

環球物源有限公司

Sino-Global Sourcing & Supply Limited

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Nozzle Filling Mass

SPECIFICATIONS

Properties	Index	Category				
		NFM-1	NFM-2	NFM-3	NFM-4	NFM-5
Chemical compositions (%)	MgO	-	-	-	-	35
	Cr ₂ O ₃	-	25	35	25	-
	SiO ₂	-	-	-	50	30
	ZrO ₂	60	30	15	-	-
PCE (SK)		38	38	38	38	38
Grading (mm)		0-1	0-2	0-3	0-4	0-5
Limit of application temp ⁰ C		1700	1700	1700	1700	1700

During the 1970s, in all major steel making units, a progressive replacement of stopper rods by sliding gate in ladles, took place. The development was largely due to increased activities in ladles during steel making, resulting in longer holding time in ladles. It will be interesting to note that the concept of slide gate system was originally patented in 1885 by David D. Lewis of USA. The idea was however not utilised till 1960s.

The ladle nozzle filling mass prevents erosion and corrosion of slide plates, the most vulnerable component of slide gate refractories and the ladle nozzle, from the very high impact while tapping of steel in ladle and decarbonization by the highly oxidised tapped steel. It does seal the slide gate refractories from the molten bath till the casting of steel, starts in ingots or tundishes, preventing any leakage or breakout; any sticking of solidified steel on slide surface and subsequent peeling of slide surface. It also safeguards the slide plates and collector nozzle from thermal shocks arising out of the situation leading to radical cracks; breaking of bore edge; and peeling of slide surface. Any leakage or breakout may also damage the electrical & mechanical assemblies. It may be noted that these factors are interrelated and affect the wear progress through a multiplication effect.

The above factors make the material design for ladle nozzle filling mass very crucial and has led to radical changes in design in order to obtain the desired safety and at the same time ensure a free opening for casting of steel. The material needs to sinter at steel making temperature forming a hard layer on the ladle nozzle filling mass. As the erosion of well block and the ladle nozzle progresses, the sintered layer of nozzle filling mass also erodes, exposing fresh layer to sinter. While it should sinter at steel making temperature, it should not fuse as the fused mass may cause problem during opening of slide gate. Such situation leads to forced opening by lancing of oxygen, which is highly undesirable.

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Slight expansion is a desired property of the material, as negative **PLC (permanent linear change)** leads to gap formation.

The most common material being used for the purpose is silica, for the ladles with the operating temperature to a maximum of **1650^o C**. For a higher operating temperature chromite is used as base material. For the ladles to be used for secondary steel making (**ladle metallurgy**) with a long holding time, zircon or high alumina is used as base material.