MAGSCIE REFRACTORIES

IFB Series Insulating Bricks

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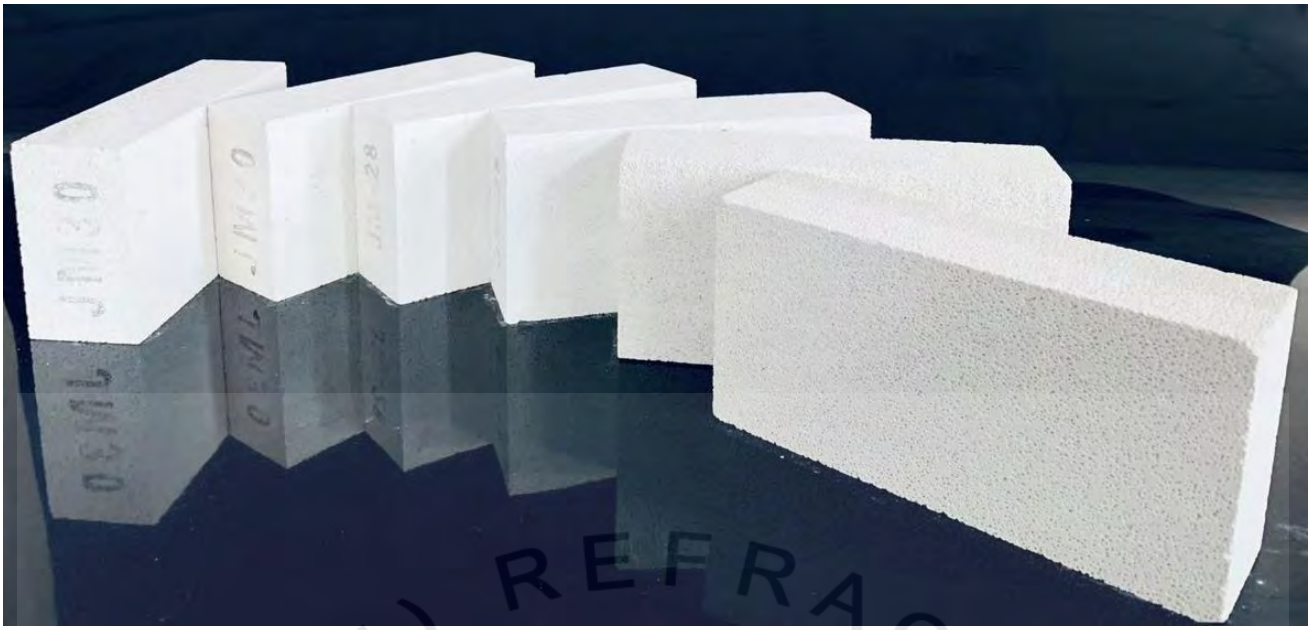
镁稀（天津）耐火材料有限公司

Magscie (Tianjin) Refractories Co., Ltd.



Standard for selection of IFB

Interface Temperature between Refractory Bricks and Back Lining Insulating Materials (IFB)

When IFB are used as the back lining insulating material for refractory lining bricks, a full consideration should be taken on the interface temperature between refractory bricks and IFB back lining materials so as to determine which IFB shall be used. The products with higher service temperature than the interface temperature are used. Meanwhile, the bad working condition of the working lining must be taken into account. Corrosion caused by dust and slag bring about quality falling, which inevitably leads to interface temperature rise. In the designing of IFB, the erosion of the working lining must be paid attention. In order to achieve this goal, one must carefully choose IFB to guarantee its service life when the interface temperature is rising. Our IFB is characterized by the lowest shrinkage and good performance in long time consecutive service. The products with service temperature of 100°C higher than the interface temperature are recommended.

Atmosphere Corrosion

The furnace atmosphere is another very important factor to damage the lining besides the interface temperature and hearth temperature while IFB are used in reheating devices. During reheat treatment, CO and H2 and decomposed N2+H2 are commonly used to prevent the product from corrosion. To avoid undesirable corrosion, the right products should be selected to suit for different furnace. For example, low Iron content or high alumina content IFB should be selected for the furnaces with reducing atmosphere.

