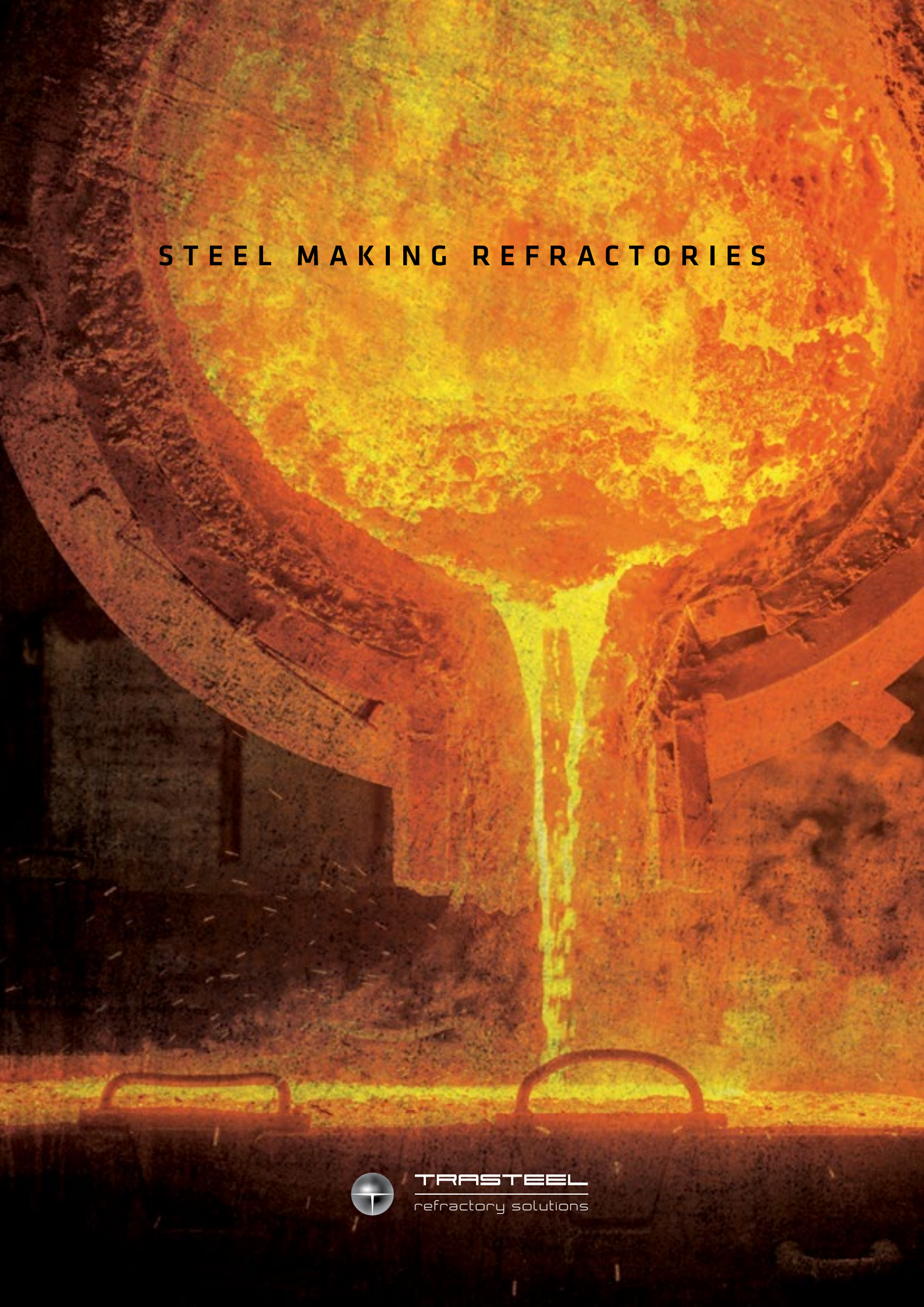

STEEL MAKING REFRACTORIES
TRASTEEL
refractory solutions

TRASTEEL

Trasteel Group is a Swiss based Company, established in September 2009, active in production and trading of steel related products such as graphite electrodes, refractories, flat and long products, steel making raw materials such as coking coal, coke and iron ore, non-ferrous metals and solid fuel such as steam coal and pet-coke.

