

SG-28

# SILICON NITRIDE CERAMICS SERIES

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- Master of advanced ceramic materials
- In the global aluminum processing industry

**SGJL**<sup>®</sup>

### ZHEJIANG SHANGGUI JULI SPECIAL MATERIAL TECHNOLOGY CO., LTD.

Founded in 2018, Zhejiang ShangGui Juli Special Material Technology Co., Ltd. (SGJL for short) is a high-tech enterprise specializing in R&D and production of special ceramic materials. After five years of rapid development, SGJL has become a high-end material backbone supplier specializing in serving the global aluminum processing industry.

At present, the brand "Shang Gui" has seven series of products with global leading quality:

- SG-28 Silicon Nitride Ceramic Series
- TA-03 Aluminium Titanate Ceramic Series
- OS-11 O'Sialon Ceramic Series
- HTE High Thermal Conductivity Immersion Heater Series
- HTA High Reliability Immersion Heater Series
- TP-02 All-Ceramic Pump Parts Series
- A-99 High Purity Corundum Thermal Storage Ball Series

SGJL's mission is to provide various high-end material solutions for the global aluminium processing industry and even the non-ferrous metal processing industry. And we will rely on our outstanding technological research and development capabilities to continuously create a leading advanced material foundation for the upgrading of the entire industry.



# ADVANTAGES OF SILICON NITRIDE CERAMICS IN ALUMINUM INDUSTRY APPLICATIONS

Due to the high temperature and corrosive property of molten aluminum, there are not many materials suitable for use in molten aluminum as core components such as rotors, riser tubes, and protection tubes. Commonly used materials include cast iron, graphite, reaction-sintered silicon carbide, carbon nitrogen bonding materials, aluminum titanate, and silicon nitride.

Overall in comparison, silicon nitride ceramic materials have significant advantages.



## LONG SERVICE LIFE LOW MAINTENANCE COSTS

Due to silicon nitride ceramics' unique advantages of high temperature strength, strong thermal shock resistance and good corrosion resistance, their service life generally reaches more than one year, thereby reducing the costs of replacement and maintenance.



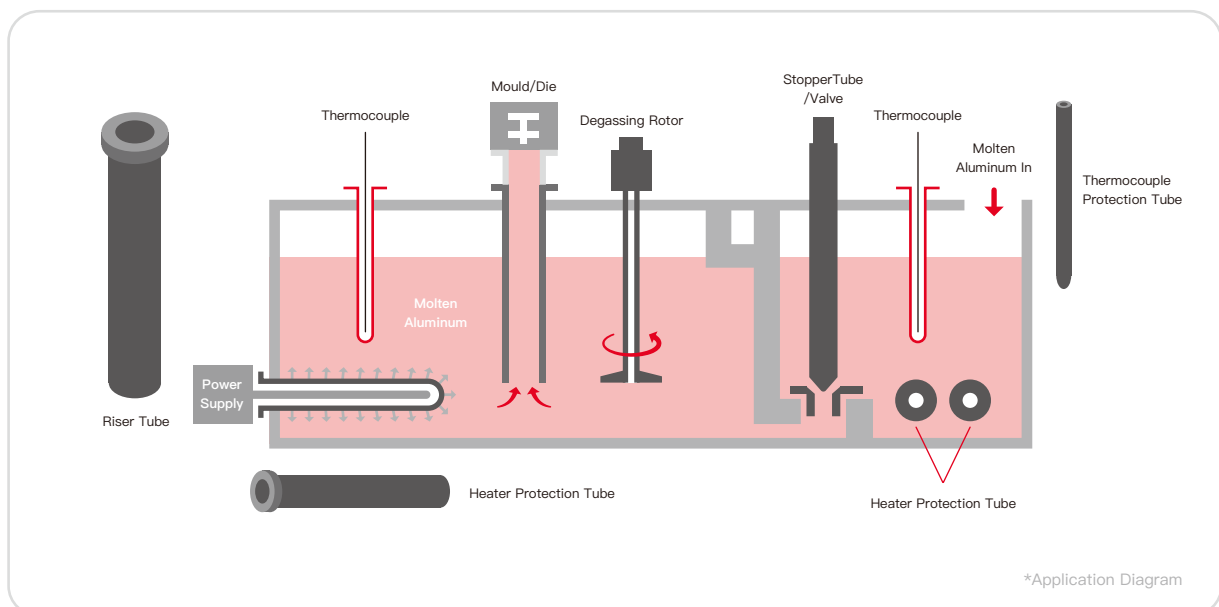
## NO POLLUTION TO MOLTEN ALUMINUM

Silicon nitride has low wettability to molten metal and almost does not react with molten aluminum, so it does not cause re-pollution to molten aluminum liquid and makes the quality of casting products stable.