Hearth temperature

The hearth temperature is the decisive factor for IFB selection when IFB are used in working face. The IFB with temperature 100~300^{o}C higher than the hearth's working temperature should be selected.

Advantage of MAGSCIE IFB Products:

- **Energy saving**

IFB-serial products are characterized by homogenous small diameter pores, which can restrict the movement of thermo-molecular. IFB- Serial products' outstanding performance on heat preservation can reduce the thermal loss to reach the energy saving result.

- **Light weight**

Comparing with heavy bricks, IFB-serial products are featured by low unit weight, which can reduce the thickness of furnace wall and the whole weight of the furnace, reduce the consumption of other building materials as well.

- **Increasing production effective**

IFB-serial products are characterized by lower thermal capacity, the furnace temperature can reach to the target temperature rapidly with less fuel, which can accelerate the running effective and improve the production capacity accordingly.

- **Improving operation condition**

IFB -serial products are characterized by lower thermal conductivity, which can effectively prevent the heat emitting from the furnace wall and improve the operators' working condition accordingly.

Application Scope

- **In metallurgical Industry:**

for HBS, Hot blast pipe, coking furnace, heating furnace, forging furnace, annealing furnace, carburizing furnace, heating furnace of steel rolling, aluminum melting furnace, aluminum holding furnace, foundry furnace, heating treatment annealing furnace, Reverberatory Furnace.

- **In petro-chemical industry:**

for heating furnace, cracking furnace, coking furnace, sulfur recovery facility.

- **In ceramic industry:**

rolling kiln, tunnel kiln, glass melting furnace, carbon baking furnace, drying kiln

- **Others:**

for chimney, industrial furnace, incinerator.

MAGSCIE IFB Series Products

IFB series light weight insulating bricks are high effective, energy saving products, which are developed and manufactured according to international advanced production standard.

Our company supplies full set of high-quality insulating refractories to customers. The products are widely used as an optimal lining and insulating materials in metallurgical industry, petro-chemical industry, building and machinery industry. They can be used as insulating layer or even as working layer where they are not be eroded by high temperature melting object. The products have been used in thermal facilities and won good reputation, including hot galvanizing furnace, silicon steel treating furnace and HBS in Metallurgical industry, ethylene cracking furnace, hydrogen manufacturing furnace, primary reformer, sulfur recovery unit in Petro-chemical industry.

Product Features:

The products are characterized by low iron and low alkali content, good performance under high temperature, which can effectively resist the effects caused by reducing atmosphere.

The products are characterized in homogenous structure, low bulk density, high CCS and low thermal conductivity, which can realize the energy saving result easily.

The products are characterized by high temperature thermal strength, low permanent linear change, high thermal shock resistance.

The products are with six-face grinding after firing, low size tolerance, which can meet strictly construction requirements.

MAGSCIE IFB-23 Insulating Fire Brick (IFB)

Product Features:

- Light weight
- Excellent insulating performance
- Low thermal capacity
- Good thermal shock resistance, anti-corrosion

Typical Applications:

- Type A and type B are suitable for low temperature furnace, inner lining of the drying furnace and back lining for all kinds of furnaces.
- Type C, type D and type E are suitable for the inner lining and back lining for all kinds of furnaces.

Main physical properties and chemical compositions:

MAGSCIE BRAND		IFB-23A	IFB-23B	IFB-23C	IFB-23D
Bulk Density	g/cm^3	0.55	0.6	0.8	1.0
Permanent Linear Change, ≤	%	-0.5 1230°Cx12h	-0.55 1260°Cx12h	-0.4 1300°Cx12h	-0.3 1300°Cx12h
Cold Compressive Strength, ≥	MPa	1.2	1.5	2.3	3.0
Thermal Conductivity At 350°C	W/M.K	0.17	0.19	0.24	0.31
Al_2O_3, ≥	%	42	42	45	48
Fe_2O_3, ≤	%	1.2	1.2	1.0	1.0

MAGSCIE IFB-26 Insulating Fire Brick (IFB)

Product Features:

Comparing with IFB-23, the IFB-26 serial products are featured with higher service temperature, lower thermal capacity and better performance in thermal shock resistance and corrosion resistance.