The Group operates as producer in the steel making consumables industry through a partnership put in place directly with one major selected supplier, offering stable and high quality products.

Trasteel idea comes from the entrepreneurship of a group of executives active in the steel industry for more than 25 years. To invest in industrial assets with clear sustainability and competitive long term advantages is the main strategy of the Group. This grants the support of the trading activities, allowing the development of a multitasking and flexible company able to mitigate the high volatility of the markets. Trasteel, in parallel to its trading activities, offers to its Customers a complete range of services, from shipping and logistic to financing, thereby forming an entire business chain with a 360° approach.

Trasteel positioned itself as a multi-geographical player with major focus on China, Middle East, Europe, CIS countries and South America. The Head Office of the Group is based in Lugano, Switzerland, while representative offices are located in South America, UAE, China, Italy, Russia, Congo and South Africa; the rest of the market is entirely covered through the network of agents and Group's representatives.

During the fiscal year of 2018 the Company generated a consolidated turnover in excess of half a billion US dollars and employing almost 100 Professionals.

HEADQUARTER

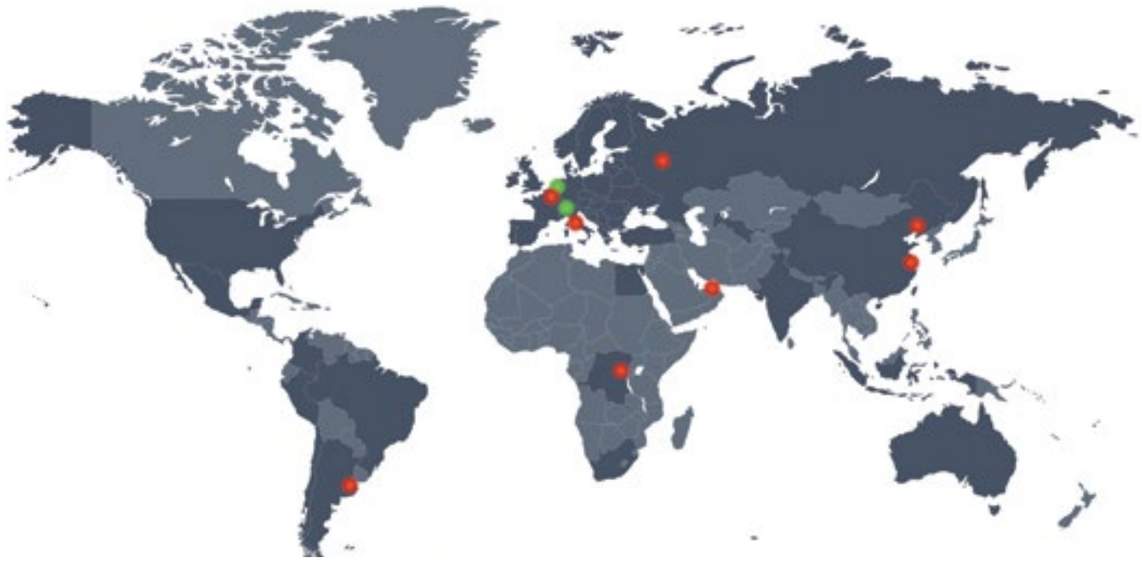
- Switzerland
- Luxembourg

OPERATIONAL OFFICES

- Lugano
- Dubai
- Shangai
- Bayuquan
- Buenos Aires
- Moscow
- Massa
- Goma

MARKETS COVERED

- Europe
- Turkey
- Russia
- Ukraine
- Arab Emirates
- Brazil
- Chile
- Colombia
- Argentina
- Perù
- Mexico
- USA
- Indonesia
- Philippines
- Australia
- South Africa
- Congo
- Egypt
- Uzbekistan
- Azerbaijan
- India



REFRACTORY SOLUTIONS

Trasteel owns an important stake in one of the **major Chinese Producer of Magnesia-Carbon and Alumina-Magnesia-Carbon refractory bricks**. The established Joint Venture is incorporated under the name of "Yingkou Liangyu - Trasteel Refractory Co. Ltd.".
Trasteel is acting as the exclusive marketing arm of the Joint Venture on all activities related to overseas marketing, sales, production financing and technology advancement. The Chinese Partner, Liaoning Liangyu Synthetic Refractory Co.,Ltd, has conferred to the Joint Venture their equipment and facilities. The production facilities are located in Dashiqiao City, Liaoning, a province in China close to the highest quality raw material sources for refractory production and major transportation.

