三華集團
SAMWHA GROUP

遼寧三華耐火集團有限公司
LIAONING SAMWHA REFRACTORY GROUP CO.LTD

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遼寧三華耐火集團有限公司
LIAONING SAMWHA REFRACTORY GROUP CO.LTD


Specialist of Refractory
and best partner of steel

GROUP INTRODUCTION

Samwha Group is a comprehensive enterprise that produces refractory materials and non-metallic mineral products, with abundant mineral resources, deep processing production capacity, and technical strength. The headquarter is located in Dashiqiao in China which area is famous for the magnesia resources and so called "The Capital of Magnesia". Samwha Group was founded in 1996, has six subsidiaries, nine domestic branch factories, three overseas branch companies and seven overseas branch offices and more than 2200 staff. Samwha Group's annual output of the refractory materials and nonmetallic mineral products for a total of 460,000 tons. The products are sold to the steel plants, glass, nonferrous and the other industries all over the world, and exports account for more than 60% of total sales. Samwha Group has a broad vision, regards the world as a stage, introduces advanced management and technology, cooperates with the famous manufacturers and agencies in depth. Manufacturing, research and development of the refractory material are in the same level of international advanced standard. It regards the originality as the most important thing and then works with rigorous approach. Samwha Group is trying the best to develop itself as an important manufacturing base of refractory material with international expertise. Warmly welcomes friends from all over the world to Samwha Group to negotiate business, discuss cooperation together and win the future.

世界為舞臺

BROAD THINKING
THE WORLD IS MY STAGE

SAMWHA GROUP

Contents/目錄

不忘初心跟党走

Never forget your original intention and follow the party

Samwha Group always implements the leadership of the Party, takes on its social responsibility, takes Party members as pioneers, is dedicated to patriotism, and promotes righteousness. A party building exhibition hall has been established at the headquarters to systematically showcase the glorious history of the party and promote the spirit of the party.

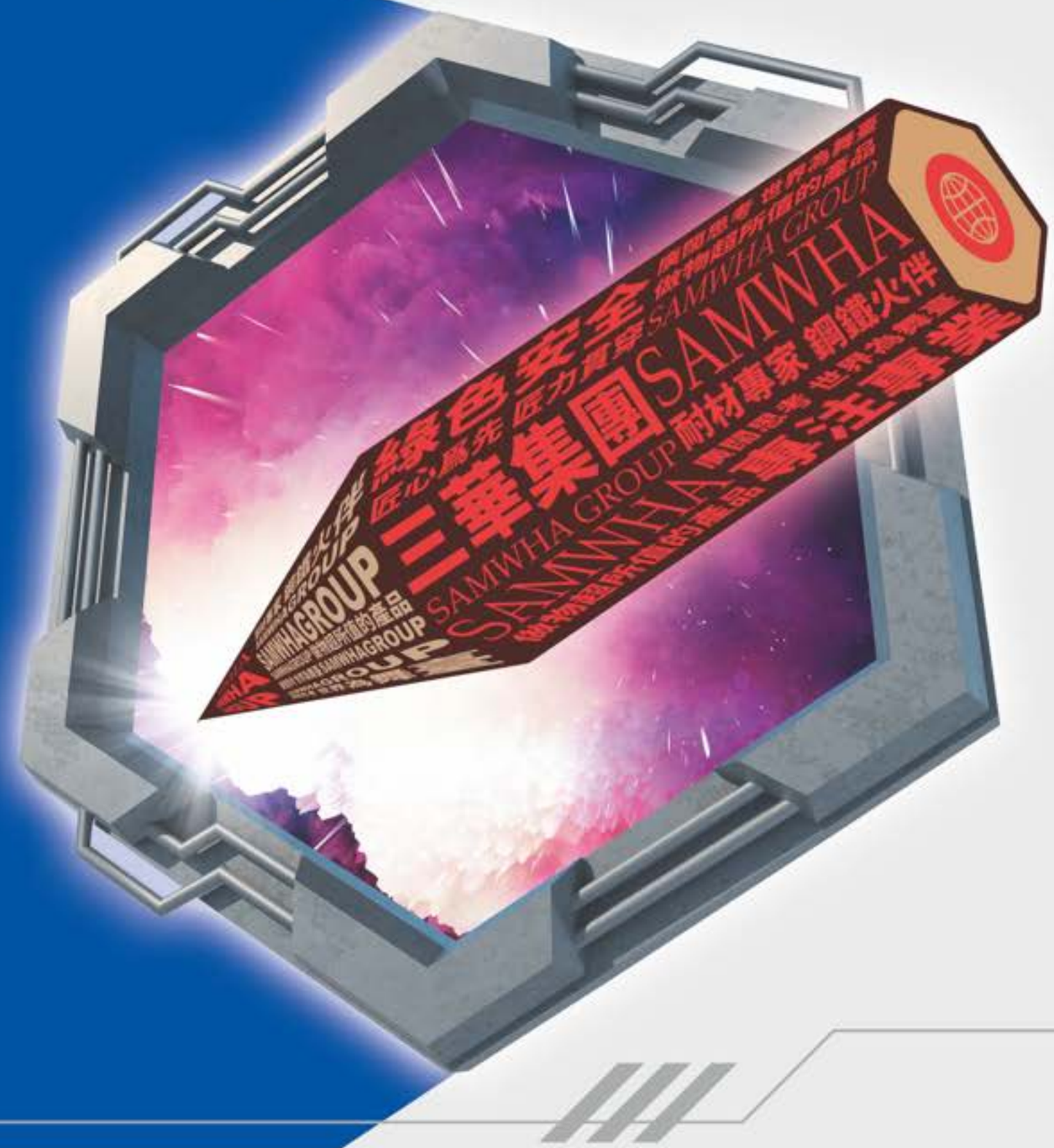
Enterprise Values Broad Thinking, the World is My Stage

Enterprise concept Focus Specialization Perseverance

Enterprise Culture Be honest, Be shrewd, do not seek the biggest, but only the best.

Objective of a Struggle

To build a world-class magnesium finished product precision processing base through industrial capitalization, industry concentration, intelligent production, international technology, and product servilization.




证 书
一级优秀承包服务商
证 书
CERTIFICATE
实用新型专利证书
实用新型专利证书
实用新型专利证书
发明专利证书

HARMONIOUS DEVELOPMENT GREEN TAKEN THE LEAD

Over the years, Sanhua Group has continuously increased its investment in environmental protection, integrating clean production, energy conservation, emission reduction and sustainable development, changing the traditional single mode of "resources - products - emissions" into the development mode of "resources - products - renewable resources", which is repeated and recycled. From end of pipe treatment to source of pipe treatment, we need to find a way through process and technological innovation, build green processes, pursue advanced economic models with greater economic benefits, less resource consumption, lower environmental pollution, and more labor employment. We not only need to have mountains of gold and silver, but also green waters and mountains.

PRACTITIONERS OF GREEN AND SAFE REFRACTORY MATERIALS

SAMWHA Location

Samwha Group is located in Dashiqiao City, Liaoning Province, known as the "Magnesium Capital of China". Dashiqiao City is rich in magnesite resources, with proven reserves of up to 2.5 billion tons, accounting for 85% of China's total reserves and 20% of the world's total reserves. The group is adjacent to the Hada Highway, Zhuanglin Highway, Changda Railway, and Shenda Panhaiying Expressway, 23km away from Yingkou Port, 45km away from Bayuquan Port, and 210km away from Dalian Port, with unique geographical advantages.

DISTRIBUTION OF ENTERPRISES IN DASHIQIAO CITY AREA

Samwha Group's domestic companies are mainly distributed in Dashiqiao, Panlong Mountain as the center of the east and west two areas. The companies in the East side of Yuzigou district are: Liaoning Samwha Refractory Group Headquarter, Yingkou Heping Samwha Minerals Co., Ltd. (#1 Factory, #2 Factory, #3 Factory), Yingkou Helong Refractory Material Co,.Ltd, Dashiqiao Shenglong Refractories Co., Ltd, R&D Center, Yingkou Ruifu New Materials Co., Ltd, Yingkou Oriental Solvent Co., Ltd. The companies in the of west side of Panlong Mountain is Yingkou Samwha Non-ferrous Metal Development Co., Ltd.

Headquarters International Office Area

Samwha Group headquarter is located in the east of Panlong Mountain and covers about 700,000 ㎡, the headquarter contain various offices and departments such as Party Building, Group Exhibition Hall, Conference Rooms, Technical Dept., Domestic Sales Dept., General Dept., Import and Export Dept., Production Dept., Purchase Dept., Equipment Dept., Finance Dept. and other Departments, which form the core of the Samwha Group daily operations.

Samwha Minerals

Yingkou Heping Samwha Minerals Co.,Ltd. is a joint venture which is controlled by the Chinese parties and it was established in 1997, with 3 production units and R&D centre.

Main products are Magnesia bricks, Magnesia Carbon bricks etc shaped refractory products and Gunning Mass, Ramming Mass, Dry Ramming Mass, Ladle monolithic refractory, and Slag Conditioner, Hot Repair Materials, Carbon Raiser and Magnesite Materials etc. five serials of about 200 varieties of refractories and non-refractories.

Helong Refractory

Yingkou Helong Refractory Material Co., Ltd was established in 2008, and the factory is in the middle of Yuzigou. The total area is 74100 ㎡ which was built leaning the mountains. Main products are fired bricks and unfired tempered bricks. It has a fired bricks factory and a Magnesia Carbon bricks factory. There are two high-temperature and environmentally friendly tunnel kilns, as well as advanced grinding, cutting, and impregnation equipment. The factory workshop is spacious and clean, with a scientific and reasonable process layout. The magnesia carbon brick pressing workshop introduces advanced equipment and technology from abroad to produce first-class products.

Fired Bricks Factory

Main products are

Fired Magnesite Brick(MgO 90%, MgO 95%, MgO 97%), Magnesia Chrome Brick (Silicate bonded), Magnesia Chrome Brick(Direct-bonded), Magnesia Chrome Brick(Semi-rebonded), Magnesia Chrome Brick(Re-bonded Fused), Magnesia Dolomite Bricks, Magnesia Alumina Spinel Bricks, Magnesia Iron Aluminum Spinel Bricks, Magnesia Olivine Bricks, Magnesia Iron Bricks, Magnesia Zirconia Bricks .

Helong Refractory

Magnesia Carbon Brick Factory

Main products: Resin/Pitch bonded Bricks, Magnesia Carbon Bricks, Alumina Magnesia Carbon Brick, Aluminum Silicon Carbide Carbon Brick etc.

Shenglong Refractory

Dashiqiao Shenglong Refractories Co., Ltd. was established in 2006. The main product is monolithic refractories and the annual production capacity is 70,000 tons.

SAMWHA Non-ferrous

Yingkou Samwha Non-ferrous Metal Development Co., Ltd was established in Jan. 2009, the main product is Ferromolybdenum and phenolic resin etc products.

Samwha Non-ferrous

Sewage Treatment Workshop

Phenolic Resin Production Workshop

Jumbo Bag Workshop

Yingkou Ruifu New materials Monolithic Factory

Yingkou Ruifu New materials Co. LTD relies on fully automated production line, with production capacity of 100,000 tons of monolithic materials every year. Automated production process ensures the standardization of the production process and eliminate the drawbacks of subtle deviations and improving quality standards

Main products are : EAF Dry Ramming Mass, EAF Hot Repair Mass, BOF eco-friendly Repair Mass, Tundish Dry Vibration Mass, Tundish Spray Mass, Submerged Arc Furnace Bottom Ramming Mass.

Monolithic Refractories Workshop

Yingkou Ruifu New materials

Magnesia Carbon Bricks Factory

Yingkou Ruifu New Materials Co., Ltd. has a fully automated production line with an annual output of 60,000 tons of shaped refractory materials. Its main products include Magnesia Carbon Bricks, Magnesia Alumina Carbon Bricks, Alumina Magnesia Carbon Bricks, Ladle Shroud, Submerged Enter Nozzle, Stopper.

Shaped refractory material production workshop

Yingkou Oriental Cosolvent

Factory area and production workshop

Yingkou Oriental Cosolvent Co. Ltd., the plant area is 22,000 square meters. It produces desulphurizing solvent and dephosphorization cosolvent 60,000 tons / year. Advanced technology and superior quality, it is a high-quality auxiliary material for the metallurgical industry.

Vietnam Lua VietBestref

Vietnam Lua Viet Bestref joint venture Co., Ltd. was registered by Samwha Group and Vietnam Lua Viet Bestref Co., Ltd. in 2011 as joint enterprises. It produces Magnesia Carbon bricks and unshaped refractory monolithic materials. It has most modern equipment and is the largest professional refractory production enterprises in Vietnam at present.

The Magnesia Carbon Bricks and Monolithics refractory materials produced by Vietnam Lua Viet Bestref Company using the core technology of Samwha Group are mainly exported to various parts of the world and widely used in Vietnamese metallurgical enterprises. It has become the largest joint venture in Taiyuan Province, Vietnam, and has accumulated experience for Samwha Group's extensive international cooperation.

Samwha Science and Technology Center

Development needs the power of perseverance, science and technology to protect the enterprise. Samwha Group faces competitive global market, positions the product structure reasonably, formulates a differentiation strategy and technology innovation strategy. Samwha Refractory Technology Research Institute uses world-class testing equipments, establishing a provincial inspection technology center to protect the reliability of product quality, research and development ability of new products.