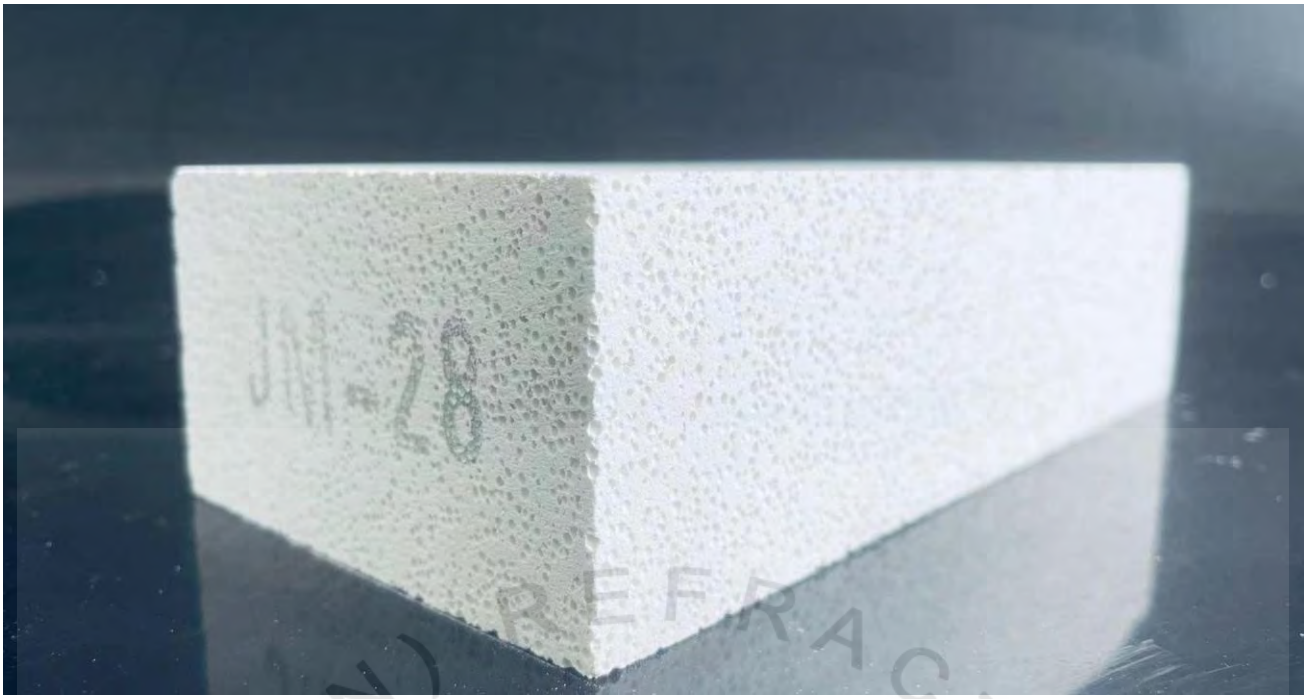
Typical Applications:

- Type A is used for the inner lining and back lining of common furnace.
- Type B, Type C and Type D are used for the inner lining and back lining for all kinds of furnaces.

For example: Annealing Furnace, carburizing furnace, galvanizing furnace, roller kiln, cracking furnace etc.

Main physical properties and chemical compositions

MAGSCIE BRAND		IFB-26A	IFB-26B	IFB-26C	IFB-26D
Bulk Density	g/cm^3	0.7	0.8	0.9	1.0
Permanent Linear Change, ≤	%	-1.0 1400°Cx12h	-0.65 1400°Cx12h	-0.5 1400°Cx12h	-0.5 1400°Cx12h
Cold Compressive Strength, ≥	MPa	2	2.3	2.8	3.2
Thermal Conductivity At 350°C	W/M.K	0.21	0.25	0.3	0.32
Al_2O_3, ≥	%	54	55	56	56
Fe_2O_3, ≤	%	0.9	0.9	1	1



MAGSCIE IFB-28 Insulating Fire Brick (IFB)

Product Features:

- High service temperature
- Excellent thermal strength
- Low thermal conductivity
- Low specific gravity
- Anti-thermal impulsion
- Excellent performance in anti-corrosion
- Excellent thermal shock resistance

