TA-03

ALUMINUM TITANATE CERAMICS SERIES

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

SGJL®

COMPANY PROFILE

ALUMINUM
TITANATE

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.

TA-03 ALUMINUM TITANATE PERFORMANCE ADVANTAGES

TA–03 Aluminum titanate (Al_2TiO_5) has excellent thermal shock resistance, low thermal conductivity, excellent corro–sion resistance to molten metals, and non wetting with molten aluminum.

The aluminum titanate riser tubes, maintenance–free lined launder series, gate sleeves, lining bricks, plugs and other products independently developed and mass–produced by SGJL have optimized the various properties of aluminum titanate ceramic materials and replaced similar imported products, playing a positive role in the upgrading of key process materials in the aluminum processing industry.

Performance Parameter	Al_2TiO_5
Density (g/cm^3)	3.2–3.4
Hardness	55–70
Fracture Toughness ($Mpa•m^{1/2}$)	3.5
Bending Strength (Mpa)	70–90
Young's Modulus	200
Thermal Conductivity (W/m•K)	1–2
Thermal Expansion Coefficient ($10^{-6}\,K^{-1}$)	0–1.6
Max Operation Temperature (°C)	1450
Thermal Shock Resistance	Excellent
Non–Stick Performance	Good

- Due to its excellent thermal shock resistance, it can withstand rapid temperature changes without cracking or breaking.
- Aluminum titanate's low thermal conductivity reduces heat loss and energy consumption during the casting process, which improves its performance in aluminum casting.

STALK / RISER TUBE

Low thermal conductivity, Non-wetting property, Strong thermal shock resistance

Application Scenarios

Thermal insulation of the riser tube in differential pressure and low pressure casting. The performance is directly related to the defect rate of the casting. Among the available materials, aluminum titanate ceramics has become an ideal material for the riser tube because of its various advantages.

High Thermal Shock Resistance

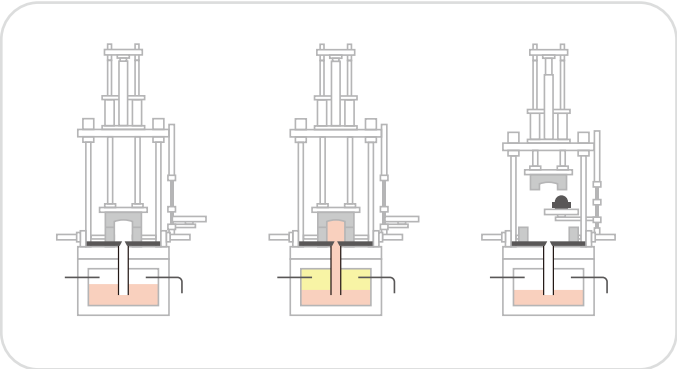
Compared with cast iron, carbonitride, and silicon nitride, aluminum titanate has the best thermal shock resistance, so it can be exempted from preheating treatment before installation, reducing the labor intensity of workers.

Low thermal conductivity

The low thermal conductivity and non-wetting properties of aluminum titanate can effectively reduce slagging on the upper part of the riser tubes, ensure the filling degree of the mold cavity, and improve the quality stability of the casting.

Non-wetting property

Among several commonly used in molten aluminum materials, aluminum titanate has the best non-wetting property, which can be exempted from coating agents, and does not cause any pollution to molten aluminum.



Precautions for use:

- Due to the low bending strength of aluminum titanate ceramics, careful adjustment is required when installing flanges to avoid over-tightening or eccentricity;
- Due to the low bending strength, more attention should be paid to the operating force during daily cleaning of surface slagging to avoid external impact;
- Before installing the aluminum titanate rise tube, it should be kept dry and not used on the machine in damp or wet conditions.

