

Noralide® NBD-200 Hot Pressed Silicon Nitride



Technical Data

Product Description

Noralide® NBD-200 Hot Pressed Silicon Nitride (Si_3N_4) offers a combination of characteristics that make it an ideal material for seal face components in nuclear applications as well as other applications where maximum fracture toughness and flexural strength are required. Hot-pressed for maximum strength and density, Noralide® Si_3N_4 provides better fracture resistance than other ceramic materials.

Noralide® Si_3N_4 meets the requirements of these Nuclear Quality Assurance Standards:

- NQA-1
- NQA-1a
- 10CFR-50, Appendix B

Applications

Examples of Noralide® seal face components for nuclear applications include:

- Boiler water reactor (BWR) pumps
- Pressurized water reactor (PWR) pumps
- Corrosive borated water service

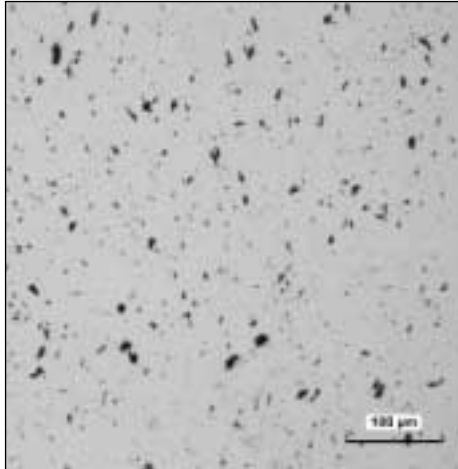
In addition, Noralide® Si_3N_4 is suitable for seal face and other components in demanding rotating equipment applications such as compressors, engines, generators, motors and turbines.

Material Characteristics

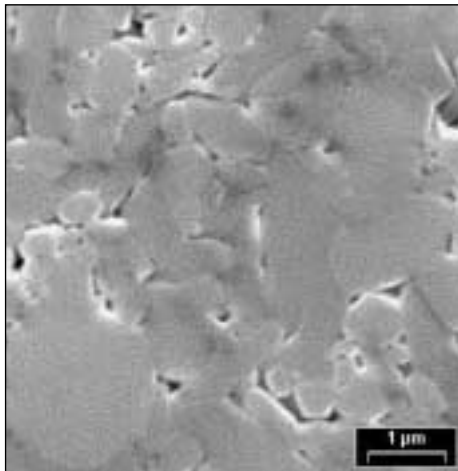
- Good high temperature strength
- Maximum fracture toughness
- High hardness and wear resistance
- Good creep resistance
- Low density
- Little oxidation at elevated temperatures
- Low thermal expansion coefficient
- Not wetted by molten metals



Noralide® NBD-200 Hot Pressed Silicon Nitride



Unpolished NBD-200 at 100X



Etched NBD-200 at 1000X

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Noralide® NBD-200 Hot Pressed Si₃N₄ Typical Physical Properties

| Property | Units | Value |
|--|--------------------------|-------------------|
| Composition* | | Si•N |
| Grain Size | μm | <2 |
| Density | g/cm ³ | 3.18 |
| Hardness (Vickers)** | GPa | 16 |
| Flexural Strength 4 pt @ RT*** | MPa | 800 |
| Compressive Strength @ RT | MPa | 3500 |
| Modulus of Elasticity @ RT | GPa | 320 |
| Fracture Toughness @ RT Indentation | MPa x m ^{1/2} | 4.1 |
| Color | | Gray |
| Coefficient of Thermal Expansion RT to 1000°C | X10 ⁻⁶ mm/mmK | 2.9 |
| Thermal Conductivity @100°C | W/mK | 29 |
| Electrical Resistivity @ RT*** | ohm-cm | >10 ¹² |
| Purity | | % |
| Si ₃ N ₄ | | 95 |
| Al | | 0.35 |
| C | | 0.50 |
| Ca | | 0.01 |
| Fe | | 0.02 |
| Mg | | 0.60 |
| O | | 2.5 |
| Other | | trace |

*Composition code: Si = free silicon metal;
 N = nitrogen; Si₃N₄ = silicon nitride

***Test Bar Size: 3 x 4 x 45 mm
 (0.118" x 0.157" x 1.772")

**Vickers 10 kg load

Saint-Gobain Ceramics application engineers can assist you with the design of cost-effective high performance components for your specific need.

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