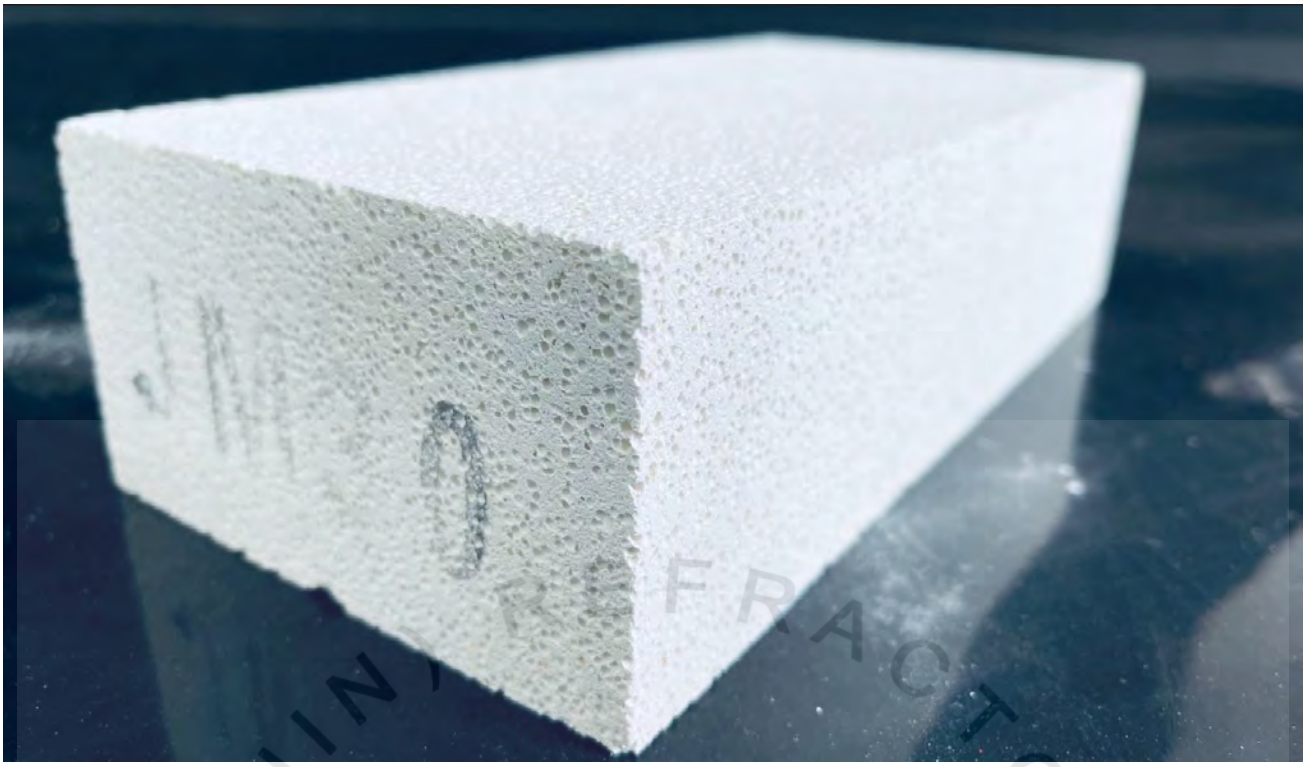
Typical Applications:

Type A, type B, type C are suitable for inner lining and back lining in all kinds of furnaces.

For example: annealing furnace, carburizing furnace, galvanizing furnace, roller kiln, cracking furnace etc.

Main physical properties and chemical compositions

MAGSCIE BRAND		IFB-28A	IFB-28B	IFB-28C
Bulk Density	g/cm^3	0.8	0.9	1.0
Permanent Linear Change, ≤	%	-1.0 1500℃x12h	-0.8 1500℃x12h	-0.7 1500℃x12h
Cold Compressive Strength, ≥	MPa	2.3	2.8	3.3
Thermal Conductivity At 350℃	W/M.K	0.28	0.32	0.34
Al_2O_3, ≥	%	64	65	66
Fe_2O_3, ≤	%	0.75	0.65	0.65



MAGSCIE IFB-30 Insulating Fire Brick (IFB)

Product Features:

- High mechanical strength
- Good high temperature thermal stability
- Lower PLC
- Thermal impulsion resistance
- Anti-corrosion

Typical Applications:

The products are widely used as inner lining for all kinds of furnaces, including ceramic furnace, cracking furnace, hot blast stove, annealing furnace etc.