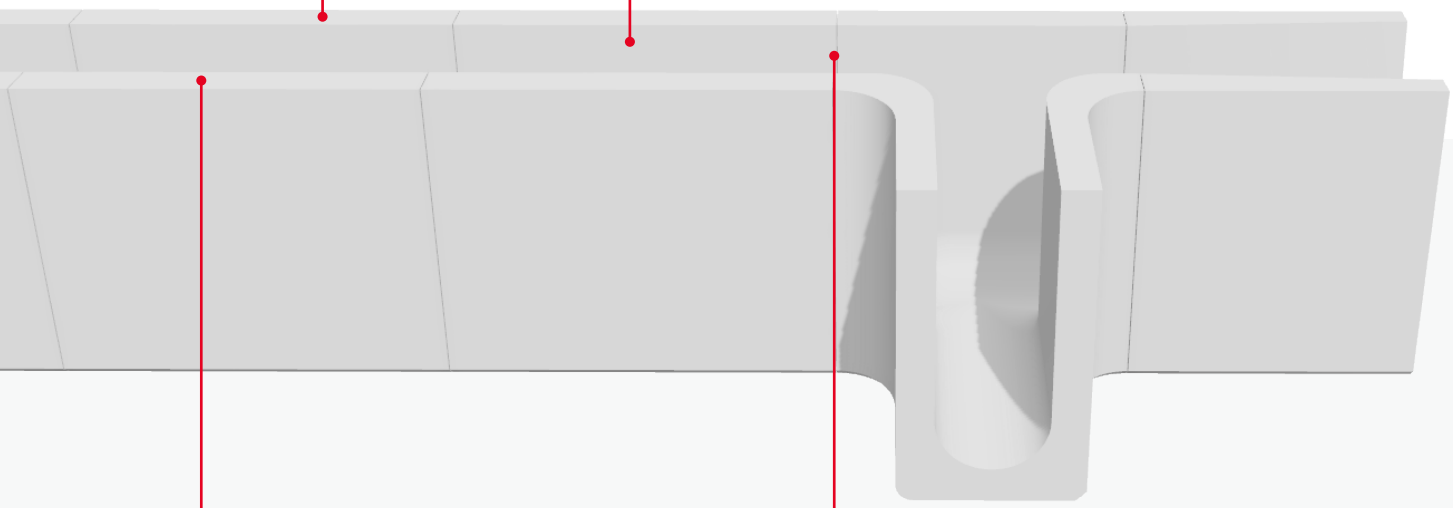
MAINTENANCE FREE CERAMIC LINED LAUNDER SERIES

No Moisture Absorption | Non-wetting Property

Compared with ordinary castable preforms, aluminum titanate ceramics do not absorb moisture. On one hand, it can prevent moisture absorption to molten aluminum and contaminating and maintaining the purity. On the other hand, aluminum titanate has a longer life and does not corrode or peel off like ordinary castables.

No Need To Be Coated With Boron Nitride In Inner Wall

The excellent non-stick performance makes it unnecessary to apply any protective coatings such as boron nitride or talcum powder during use. Even after long-term use, it still does not stick to aluminum. When stopping the machine for cleaning, only gently remove the aluminum layer on the surface with a tool, without the need for other tools to clean it forcefully. It is simple, fast, and saves consumables costs.



Ultra Thin Lined Launder

The aluminum titanate ceramic lined launder is sintered at a high temperature of 1300 ℃ and formed in one piece. After sintering, it has good high-temperature strength, so the side wall thickness is only 30mm. Meanwhile, due to the fact that aluminum titanate does not shrink significantly at high temperatures (thermal expansion coefficient<1.5x10^{-6}K^{-1}), it binds more firmly with the back adhesive and can still maintain a tight connection after long-term use, making it difficult to detach.

Excellent thermal shock resistance

Among the currently known types of industrial ceramics (aluminum titanate, silicon nitride, silicon carbide, etc.), aluminum titanate ceramics have the best thermal shock resistance. And it can withstand sudden cooling and heating without damage or delamination. Generally, simple preheating is only required during initial use, no need for prolonged heating.

