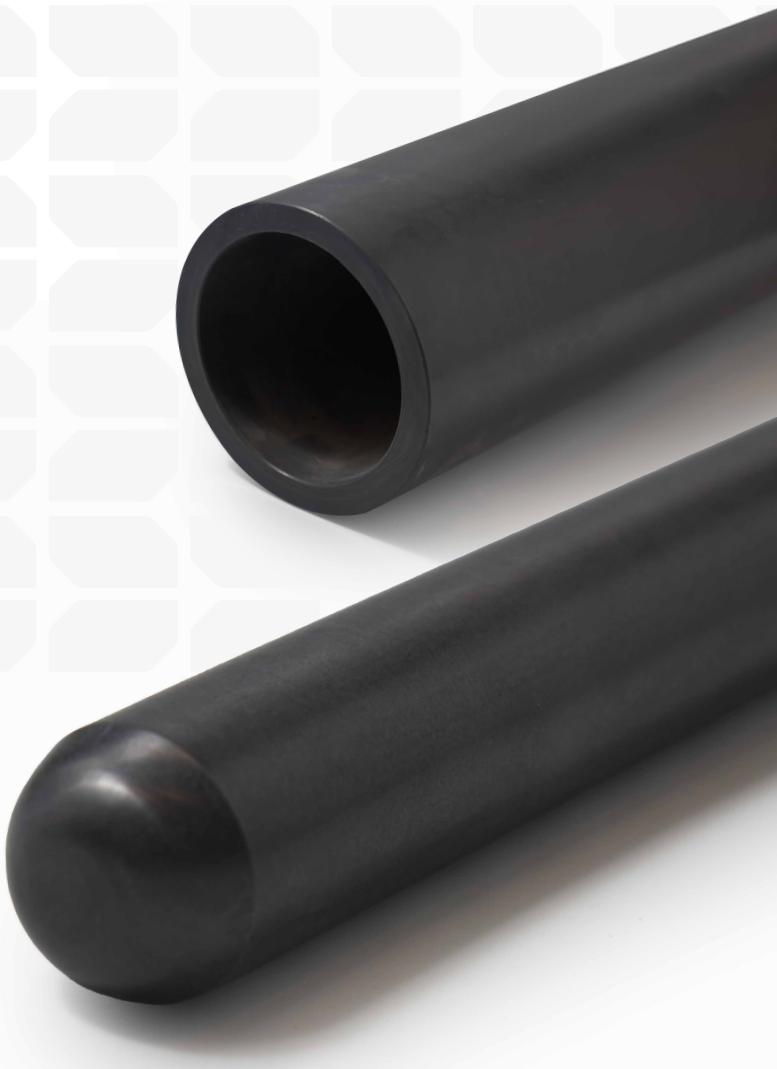
# Product Catalogue



Standard Ceramic

Ceramic Expert | Industrial Know-how

www.sceramic.com

# Ceramic expert with flexible material production and industrial know-how

Standard Ceramic has developed a unique flexible production, which enables the production line to manufacture a diverse range of ceramic materials, tailored to meet the specific needs of the aluminum industry. This adaptability ensures the production of both standard and custom ceramic products with different material, making Standard Ceramic a versatile partner for their clients.

In addition to its ceramic expertise, Standard Ceramic has extensive industrial know-how acquired through rigorous application and testing. The company tests its products internally on furnaces and equipments manufactured by its sister company, LG Intelligent Equipment. Through application feedback and continuous iterations, each product is developed to achieve optimal durability and performance.

# Silicon Nitride

Silicon Nitride is one of the hardest substances in the world. Its non-wetting and high temperature resistance properties make it the best suitable material for the harsh conditions in the aluminum industry.

Silicon Nitride ceramic is the perfect material to be used as protection sheath for temperature sensor (thermocouples) and other protective applications in molten aluminum. Its excellent thermal shock resistance and light weight make it easy to handle and maintain.