Physical Testing

Central Research Institute has advanced physical testing laboratory equipments, like normal C.C.S (Cold Crushing Strength) testing, high temperature creep, R.U.L. (Refractoriness under load), HMOR(Hot Modulus of Rupture), TSR (Thermal Shock Stability) , SEM PrismaE(scanning electron microscope) etc testing equipments.

Samwha Science and Technology

Chemical Testing

Chemical Analysis laboratory is the key department to assure product quality. The Central Research Institute configures the world' s most advanced optical spectrum analyzer and all photoelectric analytical balance that chemical analysis requires.

Technology research and development Department

The Technology R&D Department is the core research department of Sanhua Group, consisting of senior personnel such as chief engineers and refractory experts, responsible for the development and design of new products and providing customers with the best refractory solutions.

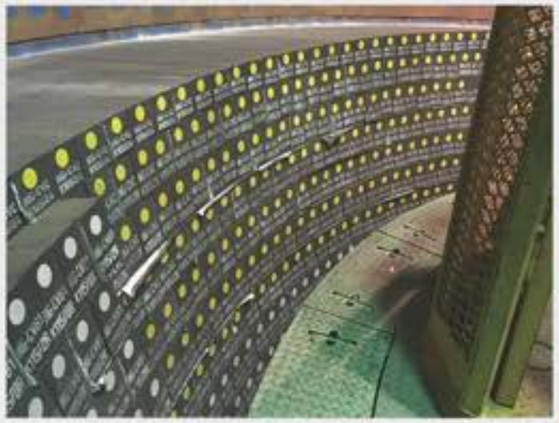
Samwha International Trade Department

Samwha Group vigorously implements the international business strategy, has very good business relationship with the international high-end steel enterprises, such as ArcelorMittal, the German Thyssen steel, Hyundai steel and other a large number of the world' s iron and steel enterprises. The products are exported to Malaysia, South Korea, Russia, Australia, Japan, Thailand, Indonesia, Britain, Mexico, South Africa, Egypt, Chile, Ukraine, Georgia, Kazakhstan, Taiwan and other countries and regions.

Samwha Domestic Trade Department

Under the premise of focusing on international sales, Samwha Group vigorously carries out domestic sales work and, according to the needs of the domestic steel industry, undertakes the overall contracting of a complete set of refractory materials including converters, electric furnaces, AOD, refining ladles, tundish, etc. At the same time, it supplies and builds furnaces for the ferroalloy ore blast furnace industry, glass industry, cement industry, building materials industry, etc., and has been widely recognized and praised by customers.

Samwha Service



Samwha Group has a competent after-sale service, with a technical guidance team established to provide full process services for product output.

Samwha Exhibition Hall

Headquarter

Samwha Exhibition Hall

R&D Center

Samwha Group established a exhibition hall at the headquarter of the group, using sound and light multimedia technology to provide customers a comprehensive introduction to the Group’ s system development process, production technology, product performance and classification, a blueprint for future development.

Products Introduction

Products Introduction

Samwha Group relies on the advantages of "Magnesium Capital" resources and integrates research and development, production, sales, and services. Its products cover cement, glass, and lime kilns in the steel smelting and continuous casting machine building materials industry, copper (lead, zinc) smelting of non-ferrous metals, refractory materials in high-temperature fields such as iron smelting furnaces, manganese iron, and chromium iron.

Specific products include: magnesia carbon bricks, magnesia bricks, and repair bricks for converters, magnesia carbon bricks for electric furnaces and steel ladles, aluminum magnesia carbon bricks, magnesium aluminum carbon bricks, magnesium iron aluminum spinel bricks, magnesium aluminum spinel bricks, magnesium chromium bricks, magnesium zirconium bricks, magnesium spray materials for cement and glass kilns, environmentally friendly spray materials for converters, slag splashing furnace protection materials, ladle castables, environmentally friendly spray coatings for tundish, dry ramming materials, environmentally friendly hot repair materials for electric furnaces, magnesium dolomite bricks for refining outside AOD and VOD furnaces, and dry ramming materials for electric furnace bottoms. The product has stable quality and good performance, receiving high praise from a large number of users.

Samwha Group uses special technique to produce product with the advantages of low apparent porosity, high density, excellent erosion resistance and oxidation resistance.

The gunning material which is made from special non-phosphorus binding agent can reduce the pollution to liquid steel. The gunning material has high adhesive rate which makes it fit to any gunning equipment.

The high-purity magnesium calcium iron synthesis electric furnace bottom ramming material produced has a reasonable particle size distribution and the optimal magnesium, calcium, and iron ratio. With minimal vibration force, the particles can quickly move, achieving overall high density and forming high-temperature ceramic bonding within the temperature range of payment. It is an ideal bottom ramming material for AC and DC electric furnaces.

Samwha Group continues to develop, forge ahead, and devote itself to researching and developing new products; Developing water-based environmentally friendly fabrics that produce no pollution and high adhesion, completely replacing asphalt based converter fabrics; The chromium free product of non fired magnesia alumina spinel bricks developed for RH furnaces has been successfully applied to modern iron RH furnaces in South Korea, with good performance and elimination of hexavalent chromium pollution; Successfully developed products such as low-carbon magnesia carbon bricks and carbon free bricks meet the increasing demand for lower carbon content in furnace linings for low-carbon special steel grades in recent years; The development of environmentally friendly dry materials for tundish has been successfully applied to continuous casting tundish both domestically and internationally, eliminating harmful gases generated during use and prolonging its service life; The advanced taphole pressing and pitch dipped equipment produces high-quality taphole products and is favored by users; The ultra vacuum high-temperature processing automation furnace equipment eliminates harmful gases (smoke) that rise during the baking of magnesia carbon brick masonry in advance, reducing environmental pollution and minimizing harm to on-site workers; The successful development of environmentally friendly resins effectively reduces water pollution during the production process, achieving the production and use of green and environmentally friendly refractory materials.

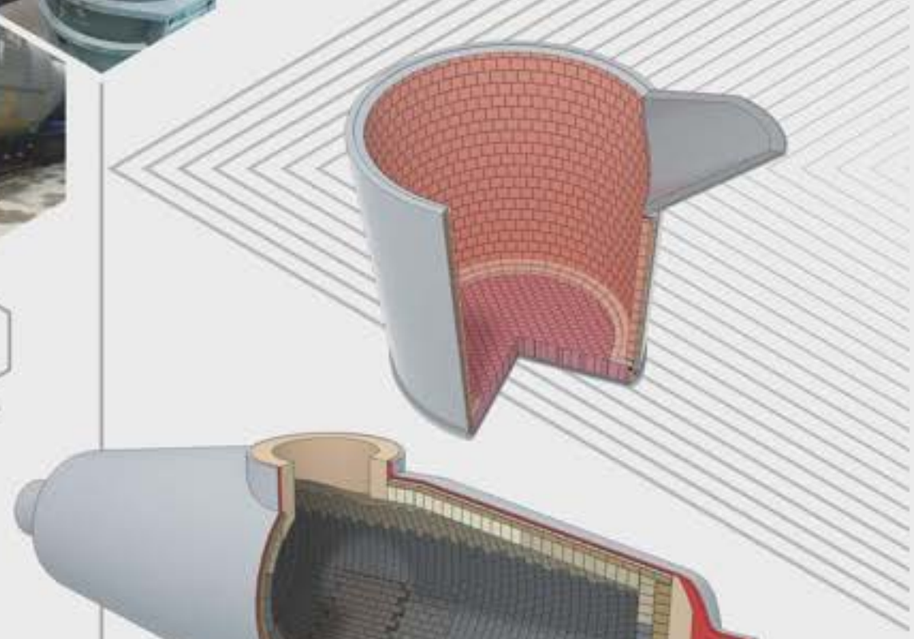
Samwha Group takes customers as the core, and with a professional and focused spirit, carefully creates first-class products to provide high-quality services for global users. With the belief of constantly grasping, Samwha people are vigorously developing new products towards the cutting-edge and higher field of refractory materials with a new attitude, constantly advancing, and providing the best demand for the continuous growth of high-end environmentally friendly refractory materials. Sanhua Group is the best partner in the high-temperature industry.

REFRACTORIES FOR STEEL MAKING

1 Refractory materials for Torpedo ladle/hot metal ladle

Torpedo ladle is a kind of large–scale hot metal transportation equipment, which has the advantages of small heat loss, long heat preservation time and energy saving. It can store hot metal and complete the operation procedures of desulfurization and dephosphorization in the process of hot metal transportation. Our company's aluminum silicon carbide carbon brick series can meet the needs of modern torpedo tank at the working layer.

Hot metal ladle is a widely used device for receiving, loosening, and buffering molten iron in the world's steel enterprises. It is also an important carrier in the iron–making steel–making section. The desulfurization, dephosphorization, and other pre–treatment stages of molten iron before entering the converter are also carried out in the ladle; And the aluminum silicon carbide carbon bricks produced by our company are applied to the working layer of the hot metal ladle.



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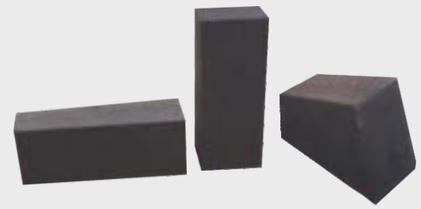
1.1 Alumina Silicon Carbide Carbon Bricks for Torpedo Ladle

Manufacturing process: Bauxite, corundum, pyrophyllite, silicon carbide and flakey graphite are used as the main raw materials, and phenolic resin is used as the binder, which is processed by heat mixing and high pressure forming.

Main application: Working lining for torpedo ladles



tem/Brand		AGS–T6	AGS–T9	AGS–T11	AGS–T13	AGS–T15
Chemical Specification (%)	Al_2O_3≥	85	80	78	75	70
	SiC≥	5	6	8	9	11
	C≥	6	9	11	13	15
Apparent Porosity(%)≤		5	5	4	4	4
Bulk Density(g/cm^3)≥		3.15	3.12	3.10	3.08	3.06
Cold Crushing Strength(MPa)≥		60	50	40	30	30

1.2 Alumina Silicon Carbide Carbon Bricks for Hot Metal Ladle

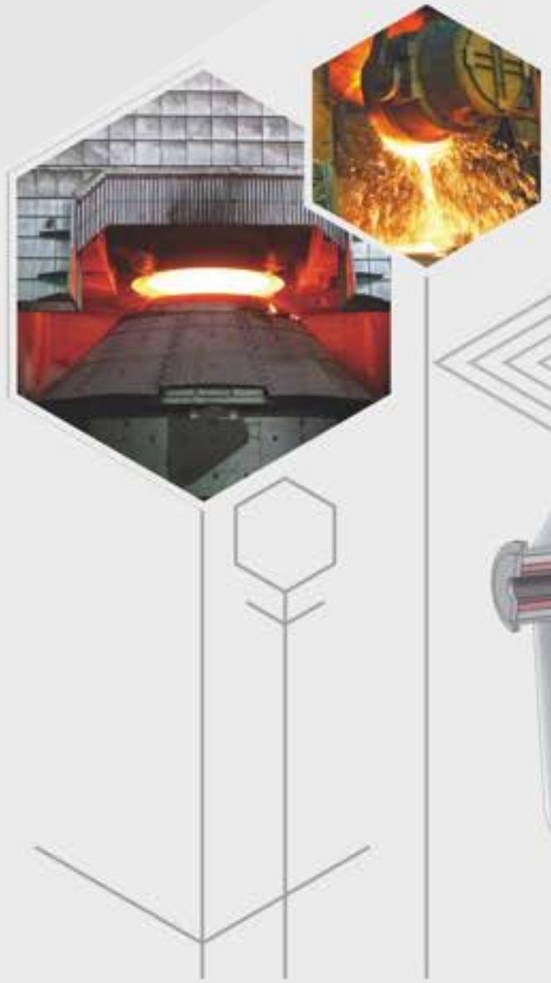
Manufacturing process: Bauxite, corundum, pyrophyllite, silicon carbide and flakey graphite are used as the main raw materials, made from phenolic resin as a binder through processes such as hot mixing and high–pressure molding machine heat treatment.

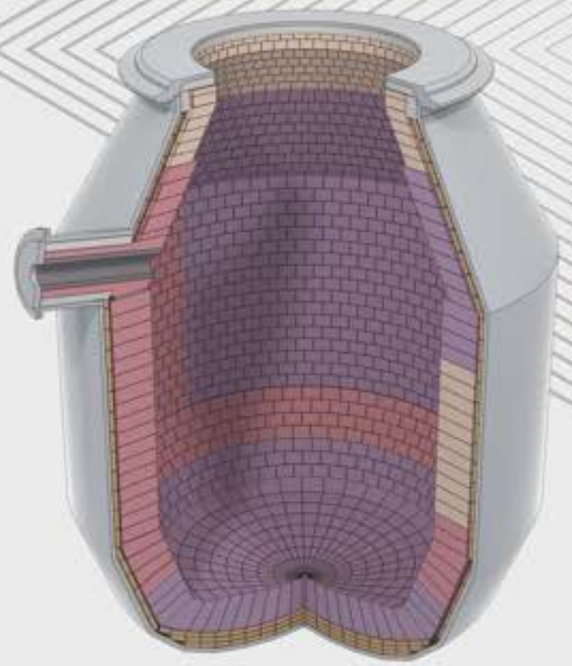
Main application: Hot metal ladle’s working lining.

tem/Brand		AGS–C5	AGS–C8	AGS–C10	AGS–C12	AGS–C14
Chemical Component (%)	Al_2O_3≥	87	83	79	76	72
	SiC≥	4	5	7	8	10
	C≥	5	8	10	12	14
Apparent Porosity(%)≤		5	5	5	4	4
Bulk Density(g/cm^3)≥		3.16	3.13	3.11	3.09	3.07
Cold Crushing Strength(MPa)≥		60	50	40	30	30

2 Refractory for BOF

BOF is a steelmaking process that uses molten iron, scrap steel, and ferroalloys as the main raw materials, without relying on external energy sources. It relies on the physical heat of the molten iron itself and the chemical reactions between its components to generate heat. At present, the most commonly used steelmaking equipment is the top blown and bottom blown converter with alkaline oxygen. Our company's converter magnesia carbon bricks are made from high–quality magnesia sand and flake graphite, organic binders, added antioxidants, and processed through mixing, high–pressure molding, and heat treatment.





