



Basic Refractories for Cement Rotary Kiln





AARYA METALLURGICALS (INDIA) PRIVATE LIMITED

We offer Customised Refractory Solutions to Cement Industry

ABOUT US

We are one of the globally recognised suppliers of high performance refractory products and other raw-materials to Iron & Steel, Foundry, Aluminium, Copper, Zinc, Cement, Oil refinery, Petrochemicals and Fertilizer industries. With Over two decades of sourcing experience from China, we bring to our valued customers very cost-effective propositions, maintaining high quality standards.

With our newly installed manufacturing facilities for monolithics and pre-cast refractories at Aarya Metallurgicals (India) Private Limited, Raigarh, Chhattisgarh (India), we are strategically positioned to reach out to our customers in the geography.

AMPL also provide Total Refractory Solutions to our valued customers with a seamless supply-chain with own high performance refractories, sourcing bricks through our Group Company www.sgssl.com; and Site Management.

We are the sole agent for of a leading Chinese Refractory Maker, for Iron & Steel (Lime Kiln & RH), Cement and Copper industries – Rebonded & Direct Bonded Mag-Chrome, Mag-Alumina Spinel and their other refractory products; in India, Algeria, Bangladesh and Zambia.

With production history of over 40 years, the Chinese company is one of the oldest refractory manufacturer. Direct Bonded and Rebonded Mag-Chrome bricks have been hallmark of the Chinese company. These bricks are treated with special detoxication technique, conforming with the strict standards of the environmental protection globally.

Refractory is a critical component in maintaining process efficiency, as well as prolonging the life of the Kiln. The durability of the rotary kiln brick lining generally determines the duration of the kiln operating campaign. Refractory protects the shell of the kiln from the temperature within, and also helps to maintain heat retention inside the kiln. Therefore the great efforts are to be made to ensure appropriate refractory brick material selection, installation, zoning, and the optimization of the refractory pre-heating practices.

The clinker mineralogy, microstructure, minor phases, macrostructure, and variability define the atmosphere and process conditions in Rotary Kiln. Any of the said parameters if found beyond permissible limits may cause damage to the coating and increase thermal and chemical stresses on the kiln refractory.

The cement industry is one of the most energy-intensive industries, therefore the use of alternative fuels has a long tradition. In addition to cost saving, it helps in ecologically sensible utilization of waste materials. But, in comparison with the use of conventional fossil fuels, refractories are subjected to significantly higher chemical stress when alternative fuels are used. In recent years kiln diameters and rotational speeds have increased, increasing the mechanical stresses.

Aarya Metallurgical (India) Private Limited brings to the valued customers in India, Algeria, Bangladesh and Zambia, the high-performance Basic Refractory for Cement Rotary Kiln .



Start of the Installtion

Chrome-Spinel (CKS)



Made of magnesite synthetic spinel and chromite processed at high temperature sintering. They are proenvironment good thermal shock resistance good heat load fatigue resistance good oxidation -reduction resistance, good high temperature mechanical flexibility fairly good wear resistance and clinker coating. Generally used at burning zone, can also be used at transition zone.

SPECIFICATION

Brand	MgO	Cr ₂ O ₃ +Al ₂ O ₃	A.P.	B.D.	CCS	RUL Ta	RTS	TE @ 1000⁰C	TC @ 1000⁰C
Name	%	%	%	g/cc	Мра	°C	950 ⁰ C	%	W/mK
CKS – A	80.0	6 – 9	18.0	2.95	50	1680	100	1.03	2,20
CKS – B	78.0	6 – 9	19.0	2.92	45	1660	80	1.03	2,20

Alumisic (CAS)

Made of Alumina Corundum and Silicon Carbide, processed by medium temperature sintering. Alumisic bricks have better thermal shock resistance Recommended to be used in the upper transition zone.