Main physical properties and chemical compositions

MAGSCIE BRAND		IFB-30A	IFB-30B
Bulk Density	g/cm^3	1.0	1.1
Permanent Linear Change, ≤	%	-0.9 1600℃x12h	-0.7 1600℃x12h
Cold Compressive Strength, ≥	MPa	3.0	3.5
Thermal Conductivity At 350℃	W/M.K	0.40	0.43
Al_2O_3, ≥	%	72	72
Fe_2O_3, ≤	%	0.55	0.55

MAGSCIE IFB-F Insulating Fire Brick (IFB)

With various high purity refractory raw materials as main material, adding with new generation foaming agent and stabilizer, adopting wet process to realize synthetic slurry, then casting, drying, firing and grinding will be carried out step by step to realize the ultra-low thermal conductivity foaming brick with precious dimensions.

Product Features:

The products are characterized by small-diameter bubble, low thermal conductivity, good chemical stability and precious dimensions.

Typical Applications:

The products are mainly used in carburizing furnace for heat treating industry, insulating layer for industrial furnace with middle and high temperature and cracking furnace for Petro-chemical industry.

Main physical properties and chemical compositions

MAGSCIE BRAND		IFB-FA	IFB-FB	IFB-FC	IFB-FD
Bulk Density	g/cm^3	0.5	0.6	0.8	1.0
Permanent Linear Change, ≤	%	-0.9 1230℃x24h	-0.9 1260℃x24h	-0.8 1350℃x24h	-0.7 1400℃x24h
Cold Compressive Strength, ≥	MPa	1.2	1.5	2.3	3
Thermal Conductivity At 350℃	W/M.K	0.13	0.18	0.22	3
Al_2O_3, ≥	%	45	50	50	55
Fe_2O_3, ≤	%	1	1	0.9	0.9

MAGSCIE High Alumina Light Weight Brick

The product is made by adopting high alumina fine powder, fire clay powder as main raw material, with flammability addition, shaped by ramming, casting or extruding, sintered at high temperature.

Product Features:

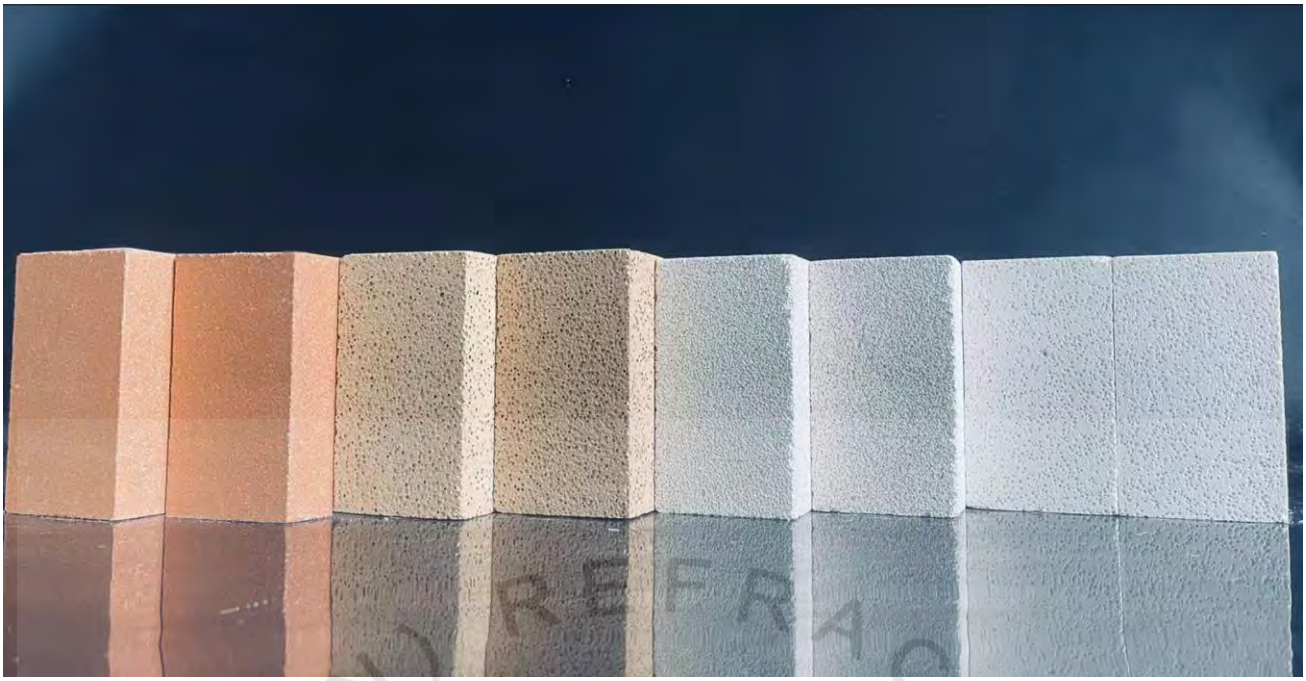
The product is characterized by high crushing strength, good thermal shock resistance, low thermal capacity and good performance at heat insulation.