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2.1 Magnesia Carbon Bricks for BOF

Manufacturing process: High–quality magnesia sand and flake graphite, organic binders, added antioxidants, and processed through mixing, high–pressure molding, and heat treatment.

Main application: Working lining for BOF

Item/Brand		MT–C10	MT–C12	MT–C14	MT–C16	MT–C18
Chemical Component≥	MgO	80	78	76	74	72
	C	10	12	14	16	18
Bulk Density(g/cm^3)≥		2.98	2.97	2.95	2.93	2.90
Apparent Porosity(%)≤		4	4	3.5	3.5	3
Cold Crushing Strength(MPa)≥		45	40	38	35	30

2.2 BOF Taphole

Manufacturing process: High–quality fused magnesia and flake graphite as the main raw material, organics as the binder, adding anti–oxidants, and processed through mixing, high–pressure molding, and heat treatment.

Main application: Taphole of BOF

Item/Brand		TAP–12	TAP–14	TAP–16	TAP–18
Chemical Component≥	MgO	78	76	74	72
	C	12	14	16	18
Apparent Porosity(%)≤		5	5	4	4
Bulk Density(g/cm^3)≥		2.96	2.94	2.92	2.90
Cold Crushing Strength(MPa)≥		40	38	35	30

2.3 Patching Bricks

Manufacturing process: It is made from fused magnesia as the main raw material, environmentally friendly organic compounds as binders, and a certain amount of sintering agents added through hot mixing and high–pressure molding.

Main application: Used for hot repair of magnesia carbon bricks and magnesia dolomite carbon bricks on the converter working face.

Physical and Chemical Specification

Item/Brand		BLZ–75	BLZ–80	BLZ–85
Chemical Component≥	MgO≥	73	78	83
	C≥	4	4	4
Bulk Density(g/cm^3)≥		2.85	2.90	2.95
Apparent Porosity(%)≤		7	7	7
Cold Crushing Strength(MPa)≥		40	40	40

Environmentally Friendly Repair Material for BOF

Samwha Group independently researched and developed environmentally friendly water–based self–flowing repair material for BOF. The material has good natural flowability, non–toxic smoke generated during sintering process, short sintering time and long durable service life. Improve the drawbacks of harmful smoke and the release of carcinogens such as benzo [a] pyrene during the use of large–area repair materials in asphalt and tar systems. It has been successfully used in the BOF of cooper plant, and the effect is extremely remarkable.

The specific features are as follows:

(1). It is environment friendly, and the sintering process does not release toxic and harmful fumes.
(2).The natural flowability of the material is very good.
(3).The material has good sintering property and good cohesiveness. The material sinters with the original furnace lining brick to form ceramic bonding.
(4).The material itself has good corrosion resistance and erosion resistance.
(5).The service life is three times that of the traditional materials .
(6).The sintering time of the material is short, and the sintering time of each ton of material is less than 15 minutes.

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2.4 Environmentally Friendly Repair Material for BOF (Environmental Friendly Green Products)

Item/Brand		ECOKNEAD–1	ECOKNEAD–2	ECOKNEAD–3
Chemical Component(%)	MgO≥	88	90	93
	SiO_2≤	5.0	4.0	3.0
	Fe_2O_3≤	1.5	1.0	1.0
	CaO≤	3.5	3.0	2.5
Bulk Density(g/cm^3)≥		2.41	2.52	2.60

2.5 BOF Patching Mass

Manufacturing process: Made from high–quality magnesia and synthetic magnesium dolomite as the main raw materials, and mixed with various composite binders. This product has good corrosion resistance and thermal stability, making it an ideal repair material for large surfaces and slag lines in converters.

Main application: Used for hot repair of converter surfaces, slag lines, and trunnion.

Item/Brand		ZDML–75	ZDML–80	ZDBL–75	ZDBL–80
Chemical Component(%)	MgO≥	75	80	72–76	76–80
	SiO_2≤	2.5	2.0	1.0	1.2
	Fe_2O_3≤	2.0	1.8	1.0	1.2
	CaO≤	3.0	3.0	9–11	6–8
	C	4–6	4–6	4–6	4–6
Bulk Density(g/cm^3)≥		2.41	2.52	2.50	2.50

2.6 BOF Gunning Mass

Manufacturing process: Made from high–quality magnesia and synthetic magnesium dolomite as the main raw materials, and mixed with various composite binders. This product has good corrosion resistance and thermal stability, making it an ideal gunning material for slag lines etc.

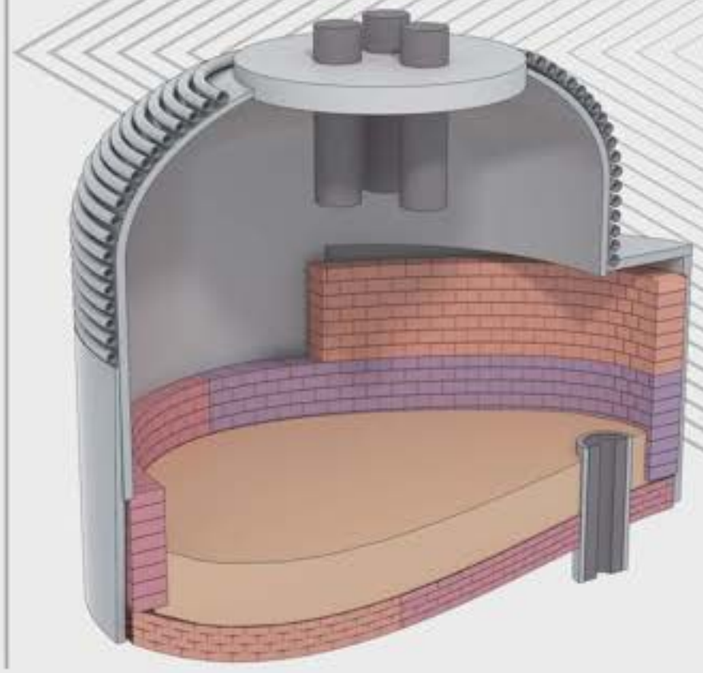
Main application: Used for gunning of slag lines and trunnion.

Physical and Chemical Specification

Item/Brand		ZDPL–80	ZDPL–85	ZDPL–90
Chemical Component(%)	MgO≥	78	83	88
	SiO_2	3–5	2–4	2–4
	Fe_2O_3≤	3.0	2.0	1.0
	CaO≤	6	6	4
Bulk Density(g/cm^3)≥		2.41	2.43	2.51
Cold Crushing Strength(MPa)≥		10	10	12

3 Refractory materials for EAF

The electric furnace, also known as the electric arc furnace, uses the high temperature generated by the electrode arc to smelt ore and metal. When the gas discharge form the arc, the energy is very concentrated, and the temperature of the arc area is above 3000 ℃. For smelting metal, EAF is more flexible than other steelmaking furnaces, and can effectively remove sulfur, phosphorus and other impurities, the furnace temperature is easy to control and suitable for melting high–quality alloy steel. The products of our company have been successfully qualified for the adverse working environment of electric furnace, and the excellent quality has been trusted by the customers.



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3.1 Magnesia Carbon Bricks for EAF

Manufacturing process: High–quality fused magnesia and flake graphite as the main raw material, organics as the binder, adding anti–oxidants, pressed by hot mixing and high pressure.

Physical and Chemical Specification

Item/Brand		MT–10	MT–12	MT–14	MT–16	MT–18
Chemical Component(%)≥	MgO	80	78	76	74	72
	C	10	12	14	16	18
Bulk Density(g/cm^3)≥		2.99	2.98	2.96	2.94	2.91
Apparent Porosity(%)≤		5	5	4	4	4
Cold Crushing Strength(MPa)≥		45	40	38	35	30

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3.2 EAF Hearth Ramming Mass

Manufacturing process: Dry ramming material made mainly from high–purity magnesium calcium iron materials such as sintered synthetic sand, scientifically formulated.

Main application: For AC and DC EAF hearth ramming

Physical and Chemical Specification

Item/Brand		DOLRAM–10W	DOLRAM–20H	DOLRAM–25S
Chemical Component(%)	MgO	80–85	72–76	65–68
	CaO	7–11	18–20	25–30
	Fe_2O_3	4–7	3–5	3–5
	SiO_2≤	1.5	1.5	1.5
Bulk Density(g/cm^3)≥		2.41	2.43	2.48
Compressive Strength(1500℃，MPa)≥		20	20	20

3.3 Gunning Mass for EAF

Manufacturing process: High quality fused magnesia and magnesia olivine as the main raw material, adding a variety of complex binders and additives in combination and pressed by mixing.

Physical and Chemical Specification

Item/Brand		EFGUN–70	EFGUN–80	EFGUN–85	EFGUN–90
Chemical Component (%)	MgO≥	68	78	83	88
	SiO_2	24–26	18–20	4–5	3–5
	Fe_2O_3≤	4–6	3–5	1.5	1.5
	CaO≤	2	2	3–5	2
Bulk Density(g/cm^3)≥		2.4	2.4	2.5	2.5
Cold Crushing Strength(MPa)≥		10	10	10	12

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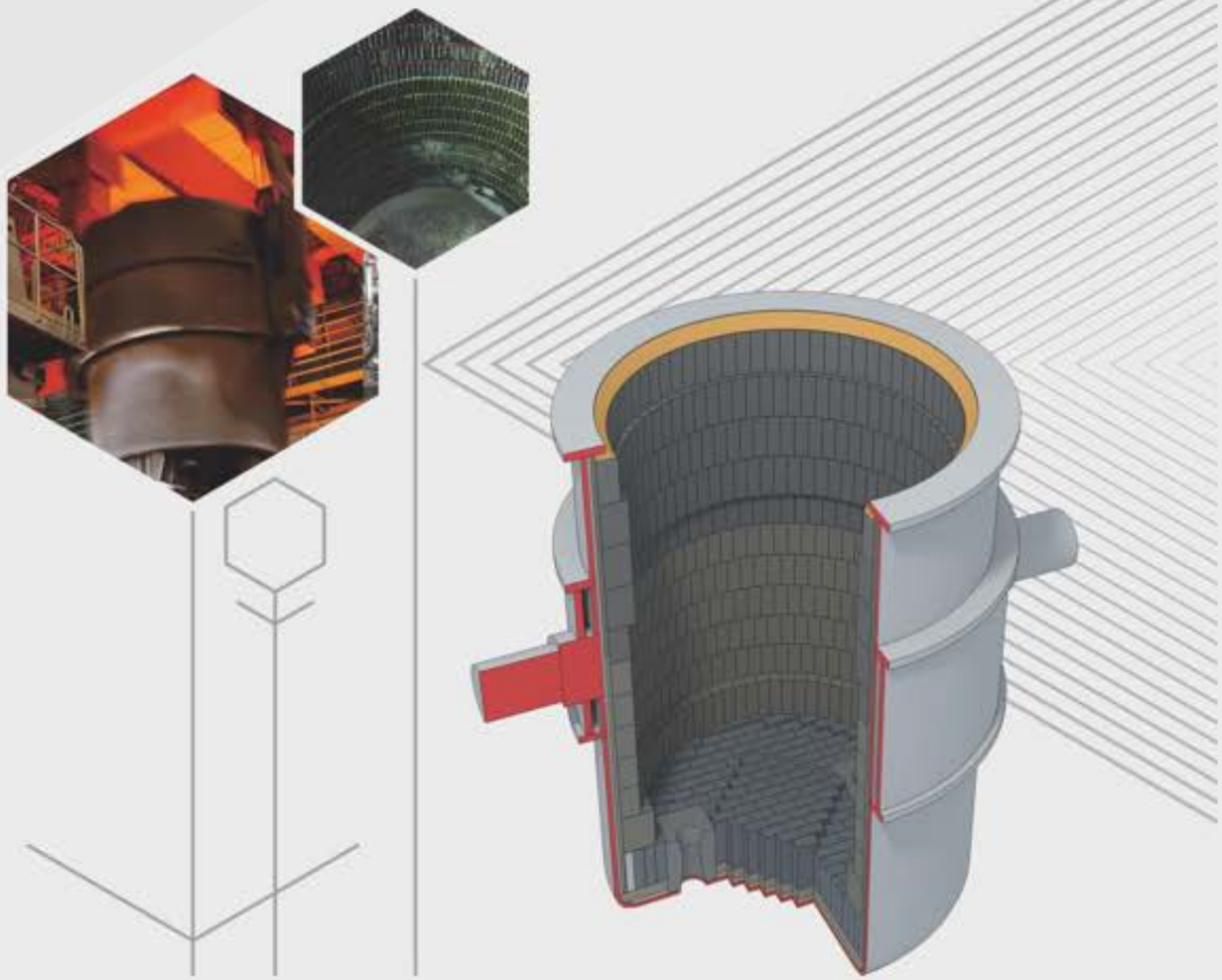
4 Refractory Materials for Ladle

Ladle: With the continuous improvement of steel–making technology, the secondary refining of molten steel has become an important part of the steel–making process. As a carrier carrying the secondary refining of molten steel, the steel ladle's refractory quality has become more demanding. Compared with the traditional ladle, the secondary refining ladle needs to go through a series of refining processes under a series of harsh conditions, which will cause more severe wear of refractories, and its slag line is the most affected area. The ladle magnesia carbon brick series produced by our company is a unique product of the research and development work carried out by our R &D Centre.