SPECIFICATION

Brand Name	Al ₂ O ₃	SiO ₂ +SiC	A.P.	B.D.	CCS	RUL Ta	RTS	W.C.	TC @ 1000⁰C
	%	%	%	g/cc	Мра	°c	950⁰C	Cm ³	W/mK
CAS – 168	65.0	30 - 33	18.0	2.70	100	1650	100	7.0	1.25
CAS – 165	63.0	25 – 30	18.5	2.65	100	1600	100	8.0	1.30
CAS – 155	60.0	20 – 25	19.0	2.60	80	1500	90	9.0	1.35

Magnesia Chrome (CMK)



Made of Magnesia and Chromite, processed at high temperature sintering. Mag-chrome are most extensively used in the world. They are used at burning zone and transition zone of cement kilns. They are adaptive to any conditions and economical. With properties of good clinker coating, sound thermal shock resistance, good heat load weariness resistance, good chemical corrosion resistance, good thermal fatigue resistance, good oxidation-reduction resistance. Disadvantages are hazardous to environment. MRL therefore developed low chrome magchrome Bricks or chrome free products as alternatives to traditional magchrome products. Please note : All MRL chrome products are treated with special detoxication technique, conforming with the strict standard of environment protection of the USA.

Brand Name	MgO	Cr ₂ O ₃	A.P.	B.D.	ccs	RUL Ta	RTS	TE @ 1000 ⁰ C	TC @ 1000 ⁰ C
	%	%	%	g/cc	Мра	°C	950 ⁰ C	%	W/mK
CMK – A	78.0	3 – 5	17.0	3.00	55	1700	100	1.05	2.10
CMK – B	76.0	3 – 5	18.0	2.98	50	1680	100	1.05	2.10
CMK – C	76.0	3 – 5	18.5	2.95	45	1650	80	1.07	2.30
CMK – D	72.0	4 - 6	19.0	2.92	40	1600	80	1.09	2.30

Magnesia Spinel (CMS)



Made of magnesite and synthetic spinel, processed by high temperature sintering. Mag-spinel bricks are most extensively used in the world. They are used in transition zone of cement kiln. They are adaptive to any conditions and economical. Low alumina Mag-spinel Bricks can also be used at burning zone. With properties of sound thermal shock resistance, heat load weariness resistance, chemical corrosion resistance, thermal fatigue resistance, oxidation-reduction resistance, high temperature mechanical flexibility, wear resistance.

Brand	MgO	Fe ₂ O ₃ +Al ₂ O ₃	A.P.	B.D.	ccs	RUL Ta	RTS	TE @ 1000⁰C	TC @ 1000⁰C
Name	%	%	%	g/cc	Мра	°C	950 ⁰ C	%	W/mK
CMS – 5A	88.0	5 – 7	17.0	2.95	55	1700	100	1.20	3.00
CMS – 5B	88.0	5 – 7	18.0	2.95	50	1680	100	1.20	3.00
CMS – 5C	87.0	5 – 7	19.0	2.92	45	1650	80	1.20	3.00
CMS – 10A	84.0	9-11	17.0	2.95	55	1700	100	1.20	2.95
CMS – 10B	84.0	9-11	18.0	2.93	50	1680	100	1.20	2.95
CMS - 10C	82.0	9-11	19.0	2.92	45	1650	80	1.20	2.95
CMS – 15A	80.0	13 – 15	17.0	2.95	50	1700	100	1.20	2.85
CMS – 15B	80.0	13 – 15	18.0	2.90	45	1680	100	1.20	2.85
CMS – 15C	78.0	13 – 15	20.0	2.90	40	1650	80	1.20	2.85

SPECIFICATION

Ferro Spinel (CFS)



Made of magnesite and hercynite, processed by high temperature sintering. With properties of good clinker coating, sound thermal shock resistance, good heat load fatigue resistance, excellent high temperature mechanical flexibility, good wear resistance. They can be used at burning zone and transition zone at the same time. It contributes to excellent performance in critical tyre section.

SPECIFICATION

Brand	MgO	Fe ₂ O ₃ +Al ₂ O ₃	A.P.	B.D.	CCS	RUL Ta	RTS	TE @ 1000 ⁰ C	TC @ 1000⁰C
Name	%	%	%	g/cc	Мра	°C	950 ^⁰ C	%	W/mK
CFS – 15A	80.0	13 – 16	17.0	2.95	55	1680	100	1.15	2,60
CFS – 15B	78.0	13 – 16	18.0	2.92	50	1660	90	1.15	2.60

MORTAR

We offer suitable grades of mortar for all grades of the bricks, both in ready to use and dry form to be mixed with liquid (water, sodium silicate solution).