Typical Applications:

The product is mainly suit for the insulation layer of ceramic roller kiln, petro-chemical furnace and heat equipment in metallurgical industry.

Main physical properties and chemical compositions

MAGSCIE BRAND		LG-0.6	LG-0.8	LG-1.0
Max service temperature	°C	1250	1300	1350
Bulk Density	g/cm^3	0.6	0.8	1.0
Permanent Linear Change, ≤	%	-1 1230°Cx24h	-0.8 1350°Cx24h	-0.7 1350°Cx24h
Cold Compressive Strength, ≥	MPa	1.2	2.4	3.7
Thermal Conductivity At 350°C	W/M.K	0.23	0.32	0.45
Al_2O_3, ≥	%	48	50	52
Fe_2O_3, ≤	%	2	1.9	1.8



MAGSCIE BC Series Insulating Bricks

For the need of refractory localization for the key project in metallurgical and petrochemical industries, with reference to international product standards, the company has successfully developed the products to replace equivalent import products.

The products have won good application results. The specifications are equal to or above the specification of imported products of the same kind, which has been proved in the testing report issued by National Quality and Supervision and Inspection Center for Refractories. Our capacity of MAGSCIE special insulating bricks is 5000mt, the products has been exported to America, Japan, Korea and won good reputation.

Main physical properties and chemical compositions

MAGSCIE BRAND		B1	B2	B3	B4	B5	B6	B7	C1	C2	C3
Classification Temperature	°C	900	1000	1100	1200	1300	1400	1500	1300	1400	1500
Properties measure at ambient condition (23°C/50% RH)											
Permanent Linear Change Not mor than ±2% when tested at	°C	900	1000	1100	1200	1300	1400	1500	1300	1400	1500
Bulk Density	Kg/m^3	700	700	750	800	800	900	1000	1100	1200	1250
Cold Crushing Strength JIS R2615	Kg/cm^2	30	32	32	32	32	33	40	50	70	100
Thermal Conductivity at mean temperature of											
350°C JIS R2616	W/M.K	0.18	0.22	0.26	0.29	0.29	0.33	0.37	0.40	0.48	0.58
400°C JIS R2616	W/M.K	0.19	0.23	0.27	0.30	0.30	0.34	0.38	0.41	0.49	0.59
600°C JIS R2616	W/M.K	0.22	0.26	0.30	0.33	0.33	0.37	0.41	0.44	0.52	0.62
800°C JIS R2616	W/M.K	-	-	0.34	0.35	0.36	0.41	0.44	0.47	0.57	0.65
1000°C JIS R2616	W/M.K	-	-	-	-	-	0.45	0.49	-	0.62	0.70
Chemical Composition											
Al_2O_3	%	20.0	20.0	25.0	42.0	42.0	46.0	70.0	42.0	46.0	70.0
SiO_2	%	65.0	65.0	60.0	54.0	54.0	50.0	28.0	54.0	50.0	28.0

MAGSCIE High Temperature Refractory Mortar

The product is a new model inorganic bonding material made by adopting the same powder material with the same quality of insulating material with inorganic binder and admixture after reaction according to the requirements for the insulating bricks. The mortar is divided into air setting mortar and thermal setting one. The products are with three grades including RM1300, RM1400, and RM1500. Each quality can be divided into light weight and heavy weight. They are selected according to the quality of the brick.