4.1 Magnesia Carbon Bricks for Ladle

Manufacturing process: Using high–quality fused magnesia and flakey graphite as main raw materials, organic matter as binder, antioxidant as well as heat mixing, high–pressure molding and heat treatment.

Main application: For ladle working lining

Physical and Chemical Specification

Item/Brand		MT–10	MT–12	MT–14	MT–16
Chemical Component(%)≥	MgO	80	78	76	74
	C	10	12	14	16
Bulk Density(g/cm^3)≥		3.02	3.00	2.98	2.96
Apparent Porosity(%)≤		4	4	4	4
Cold Crushing Strength(MPa)≥		45	40	40	35

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4.2 Alumina Magnesia Carbon Bricks for Ladle

Manufacturing process: Corundum, high–quality fused magnesia and flakey graphite are used as the main raw materials, phenolic resin as the binder, and antioxidants are added to make it through heat mixing, high–pressure molding and heat treatment.

Main application: Working lining of various types of steel ladle.

Physical and Chemical Specification

Item/Brand		AMC–6	AMC–8	AMC–10	AMC–12
Chemical Component(%)	Al_2O_3≥	75	70	65	58
	MgO≥	10	15	20	25
	C≥	6	8	10	12
Bulk Density(g/cm^3)≥		3.25	3.21	3.18	3.10
Apparent Porosity(%)≤		5	5	5	5
Cold Crushing Strength(MPa)≥		60	55	50	45

4.3 Magnesia Alumina Carbon Bricks for Ladle

Manufacturing process: With high quality fused magnesia, corundum with flakey graphite as main raw materials, phenolic resin as binder, and antioxidant added, it is made by heat mixing, high pressure forming and heat treatment.

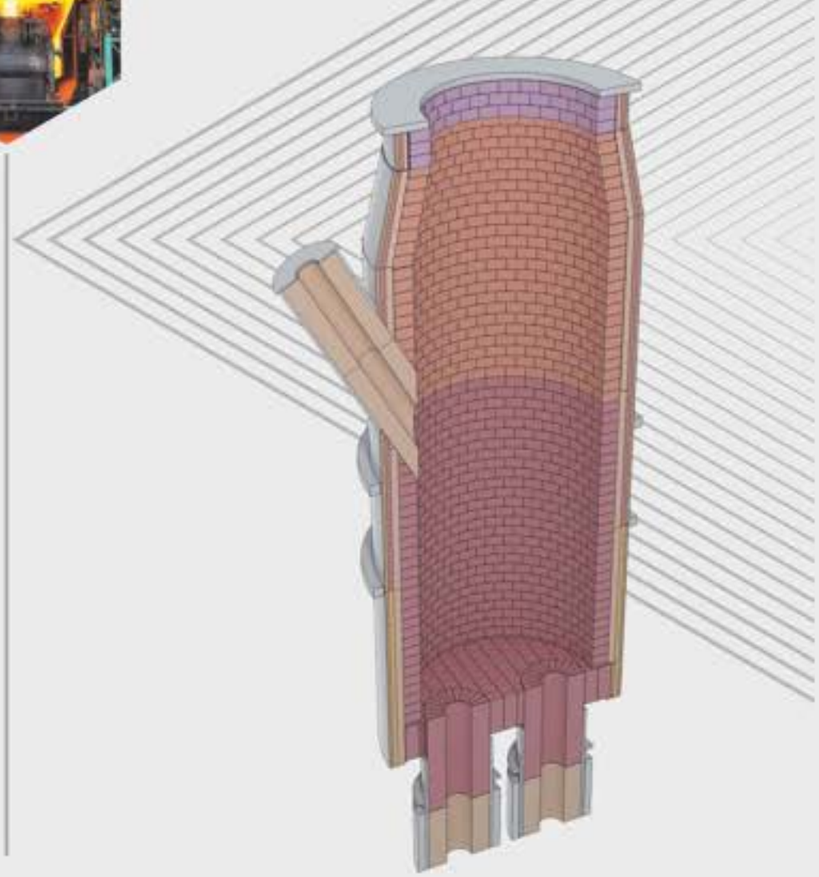
Main application: Working lining of steel ladles.

Physical and Chemical Specification

Item/Brand		MAC–6	MAC–8	MAC–10	MAC–12
Chemical Component(%)	Al_2O_3≥	8	10	12	25
	MgO≥	80	76	72	58
	C≥	6	8	10	12
Bulk Density(g/cm^3)≥		3.13	3.11	3.08	3.00
Apparent Porosity(%)≤		6	6	6	6
Cold Crushing Strength(MPa)≥		55	50	45	40

5 Refractory Materials for RH Degasser

RH Degasser : RH system equipment is a secondary refining process equipment used for producing high–quality steel. The entire metallurgical reaction of molten steel is carried out in a vacuum chamber lined with refractory materials. Through RH vacuum refining process, harmful gases such as H2 can be removed from molten steel in a short period of time. Our company's RH furnace magnesia chrome brick series has undergone special processing to improve the effectiveness of magnesia chrome brick use. At the same time, our company has successfully developed chromium free products, which have been proven by steel mills to meet their product requirements without causing pollution.



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5.1 Magnesia Chrome Bricks for RH Degasser

Manufacturing process: High quality fused magnesia and fused magnesia chrome sand are used as the main raw materials, which are formed at high temperature and sintered at high temperature, which has very strong corrosion resistance.

Main application: For RH Degasser and other Secondary Refining Vessels.

Physical and Chemical Specification

Item/Brand		Directly combined Magnesia Chrome Brick		Semi combined Magnesia Chrome Brick		Rebonded Magnesia Chrome Brick	
		ZMCr–16	ZMCr–20	BDMK–18	BDMK–20	DMK–20	DMK–26
Chemical Component(%)	MgO≥	68	60	62	60	58	53
	SiO_2≤	1.5	2.0	1.5	1.5	2.0	2.0
	Cr_2O_3≥	16	20	16	20	20	26
Apparent Porosity(%)≤		18	18	16	14	16	17
Bulk Density(g/cm^3)≥		3.12	3.15	3.20	3.25	3.25	3.30
Cold Crushing Strength(MPa)≥		45	40	40	40	50	50

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5.2 Magnesia Carbon Bricks of RH Degasser (Chrome-free)

Manufacturing process: Using high–quality fused magnesia and flake graphite as main raw materials, organic as binder, antioxidant as well as heat mixing, high–pressure molding and heat treatment.

Main application: For RH furnace and other external refining furnace.

Physical and Chemical Specification

Item/Brand		MT–3RH	MT–4RH	MT–5RH	MT–6RH
Chemical Component (%)	MgO≥	91	90	89	88
	C≥	3	4	5	6
Bulk Density(g/cm^3)≥		3.15	3.13	3.11	3.09
Apparent Porosity(%)≤		4	4	4	4
Cold Crushing Strength(MPa)≥		65	60	55	50

5.3 Magnesia Alumina Spinel Bricks of RH Degasser (Chrome-free)

Manufacturing process: Using high–quality fused magnesia, corundum and bauxite as main raw materials, phenolic resin as the binder, and antioxidants are added to make it through heat mixing, high–pressure molding and heat treatment.

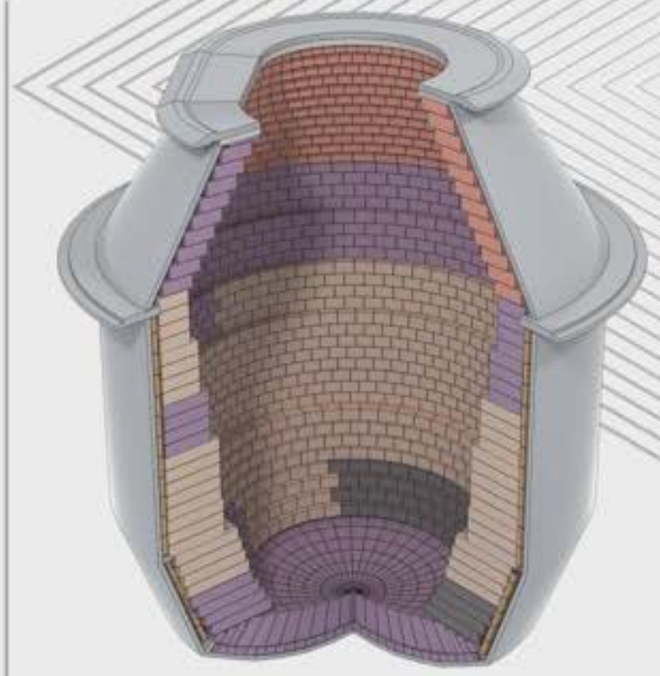
Main application: Working lining of RH furnace.

Physical and Chemical Specification

Item/Brand		MRS–NB1	MRS–NB2	MRS–NB3
Chemical Component (%)	MgO≥	86	83	81
	Al_2O_3≥	10	13	15
Bulk Density(g/cm^3)≥		3.15	3.19	3.21
Apparent Porosity(%)≤		7	7	8
Cold Crushing Strength(MPa)≥		80	80	80

6 Refractory Materials for AOD Converter

AOD Converter : AOD furnace is a refining equipment for argon oxygen refining method, mainly using Li Yong gas dilution method to reduce CO partial pressure. The blowing of high–pressure argon oxygen mixed gas increases the contact opportunity between molten steel and bubbles and slag, which is conducive to the rapid removal of carbon, sulfur and non–metallic inclusions. It is one of the essential refining equipment for refining stainless steel. Due to factors such as high refining temperature, refractory materials for AOD furnaces must have high–temperature strength, good thermal shock resistance, slag resistance, and abrasion resistance. Our company's AOD furnace magnesia calcium bricks have all the characteristics required for AOD furnaces and are widely used in AOD furnaces around the world.



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6.1 Fired Dolomite Bricks for AOD Furnace

Manufacturing process: Using high–quality synthetic dolomite sand as raw material, selecting MgO/CaO ratio according to different needs, high–temperature firing, vacuum pressure impregnation with asphalt or paraffin, excellent high–temperature performance and slag resistance.

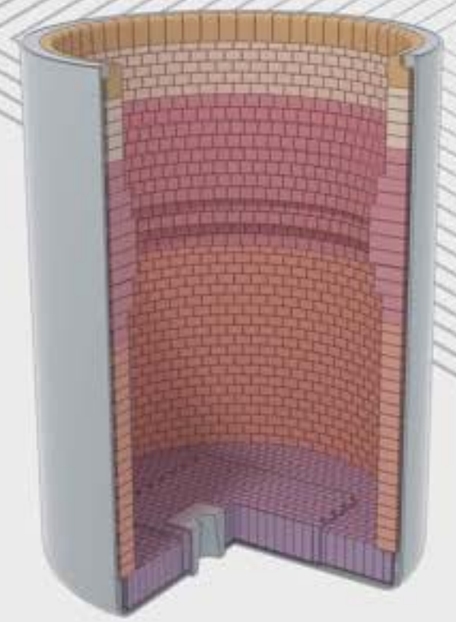
Main application: Used in refining furnace such as AOD furnace.

Physical and Chemical Specification

Item/Brand		MCa–20A	MCa–20B	MCa–30A	MCa–30B	MCa–40A	MCa–40B
Chemical Component (%)	CaO	20	20	30	30	40	40
	(A+F+S) ≤	3	4	3	4	3	4
Apparent Porosity(%)≤		14	14	14	14	14	14
Cold Crushing Strength(MPa)≥		55	50	55	50	55	50

7 Refractory materials for VOD Furnace

VOD furnace: VOD furnace is a refining device for making stainless steel, ultra–low carbon steel and alloy by blowing oxygen and decarburizing under vacuum. In the refining process, the main characteristics are: vacuum at high temperature , basicity change, turbulence of molten steel and slag, and long high temperature operation time, etc; Therefore, the refractories for VOD furnace need to have the characteristics of good stability under high temperature and vacuum conditions, good slag and erosion resistance, and good thermal shock resistance . The quality of magnesia chrome brick for VOD furnace produced by our company is stable and has been widely praised by steel enterprises. In order to meet the needs of the steel plant, our company has successfully developed a low carbon magnesia carbon brick for VOD furnace, which will not affect the carbon content of the steel, but will be excellent in quality and will not bring pollution to the environment. At present, it is gradually being popularized in major steelmaking enterprises.



