Classification Of ZhenAn Refractory Materials

Based On Chemical Properties

The main component of the acid refractory is silicon oxide, and the common bricks are silica bricks and fireclay bricks. The former contains 94% of silicon oxide, and take the silica as raw materials. Such bricks are featured with strong acidic slag erosion resistance, and high refractoriness, being widely used in the coke oven, glass furnace, and acid steel making furnace, etc. while the latter is mainly made of fireclay, plus 30%-46% of alumina. Such bricks are weak acid refractory materials, being featured with good thermal shock resistance, and acid resistance.

Physical And Chemical Indicators of Refractory Clay Bricks

Item	SK-30	SK-32	SK-34	SK-36	SK-38
AL_2O_3 % (min)	30-35%	35-38%	38-42%	50-55%	60-65%
Fe_2O_3% (max)	3	3	2.8	2.5	2.3
Refractoriness	≥1670°C	≥1690°C	≥1710°C	≥1750°C	≥1770°C
Refractoriness under load, 0.2MPa, (°C)	≥1270	≥1350	≥1350	≥1430	≥1450
Apparent porosity (%)	20-24	20-24	19-23	18-22	18-22
Bulk density (g/cm^3)	2.00-2.05	2.05-2.1	2.1-2.15	2.15-2.25	2.25-2.35
Cold crushing strength (MPa)	≥25	≥30	≥35	≥45	≥50
Thermal	≤0.6	≤0.55	≤0.55	≤0.4	≤0.4

expansion at 1000°C (%)					

Physical And Chemical Indicators of Silica Bricks

Item		ZAGZ-94	ZAGZ-95	ZAGZ-96A	ZAGZ-97B
Chemical Composition %	SiO2	≥94	≥95	≥96	≥96
	Fe2O3	≤1.5	≤1.5	≤0.8	≤0.7
	Al2O3+2(K2O+Na2O)		≤1.0	≤0.5	≤0.7
Refractoriness ℃		1710	1710	1710	1710
Apparent Porosity %		≤22	≤21	≤21	≤21
Bulk Density g/cm³		≥1.8	≥1.8	≥1.87	≥1.8
True Density g/cm³		≤2.38	≤2.38	≤2.34	≤2.34
Cold Crushing Strength Mpa		≥24.5	≥29.4	≥35	≥35
Refractoriness Under Load (0.2MPa)T0.6℃		≥1630	≥1650	≥1680	≥1680
Permanent Linear Change On Reheating % 1500℃X2h		0~ + 0.3	0~ + 0.3	0~ + 0.3	0~ + 0.3
Thermal Conductivity W/m.k 1000℃		1.74	1.74	1.44	1.44
20-1000℃ Thermal Expansion 10-6/℃		1.25	1.25	1.25	1.25

Neutral refractory materials contain alumina, chromium oxide and carbon. Corundum products, chrome bricks and carbon refractory materials are common types of such materials. Corundum refractory materials are high quality refractory material, which contain alumina more than 95%. Chrome bricks are used as the insulation bricks. And carbon refractory materials can be classified into carbon bricks, graphite products, and silicon carbide products, being featured with low thermal expansion coefficient, good thermal conductivity, good thermal shock resistance, high strength at high temperature, and anti-acid and alkali performance.

Physical And Chemical Indicators of High Alumina Brick

No.	Properties	Unit	Type of High Alumina Brick				
			HAL-80	HAL-70	HAL-60	HAL-50	HAL-45
1	Al2O3 Content	%	80-85	70-80	60-65	50-55	45-50
2	Refractoriness	℃	1790	1790	1770	1750	1750
3	Parmanent linear change(2h x temp)	%	< 0,7	< 0,7	< 0,6	< 0,6	< 0,6
		℃	1500	1500			
4	Refractoriness under load 2kg/cm²	℃	1550-1650	1500-1650	1450-1500	1420-1570	1400-1570

5	Cold crushing strength	Mpa	100	> 80	65-70	50-60	40-50
6	Porosity	%	18-20	18-20	18-21	18-21	18-21
7	Bulk density	g/cm³	> 2.75	2.65-	2.45-	2.35-	2.30-
				2.75	2.6	2.55	2.5
8	Thermal shock resistance (850℃-Water)	Time	>30	>30	>30	>30	>30