LINING BRICK

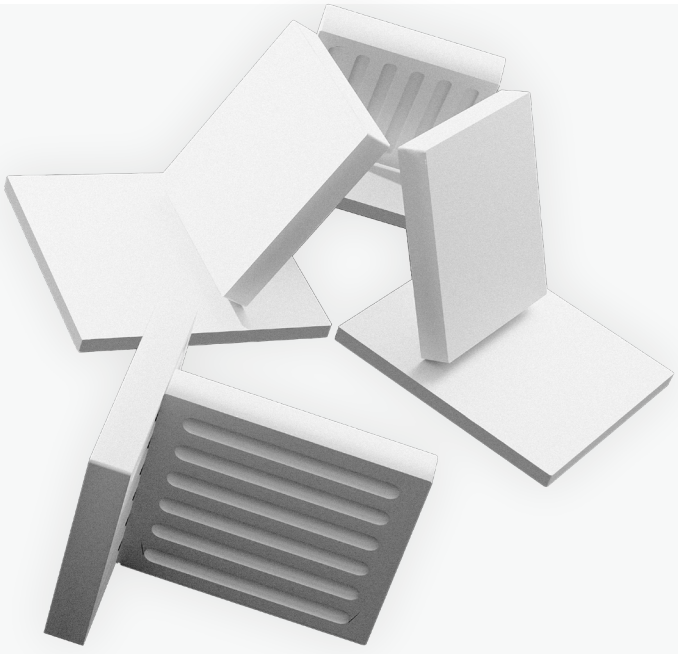
No moisture absorption, Strong thermal insulation, Resistant to molten aluminium erosion

Lining Brick

- TA-03 aluminum titanate ceramics are particularly suitable for use as lining bricks for various aluminum melting furnaces and holding furnaces due to their three advantages: low thermal conductivity, thermal shock resistance, and non-wetting with molten aluminum.
- Compared with traditional cast refractory furnaces, the furnace walls of melting furnaces lined with aluminum titanate ceramics are not easily corroded by molten aluminum and slag hanging, and the maintenance of the furnace walls is more time-saving and labor-saving, and the service life is longer.
- After using aluminum titanate ceramic lining bricks for degassing boxes, filter boxes, and machine-side holding furnaces, the insulation effect is better. In addition to extending the life of the equipment, it is also more energy-efficient.
- Aluminum titanate ceramics do not wet with molten aluminum and almost do not react. The use of ceramic lining bricks in furnaces will make the molten aluminum cleaner and effectively overcome the problem of moisture absorption by the castable furnace walls.

Precautions for use:

- The bonding construction of aluminum titanate ceramic lining bricks requires the use of specialized adhesives, and construction personnel must undergo professional training
- The furnace that completes the pasting of lining bricks needs to undergo drying and roasting with a specified temperature curve before it can be put into use
- Although the strength of aluminum titanate ceramic lining bricks is significantly higher than that of castables, it is still necessary to avoid the gravitational impact of slag cleaning tools and reduce the trouble caused by the peeling of lining bricks



GATE SLEEVE & PLUG

High temperature resistance, Good thermal stability, Strong corrosion resistance

Gate Sleeve & Plug

- In various production lines of the aluminum processing industry, there are many joints, nozzles, troughs, and pipes involved in conveying and controlling molten aluminum. The use of aluminum titanate ceramics with low thermal conductivity, good thermal shock resistance, and non-stick with molten aluminum is the future trend.
- Compared with aluminum silicate ceramic fiber, TA-03 aluminum titanate ceramic has higher strength and better non-wetting property. It is used in the plugs, downpipes, hot top risers and other parts of the casting industry with higher reliability and longer service life.
- Various gate sleeves for gravity, differential pressure, and low-pressure die casting have high requirements for thermal insulation, thermal shock resistance, and non-wetting properties. In most scenarios, aluminum titanate ceramics are the best choice.

Precautions for use:

- The bending strength of aluminum titanate ceramics is 70-90MPa. Please be patient and careful when installing onto the machine to avoid unnecessary external force damage.
- In application scenarios if it requires tighter fit, then please use sandpaper or a shaping grinding wheel to polish it carefully.
- Before installation, please confirm whether the product contains moisture. It is recommended to dry it in advance.

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