

HIGH PERFORMANCE TAP HOLE CLAY

A KEY FOR BLAST FURNACE
HEARTH PROTECTION AND COST
REDUCTION

Performance Ceramics & Refractories



SAINT-GOBAIN

TAP HOLE CLAY

BEYOND HIGH PERFORMANCE OR OPERATIONAL SAFETY

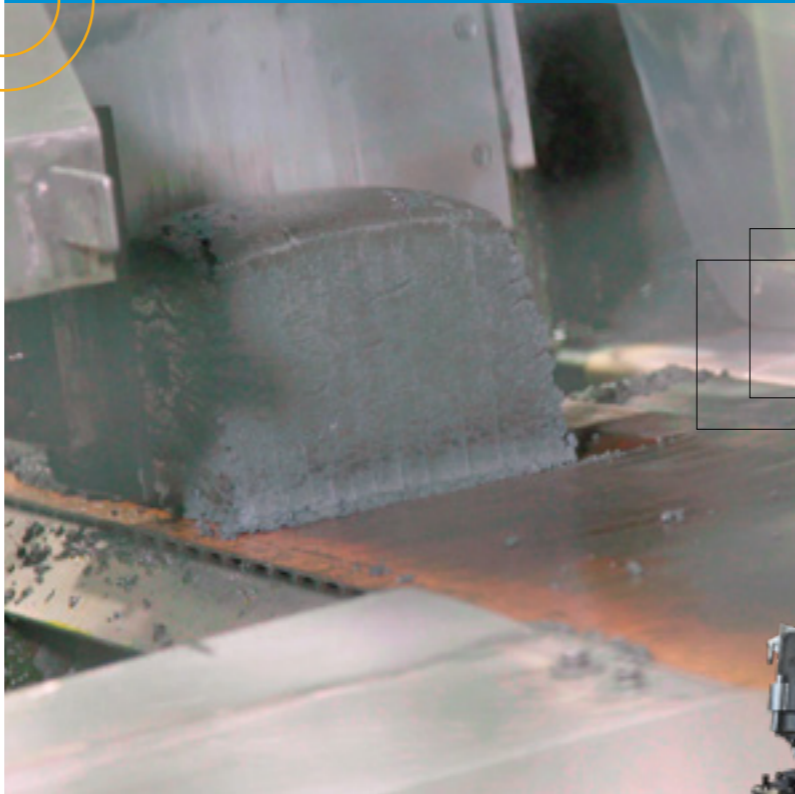
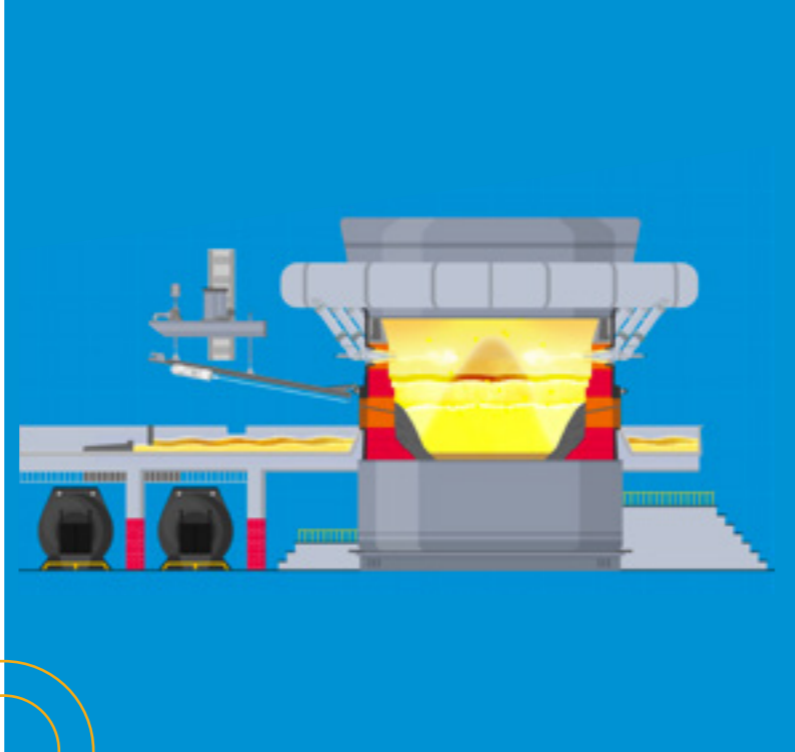
A high-performance tap hole clay allows a blast-furnace hearth to continue operating with a safe protection, enabling to increase its operational life for many years and consequently reducing the overall costs of maintenance & stoppages.