Physical And Chemical Indicators of Corundum brick

Item	Unit	High Purity Corundum Brick	Common Corundum Brick	Common Corundum Brick	Mullite Corundum Brick	Chrome Corundum Brick
		DL-98	DL-95	DL-90	MDL-80	GDL-85
Al2O3 ≥	%	98.5	95	90	80	85
SiO2 ≤	%	0.3	3	9	18	0.2
Fe2O3 ≤	%	0.2	0.2	0.5	0.5	0.2
R20 ≤	%	0.3	0.6	0.6	0.4	0.5
Bulk Density ≥	g/cm3	3	2.9	2.9	2.7	3.1
Cold Crushing	MPa	75	100	100	60	80

Strength ≥						
Refractoriness ≥	℃	1790	1790	1790	1790	1790
Deformation Temperature 0.2MPa ≥	℃	1700	1650	1650	1700	1700
Linear Change On Reheating 1600*3h ≤	%	0.2	0.2	0.2	0.3	0.2
Thermal Stability (1100℃) ≥	Times	6	10	10	20	15

Physical And Chemical Indicators of Magnesia chrome bricks

Item	Common Magnesia Chrome Brick				Direct-Bonded Magnesia Chrome Brick			
	MGe6	MGe8	MGe12	MGe16	DMGe4	DMGe8	DMGe12	DMGe16
MgO %	80	72	70	65	85	77	74	69
Cr2O3 %	7	10	13	17	5.5	9.1	14	18
CaO %	1.2	1.2	1.2	1.2	1.1	1.4	1.2	1.2

SiO2 %	3.4	4	4	4.2	1.3	1.2	1.2	1.5
Al2O3 %	4.5	6.5	6	6	3.5	4	3.5	4.5
Fe2O3 %	4	4.8	5.5	6.5	3	6.4	5	5.7
Apparent Porosity %	17	18	18	18	18	18	18	18
Bulk Density g/cm3	3	3	3.02	3.05	3.02	3.04	3.06	3.08
Cold Crushing Strength Mpa	55	55	55	50	50	50	55	55
Refractoriness Under Load °C	1600	1600	1600	1600	1700	700	1700	1700
Thermal expansion % 1000°C	/	/	/	/	1	1	1	0.9
Thermal expansion % 1600°C	/	/	/	/	1.8	1.8	1.8	1.6

As for the alkaline refractory materials, such products is made of magnesium oxide and calcium oxide. The most commonly used products are magnesite bricks, which contain magnesium oxide about 80%-85%，with characters of alkaline slag and iron slag resistance,

being widely used in the open hearth furnace, electric furnace, and non-ferrous metal smelting equipment, etc.

Physical And Chemical Indicators of Magnesium Bricks

Item	Magnesite Bricks									
Grade	MZ	MZ	MZ	MZ	MZ	MZ	MZ	MZ	MZ	MZ
Indexes	89	91	95	96	97	98	95	96	97	98
MagO (%)	89	91	94.5	95.5	96.5	97.5	95	96	97	98
CaO (%)	2.5	2.5	2	1.8	1.5	1.2	2	1.7	1.4	1.2
SiO2 (%)				2.5	1.5	1	2.5	2	1.5	1
Refractoriness Under Load	1540	1550	1620	1650	1680	1700	1650	1660	1700	1700
Pressure At Normal Temperature (Mpa)	55	55	55	55	55	60	60	60	60	60
Gas Hole Indicating Rate	19	18	18	18	17	17	16	16	16	16

Magnesium Bricks

Based On Shapes

The most commonly used refractory materials are shaped refractory, unshaped refractory and insulation refractory.

Shaped refractory materials are refractory bricks, such as AZS refractory brick, high alumina brick, magnesia brick, fireclay refractory brick, silicon brick, corundum brick, direct-bonded magnesia-chrome brick, silicon-carbide brick, and insulation brick, etc.

Shaped refractory materials

Unshaped refractory materials are also called monolithic refractory, which are made of power, aggregate and binder, being used directly without firing, such as ramming mass, castable, cement, and mortar, etc.

Unshaped refractory materials