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7.1 Magnesia Chrome Bricks for VOD

Manufacturing process: Using high–quality fused magnesia and fused magnesia chrome sand as main raw materials, the bricks are made by high–temperature molding, high–temperature sintering, and then by vacuum pressure impregnation and salt leaching, to produce the seventh empty, high–density and long–life magnesia chrome bricks.

Main application: Used in refining furnace such as VOD furnace.

Item/Brand		Semi combined Magnesia Chrome Brick			Rebonded Magnesia Chrome Brick	
		BDMK–18	BDMK–20	BDMK–22	DMK–18	DMK–20
Chemical Component(%)	MgO≥	62	60	55	64	60
	SiO_2≤	1.5	1.5	1.8	1.5	2.0
	Cr_2O_3≥	18	20	22	18	20
Apparent Porosity(%), Salt dipping≤		14	14	14	14	14
Bulk Density(g/cm^3)≥		3.2	3.25	3.25	3.25	3.27
Cold Crushing Strength(MPa)≥		40	40	40	50	50

7.2 Low Carbon Magnesia Carbon Bricks for VOD furnace

Manufacturing process: Using high–quality fused magnesia and flake graphite as main raw materials, organic matter as binder, antioxidant as well as heat mixing, high–pressure molding and heat treatment.

Main application: Used in working lining of refining furnaces such as VOD furnace.

Item/Brand		MT–LC2	MT–LC3	MT–LC4	MT–LC5
Chemical Component (%)	MgO≥	93	92	91	90
	C≥	2	3	4	5
Bulk Density(g/cm^3)≥		3.16	3.14	3.12	3.10
Apparent Porosity(%)≤		4	4	4	4
Cold Crushing Strength(MPa)≥		65	60	55	50

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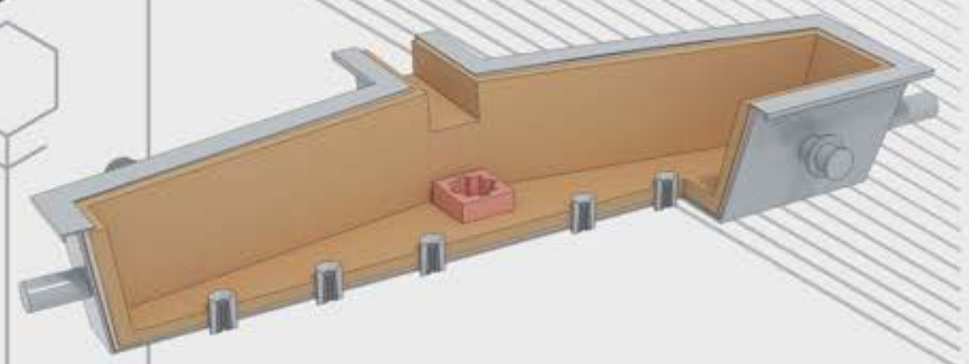
8 Refractory Materials for Tundish

Tundish is a kind of intermediate refractory vessel used in process steelmaking. Firstly, it receives molten steel poured from the ladle, and then it is distributed to each mould by the tundish nozzle or sub entry nozzle (SEN). The tundish series products produced by our company have stable quality and excellent performance, which can meet the application conditions of steel plants around the world .



8.1 Tundish Gunning Mass

Manufacturing process: Using high purity magnesia and calcined olivine as raw material, adding binding agent, water reducing agent and antiknock agent and mixing the material.

Main application: Working lining spray of tundish.

Physical and Chemical Specification

Item/Brand		TUNCOT–1	TUNCOT–2	TUNCOT–3
Chemical Component(%)	MgO≥	65	80	90
	CaO≤	2.0	2.0	2.0
	Fe_2O_3≤	6	1	1
	SiO_2≤	30	7	3
Bulk Density(g/cm^3)≥		1.8	1.83	1.85
Cold Crushing Strength(MPa)≥		5	5	5

8.2 Environmental Protection Type Tundish Dry Material

Manufacturing process: Utilizing high purity magnesite and calcined olivine as a base material, adding environmental protection type agents, and ideally mixing the material.

Main features: No harmful gas is produced during drying ; high strength at medium and high temperature during use; easy to deskull.

Main application: For the working lining spray of tundish.

Physical and Chemical Specification

Item/Brand		TUNDRY–1	TUNDRY–2	TUNDRY–3
Chemical Component (%)	MgO≥	64	85	90
	CaO≤	5	5	5
	Fe_2O_3≤	4.7	1	1
	SiO_2≤	18–22	5	3
Bulk Density(g/cm^3)≥		2.00	2.10	2.15
Cold Crushing Strength(MPa)≥		5	5	5

8.3 Tundish Safety Lining Castable Material

Manufacturing process: The low cement castable is made of bauxite and andalusite.

Main application: Using in the safety lining of Tundish, for insulation and safety majors.

Physical and Chemical Specification

tem/Brand		TUNCAST–1	TUNCAST–2	TUNCAST–3
Apparent Porosity (%)	Al_2O_3≥	61	65	70
	SiO_2≤	34	30	26
Bulk Density(g/cm^3)≥		2.45	2.60	2.65
Cold Crushing Strength(MPa)≥		50	60	60

REFRACTORIES FOR BUILDING MATERIALS

Products Introduction

三華集團 SAMMHA GROUP

SAMWHA GROUP

Lime Kiln Series Products

The 600t Maerz PFR Kiln of Mayes Steel Plant in Malaysia

Huaiyin Steel Plant 300TD Sleeve kiln

Anshan Iron and Steel Group Corporation 1000TD Rotary Kiln in Bayuquan

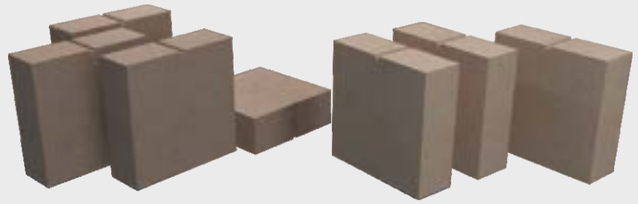
Taiyuan Iron and Steel Co. 1000TD Rotary Kiln

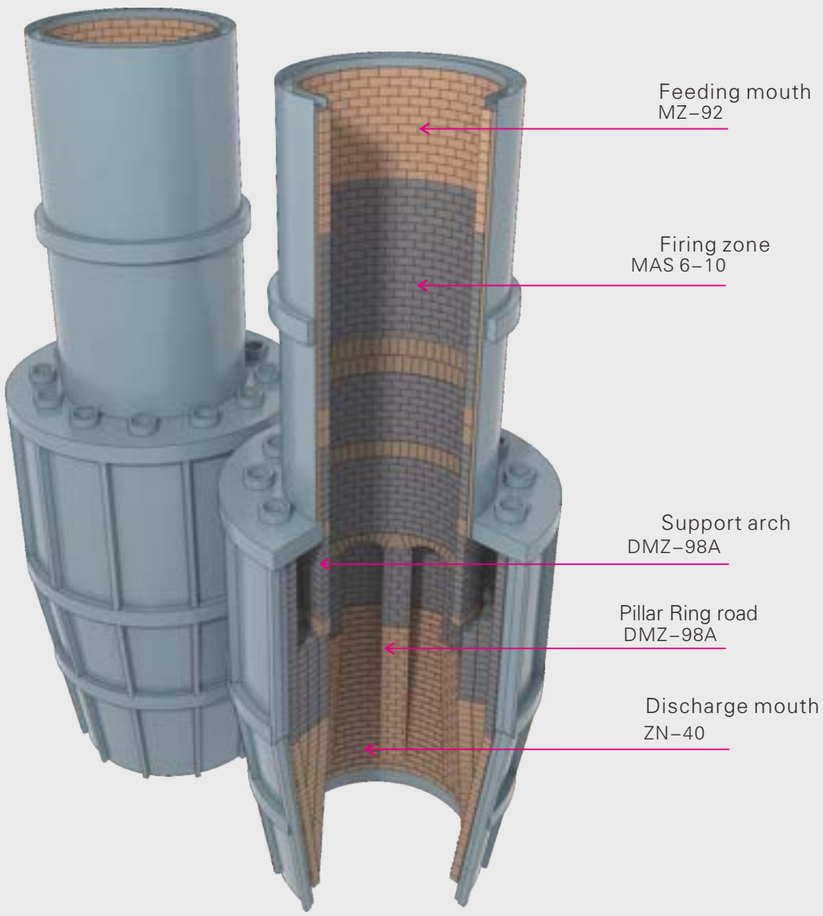
Products Physical and Chemical Specification
High Purity Magnesia Brick for Lime Kiln

Brand/Specification	MZ-97	MZ-95	MZ-92
MgO(%)≥	97	95	92
CaO(%)≤	1.2	2.0	2.5
SiO_2(%)≤	0.6	2.0	4.5
Fe_2O_3(%)≤	0.8	1.2	1.3
Bulk Density BD (g/cm^3)≥	3.00	2.95	2.90
Apparent Porosity AP(%)≤	17	17	18
Cold Crushing Strength(MPa)≥	50	50	55
0.2MPaload softening temperature(T0.6)≥( )	1700	1600	1520
Thermal Shock Resistance (970℃air-cooling)≥(Times)	10	10	10

Lime Kiln Series Products　Maerz Shaft Kiln

Lime Kiln Series Products　Magnesia-alumina Spinel Brick for Lime Kiln





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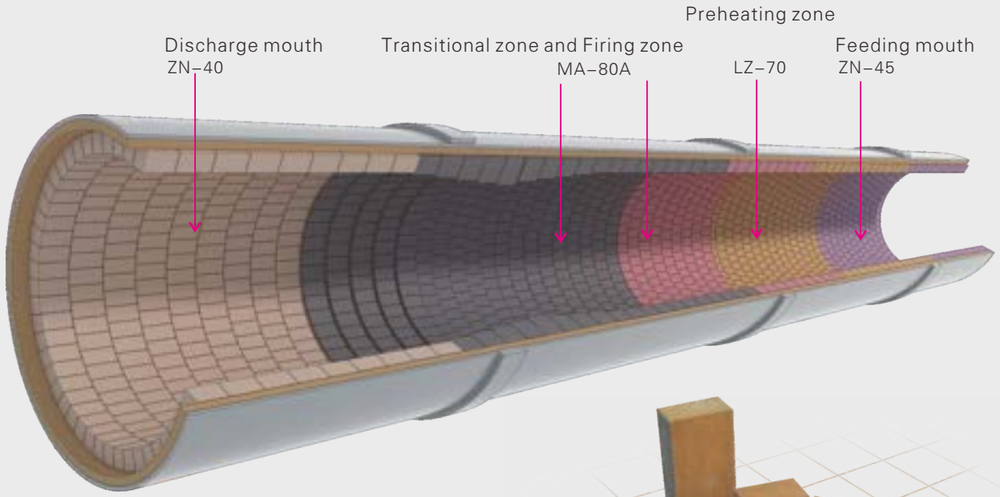
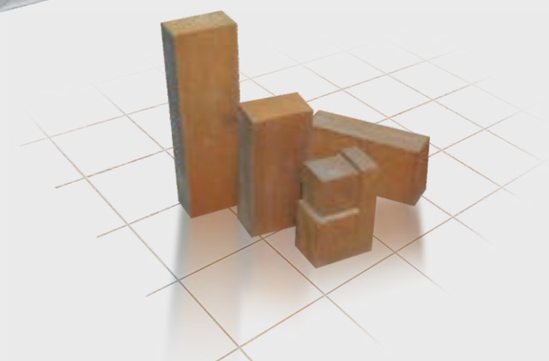
Lime Kiln Series Products　Lime Rotary Kiln

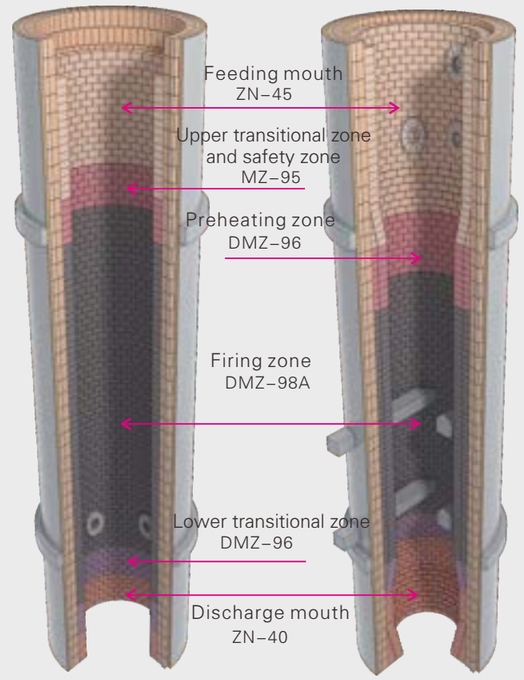




Lime Kiln Series Products　Magnesia-alumina Spinel Brick for Lime Kiln

Brand/Specification	MAS-90A	MAS-85A
MgO(%)≥	88	84
Al_2O_3(%)	5-8	11-13
SiO_2(%)≤	1.0	1.0
Apparent Porosity(%)≤	17	17
Bulk Density BD (g/cm^3)≥	2.95	2.90
Cold Crushing Strength(MPa)≥	55	50