Saint-Gobain offers a complete portfolio of high-performance tap hole mix for blast furnaces of all sizes. By selecting the finest raw materials and by thorough understanding of the current furnace conditions, we offer custom products with leading technology to ensure increased tap hole lengths, reduced tapping time and a suitable protection of the furnace hearth.

Besides tap hole mix for applications involving regular operational conditions, we offer unique fast sintering materials for consecutive tapping operations in small furnaces, expansive clays for furnaces blow-in and a crack-closing technology for damaged tap hole mushrooms.

OUR DIFFENTIALS

- Tailor made
- Local Technical Support
- Ecological product line
- Strong & stable partnership
- State-of-the-art technology



MAXIMIZE YOUR BENEFITS

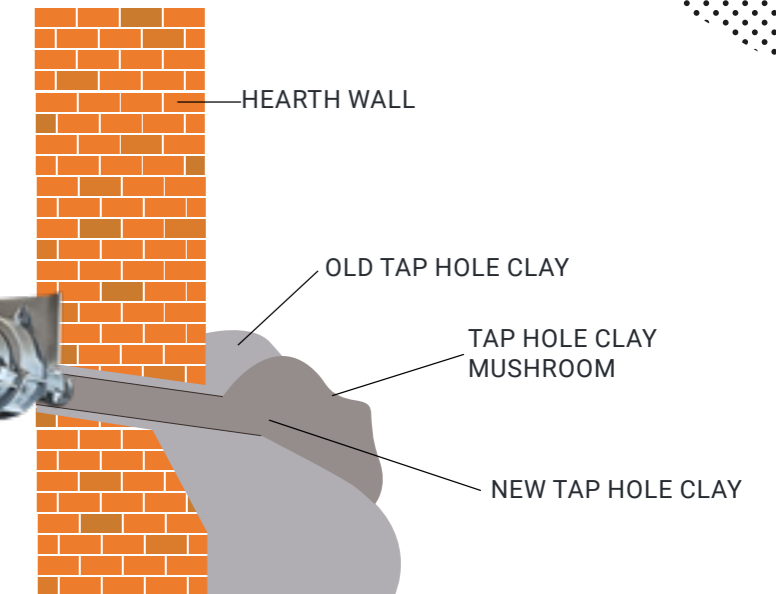
Our custom product solutions offer distinctive features that has enabled our customers to overcome the persistent pain points while proving economical impact.

KEY FEATURES

- Easy to drill
- Improved Plasticity
- High corrosion resistance
- High abrasion resistance
- Improved adhesive strength
- Good sintering behavior

YOUR BENEFITS

- Reduce overall cost
- Lower consumption of tap hole clay
- Better protection of the BF hearth walls
- Better and stable drainage of metal from the furnace
- Robust composition for harsh process condition



WHY CHOOSING SAINT GOBAIN?

Over 3 decades, Saint-Gobain has partnered with Shinagawa Refractories, one of the leaders in refractory solutions for ironmaking industry, for designing, developing and manufacturing of custom solutions to the fast changing and demanding market needs.

This collaboration has helped us to become the most preferred choice and a strong brand across ironmaking plants, for its most advanced tap hole clay technology, fast technical assistance and tailor made innovative solutions

