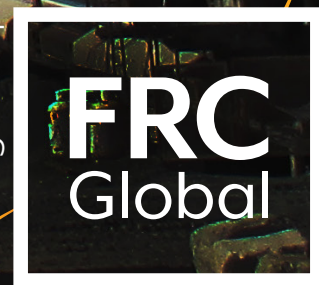


FRC Global Sands



Innovation

High Temp



Expert Teams.

Global Networks.

Quality Products.

Who We Are

FRC Global is a leading supplier of refractories, electrodes, and high temperature combustion systems.

FRC Global provides outstanding results for our clients within the iron, steel, and non-ferrous industries. Our company's reputation is built by delivering high quality products made with premium raw materials. We are more global now than ever before.

We give you a competitive advantage by offering you superior proven products that positively impact your bottom line and perform better. Our knowledgeable engineers ensure the proper application of our products to give you the maximum level of output and safety.

With over 25 warehouse facilities in the United States, Canada, Mexico, and South America we assure your products are readily available when you need them in these regions.

Through the use of vast global resources, all of us at FRC Global are committed to being the value creators and problem solvers for our industry.

Mission Statement

Embrace modern technology to increase innovation, efficiency, and transparency. Inspire the next generation by driving change, promoting curiosity, and shaping sustainable solutions in the high temp world.



About Us



Background information

FRC Global is a second generation family owned company with a 30-year history.

FRC Global has offices, agents, or partners in 20 countries around the world.

Global Offices:

- ◆ North America: United States and Canada
- ◆ South America: Colombia
- ◆ Asia: China

We provide quality engineered products and services for all your high temperature applications.

FRC Global facts

Our quality control employees thoroughly inspect shipments to ensure products are within specification and are properly packaged.

Sales force and service needs are available in the following:

- ◆ North America
- ◆ Central America
- ◆ South America
- ◆ Europe
- ◆ Middle East

Why FRC Global?

Why Us

FRC Global products are based solely on virgin raw materials. No reclaimed sand or minerals are used in any of our products. Sand blends are produced according to our proprietary formula. We have a focus on relative cost, particle packing and maximizing performance.

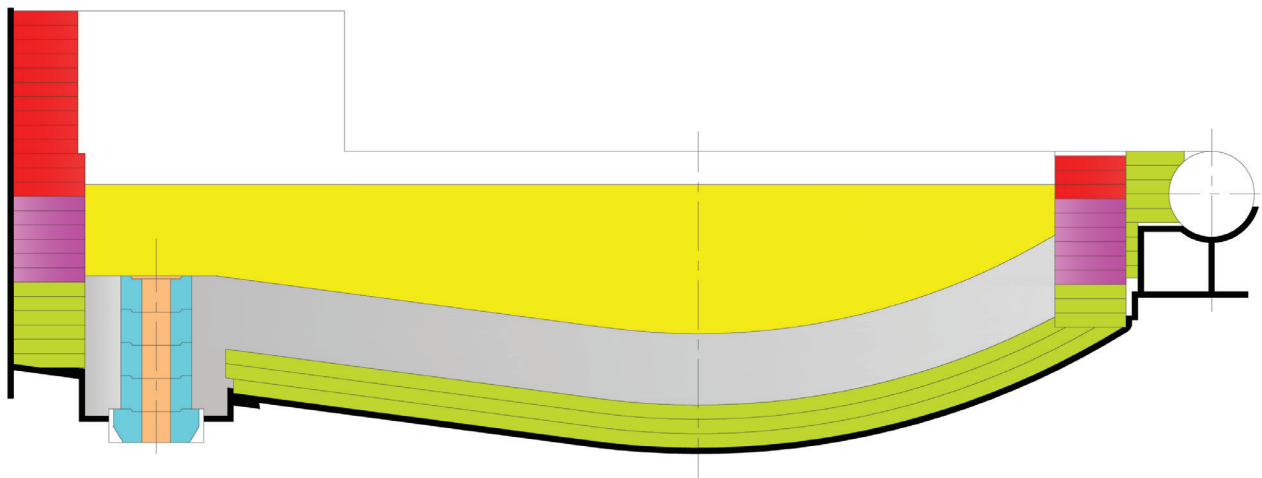
Our experts and service staff are there for you when you need it. Custom formulations are possible at no additional charge to match the unique characteristics of your process. We provide a trial evaluation and continual monitoring of product performance. Custom equipment is available if required for material handling and/or placement.



