MAGNESIA CARBON REFRACTORY BRICKS : GRANULOMETRY

MgO-C (Magnesia carbon) refractories or Carbon containing Magnesite refractories have been extensively used by steel makers in ladles that are containers for the secondary treatment of steel. MgO-C refractory bricks are widely used in slag lines of BOF (Basic Oxygen Furnace) because of their superior wear resistance. The service life of Magnesia-Carbon refractories used in BOFs have been pushed quite significantly (largely due to slag splashing and gunning improvements) even as the service conditions have become more severe due to the increased operating temperature required for continuous casting and the need to produce cleaner steel.

Selection of raw materials, their grading and grain size distribution (Granulometry) and composition together play a very important role in the development of various physical properties, microstructure and thermo-mechanical properties of MgO-C refractory bricks. Various different types of MgO (Magnesite) grains provide different levels of corrosion resistance. It has been found that Magnesia-carbon bricks having 3 mm particle size show better wear resistance and other characteristics as compared to the bricks with 5 mm size grains. The graphite flakes used in these bricks impart -

=> High thermal conductivity

=> Good thermal shock resistance

=> Low thermal expansion

=> Non-wettability by liquid slag

=> Low corrosion rates by slags

Graphite contents of typical bricks range from 4 - 35% natural flake graphite. Since oxygen affinity of carbon is very high so different kinds of antioxidant minerals are used (in fines or superfines) in order to

protect refractory material against chemical corrosion. The REDOX reactions in magnesia carbon can be reduced by selection of high purity magnesite, large crystal size and use of graphite with low impurities. Slag corrosion resistance of MgO-C refractories can be improved by use of magnesite grains with less reactivity i.e. fused magnesite grains of high Bulk Density (BD) and high purity.

The above are some of the reasons which explain how selection of various raw materials can affect the performance of magnesia-carbon bricks. More on this aspect and the compositions of Magnesia-carbon refractory bricks will be discussed in a separate post. Here, our topic is Granulometry i.e. overall grading and the grain size distribution, suitable for the best performance of MgO-C bricks. Grading and the grain size distribution are important as these are directly related with the following properties of Magnesia-carbon bricks:

=> Porosity

=> Mechanical strength

=> Spalling resistance

=> Microstructure and phase development

=> Wear resistance

From the experience of various trials and performances it has been found that 0 - 4 mm grading is the best for MgO-C bricks for all general applications and also for different shapes like Tap Hole Blocks, Sleeves, etc. (except Slide Gate refractories which will be different). The size distribution of the press mixture (powder) for MgO-C bricks with different Graphite percentages as they should be are given in the following table:

Grain size	IS Mesh No	BS Mesh No	Graphite < 12.5%	Graphite > 12.5%
> 2 mm; <= 4 mm	+ 200#	+ 8#	20 - 25%	25 - 30%
> 0.5 mm; <= 2 mm	+ 50#	+ 30#	35 - 40%	33 - 38%
> 0.2 mm; <= 0.5 mm	+ 20#	+ 72#	10 - 15%	12 - 17%
<0.2 mm	- 20#	- 72#	25 - 30%	20 - 25%

Source : http://viewforyou.blogspot.in/2009/06/mgo-c-magnesia-carbon-refractory-bricks.html