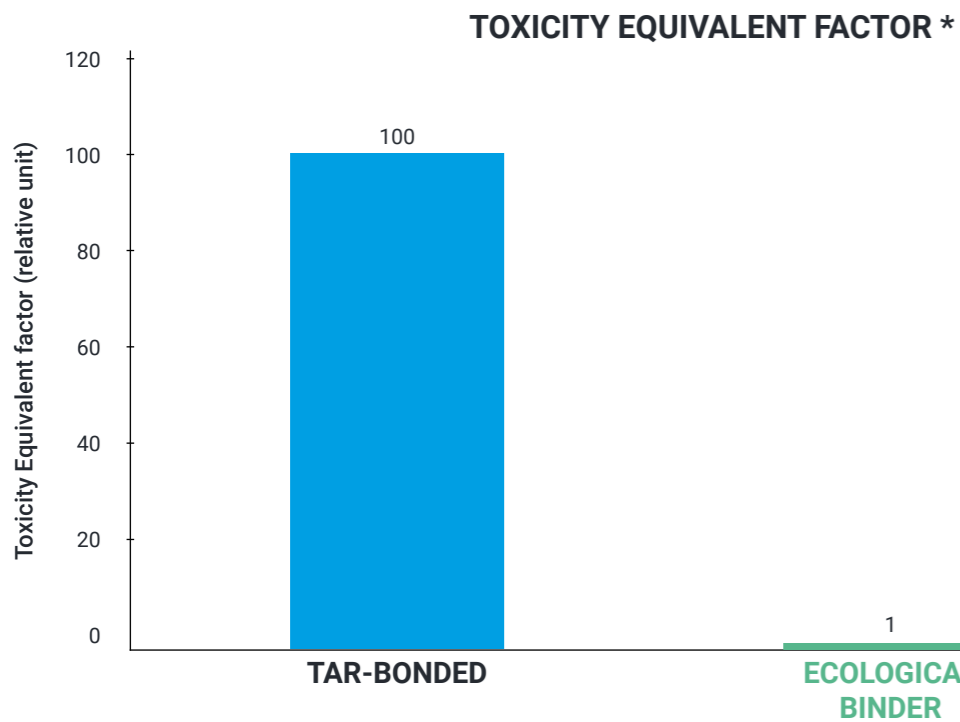


100% ECOLOGICAL LINE

Tar-free | No Phenolic Resin | Special Carbon Binder

Responding to market demand, Saint-Gobain offers eco-friendly tap hole clay solutions. As a green solution, a substitute binder with reduced concentration of PAHs (Polycyclic Aromatic Hydrocarbons) provides benefits including:

- Reduced toxicity equivalent factor to 1% relative to 100% with tar-bonded tap hole clay
- BaP (Benzo(a)pyrene) content according to European regulations
- Free of phenol formaldehyde
- Higher viscosity stability with time at temperature > 100°C
- Higher fixed Carbon content
- Excellent corrosion resistance behavior



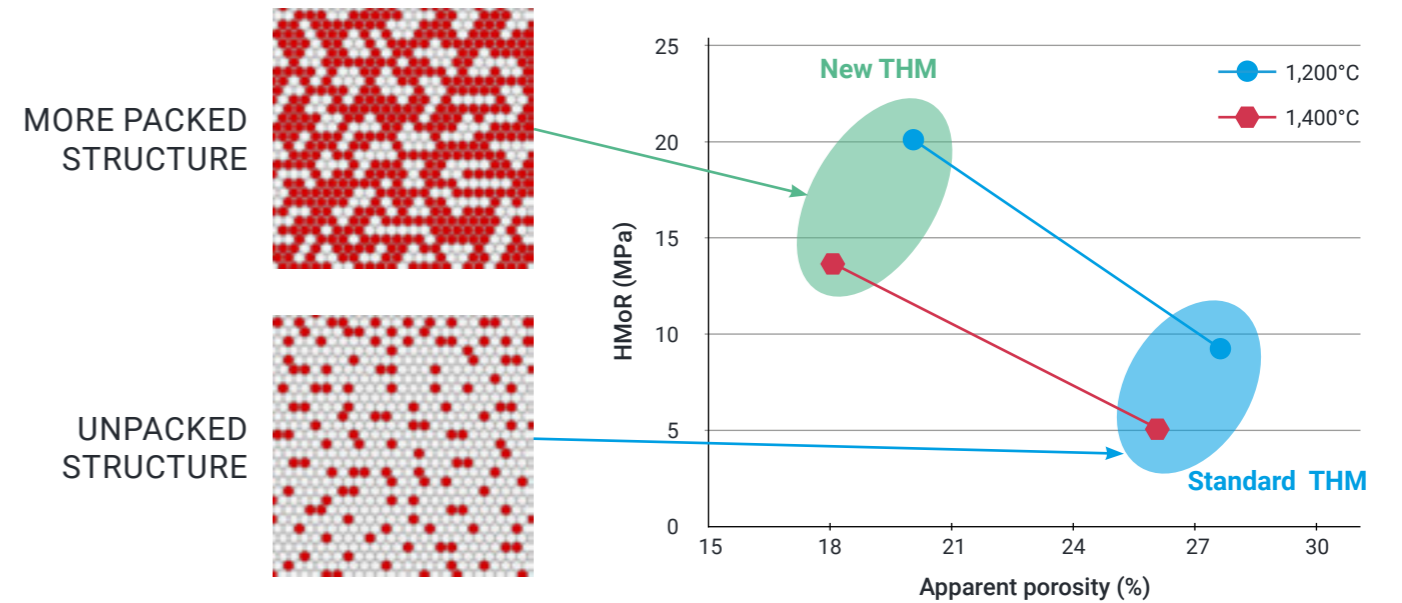
* $(BaP-TEQ)_{\Sigma PAH} = [BaA] \times 0.1 + [Chry] \times 0.01 + [BbFA] \times 0.1 + [BkFA] \times 0.1 + [BaP] \times 1 + [IP] \times 0.1 + [DahA] \times 5 + [BghiP] \times 0.01$