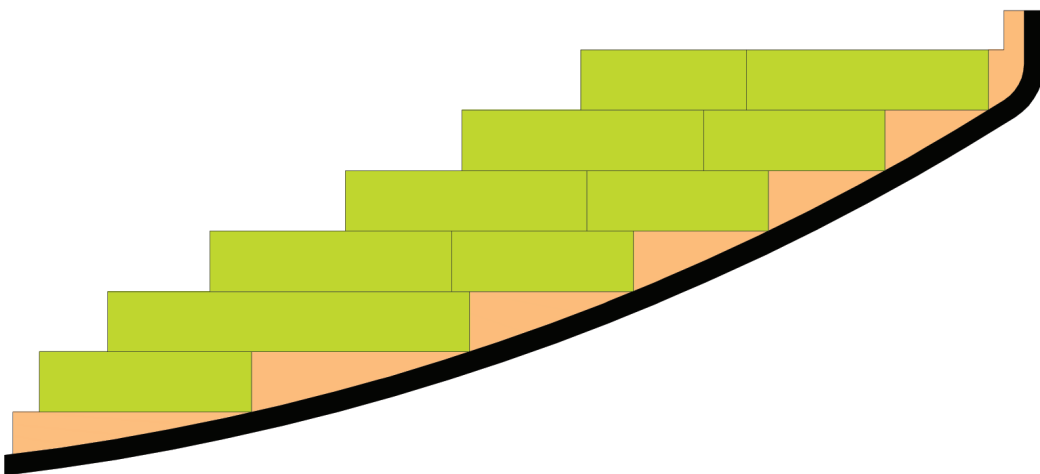
Magfill

Magfill is a synthetic calcined olivine with the dominant mineralogical phase forsterite. The uses for Magfill include EBT taphole fill, ladle nozzle fill, tundish insulation, and EAF stadium backfill. It is less dense than green olivine, it is more insulating and has no organics and no gas evolution. Due to the calcining and the mineralogy, there is almost no free silica.

EBT taphole with fill:

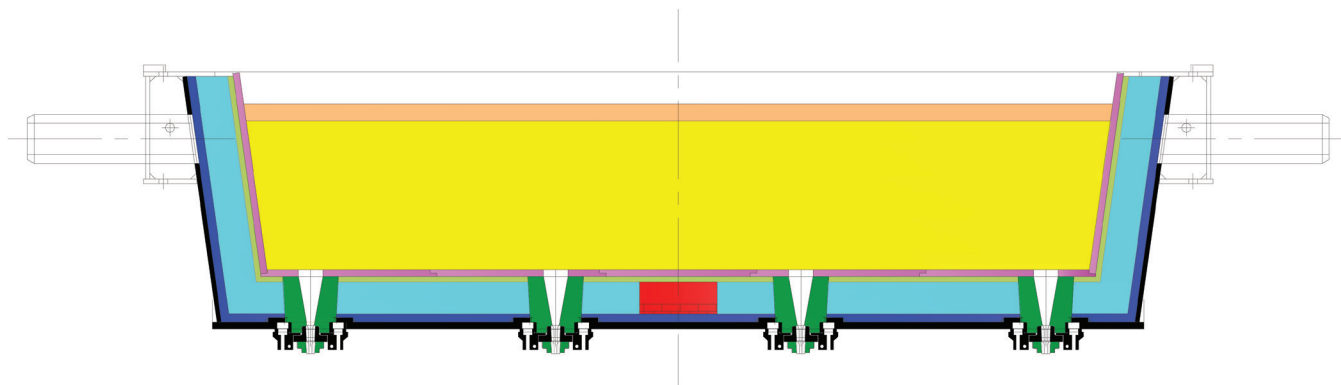


Stadium with Magfill backfill:



Magfill

The Magfill tundish cover/insulator is basic yet lightweight and insulating.