The New Joint Venture integrates production and research facilities and is able to produce, with a capacity of about 70'000 MT/year, the following range of products:

- Magnesia Carbon bricks for converters, electric arc furnaces and ladles
- Magnesia Alumina Carbon bricks
- Alumina Silicon Carbide bricks
- Fired Magnesia and fired Magnesia Chrome Bricks
- Fired Magnesia Spinel bricks
- Sliding Gate Plates and Nozzles for Tundish and Ladle flow control
- Various unshaped products for lining installations and maintenance of steel making units.

Our Joint Venture partner owns a magnesite mine with discovered deposits of raw magnesite of **30 million MT** with an annual output of **200'000 MT** assuring to the Joint Venture a reliable and competitive source of fused and sintered Magnesia raw materials.
In order to control its materials and to develop tailor made production based on customers needs, Trasteel established a **technical center** located in Dalian Development Zone, China serving as the company' **Scientific & Research laboratory**. Thanks to the latter, Trasteel is able to analyze all the raw materials used during the production and to test the quality of the final product. The Company implemented this strict and structured approach in order to guarantee the constancy of its production and to make sure that all its guidelines and procedures are respected, so that if necessary immediate actions can be taken during the production.

The Functions of **Trasteel Technical Center** are:

- Quality control system for raw materials and finished products
- Chemical, physical and mineralogical test
- Quality control on all mixes used for the production of finished refractories
- Microstructural investigation for crystal size and component distribution
- Customers support with the development of dedicated solutions and receipts for the most demanding and extreme working conditions

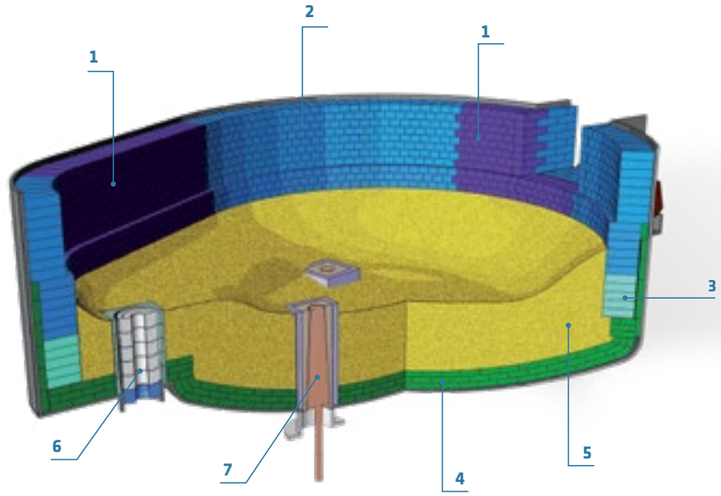
In addition Trasteel has established long-term partnerships with major manufactures of other refractories products:

- Isostatic products for continuous casting machine
- Special shape like purging plugs, EAF plugs, tap hole and well block
- Insulating materials

Having direct control over the Joint venture facilities and thanks to a team of skilled and long-term experienced technicians, Trasteel Refractory Solution can provide its customer with a full range of services including: refractory engineering, training, logistics, installation supervision, after sales assistance and global refractory management service aimed at guaranteeing and even exceeding the performances.

REFRACTORY MATERIAL FOR EAF

1. Hot spot reinforcement
2. Slag line lining
3. Lower side wall lining
4. Permanent lining
5. Hearth ramming
6. EBT system
7. Purging system