Lime Kiln Series Products　Shaft kiln and Fukas Shaft Kiln



Lime Kiln Series Products Fused magnesium brick for Lime Kiln

Brand/Specification	DMZ-98A	DMZ-97	DMZ-96
MgO(%)≥	97.8	97	96
CaO(%)≤	1.2	1.2	1.5
SiO_2(%)≤	0.6	0.8	1.2
Fe_2O_3(%)≤	0.7	0.8	0.8
Bulk Density BD (g/cm^3)≥	3.05	3.00	2.98
Apparent Porosity AP(%)	16	16	17
Cold Crushing Strength(MPa)≥	60	60	60
0.2MPa load softening temperature(T0.6)≥(　)	1700	1700	1700
Thermal Shock Resistance (1100℃ water-cooling)≥(Times)	3	3	3

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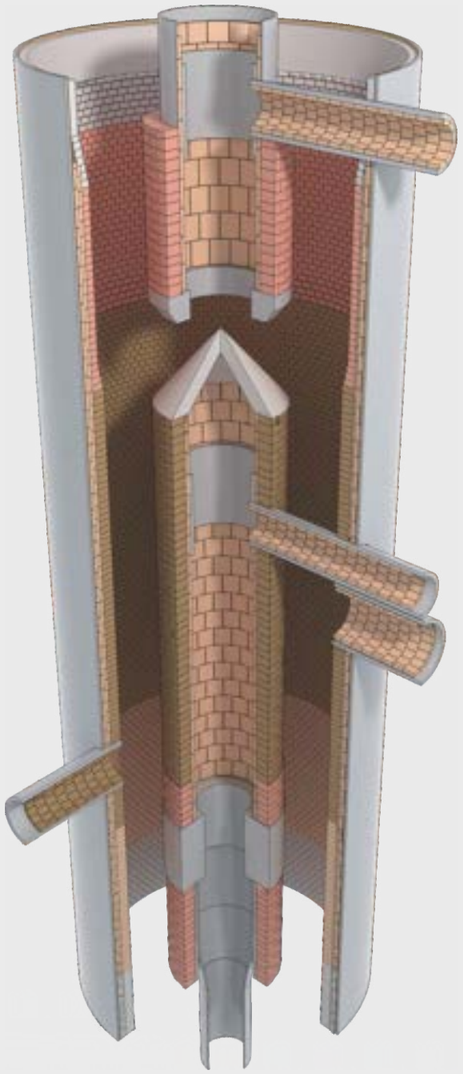
Magnesia Brick and Magnesia alumina Spinel Brick for Lime Sleeve Kiln



Magnesia Chrome Brick Physical and Chemical Specification

Brand/Specification	MZ-97	MAS-85A	MAS-85B
MgO(%)≥	97.0	85	83
Al_2O_3 (%) ≤	0.6	11-13	11-13
CaO (%) ≤	1.2	1.5	1.5
SiO_2 (%) ≤	0.8	1.0	1.2
Fe_2O_3 (%) ≤	0.8	0.8	0.8
Bulk Density BD (g/cm^3) ≥	3.0	2.95	2.90
Apparent Porosity AP(%) ≤	17	17	17
Cold Crushing Strength (Mpa)≥	50	55	55
0,2Mpaload softening temperature (T0.6) ≥ (℃)	1730	1700	1680
Thermal Shock Resistance (970℃air-cooling) ≥ (Times)	3	15	15

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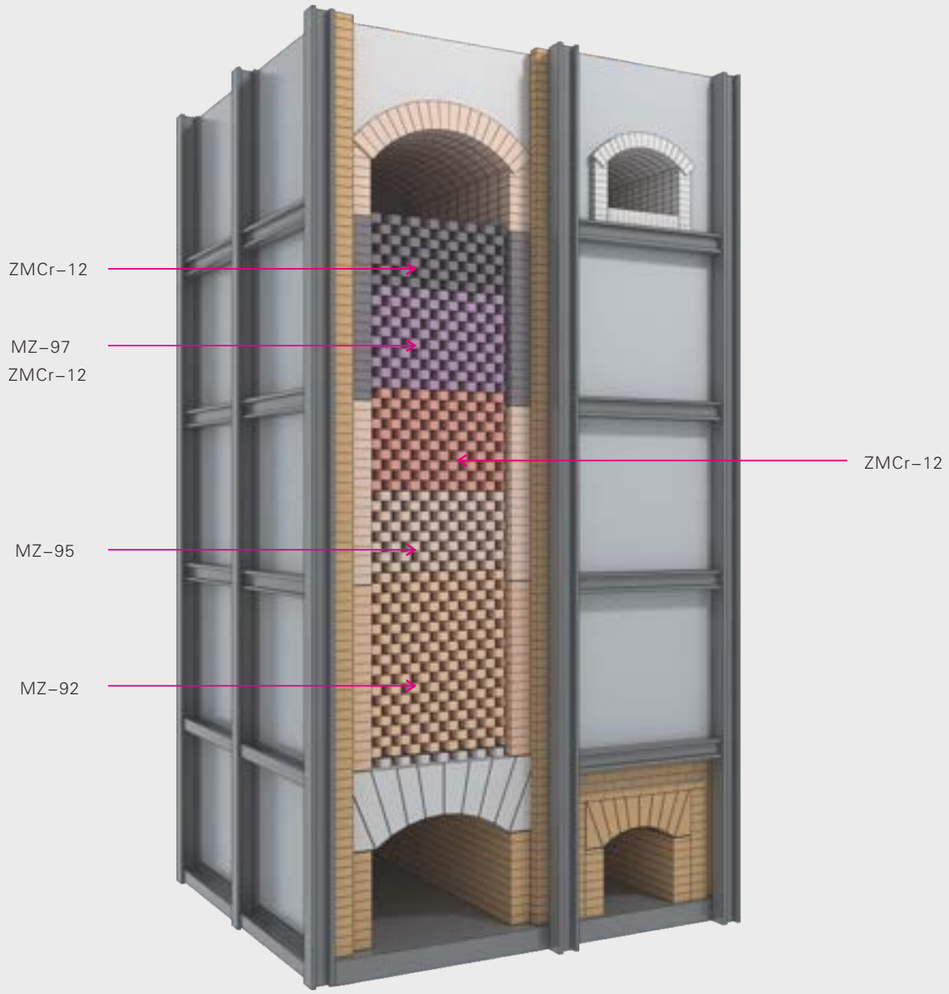
Series Products of Regenerator Chamber of Glass furnace



Checker Brick for Glass Kiln

Physical and Chemical Specification

Brand/Specification	DMZ-98	DMZ-97	DMZ-95	DMZ-92	ZMCr-12
MgO(%)≥	97.8	97	94.5	92	68
CaO(%)≤	1.2	1.2	2.0	2.5	2.0
SiO_2(%)≤	0.6	0.8	2.0	4.0	2
Fe_2O_3(%)≤	0.7	0.8	1.3	1.5	6
Cr_2O_3(%)≥					12
ZrO_2(%)≤					
Bulk Density BD (g/cm^3)≥	3.10	3.05	2.95	2.92	3.05
Apparent Porosity AP (%)	16	16	17	17	17
Cold Crushing Strength(MPa)≥	60	60	55	55	45
0.2MPaload softening temperature(T0.6)≥(℃)	1700	1700	1600	1520	1580
Thermal Shock Resistance (1100℃ water-cooling)≥(Times)	3	3	3	3	5

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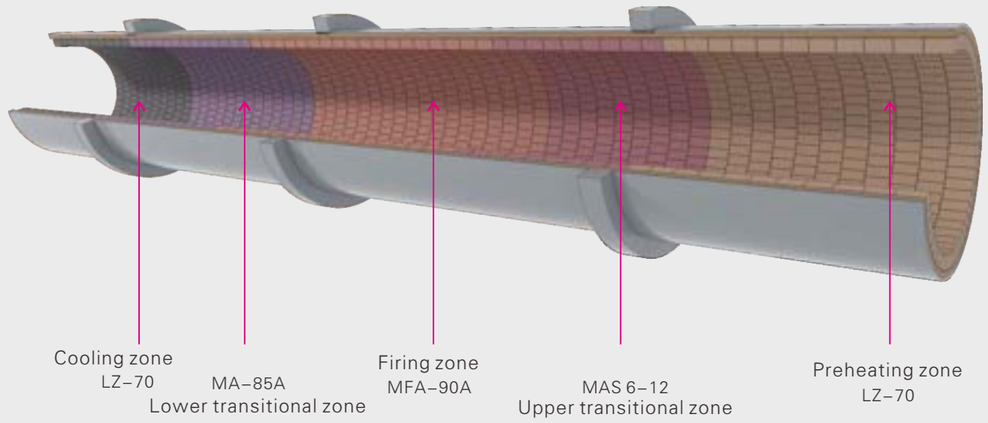
Cement Kiln Series Products



New Chrome-free Products in Firing Zone of Cement Kiln

Magnesia Iron Alumina Spinel Brick

Magnesia Iron Alumina Spinel Bricks have the advantages of chrome–free environmental protection, good thermal shock stability, good ability to hang "kiln shell", good corrosion resistance, thermal shock expansion and low thermal conductivity with a good structural flexibility.

Item/Brand	MgO(%) ≥	Al_2O_3 (%)≥	SiO_2 (%)≤	Fe_2O_3 (%)≤	Apparent Porosity (%)≤	Bulk Density (g/cm^3) ≥	Cold Crushing Strength (MPa)≥	0.2MPa load softening temperature T0.2(℃)	Thermal Shock Resistance 1100℃ water–cooling (Frequency) ≥	Thermal conductivity (1100℃) w/m・K	Thermal expansion rate (1400℃)%
MFA–80A	85	4.5	1.0	7.5	17	2.95	50	1650	10	2.6	1.6
MFA–80B	80	4.5	2.0	7.5	17	2.90	45	1600	8	2.6	–
MFA–90A	90	3.5	1.0	5.5	17	2.95	55	1700	10	2.8	–
MFA–80B	88	3.5	2.0	5.5	17	2.90	50	1650	8	2.8	–

Cement Kiln Upper Lower transitional zone new products

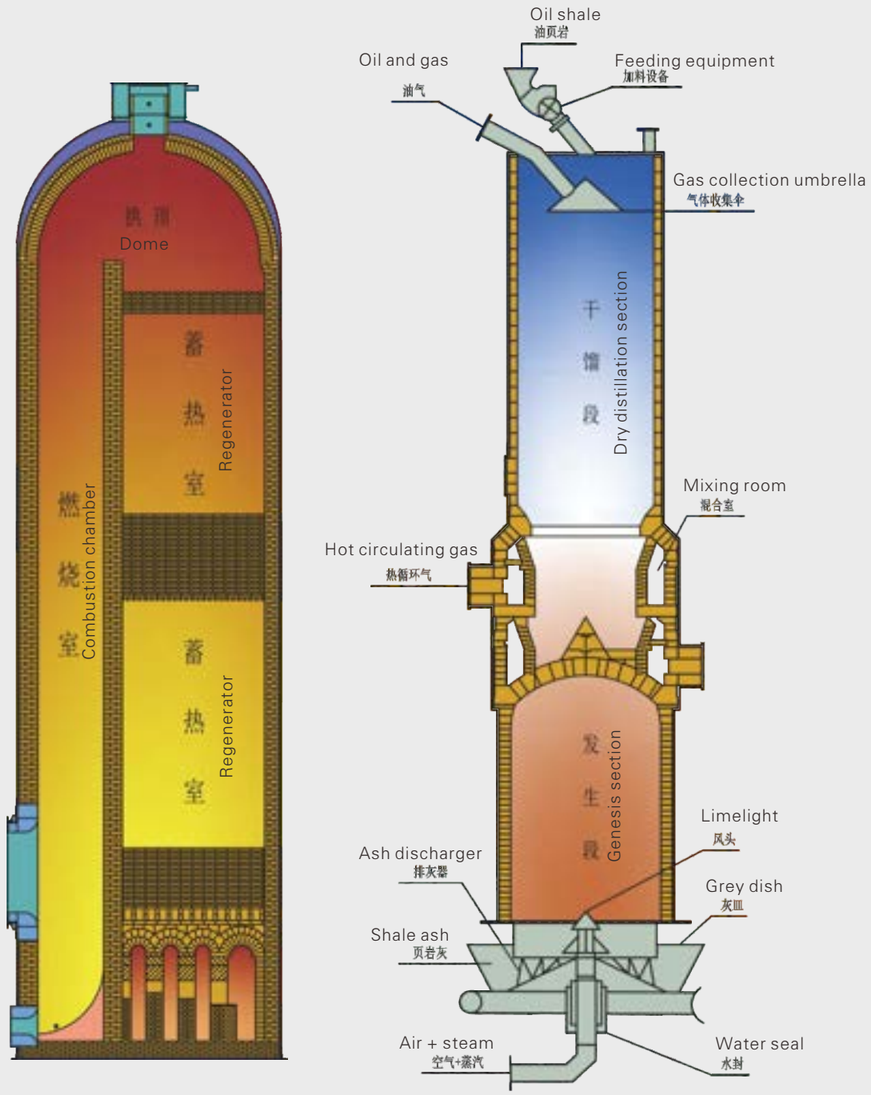
Magnesia-alumina Spinel Brick

Low thermal conductivity Magnesium Alumina Spinel Bricks are specially developed chromium–free alkaline products for the transition zone of large dry process cement kilns. It has the characteristics of high strength, corrosion resistance, excellent thermal stability and no chromium pollution.

