                    | 73                             | 119                              | 28                | 30                   |
| Vertical   | 392                    | 73                             | 116                              | 28                | 31                   |
| Horizontal | 572                    | 74                             | 124                              | 28                | 30                   |
| Vertical   | 572                    | 73                             | 121                              | 28                | 31                   |
| Direction  |                        | Temperature (T                 | ), °C                            | Impact energy (   | W), J                |
| Horizontal |                        | -50                            |                                  | 198               |                      |
| Vertical   |                        | -50                            |                                  | 235               |                      |



| Horizontal | 0                   | 237                      |
|------------|---------------------|--------------------------|
| Vertical   | 0                   | 250                      |
| Horizontal | 20                  | 242                      |
| Vertical   | 20                  | 247                      |
| Horizontal | 50                  | 248                      |
| Vertical   | 50                  | 263                      |
| Direction  | Temperature (T), °F | Impact energy (W), Ft-lb |
| Horizontal | -58                 | 146                      |
| Vertical   | -58                 | 173                      |
| Horizontal | 32                  | 174                      |
| Vertical   | 32                  | 184                      |
| Horizontal | 68                  | 178                      |
| Vertical   | 68                  | 182                      |
| Horizontal | 122                 | 182                      |
| Vertical   | 122                 | 194                      |

#### Hardness

Typical Vickers Hardness (HV) levels (ASTM E92, ISO 6507-1, JIS Z2244, GB/T 4340.1) as well as HRC values, in the Laser - Powder Bed Fusion (L-PBF) heat-treated condition.

| HV       | HRC     |
|----------|---------|
| 282 +/-8 | 29 +/-1 |

#### Surface roughness

Measured surface roughness values (ISO 25178-6, ISO25178-606, DIN EN ISO 4287, ISO 4288), Laser - Powder Bed Fusion (L-PBF) heat-treated and blasted condition.

| Ra, µm | Rz, μm | Sa, µm |
|--------|--------|--------|
| 1.6    | 7.02   | 4.8    |



# **Corrosion properties**

Corrosion properties tested on the bulk material as per the ASTM G48 and ASTM G150 standards.

| Standard  | Temperature (T), °C | Temperature (T), °F |
|-----------|---------------------|---------------------|
| ASTM G48  | 90                  | 194                 |
| ASTM G150 | >95                 | >203                |



# Critical Pitting Temperature (G48 A)

## Typical application areas

Osprey<sup>®</sup> 2507 powder is typically used in the following areas:

Oil and gas industry Pulp and paper industry Chemical industry Refineries and petrochemical plants On-shore and off-shore industry



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# Testing

All Osprey<sup>®</sup> metal powders are supplied with a certificate of analysis containing information on the chemical composition and particle size distribution. Information on other powder characteristics is available upon request.

# Packaging

A wide range of packaging options is available, from 5kgs plastic bottles to 250kg metal drums.

5 kg (11 lbs) Plastic bottles 6 kg (13 lbs) Plastic bottles 10 kg (22 lbs) Plastic bottles 20 kg (44 lbs) Metal cans 100 kg (220 lbs) Steel drums 150 kg (330 lbs) Steel drums 250 kg (551 lbs) Steel drums All packaging materials are suitable for air, sea and road freight.

Contact us for more information and to discuss your packaging requirements.

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. Datasheet updated: May 8, 2024 1:43 PM CET (supersedes all previous editions)