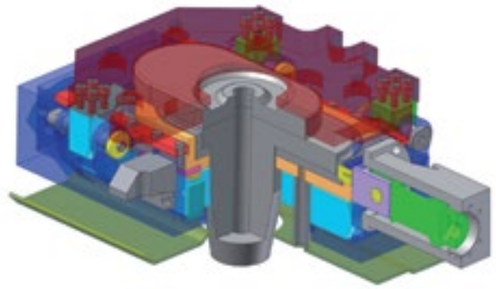
Working lining bricks									
Quality Name	MgO (%)	SiO_2 (%)	CaO (%)	Fe_2O_3 (%)	Carbon (%)	BD (g/cm³)	AP (%)	CCS (Mpa)	Application
EA14L5	98.17	0.39	0.89	0.35	14	2.99	3	45	Hot spot and burners area
E16C5	98.07	0.44	0.93	0.41	16	2.97	3	40	Hot spot and slag zone
EI14L2	97.58	0.56	1.16	0.57	14	2.99	3	40	Slag zone
I12C2	97.19	0.65	1.33	0.67	12	3.00	4	42	Slag zone
IP12L2	97.18	0.68	1.39	0.61	12	2.99	4	38	Upper sidewall
O10C2	96.12	0.88	1.74	0.83	10	3.01	4	43	Lower sidewall
I10C2-F3	97.16	1.04	1.12	0.61	10	3.01	4	43	Underbath

Safety lining bricks								
Quality Name	MgO (%)	SiO_2 (%)	CaO (%)	Fe_2O_3 (%)	Al_2O_3 (%)	BD (g/cm³)	AP (%)	CCS (Mpa)	Application
M93F	93.00	3.40	2.60	1.00	-	2.93	18	60	Safety lining

Unshaped materials									
Quality Name	MgO (%)	SiO_2 (%)	CaO (%)	Fe_2O_3 (%)	Al_2O_3 (%)	BD (g/cm³)	Grain Size (mm)	CCS (1600°Cx3h) (Mpa)	Application
RAM-M79	79.00	1.30	13.50	5.00	0.50	2.2	0-6	30	Hearth mass
REP-M68HF	65.00	1.02	27.40	2.40	-	2.20	0-6	30	Local hot reparations
RAM-M94U	94.50	0.75	1.20	0.80	0.40	2.72	0-6	20	Joints ramming
GUN-M88V	88.00	6.00	3.00	1.50	1.50	2.20	0-3	-	Gunning for hot and cold reparations
MOR-M93	93.00	2.50	1.80	0.90	0.50	-	0-0.5	-	Mortar for the installation of safety lining bricks

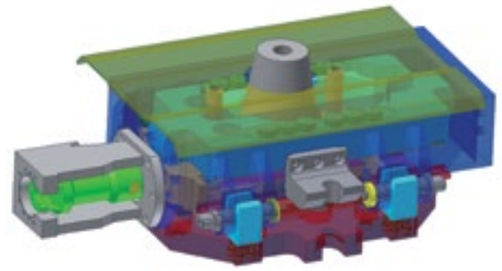
The table does not represent all the available products. More qualities can be produced according to Customer requirements.

SLIDING GATE SYSTEM MECHANICAL



The Sliding Gate System TRS-1000L provides multiple advantages for an easier use and higher performance:

- Simplicity: reduction of components, quicker application on the ladle, Interchangeability with existing systems, reduction of maintenance
- Dimensions: the reduced dimensions of TRS1000L guarantee the application of the system without the need of changes to the standard settings
- Speed: quicker change of refractories, closing with hydraulic system, reduction of ladle preparation time
- Performance: high performance of the refractories guaranteed by high quality of products and reliability of the system, holding between refractory plates ensured by a system of heat-resistant springs and by a stroke of 150 mm



Slide gate system						
Model	Casting bore diameter(mm)	Length(mm)	Width(mm)	Thickness(mm)	Stroke(mm)	Ladle capacity(MT)
TRS-1000L	35 - 60	715	520	256 (without tip) 346 (including tip)	150	30 - 150