Item/Brand	MgO(%) ≥	Al_2O_3(%)≥	SiO_2(%) ≤	Apparent Porosity (%)≤	Bulk Density (g/cm^3) ≥	Cold Crushing Strength (MPa)≥	0.2MPa load softening temperature T0.2(℃)	Thermal Shock Resistance1100 water–cooling (Times)≥	Thermal conductivity (1100℃) w/m・K	Thermal expansion rate (1400℃)%
MA–85A	85	10	1.0	18	2.95	55	1700	10	3	1.2
MA–85B	83	10	2.0	18	2.92	50	1650	8	–	–
MA–90A	90	6	1.0	18	2.96	55	1700	8	3.8	1.5
MA–90B	88	6	2.0	18	2.93	50	1700	8	–	–

SAMWHA GROUP

Hot Stove and Dry Distillation Furnace Physical and Chemical Specification



1. Physical and Chemical Specification of Furnace Wall and Checker Brick

Commodity	Fireclay brick with low creep	High aluminum brick with low creep	Andalusite brick
Brand	ANRN	ANRDL	ANRH
Al_2O_3 %	≥42	≥65	≥60
Refractoriness ℃	≥1750	≥1790	≥1790
Apparent Porosity %	≤22 (24)	≤24	≤22
Bulk Density	≥2.2 (2.1)	≥2.5 (2.4)	≥2.4 (2.3)
Cold Crushing Strength Mpa	≥45(35)	≥60 (55)	>60(55)
Load softening starting temperature, (0.2Mpa) , ℃	≥1410	≥1500	1550
Creep Rate,0.2Mpa %	1150℃×50h×0.2 <0.8	1350℃×50h×0.2 <0.8	1400℃×50h×0.2 <0.8
Linear Change on Reheating ℃ %	1400℃×4h ±0.2	1500℃×20h +0.1 −0.4	1550℃×2h ±0.2

Remarks: The value in brackets is the specification of the checkered brick of the regenerator

2.Physical and Chemical Specification of Furnace Body Fireclay

Commodity		High Alumina Refractory Mortar	Refractory Clay, Mullite Refractory Mortar	Andalusite Refractory Mortar
Code		CLQ70	CNQ45	HF-A
Al_2O_3 %		≥70	≥42	57
Refractoriness ℃		1770	1690	1770
Granularity%	>0.5mm	≤1	≤1	≤1
	≤0.076mm	>50	≥60	≥60
Bonding time		1-3分	1-2分	1-3
Bending Strength Mpa	110℃ Drying	≥1.0	≥1.0	≥1.0
	After firing	1450℃×3h ≥4.9	(1450℃×2h) ≥3.0	(1450℃×2h) ≥3.0

3. Physical and Chemical Specification of Insulation Brick

Commodity	Fireclay Insulating Brick	Light high Alumina Brick
Brand	NG-1.0	LG-0.8
Bulk Density g/cm^3	1.0	0.8
Cold Crushing Strength Mpa ≥	10	6.0
Linear Change on Reheating %	2.0% , 1300℃	2.0% , 1350℃
Thermal Conductivity W/mk 350℃≤	0.35	0.3

4. Physical and Chemical Specification of Unshaped Refractories for Furnace Wall and Burner

Commodity	Castable	Heat-resistant Concrete	Gunning Material
Brand	FN-130	YA	FL-130
Al_2O_3 %	>40	60	≥35
Refractoriness ℃	>1530	>1690	
Bulk Density t/m^3	>1.65	2.2	≥1.4
Bending Strength 1500° Mpa	>0.5	>4	
Cold Crushing Strength Mpa		>30	≥9.8 120℃ Drying
Safe Operating Temperature ℃	≥1200	>1300	1050
Concrete Strength Grade		C15	
Thermal Conductivity W/M.k			≤0.45 Average Temperature600±25℃
Curing Time h			3~8

5. Physical and Chemical Specification of Refractory Fiber for Furnace Wall and Burner

Commodity	Refractory Fiber Cotton	Ceramic Fiber Blanke
Brand	LYGX-421	LYGX-212
Al_2O_3 %	52~55	≥46
Al_2O_3+SiO_2 Content %	≥99	≥97
Fe_2O_3 Content %	≤0.2	≤1.0
K_2O+Na_2O Content %	≤0.2	≤0.5
Continuous Use Temperature ℃	1200	1000
Volume kg/m^3	200	96
Tensile Strength Mpa		≥0.04
Linear Shrink after Firing %		≤-3 1000℃×24h
Thermal Conductivity W/m.k1000℃(Hot face)		0.22

6.Physical and Chemical Specification of Burner Refractory Brick

Commodity	Andalusite High Alumina Brick	Mullite Brick	Andalusite Fireclay Brick
Brand	CDL65	CRM55	CRN42
Al_2O_3 %	≥65	≥55	≥42
Refractoriness ℃	≥1790	≥1790	≥1750
Apparent Porosity %	≤21	≤23	≤24
Bulk Density	≥2.6	≥2.3	≥2.2
Cold Crushing Strength Mpa	≥55	≥58	≥30
Refractoriness under Load, (0.2Mpa), ℃	≥1500	≥1450	≥1400
Creep Rate, 0.2Mpa %	≤-0.2 1450℃×20~50h×0.2		
Anti-vibrating Stability (Frequency) 1100℃ Water cooling	≥8	≥40	

7. Physical and Chemical Specification of Burner Fireclay

Commodity		High Alumina Refractory Mortar	Refractory Clay Refractory Mortar	Mullite Refractory Mortar	Andalusite Refractory Morta
Code		CLQ70	CNQ45	CMQ	HF-A
Al_2O_3 %		≥70	≥42	60	57
Refractoriness ℃		1770	1690	1770	1770
Grain size%	>0.5mm	≤1	≤1	≤1	≤1
	≤0.076mm	>50	>50	≥60	≥60
Bonding time		1-3分	1-2分	1-3分	1-3
Bending Strength Mpa	110℃ Drying	≥1.0	≥1.0	≥1.0	≥1.0
	After firing	1450℃×3h ≥4.9	1200℃×3h ≥2.9	(1450℃×2h) ≥3.0	(1450℃×2h) ≥3.0

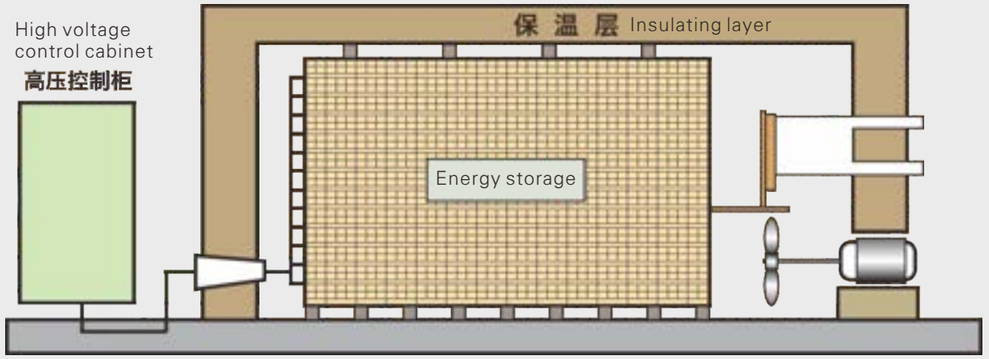
8.Physical and Chemical Specification of Burner Insulating Brick

Commodity	High Alumina Insulation Brick	Floating Bead Brick CRP-0.6
Brand	CLG-0.6	CRP-0.6
Bulk Density g/cm^3	0.6	0.6
Cold Crushing Strength Mpa ≥	2.0	2.0
Linear Change on Reheating %	1350℃×2h ， ≤2	1250℃×0.2h ≤1.0
Thermal Conductivity W/mk 350℃≤	0.3	0.25

三華集團

Refractory Products for Solid Electric Heat Storage in Thermal Power Plants

In modern society, the demand of electric power is growing, the daily change of electric load is very big, and the supply of electric steel is tight in the peak load period. If it is used in the peak load period and low-level energy storage, it can use little investment to relieve the power pressure in the peak load period. Therefore, thermal power plants have launched the project of peak load regulation of solid electric heat storage to realize large-scale urban continuous heating, replace kerosene fired boilers, and achieve zero emissions, which is a strategic project of environmental protection upgrading in the field of heating. The project of peak load regulation of solid electric heat storage is composed of solid heat storage module, heat exchange system and full-automatic intelligent control system. The heat storage module is composed of fired magnesia brick with high specific heat capacity. Samwha group is a well-known enterprise specializing in the production of heat storage fired bricks, with a long history of directors and excellent quality. Samwha brand heat storage fired magnesia bricks are ideal refractory materials for the project of heat storage and peak shaving in thermal power plant.



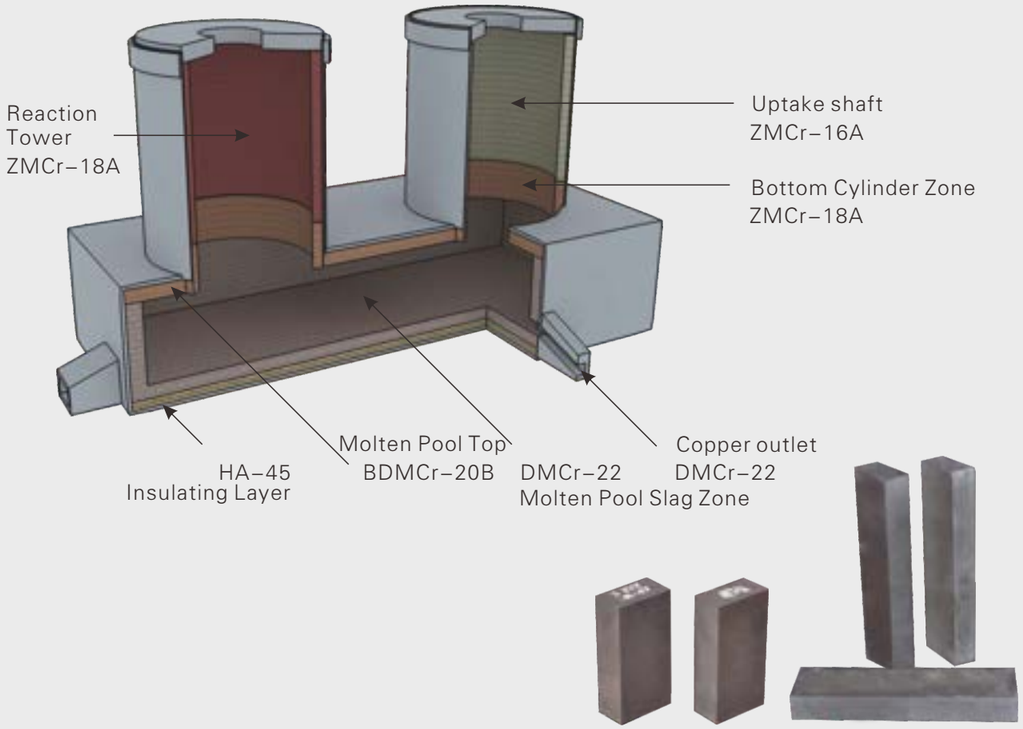
Physical and chemical Specification of Regenerative Fired Magnesia Brick

Brand and Specification	MF-80	MZ-90	MZ-92
MgO(%)≥	80	90	92
CaO(%)≤	2	3	2.5
SiO_2 (%)≤	4	5	4.5
Fe_2O_3 (%)≤	7-8	1.2	1.3
Bulk Density BD(g/cm^3)≥	2.8	2.88	2.90
Apparent Porosity AP(%) ≤	18	18	18
Cold Crushing Strength (Mpa)≥	55	55	55
Starting temperature of 0.2MPa load softening（T0.6）≥（℃）	1500	1500	1520

REFRACTORIES FOR NON-FERROUS INDUSTRY

SAMWHA GROUP

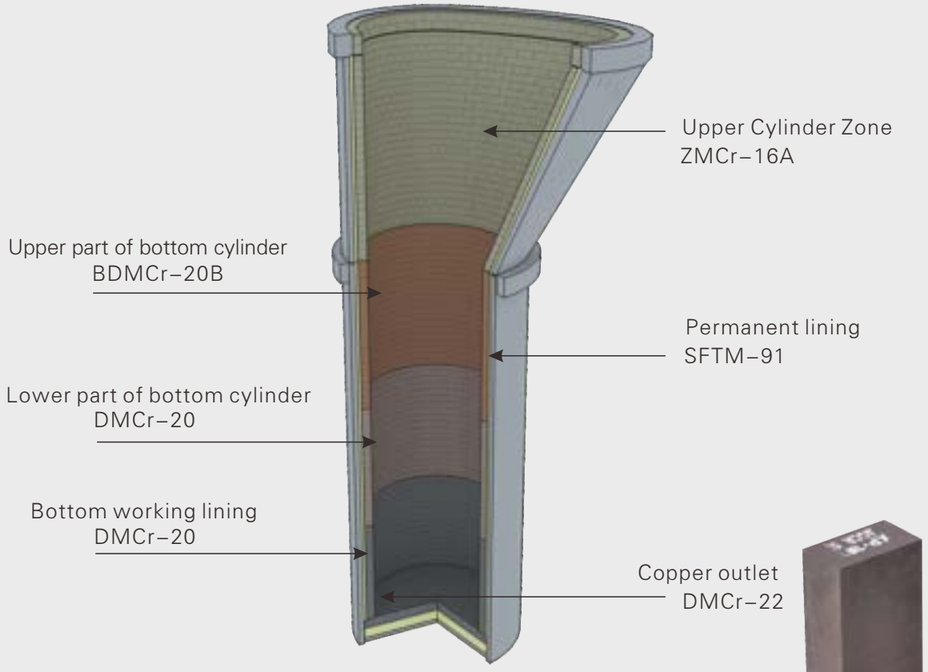
Flash Smelting Furnace (Copper smelting)