## EASIER INSTALLATION AND MAINTENANCE

Silicon nitride ceramics can maintain a flexural strength of over 500MPa and good thermal shock resistance below 800 °C. Therefore, the product wall thickness can be thinner. In addition, its low wettability with the molten metal eliminates the surface coatings, and makes the installation and maintenance of ceramic parts easier.

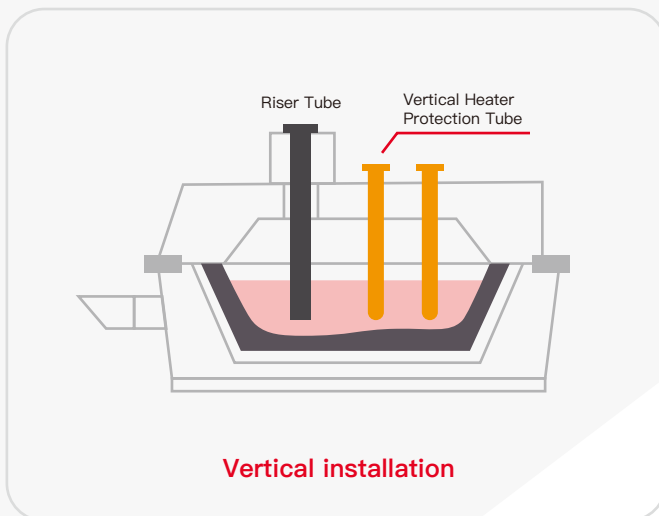
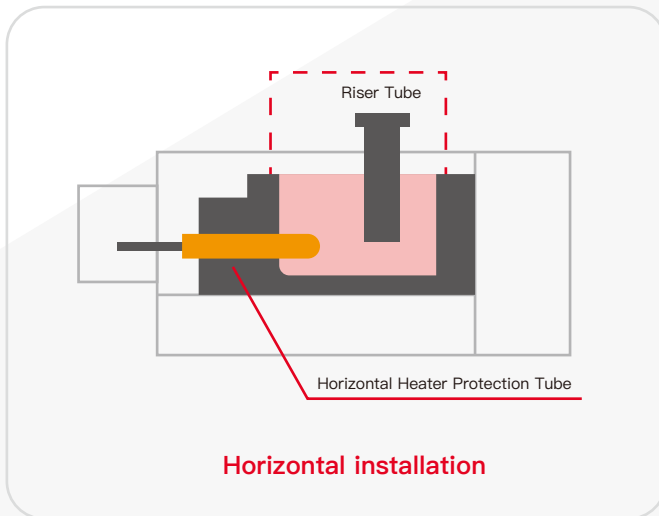


# HEATER PROTECTION TUBE

Strong resistance to high temperature, corrosion and thermal shock

SG-28 silicon nitride heater protection tube has strong resistance to high temperature, corrosion and thermal shock in molten aluminum. It can withstand the heat load of heating elements or burners for a long time, and has a service life of more than one year. Silicon nitride does not react with molten aluminum, so can guarantee the purity of it.

- Due to the immersion type of the heater, direct heating is carried out and ensuring that the molten aluminum is uniformly heated and will not oxidize by overheating, so as to avoid slag formation and help customers improve the quality of the molten aluminum, and achieve energy-saving of over 20% -30%.



# THERMOCOUPLE PROTECTION TUBE

Lighter weight, longer service life, easier to be used

The thermocouple protection tube is made of SG-28 silicon nitride ceramics and compared with other materials such as cast iron, graphite, and carbon nitride, it can not be corroded by molten aluminum, so it ensures the accuracy and sensitivity of the measured temperature, and no need for daily maintenance due to its low wettability.

Thermocouple  
Protection Tube Materials

## Prior Choice

Due to light weight, easy to be used and maintained and long service life, silicon nitride is widely used as a material for thermocouple protection tubes.



Maximum **accuracy** and  
**sensitivity** of the measured  
molten aluminium temperature

# DEGASSING ROTOR

High strength, high density, strong thermal shock resistance

SG-28 silicon nitride degassing rotor removes hydrogen from molten aluminum through high-speed agitation. Excellent thermal shock resistance ensures that the rotor will not break during frequent intermittent operation, reducing downtime losses and reducing labor intensity.