### Non-wetting

Unique non-wetting property makes it easy to clean and maintain when used in aluminum melt.

### Chemically stable

Does not react with aluminum melt or other non-ferrous metal melt. This ensures the purity of the melt during production.

### Cost-effective long term solution

Much longer lifetime comparing to other refractory material, with lifetime 3 - 5 times longer than that of Aluminum Titanate and Silicon Carbide.

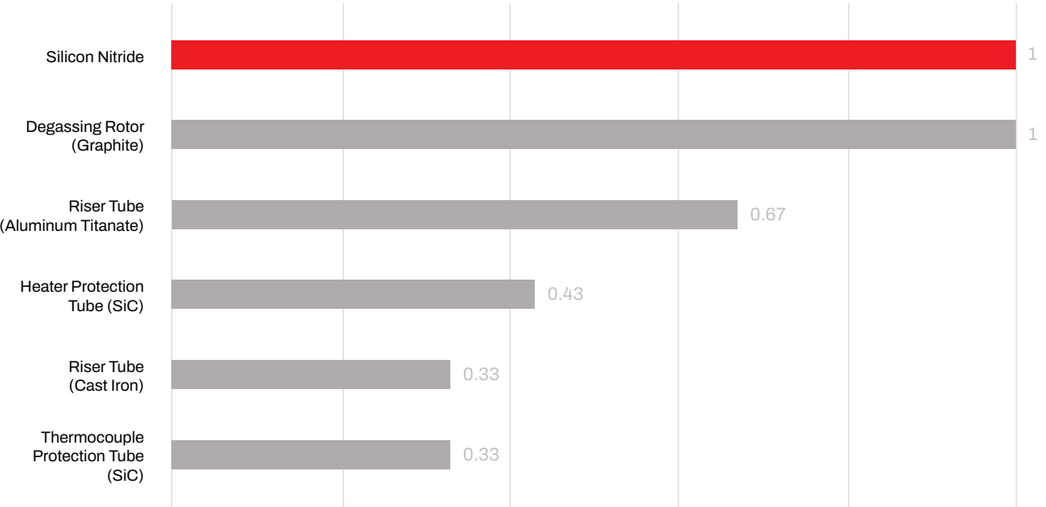
## Technical Specifications

| | |
|---|---|
| Bending strength | 750 MPa |
| Young's modulus | 280 GPa |
| Fracture toughness | 6.5 MPa · m1/2 |
| Thermal conductivity | 26 W/(m · K) |
| Specific heat | 0.65 J/(g · K) |
| Resistivity | $10^{14}$ Ω · cm |
| Thermal shock resistance | 800 °C (1,472 °F) |
| Max operation temperature | 1,150 °C (2,102° F) |
| Coefficient of linear expansion | 3.4 x $10^{-6}$ m/°C |





## Service-life / Price Index




Flow control pin and ring set for holding furnaces

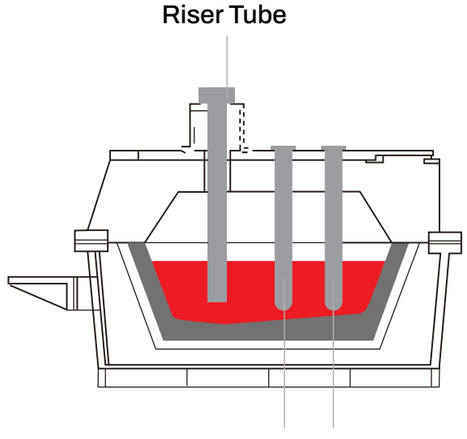
# Heater Protection Tube

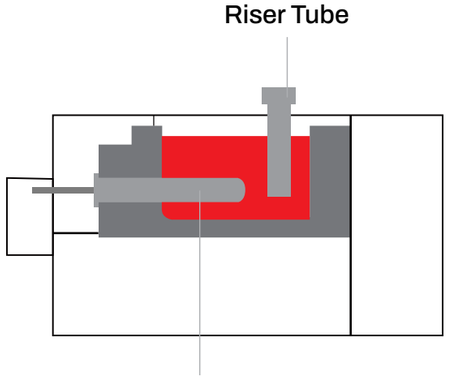
### Corrosion resistant

Silicon nitride can resist the corrosion and erosion by aluminum melt and its alloys, making it significantly cost-effective for heater protection tubes in holding furnaces.