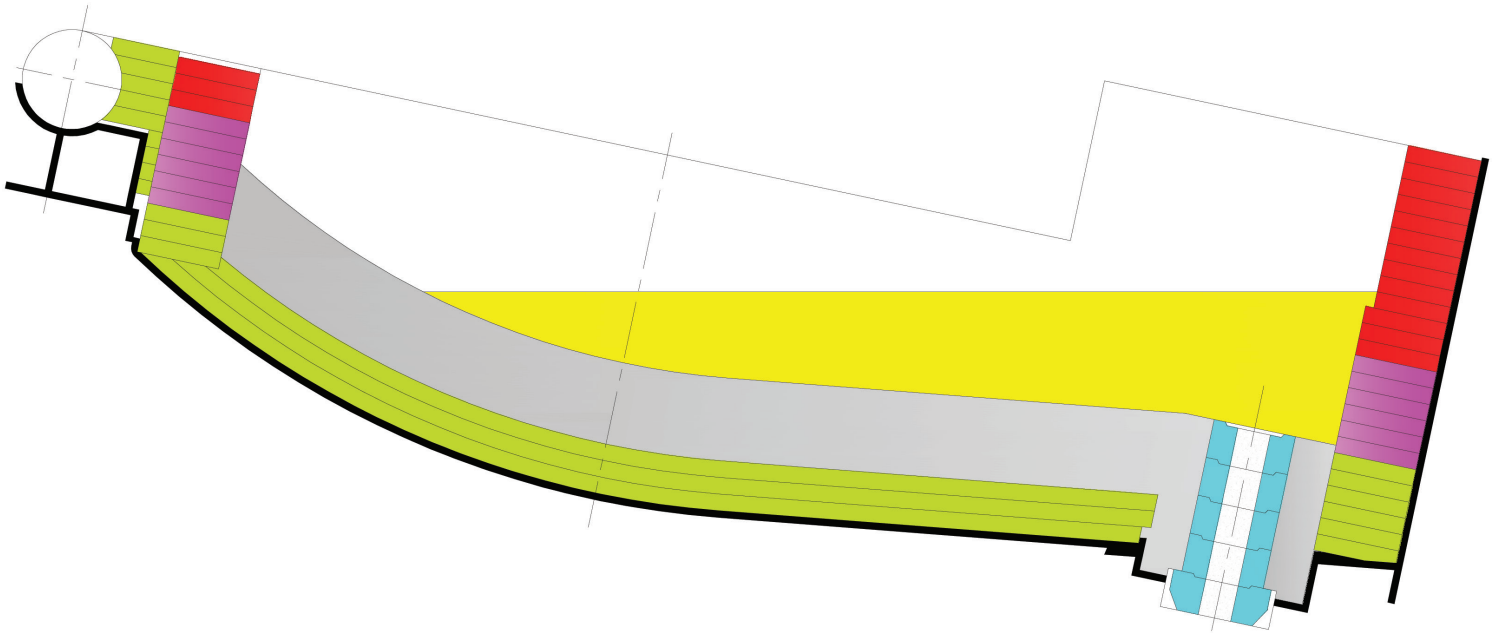
TYPICAL CHEMICAL ANALYSIS (% by weight):

MgO	%	53
SiO ₂	%	37
Fe ₂ O ₃	%	5-7
Al ₂ O ₃	%	2
CaO	%	2

TYPICAL AS RECEIVED PROPERTIES:

Color:		Brown
Fusion temperature:	°C	>1700
Hardness (Mohs' scale):		6 to 6.5
Thermal expansion:	% in/in	0.01
Thermal conductivity:		Very low
Bulk density:	lbs/ft ³	82-87
Compacted density:	lbs/ft ³	93-100
pH:		8.4

Magfill



How to maximize head pressure for EAF tapping:

- ◆ Open taphole with furnace tilted as far as possible
- ◆ Run with the largest possible heel size
- ◆ Consider lowering hearth thickness at taphole and taphole height

Flosan

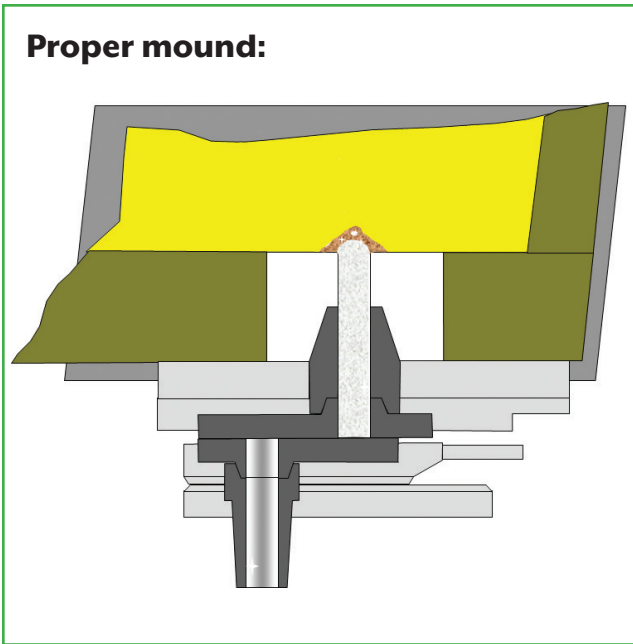


FRC Global's ladle nozzle fill, Flosan, has a range of chemistries for various grades, heat sizes, processes and bore configurations. From pure quartz to pure zirconia and chromite blends of each, FRC Global will develop a blend for your unique application.