Ultra High Speed & Long Lifespan

## High Speed Silicon Nitride Rotor

The rotor shaft and impeller are made of silicon nitride material, which has higher machining accuracy and material strength than graphite, so it can withstand higher speed, up to 600 rpm. It does not react with aluminum liquid and can maintain the best degassing effect for a long time.



Concentric High-speed Drive  
Minimized Surface Fluctuation

## Stabilizing Surface Of Molten Aluminum

The concentricity of the rotor is controlled within 0.2mm, which can ensure the stability of the rotor at high speed. The rotor joint and flange connection shaft are made of stainless steel material, with a machining accuracy of less than 0.01mm. Combined with high-precision assembly, they can maintain the most stability of the molten aluminum level.

- Compared to graphite rotors, silicon nitride is almost not oxidized in high-temperature environment, thus it does not pollute molten aluminum and has a longer service life.
- High density and strength ensure reliable and stable operation at high speed.

# DEGASSING ROTOR

High strength, high density, strong thermal shock resistance

The degassing rotor made of SG-28 silicon nitride ceramic ( $\text{Si}_3\text{N}_4$ ) adopts a unique design to ensure its optimal stability and high degassing efficiency, in addition to the superiority of the material itself.

## B-Type Rotor $\Phi 200 \times 30$

The B-type impeller structure provides sufficient pressure to produce small bubbles, producing balanced bubbles while reducing thermal shock.

\* Suitable for continuous casting and rolling casting lines: single-rotor degassing



## D-Type Rotor $\Phi 200 \times 60$

The D-type rotor adopts a double-layer bread wheel design, and the stirring and diffusion effect of bubbles is very good.

\* Suitable for high flow casting lines: dual-rotor degassing equipment

## F-Type Rotor $\Phi 250 \times 33$

The F-type rotor forms small bubbles due to the special design of impeller grooves and peripheral gears, and its larger impeller size has better dispersion effect in molten aluminum. The thinner impeller design can control the surface fluctuations of the molten aluminum to a minimum range.

\* Suitable for large slab and billet melting and casting lines: dual-rotor, three-rotor degassing equipment



- The rotor diameter of 60 mm minimizes the surface area of aluminium melt and avoids swirls and slagging.
- The impeller has gone through several iterations with different designs to meet the needs of different operating conditions.

• High Strength

• High Wear Resistance

• High Degassing Effect

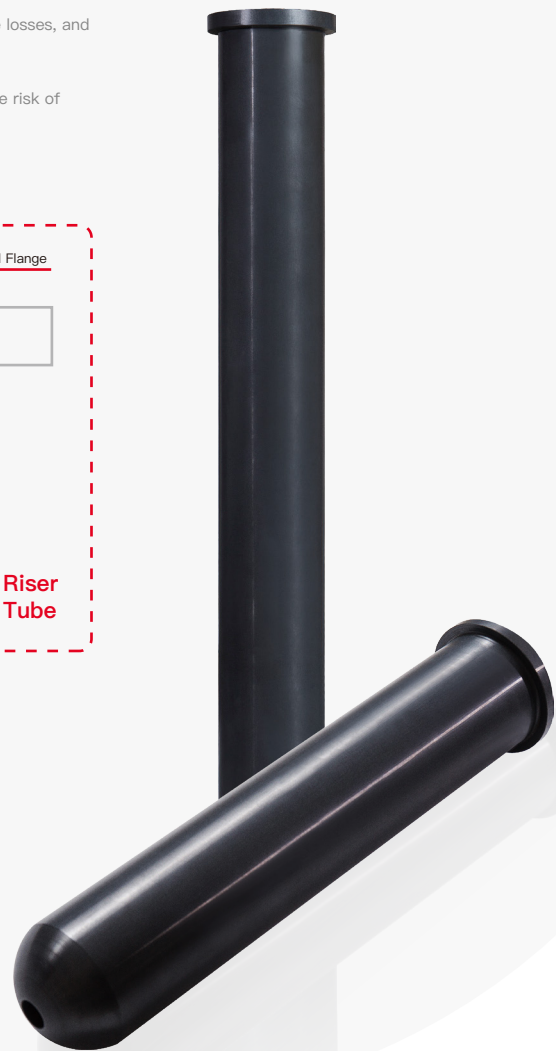
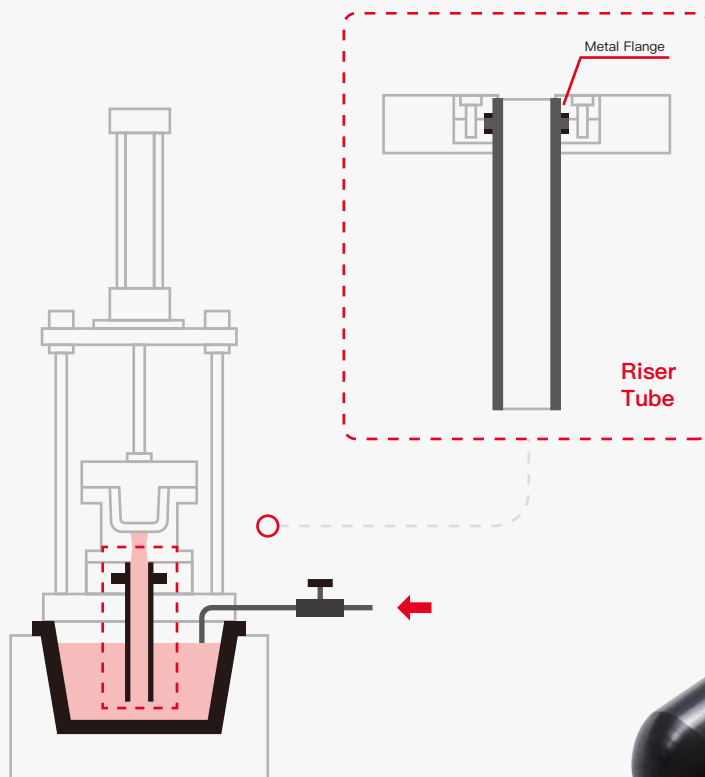
• High Corrosion Resistance