Brand Name	MgO	Al ₂ O ₃	$Cr_2O_3 + Al_2O_3$	$Fe_2O_3 + Al_2O_3$	Cr ₂ O ₃	SiO2+ SiC	Grading	CCS 110 ⁰ C/24 h	Water required
	%	%	%	%	%	%	mm	Мра	%
CKS – M	80.0	-	6 – 9	-	-	-	0-0.5	5	25 – 30
CAS – M	-	65	-	-	-	30 - 33	0-0.5	5	25 – 30
CMK – M	78.0	-	-	-	3 – 5	-	0-0.5	5	25 – 30
CMS – M	88.0	5 – 7	-	-	-	-	0-0.5	5	25 – 30
CFS – M	80.0	-	-	13 – 16	-	-	0-0.5	5	25 – 30

SPECIFICATION

Rotary Kiln Lining Profile



UPPER TRANSITION ZONE

This is the zone, where liquid phase begins to appear in the raw meal making the kiln lining more vulnerable. The operation is defined as

- Several redox cycles bricks getting weak and friable;
- unstable coating bricks getting exposed to infiltration by clinker liquid phase;
- Kiln shell corrosion, caused by sulfate and chloride diffusion through the refractory, can result from the burning of some waste fuels.

MAGNESIA CHROME (CMK) Grade bricks are recommended for lining in the zone.

MAGNESIA SPINEL (CMS) Grade bricks are recommended for lining in the zone.

FERRO SPINEL (CFS) Grade bricks are recommended for lining in the critical tyre section of the zone.

ALUMISIC (CAS) Grade bricks are recommended for lining in the zone.

BURNING ZONE

The generation of clinker coating on the refractory brick is most important factor for the performance of the bricks. In addition to the protection of bricks, it helps in clinkerisation reaction in the kiln. Maintenance of the coating can be influenced by:

- Large fluctuations in raw meal and poorly nodularised clinker can result in liquid phase segregation. Which reduces the thickness and stability of the coating.
- The use of high sulphur fuels, combined with poor combustion engineering, can lead to a high sulphate compound volatilization and ring formation build-ups.
- A number of factors can cause coating to disappear completely, with a resulting tendency for the brick to become weak and friable due to thermo-mechanical fatigue.

MAGNESIA CHROME (CMK) Grade bricks are recommended for lining in the zone.

CHROME-SPINEL (CKS) Grade bricks are recommended for lining in the zone.

MAGNESIA SPINEL (CMS) Grade bricks with low alumina content can be used for lining in the zone.

FERRO SPINEL (CFS) Grade bricks are recommended for lining in the critical tyre section of the zone.

LOWER TRANSITION ZONE

Factors affecting the brick life are very varied in the lower transition zone, such as:

- Excessive ovality or damage to kiln shell cause mechanical stresses, which may lead to displacement of refractories and ultimately may cause a twisting of the brick lining.
- Use of alternative fuels with high alkaline and sulfer content may lead to "capping", caused by the infiltration and condensation of alkalis in the brick.
- "Capping" can also occur as a result of thermal overload, or from firing with the burner tip coincident with the nose ring or outlet zone. Thermal overload can also cause spalling as a result of the thermal shock.
- Very abrasive "dusky" clinkers high in SiO2; can cause high abrasion wear on refractories.

MAGNESIA CHROME (CMK) Grade bricks are recommended for lining in the zone.

MAGNESIA SPINEL (CMS) Grade bricks are recommended for lining in the zone.

FERRO SPINEL (CFS) Grade bricks are recommended for lining in the critical tyre section of the zone.

Refractory Selection Options

•	Clinker coating	:	CFS>CMK>CKS>CMS>CAS
•	Hot mechanical flexibility	:	CAS > CFS > CMS > CKS > CMK
•	Resistance against weariness	:	CAS > CFS > CMS > CKS > CMK
•	Thermal conductivity	:	CMS > CFS > CKS > CMK > CAS
•	Refractoriness	:	CMS > CFS > CMK > CKS > CAS



Marking of the Axial Line



Aarya Metallurgicals (India) Private Limited, Raigarh, Chhattisgarh, India has been given by a leading Chinese Refractory Company the exclusive rights to market, sell and service of all products for Iron & Steel (Lime Kiln & RH), Cement and Copper industries – Rebonded & Direct Bonded Mag-Chrome, Mag-Alumina Spinel and their other refractory products; in India, Algeria, Bangladesh, and Zambia.



AARYA METALLURGICALS (INDIA) PRIVATE LIMITED

Office & Works : Chakradharpur, Bangursia, Raigarh, 496 001 Chhattishgarh (INDIA) Contact : +91 9831690889, 9831898816, 9432012588, 7898370262 Email : aaryamet@gmail.com www.aaryametallurgicals.com