### Good thermal conductivity and energy efficient

This helps to prevent heater overheating and reduces energy consumption, improving the efficiency and service life of the heater inside.








# Riser Tube

## Corrosion resistance

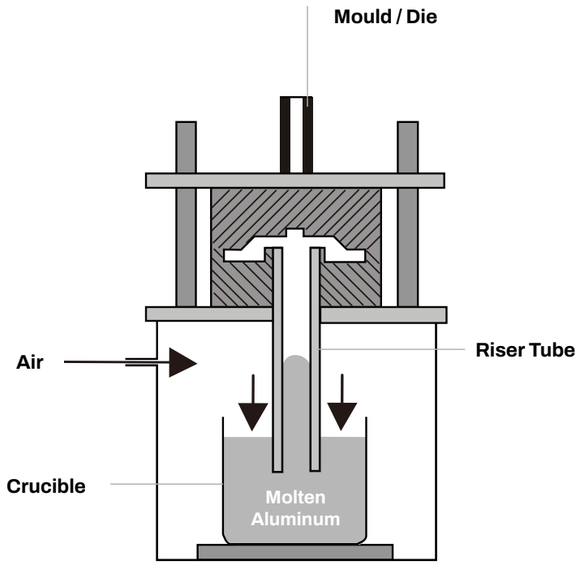
The corrosion resistance and chemical inertness helps to avoid reaction or dissolution with molten aluminum.

## Thermal shock resistance

Offering high thermal shock resistance and low thermal expansion coefficient to prevent cracking or distortion due to rapid temperature changes.

## Non-wetting

Unique non-wetting property makes it easy to clean and maintain after each casting cycle.






Riser Tube / Silicon Nitride

# Thermocouple Protection Tube

Silicon nitride's closely bonded micro-structure gives it excellent thermal shock resistance and high fracture toughness, making them resistant to impacts and shocks. The thermocouple's stable performance and long service life is closely related to the thermocouple protection tube. The tube's good thermal conductivity and quick response, ensures the accurate temperature can be measured instantly.

## High mechanical strength

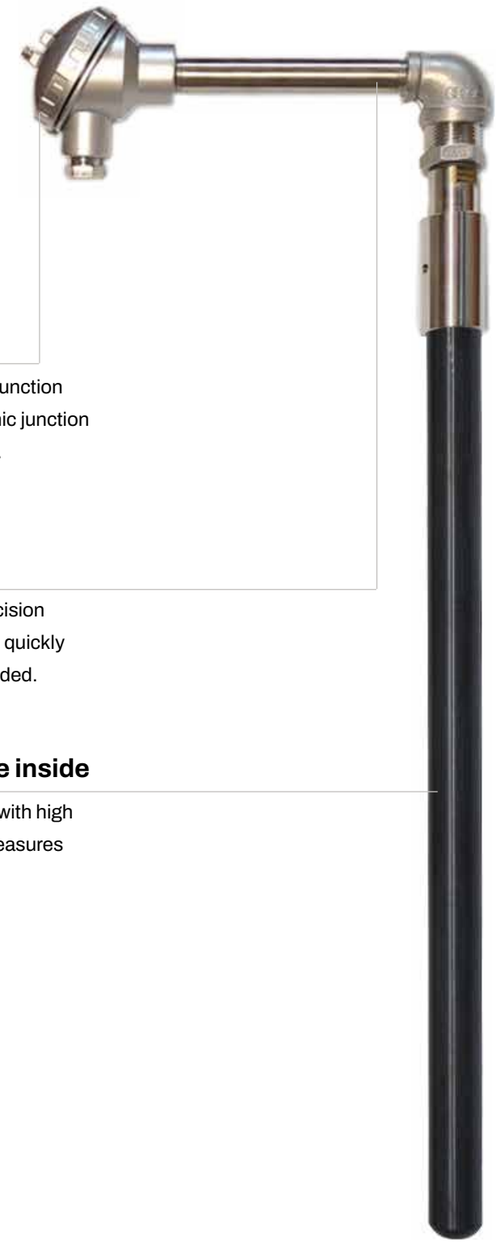
The robust mechanical properties of silicon nitride ensure that the protection tube can endure the harsh conditions of the aluminum melt, including mechanical impacts and thermal stresses.