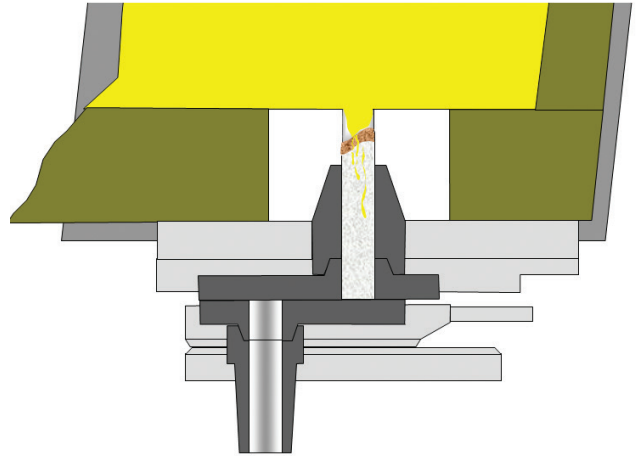
Potential sources of non-free opening

- ◆ **Ladle design:** wellblock located in or very near tap stream
- ◆ **Time:** increased sintering leads to thicker crust
- ◆ **Temperature:** too high- increased sintering, too low- slag/skull solidification over mound
- ◆ **Debris:** blocks bore
- ◆ **Build-up in bore (mortar and/or slag):** displaces sand, reduces bore diameter, creates choke-points
- ◆ **Lack of head pressure:** inability to break through crust
- ◆ **Small bore:** directly results in lower available head pressure, more resistance to sand flowing and minor obstructions are worsened by this condition
- ◆ **Impact/tap stream:** washes away mound, remaining crust becomes a plug
- ◆ **Wearing of block/volume changes:** smaller mound of different shape as block wears, new nozzle creates a lip/ledge inside the block

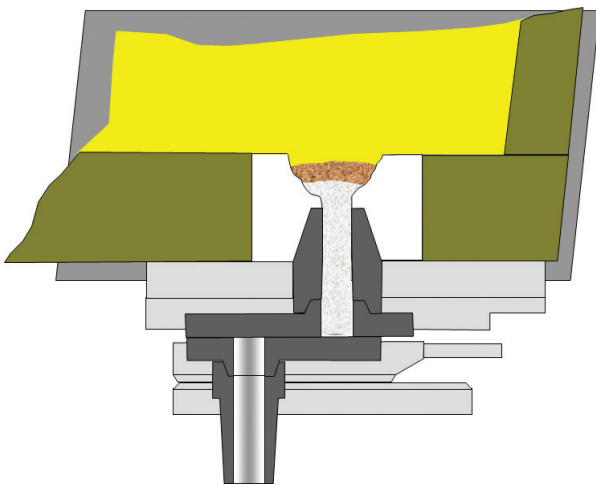
Proper mound:



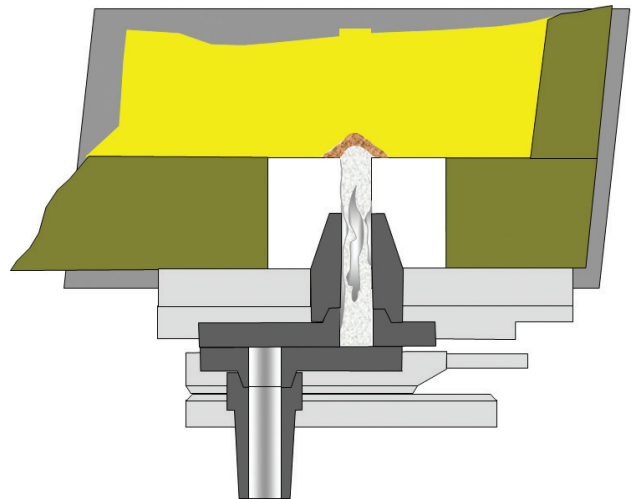
Too little sand:



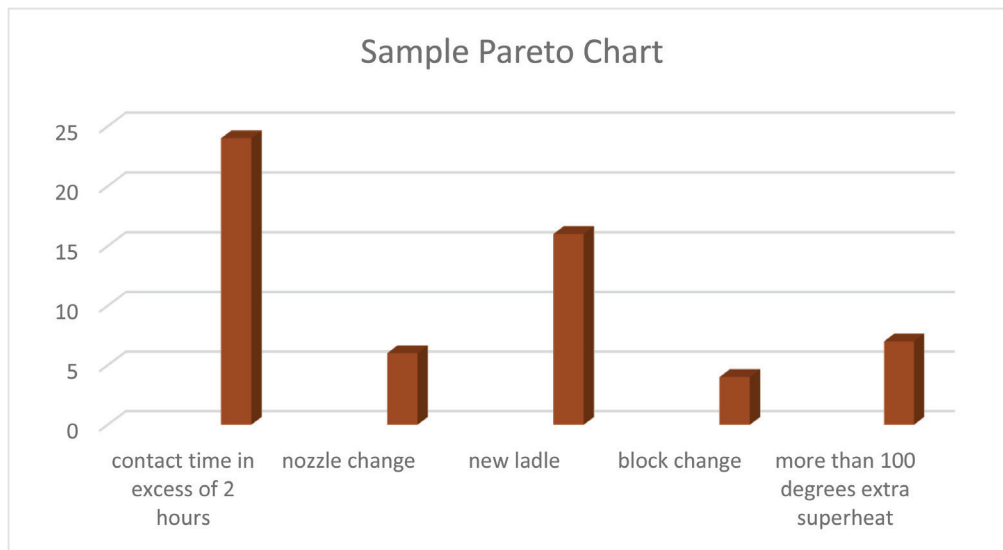
Worn block and obstructed sand flow:



Something blocking the bore:

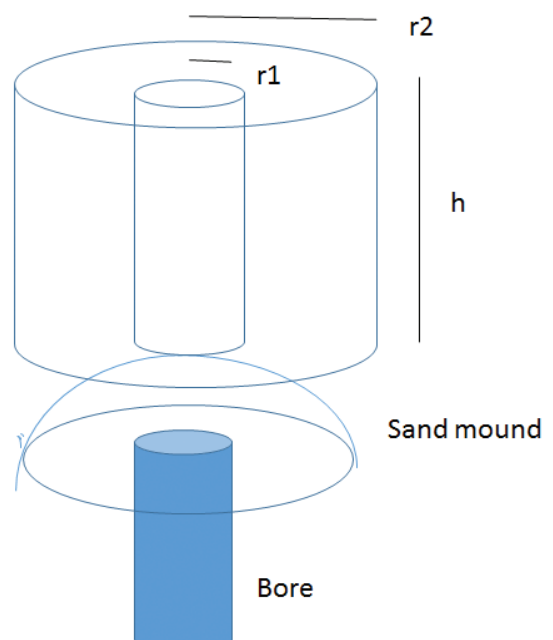
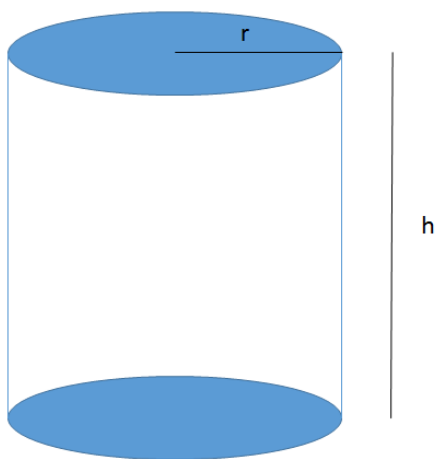


A simple Pareto chart is very useful in determining the cause(s) of ladle non-free opens. It addresses the highest frequency causes first, and then continues monitoring.