Product Features:

The product is feature with high bonding strength, erosion resistance, long service life, high RUL, low shrinkage under high temperature, slag resistance and convenient installation.

Typical Applications:

It is used as bonding material for refractory fiber and refractory blanket suitable for all kinds of industry furnaces.

Main physical properties and chemical compositions

MAGSCIE BRAND		RM-1300	RM-1400	RM-1500
Refractoriness Under Load	℃	1320	1410	1550
MOR (fired at 1300℃)	MPa	3.9	4.6	5.0
Al_2O_3, ⩾	%	48	50	52
Fe_2O_3, ⩽	%	2	1.9	1.8
Application	-	B1, B2, B3, B4, B5 C1, IFB23	B6 C2 IFB26	B7 C3 IFB28, IFB30

MAGSCIE Light Weight Clay Based Insulating Castable

Usually the density of the insulation castable is from 0.8g/cm3 to 1.5g/cm^3, the raw material can be perlite, vermiculite, light weight clay, light weight mullite or bubble alumina according to the different service temperature.

Light weight clay based insulation castable can be used in petrochemical industry, back up lining of boiler and other insulation lining.

MAGSCIE BRAND		CAST-INS0.8	CAST-INS1.2	CAST-INS1.4	CAST-INS1.5
Max Service Temp	℃	800	1050	1100	1150
Bulk Density (Dried at 110℃)	g/cm^3	0.8	1.2	1.4	1.5
Max Grain Size	Mm	6	6	6	6
Cold Crushing Strength					
at 110℃	MPa	4	10	11	20
at 1100℃	MPa	/	6	7	13
Modulus of Rupture					
at 110℃	MPa	1	4	5	7
at 1100℃	MPa	/	3	3	5
Al_2O_3,	%	25	30	30	32
Fe_2O_3,	%	3.5	3.5	3.6	3.5

MAGSCIE Light Weight Mullite Based Insulating Castable

Usually the density of the insulation castable is from 0.8g/cm^3 to 1.5g/cm^3, the raw material can be perlite, vermiculite, light weight clay, light weight mullite or bubble alumina according to the different service temperature.

Compare to light weight clay based insulation castable, light weight mullite based insulation castabe can be used in higher temperature, the density can be from 1.2-1.5g/cm^3.

MAGSCIE BRAND		CAST-INS1.2M	CAST-INS1.3M	CAST-INS1.4M
Max Service Temp	℃	1200	1300	1400
Bulk Density (Dried at 110℃)	g/cm^3	1.2	1.3	1.4
Max Grain Size	Mm	6	6	6
Cold Crushing Strength				
at 110℃	MPa	6	14	18
at 1100℃	MPa	/	8	13
Modulus of Rupture				
at 110℃	MPa	3	5	6
at 1100℃	MPa	/	3	4
Al_2O_3,	%	35	40	45
Fe_2O_3,	%	2.0	1.8	1.5

Bubble Alumina Based Insulating Castable

Usually the density of the insulation castable is from 0.8g/cm^3 to 1.5g/cm^3, the raw material can be perlite, vermiculite, light weight clay, light weight mullite or bubble alumina according to the different service temperature.

Bubble Alumina Based Insulation Castable is fully bubble alumina based, the max service temperature can reach 1700℃, we use CA70 cement as binder and also add some α alumina powder to improve the high temperature performance, the density can be from 1.5-1.6g/cm^3.

MAGSCIE BRAND		CAST-INS1.5B	CAST-INS1.6B
Max Service Temp	℃	1700	1700
Bulk Density (Dried at 110℃)	g/cm^3	1.5	1.6
Max Grain Size	Mm	5	5
Cold Crushing Strength			
at 110℃	MPa	20	25
at 1100℃	MPa	17	22
Modulus of Rupture			
at 110℃	MPa	7	7
at 1100℃	MPa	5	5
Al_2O_3,	%	90	90
Fe_2O_3,	%	0.2	0.2