Magnesia Chrome Brick Physical and Chemical Specification of Flash Smelting Furnace (Copper smelting)

Specification	Chemical Contents			Apparent Porosity AP(%)	Bulk Density BD (g/cm^3)≥	Cold Crushing Strength CCS (mpa)≥	Starting temperature of 0.2MPa load softening (℃)≥	Heat frequency1100℃ water–cooling
Brand	MgO(%)≥	SiO_2(%)≤	Cr_2O_3(%)≥					
ZMCr–16A	70	1.8	16	18.0	3.15	45	1700	4
ZMCr–18A	68	1.8	18	16.8	3.18	45	1700	4
BDMCr–20B (Salt dipping)	60	1.7	19	12.5	3.25	70	1750	5
DMCr–22 (Salt dipping)	58	1.5	22	12.0	3.30	70	1750	5

Essa furnace(Osmet Furnace)



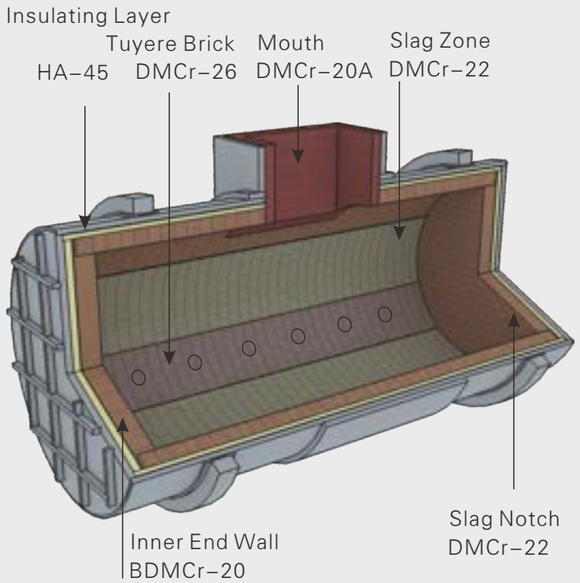
Magnesia Chrome Brick physical and chemical specification of Essa furnace

Specification	Chemical Contents			Apparent Porosity AP (%)	Bulk Density BD (g/cm^3))≥	Cold Crushing Strength CCS (mpa)≥	Starting temperature of 0.2MPa load softening (℃)≥	Heat frequency 1100℃ water–cooling
Brand	MgO(%)≥	SiO_2(%)≤	Cr_2O_3(%)≥					
ZMCr–16A	68	1.8	16	16.8	3.18	45	1700	4
BDMCr–20B	60	1.6	19	12.5	3.25	70	1720	4
DMCr–20A (Salt dipping)	60	1.5	20	12.0	3.28	70	1750	5
DMCr–22 (Salt dipping)	58	1.4	22	12.0	3.30	70	1750	5

SAMWHA GROUP

P-S Converter

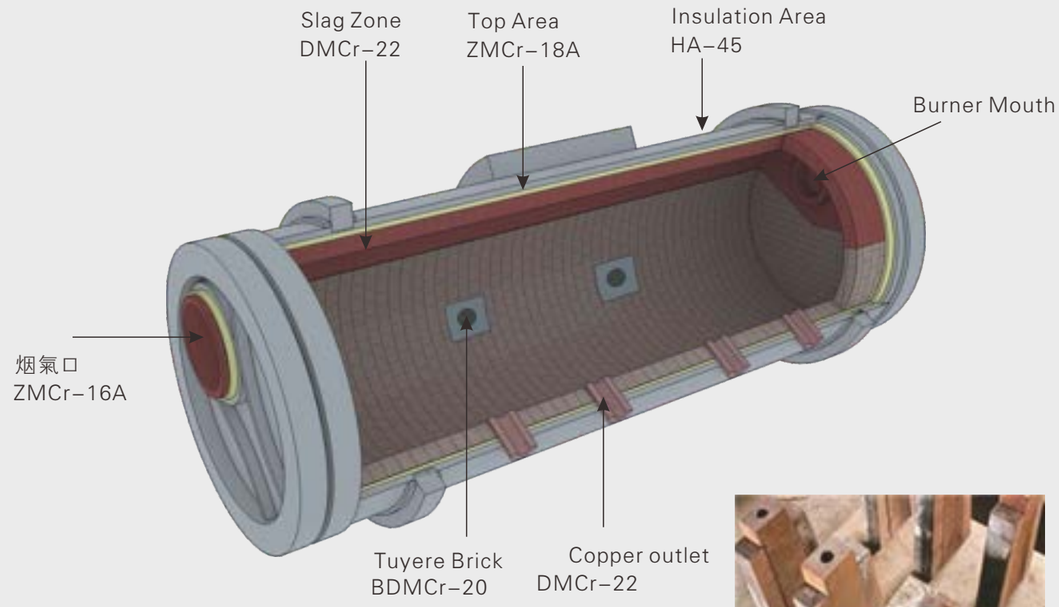
The areas of high erosion of the P–S converter lining are mainly tuyere line, tuyere bricks, the layers above tuyere line and below tuyere line, and the sides, especially the tuyere layer. Solving the service life of the refractory material for the tuyere layer and the tuyere bricks and the layers immediately above and below the tuyeres can greatly increase the campaign of the Copper converter. The consumption of refractory materials for converters is the largest in pyrometallurgy of non–ferrous metals. The Magnesia–chrome Bricks in these key parts are all treated by vacuum pressure and salt dipping.



Magnesia Chrome Brick physical and chemical specification of P-S converter (copper smelting)

Specification	Chemical Contents			Apparent Porosity AP(%)	Bulk Density BD (g/cm³)≥	Cold Crushing Strength CCS (mpa)≥	Starting temperature of 0.2MPa load softening (℃)≥	Heat frequency1 100℃ water–cooling
Brand	MgO(%)≥	SiO_2(%)≤	Cr_2O_3(%)≥					
BDMCr–20B (Salt dipping)	60	1.6	20	12.5	3.25	70	1720	4
DMCr–20A (Salt dipping)	60	1.5	20	12.5	3.28	70	1750	5
DMCr–22 (Salt dipping)	58	1.4	22	12.0	3.30	70	1750	5
DMCr–26 (Salt dipping)	53	1.3	26	11.5	3.36	70	1750	6

Anode Converter (Copper smelting)

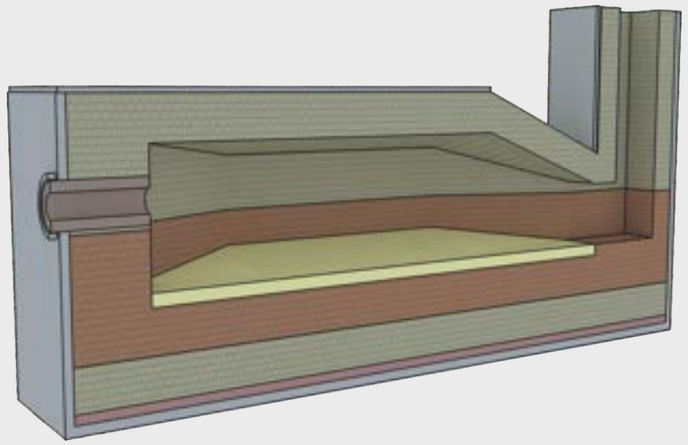


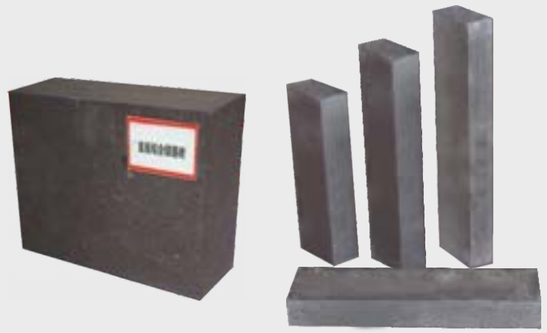
Magnesia Chrome Brick physical and chemical specification of Anode Converter (Copper smelting)

Specification	Chemical Contents			Apparent Porosity AP (%)	Bulk Density BD (g/cm³)≥	Cold Crushing Strength CCS (mpa)≥	Starting temperature of 0.2MPa load softening (℃)≥	Heat frequency1 100℃ water–cooling
Brand	MgO(%)≥	SiO_2(%)≤	Cr_2O_3(%)≥					
ZMCr–16A	70	1.8	16	17.0	3.15	45	1700	4
ZMCr–18A	68	1.8	18	16.8	3.18	45	1700	4
BDMCr–20B (Salt dipping)	60	1.7	20	12.5	3.25	70	1750	5
DMCr–22 (Salt dipping)	58	1.5	22	12.0	3.30	70	1750	5

SAMWHA GROUP

Reflection Refining Furnace (Copper smelting)



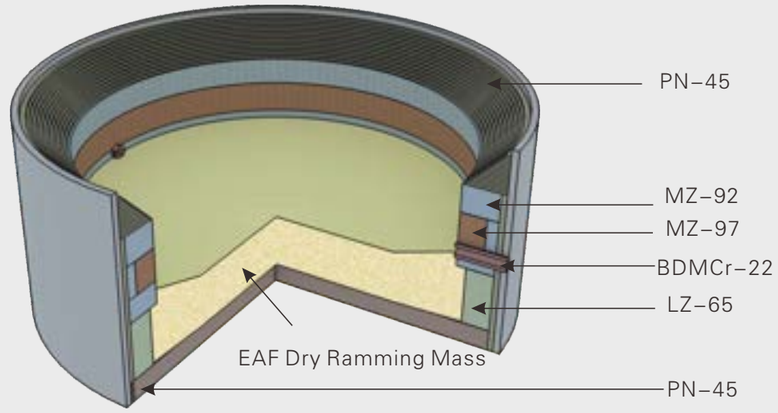


Magnesia Chrome Brick Physical and Chemical Specification

Specification	Chemical Contents			Apparent Porosity AP(%)	Bulk Density BD (g/cm^3)≥	Cold Crushing Strength CCS (mpa)≥	Starting temperature of 0.2MPa load softening (℃)≥	Heat frequency1 100℃ water–cooling
Brand	MgO(%)≥	SiO_2(%)≤	Cr_2O_3(%)≥					
ZMCr–12A	75	2.0	12	18.0	3.06	45	1680	4
ZMCr–16A	70	1.8	16	17.0	3.16	45	1700	4
ZMCr–18A	68	1.8	18	16.8	3.18	45	1700	4
BDMCr–20B (Salt dipping)	60	1.7	20	12.5	3.25	70	1750	5

Mineral furnace

Mineral furnace, also known as electric arc furnace or resistance electric furnace. It is mainly used for reducing raw materials such as smelting ores, carbonaceous reducing agents, and solvents. It mainly produces ferroalloys such as ferrosilicon, nickel iron, manganese iron, chromium iron, tungsten iron, silicon manganese alloy, etc. It is an important industrial raw material in the metallurgical industry and a chemical raw material such as calcium carbide. Mineral furnaces can be divided into silicon iron furnaces, manganese iron furnaces, chromium iron furnaces, tungsten iron furnaces, silicon chromium furnaces, silicon manganese furnaces, nickel iron furnaces, etc. according to different production varieties.



Construction Photos of iron notch and slag notch

SAMWHA GROUP

Physical and Chemical Specification of Submerged Arc Furnace Bricks

Brand	MZ-92	MZ-95	MZ-97	MZ-97 Salt oil	BDMCr-20A	BDMCr-22
Bulk Density(g/cm^3)≥	2.90	2.95	2.98	3.05	3.25	3.30
Apparent Porosity(%)≤	18	18	17	10	17	17
Cold Crushing Strength(Mpa)≥	55	55	60	60	45	45
load softening temperature(℃)≥	1520	1600	1700	1700	1700	1700
SiO_2(%)≤	4.5	2.2	1.6	1.6	2	2
CaO(%)≤	2.5	2.0	1.6	1.6	2	2
Fe_2O_3(%)≤	1.5	1.2	0.8	0.8	10	12
Al_2O_3(%)≤	0.8	0.6	0.5	0.5	8	8
MgO(%)≥	92	94.5	97	97	58	54
Cr_2O_3(%)≥					20	22

Zinc Oxide Volatilization Furnace

Magnesia Alumina Chrome Brick Physical and Chemical Specification

Specification	Chemical Contents			Apparent Porosity AP(%)	Bulk Density BD (g/cm^3)≥	Cold Crushing Strength CCS (mpa)≥	Starting temperature of 0.2MPa load softening (℃)≥	Heat frequency 1100℃ water-cooling
Brand	MgO(%)≥	Al_2O_3(%)≤	Cr_2O_3(%)≥					
MACr-80	80	6-7	5	17	3.05	45	1680	8

On the same stage
with the world,
we meet from time to time

Service Globally

Broad thinking, taking the world as the stage, ingenuity first, and ingenuity penetrating, Samwha Group is redouble its efforts to become a refractory production base with international influence. Warmly welcome friends in China domestic and abroad to visit Samwha Group to discuss cooperation and win-win future