## Corrosion and thermal shock resistance

Silicon nitride is highly resistant to corrosion by molten aluminum and its alloys. This helps maintain the integrity of the thermocouple and ensures accurate temperature readings over time. It can withstand rapid temperature changes without cracking, which is crucial in aluminum melting processes where temperature fluctuates significantly.







## Junction box on request

Also available to include high temperature resistant junction box with the thermocouple assembly, internal ceramic junction base is designed for optimal stability and endurance.

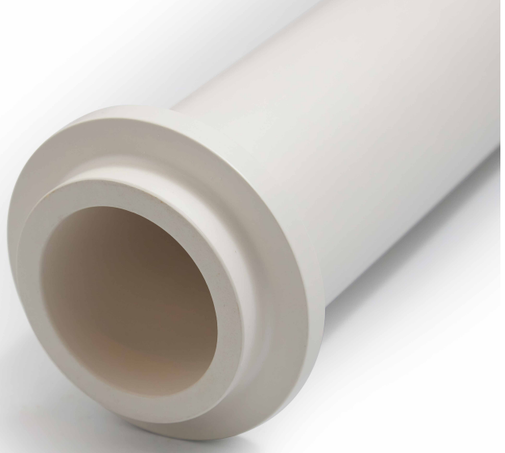
## Easy and quick connection

The stainless steel connector is paired with high precision grooves on the protection tube, making it possible to quickly change and connect new protection tubes when needed.

## Assembly with Type-K thermocouple inside

Full set of thermocouple assembly is also available, with high quality and responsive Type-K thermocouple that measures temperature up to 1,200°C (2,192°F).

***other types of thermocouples also available.**



# Aluminum Titanate

Aluminium Titanate ($Al_2TiO_5$) is a refractory compound formed by combining high-purity aluminium oxide and titanium oxide through a precision-controlled reaction sintering process. Aluminium Titanate is extensively employed in aluminum foundry/casting applications because of its low wettability with aluminum, preventing reactions and ensures smooth casting.

### Excellent thermal shock resistance

Aluminium titanate can withstand rapid temperature changes without cracking or breaking. Direct exposure to molten metal is feasible even without preheating. (thermal shock up to 900°C).

### Low thermal expansion coefficient

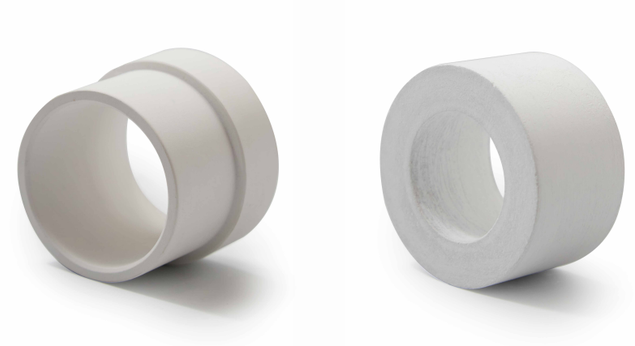
Its thermal expansion is very low (2.77 x $10^{-6}$ m/°C), which is beneficial for maintaining stability with steel flange tightly installed.