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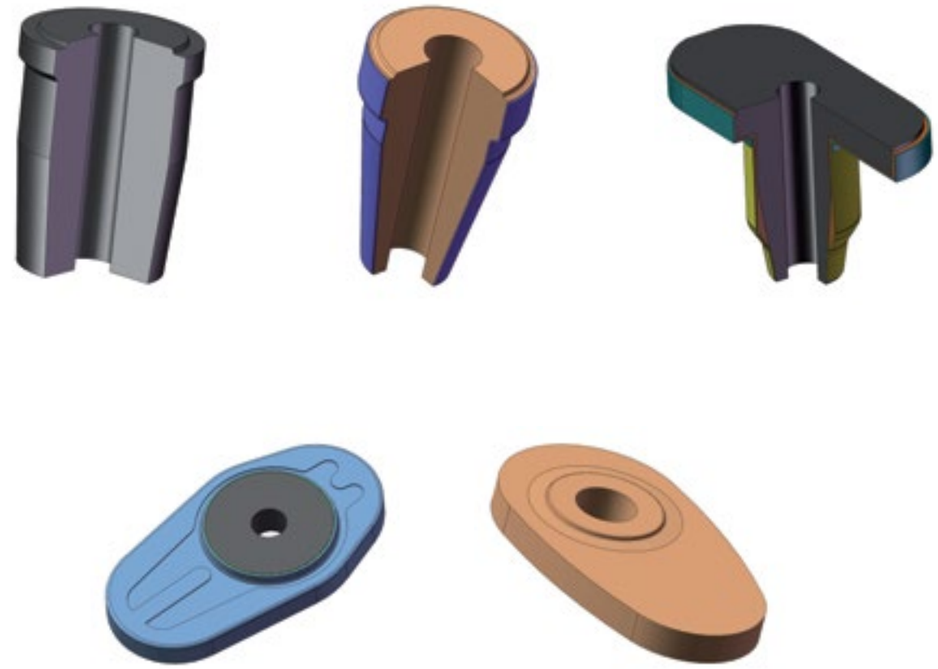
SLIDING GATE SYSTEM REFRACTORY



Slide gate plates

Quality Name	Al_2O_3(%)	MgO(%)	ZrO_2(%)	Carbon(%)	BD(g/cm³)	AP(%)	CCS(Mpa)	Application
SP-A70BU	72.00	-	-	6.00	2.85	8	70	Alumina Carbon unfired plate
SP-A85BU	86.00	-	-	3.00	3.10	10	100	Alumina Carbon unfired plate
SP-A75ZF	75.00	-	6.50	7.00	3.05	7	115	Alumina Zirconia Carbon fired plate
SP-A80CF	80.00	-	-	5.00	3.00	9	93	Alumina Carbon fired plate
SP-M80AF	12.00	80.00	-	2.50	2.97	10	85	Magnesia Fired Plate

Nozzles

Quality Name	Al_2O_3(%)	MgO(%)	ZrO_2(%)	Carbon(%)	BD(g/cm³)	AP(%)	CCS(Mpa)	Application
IN-A80	80.00	-	-	4.00	3.00	13	65	Inner Nozzle
IN-A90	90.00	-	-	4.00	3.00	12	100	Inner Nozzle
CN-A80	80.00			5.00	3.00	15	75	Collector Nozzle
CN-A90	90.00	-	-	3.00	3.00	13	90	Collector Nozzle

The table does not represent all the available products. More qualities can be produced according to Customer requirements.

TECHNICAL ASSISTANCE AND OPTIMIZATION OF REFRACTORIES APPLICATIONS

Trasteel prouds itself on the quality of its engineering staff, which is capable of optimizing the performance of its materials even in extreme working conditions.
Besides, it can offer a wide range of services, teaming up with customer's technical staff and reducing the transformation costs of the mill.
Trasteel technical team provides complete assistance and consulting in order to maximize the results of its products.
Its services go beyond a simple product-related service, as listed below:

- Study, design and optimization of all refractories lining by using thermal calculation and dynamic model
- On-site training to steel plant technicians on the refractory operation
- Development of 4.0 Industry, by providing software and tools in order to monitor the refractories life with forecast analysis and therefore bettering the stock management
- Detailed practical and theoretical studies related to the electric arc furnaces and their operations
- Monitoring and optimization of operational, mechanical and electrical variables which affect the performances of the electric arc furnaces
- Monitoring and optimization of operational and mechanical performance of the refractory
- Calculation of productivity increase
- Furnace start-up assistance
- Furnace Regulation
- Hydraulics
- Evaluation of power supply system
- Evaluation of transformer performance
- Evaluation of load current and current balance between phases
- Optimization of melting efficiency
- Optimization of graphite electrodes consumption
- Customized Reporting
- Interaction with customer's data – PLC
- Inspection of accessories

TRASTEEL

refractory solutions

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