# STALK / RISER TUBE

High mechanical strength, excellent thermal shock resistance, good corrosion resistance

SG-28 silicon nitride ceramic is a high-density material that maintains high mechanical strength even when it warms up; it has the highest thermal shock resistance, simplifies handling and preheating, and is therefore ideal for use as a riser tube in low-pressure and differential pressure casting.

- Silicon nitride riser tubes replace cast iron or ordinary refractory riser tubes and are impermeable to aluminium solutions and have strong corrosion resistance, resulting in a longer service life than conventional materials.
- Not easy to stick aluminum, can reduce slagging on the tube wall, reduce downtime losses, and make daily maintenance easier.
- The flange connection part adopts a metal composite structure, fully considering the risk of damage and air leakage caused by load.





# STOPPER TUBE / VALVE

Strong resistance to high temperature, corrosion and thermal shock

SG-28 silicon nitride ceramics have good wear resistance, which can ensure the tightness of the sealing tube (valve) for a long time, and ensure the smooth operation under high temperature and frequent operation conditions for a long time.

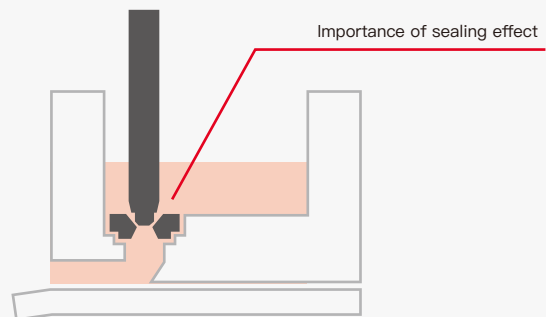


Silicon nitride sealing pipe is

## Preferred Selection

In the aluminium processing industry, there are often scenarios where molten aluminium has to be blocked. Silicon nitride ceramics are the best choice for all kinds of stopper tubes /valves due to their high densities, high-temperature strength, and good thermal shock resistance.

- Compared with aluminium titanate and alumina ceramics, silicon nitride ceramics are better wear-resistant and ensure the tightness of the stopper tube /valve for a longer period of time;
- The excellent high-temperature strength of silicon nitride ceramics ensures the smooth operation of the stopper tube /valve for a long period of time under conditions of frequent operation;
- Low wettability with molten aluminium reduces slagging and no pollution of the molten aluminium.



# SILICON NITRIDE PERFORMANCE PARAMETERS

## Performance Parameter

$\text{Si}_3\text{N}_4$

Density (g/cm <sup>3</sup> )	3.2–3.4
Porosity (%)	<0.5
Vickers Hardness	15
Fracture Toughness (Mpa•m <sup>1/2</sup> )	8.04
Bending Strength (Mpa)	791
Young's Modulus	290
Thermal Conductivity (W/m•K)	29.9
Thermal Expansion Coefficient (10 <sup>-6</sup> K <sup>-1</sup> )	3.2
Max Operation Temperature (°C)	1200
Thermal Shock Resistance	Excellent
Non-Stick Performance	Excellent

\* If you need to customize special dimensions (non-standard sizes), please contact our company. Thank you!

# OUR PARTNERS



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