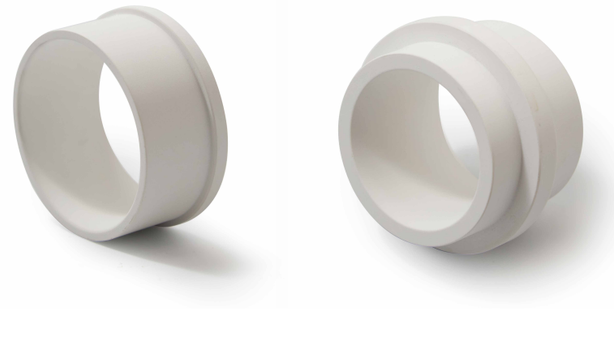
### Non-wettability with molten metals

Aluminium titanate does not easily react or stick with molten aluminum, this mean aluminum can flow smoothly within the tube, keeping the tube internal as clean as possible.









## Technical Specifications

| | |
|---|---|
| Density | 0.45 - 0.50g/cm³ |
| Thermal conductivity | <0.12 W/(m · K) at 700°C |
| Fracture toughness | 6.5 MPa · m1/2 |
| Thermal conductivity | 26 W/(m · K) |
| Compressive strength | 0.16 MPa |
| Flexural strength | 0.06 MPa |
| Continuous operation temperature | 800 °C (1,472 °F) |
| Max operation temperature | 1,250 °C (2,102° F) |
| Coefficient of linear expansion | 2.77 x $10^{-6}$ m/°C |

# Casting Ladle

Ceramic fiber composite material has excellent resistance to thermal shock. The wall thickness of ceramic fiber ladle is usually 5mm - 30mm, much thinner and lighter than traditional steel ladles, making it especially suitable for automatic pouring machines. Compared with other material, ceramic fiber material has very good wear resistance and insulation capability, keeping the temperature drop to the minimum.

Standard Ceramic's ceramic fiber ladle are by default coated with boron nitride when manufactured. Boron nitride coating acts as a release agent and enhances the smoothness of ceramic fiber ladle during operation.

## Chemically stable

Ceramic fiber composite material does not react with aluminum, this ensures the purity of the aluminum melt. With proper maintenance, the service lifetime can reach up to 100,000 casts (about 3 months).

## Good thermal insulation

Very little heat is dissipated through the ladle due to its good thermal insulation. Less temperature drop helps maintain the quality of the aluminum melt.

## Non-stickness

The surface of the ceramic fiber ladle is coated with boron nitride, which gives the surface a light blue colour while acting as a release agent between the ladle and the aluminum.





## Dross-proof design

Added dross proof section helps effectively blocking out dross on the melt surface.

## Reinforced metal connection

The connection is made with high purity iron, which can withstand operating temperature up to 1,400°C.

## Launders up to 2.5m

Extended length is available on request.
For longer length, assembly is recommended.

## Technical Specifications

| | |
|---|---|
| Density | 1.6 x 10 g/cm$^3$ |
| Max. Operating Temperature | 780 °C |
| Thickness | 8 - 25 mm |
| Bending Strength | 22 MPa |
| Thermal Expansion Coefficient | 0.9 x 10$^{-6}$ m/°C |
| Thermal Conductivity | 0.43 W/(m · K) at 750°C |
| Capacity | 0.3kg - 120kg |
| Heat Preservation Ability | +15 to 20°C comparing to iron ladle |

# Ceramic Foam Filter

Ceramic Foam Filters operate on the principle of adsorption, effectively removing large inclusions from molten aluminum while adsorbing tiny particles. Their superior thermal shock resistance enhances its high temperature strength in molten aluminum. With the proper mesh size, the ceramic foam filter helps to improve the quality of the final product.

### Effective filtration

The adsorption-based filtration effectively removes large inclusions from the aluminum melt and adsorbs fine-sized impurities.

### Reduced contamination

Less slag generation, which effectively reduces the contamination of the aluminum melt. The enhanced strength of the filter means less broken piece into the melt.