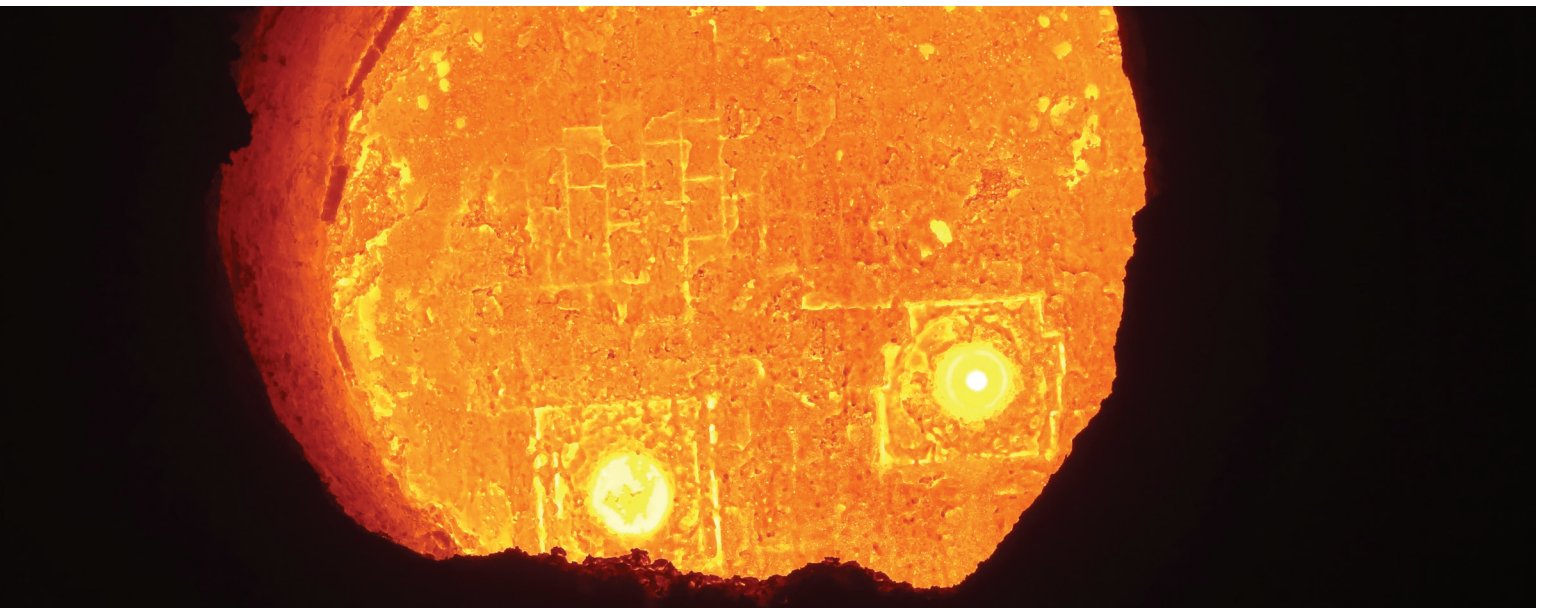


For ladles with small bore/low head pressure, how to “cheat” by means of a large mound:

Head pressure: bath height (h) inches x mound area (πr^2) square inches x steel density in lbs/in³ (eg- 490)



Flosan



	Cr_2O_3	SiO_2	Fe_2O_3	ZrSiO_4	MgO	Al_2O_3
FLOSAN NORMAL	36	24	18	0	8.5	12
FLOSAN GDS	34	28	17	0	7.5	11
FLOSAN Z10	33	20	16	12	7.5	12
FLOSAN Z30	28	16	14	30.5	6.5	10
FLOSAN Z50	20	12	9	50	5.5	7



Equipment



Delivery (above) and handling (below)



Ladle mag



FRC Global's ladle backfill, Ladlemag, is a synthetic olivine with or without a binder. Little or no free silica means the only concern is a nuisance dust. It is free flowing to minimize effort and time during installation. It sticks to the working lining, not the safety lining. It will flow freely from a hopper. Handling equipment is inexpensive and is very easy to maintain.



Ladle mag



Ladle mag installation (left) and demolition (above)

TYPICAL CHEMICAL ANALYSIS (% by weight):

MgO	%	45-55
SiO ₂	%	35-45
Fe ₂ O ₃	%	5-7
Na ₂ O(SiO ₂) _x (H ₂ O) _x	%	0-5
Al ₂ O ₃	%	< 2
CaO	%	2
L.O.I	%	< 1
Others	%	1.0-2.0

TYPICAL AS RECEIVED PROPERTIES:

Standard size	35-70 (40 mesh)
Density, pcf (g/cc)	85 (1.36)

Innovation

High Temp

FRC
Global

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