CASE STUDY

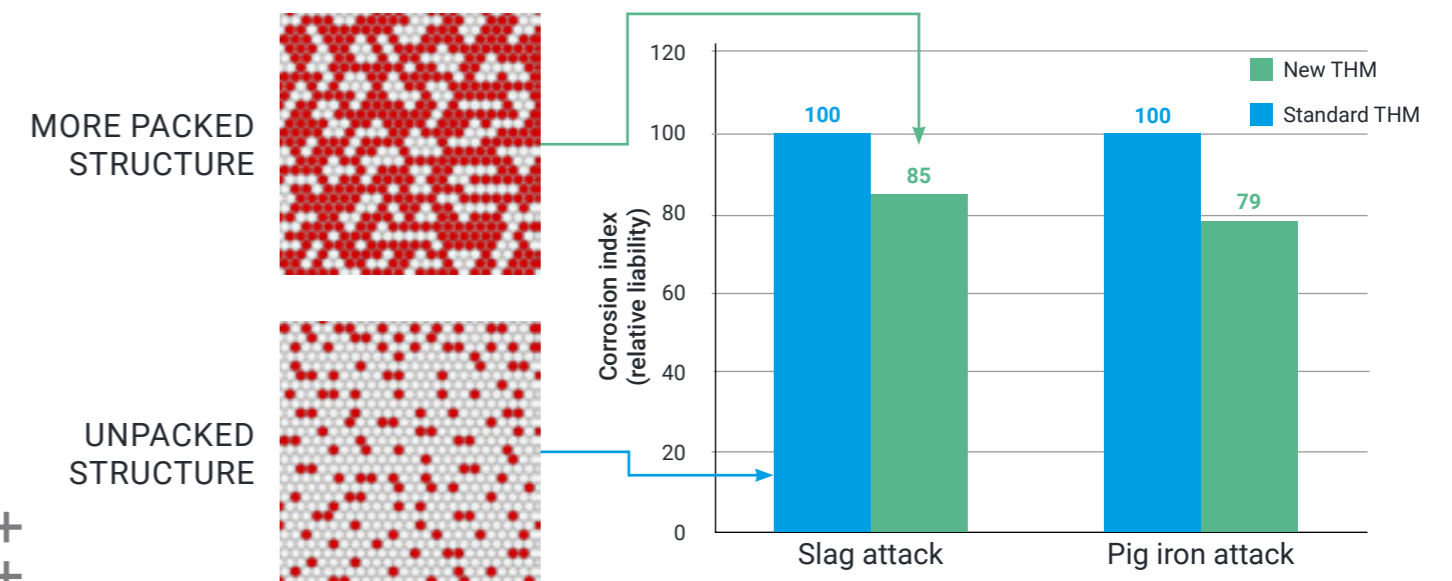
High temperature properties



HOT MODULUS OF RUPTURE & APPARENT POROSITY



CORROSION RESISTANCE - PIG IRON AND SLAG ATTACK



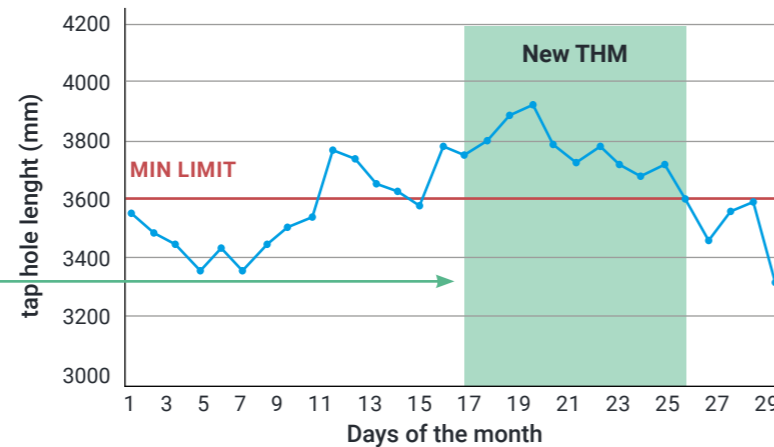
FIELD RESULTS

The tap hole clay developed with the novel technology is able to hold its enhanced performance at high temperatures, as noted by the high HMoR (Hot Modulus of Rupture) values. Such aspect is highly relevant, as low values of hot mechanical strength could easily decrease the material's erosion resistance to the aggressive pig iron peripheral flow. Owing to such improved mechanical strength and to the proper grain size distribution, the "new THM" formulation presented a much better corrosion resistance to both slag and pig iron.