### Precision and improved product quality

The production for ceramic foam filter is fully automated. Each filter goes through three stages of calibration procedure to ensure its precise dimension and better compatibility with the filter box, preventing any leakage on the side of the filter and improves the filtration thoroughness.

## Technical Specifications

| | |
|---|---|
| Density | 0.45 g/cm³ |
| Fracture Toughness | 5.5 MPa |
| Compressive Strength | 1.2 MPa |
| Operating Temperature | 1,280°C |
| Sealing Type | Fiber cotton / Self-expanding cotton |
| Thermal Conductivity | 0.43 W/(m · K) at 750°C |

## Model and Quantity Recommendation

| Application | Mesh | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | Flow rate *(ton/h)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ingots and extrusion billets | 10 ppi | 12 | 15 | 17 | 20 | 20 | 23 | 23 | 26 | 26 | 26 | 26 | |
| | 20 ppi | 12 | 15 | 17 | 20 | 20 | 23 | 23 | 26 | 26 | 26 | 26 | |
| | 30 ppi | 15 | 15 | 17 | 20 | 23 | 23 | 26 | 26 | 26 | 23x2 | 23x2 | |
| | 40 ppi | 15 | 17 | 17 | 20 | 23 | 23 | 26 | 26 | 26 | 23x3 | 23x3 | |
| High quality ingots for aerospace | 30 ppi | 15 | 17 | 20 | 23 | 26 | 26 | 26 | 23x2 | 23x2 | 23x2 | 23x2 | |
| | 40 ppi | 15 | 17 | 20 | 23 | 26 | 26 | 26 | 23x2 | 23x2 | 23x2 | 23x2 | |
| | 50 ppi | 15 | 17 | 20 | 23 | 26 | 26 | 26 | 23x2 | 23x2 | 23x2 | 23x2 | |
| | 60 ppi | 17 | 20 | 23 | 23 | 26 | 26 | 23x2 | 23x2 | 23x2 | 23x2 | 26x2 | |
| | 80 ppi | 17 | 20 | 23 | 23 | 26 | 26 | 23x2 | 23x2 | 23x2 | 23x2 | 26x2 | |

# Refractory Brick

## Vermiculite Insulation Brick

The vermiculite insulation brick is characterised by its low density, superior thermal insulation, and robust strength.

These advantages ensure energy efficiency and environmental sustainability in high-temperature applications, this is specially evident in large-scale electrolytic tank installations.

## Technical Specifications

| | |
|---|---|
| Density | 0.43 - 0.48 g/cm³ |
| Compressive Strength (25°C ) | 1.3 MPa |
| Compressive Strength (600°C) | 1.2 MPa |
| Thermal Expansion | -2% to +1% (900°C for 3h) |
| Thermal Conductivity | 0.115 W/(m · K) at 200°C |
| | 0.142 W/(m · K) at 600°C |
| | 0.155 W/(m · K) at 800°C |





## Barrier Brick

The barrier is typically used for aluminum electrolysis cell linings, this means its impermeability is key in order to offer enhanced insulation and electrolyte penetration resistance.

Barrier bricks also provide improved pressure resistance, structural stability, and erosion resistance, ensuring production safety for large scale operations.

## Technical Specifications

| | | |
|---|---|---|
| Standard Size | 152 x 152 x 19mm | 440 x 440 x 60/40mm |
| Density | 2.05g/cm³ | 2.0g/cm³ |
| Compressive Strength (25°C ) | 30MPa | 20MPa |
| Porosity | 22% | 24% |
| Thermal Conductivity | 1.1W/(m · K) at 200°C | |
| Thermal Expansion (1000°C ) | <1% | |
| Anti-electrolyte Penetration | Reaction corrosion area<7cm³ , Reaction depth <4mm | |
| Chemical Composition | $Al_2O$>18% ; $SiO_2$>65% | |

Standard Ceramic

## Ceramic Expert
## Industrial Know-how

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