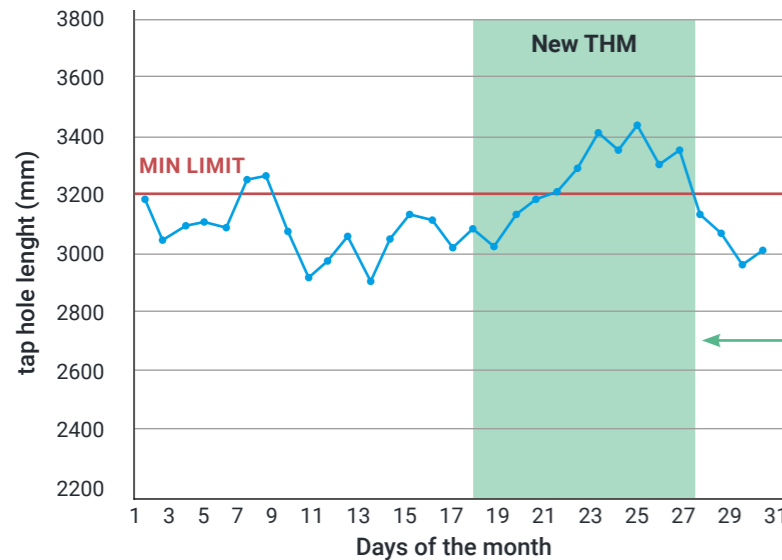
Blast-furnace #A (Brazil) – 4TH₃, 8,500 t pig iron / day and 3,500m³ (inner volume)

Standard THM was in use
 Drastic coke rate reduction
 High production rate
 High hearth wall temperature

Direct effect of new THM
 Suitable hearth protection



Blast-furnace #8 (Brazil) - 2TH₃, 7,500 t pig iron / day and 3,300 m³ (inner volume)



Competitor THM was in use
 Drastic coke rate reduction
 High production rate
 Poor quality raw materials

Direct effect of new THM
 Reduction of pushed clay amount

On both graphs, right after the standard clay was changed to the "new THM", long values of tap hole length could be obtained, pointing out a fast mushroom recovering. This innovative solution, based on different concepts, such as the improved microstructure and a proper combination of special additives, proved to be the key answer to protect the blast-furnace hearth and help to lengthen its working life.

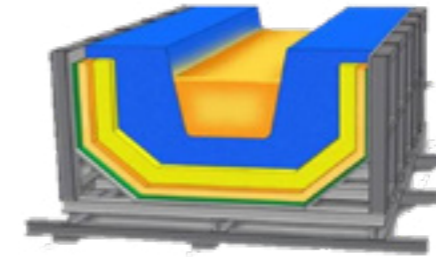
IRON MAKING SOLUTIONS

With over 5 decades of experience in providing refractory solutions Iron Making process, Saint-Gobain Performance Ceramics & Refractories understands every customer need thoroughly which enables us to offer custom solutions.

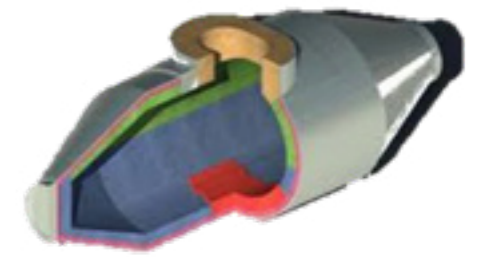
Not limiting to engineering high-quality products for blast furnaces, Saint-Gobain stands as a worldwide leader in the supply of refractories for reduction through concretes with excellent performance characteristics for trough runners, Al₂O₃-SiC-C bricks for torpedo ladles (torpedo cars) and high-quality best in class tap hole mix for iron notches including the most innovative ecological THM.



Blast Furnace Solution



Troughs & Runners



Torpedo Ladle (Torpedo car)



TOGETHER WE MAKE THE MATERIAL DIFFERENCE

1 product
out of 4

sold by Saint-Gobain
today didn't exist
5 years ago

Nearly
400

patents filed in 2017

3700

Researchers

One of the top

100

industrial groups
in the world

Present in

67

countries

2018 net sales

€41.8

billion



ceramicsrefractories.saint-gobain.com



ceramics.refractories@saint-gobain.com



[saint-gobain-performance-ceramics-refractories](https://www.linkedin.com/company/saint-gobain-performance-ceramics-refractories)

**SAINT-GOBAIN DO BRASIL
PRODUCTOSINDUSTRIAIS E PARA
CONSTRUÇÃO LTDA.**

Av. Independencia, 7031
Jardim São Matheus
13280-000 Vinhedo-Sp
Brazil

TEL: + 55 19 21278674
FAX: + 55 19 2127 8548

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