

**GOVERNMENT OF INDIA  
(Ministry of Railways)**

**SPECIFICATION FOR  
MAGNESITE DRY RAMMING MASS  
(FOR TRIAL)**

**MECHANICAL DRAWING OFFICE  
RAIL WHEEL FACTORY  
YELAHANKA, BANGALORE-560 064  
INDIA**

Issued by  
SSE/D *Kadk*  
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<i>Magnesi</i>	<i>Qwtona</i> 24.1.06	<i>C-24.1.06</i>	<i>H. Kulkarni</i> 24/1/06
CME	CWE/Mfg.	Dy. CME/Mfg.	WM/WP
APPROVED	REVIEWED	VERIFIED	PROPOSED

**SPECIFICATION FOR MAGNESITE DRY RAMMING MASS (FOR TRIAL)**

1.0 PURPOSE AND SCOPE:

The Specification covers supply of Magnesite Dry Ramming Mass to be used for hearth building of electric arc furnace.

2.0 JOB REQUIREMENT:

2.1 Magnesite Dry Ramming Mass (DRM) is intended for use in High Powered Electric Arc furnaces of 20 MT capacity for building working hearth. The hearth should withstand all working conditions like temperatures up to 1750°C, thermal and mechanical shocks, while top loading of heavy steel scraps like railway wheels, foundry returns etc. Steel produced in EAF is generally medium carbon steel, with a melting period of 60 minutes and a refining period of 60 minutes.

2.2 The product should be such that the material after first heat, sinters to a sufficient thickness to withstand shock loads, thermal and chemical attacks, and then progressively sinters to the full depth during subsequent heats.

3.0 WORKING CONDITIONS:

- 3.1 High Powered Electric Arc Furnace Capacity : 20 T with 12.6 MVA transformer.
- 3.2 Melt down time : 1 hour
- 3.3 Power on to tap time- : 2 hours
- 3.4 Scrap used : Medium and Heavy, with light scrap only for cushioning purpose.
- 3.5 Tapping temperature : 1680 to 1730°C

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- 3.6 Process : Basic, single slag process, FeO in the slag is around 15% and basicity around 2.5% right upto the time of tapping.
- 3.7 High Temperature holding : 1660 to 1730°C will be time of liquid metal in furnace around 20 to 30 minutes
- 3.8 Flux used : Calcined lime (90% CaO), along with the charge (40 kg per ton of LM).
- 3.9 Gunning material used for: Wet gunning mix, MgO > 80% hot repair of the furnace and Fe<sub>2</sub>O<sub>3</sub> < 3.0%. banks.
- 4.0 TECHNICAL REQUIREMENT:
- 4.1 The Dry Ramming Mass shall be manufactured from sintered magnesia of Alpine origin, oil free, low in iron with high CaO content and capable of withstanding a minimum working temperature of 1750°C. CaO shall be present in the combined phase with MgO. Laboratory test is for chemical analysis and to check other required properties. Final acceptance will be only after shop floor use.
- 4.2 Firm shall produce documentary evidence for the source of sintered magnesia.
- 4.3 Consumption of Dry Ramming Mass with Calcined Lime as flux: 2.5 kgs/MT of the metal melted.

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5.0 CHEMICAL COMPOSITION:

5.1 Magnesium Oxide (MgO)	75% Min.
5.2 Silica (SiO <sub>2</sub> )	1.0% Max.
5.3 Calcium Oxide (CaO)	8.0% Min
5.4 Iron Oxide (Fe <sub>2</sub> O <sub>3</sub> )	8.0% Max.
5.5 Alumina (Al <sub>2</sub> O <sub>3</sub> )	0.4% Max.
5.6 Chromium Oxide (Cr <sub>2</sub> O <sub>3</sub> )	Absent
5.7 Bonding	Ceramic
5.8 Free lime	Traces

6.0 PHYSICAL PROPERTIES:

6.1 Bulk Density (gm/cc) 2.1 min

6.2 Granulation (Indicative Values)

PARTICLE SIZE	PERCENTAGE
<0.1mm	15- 30%
<1.0mm	40-60%
<5.0mm	90% min.

Over size Granulation oversize (>6mm) should not be more than 10% of the total quantity by weight.

7.0 ADDITIONAL INFORMATION TO BE SUBMITTED BY THE SUPPLIER

7.1 Information to be submitted by the supplier while quoting against the RWF's tender for the item.

- a) Source of sintered magnesia
- b) Typical and guaranteed values of granulation
- c) Type of bond
- d) Typical values of Cold Crushing Strength in kg/cm<sup>2</sup> with indication of firing temperature and duration of firing.
- e) Sintering temperature range of the material.
- f) Shelf Life

<i>M. Ganesan</i>	<i>24.11.06</i>	<i>24.11.06</i>	<i>24/11/06</i>
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8.0 INSPECTION:

Final inspection and acceptance shall be at Rail Wheel Factory, Yelahanka, Bangalore based on sampling and testing as per IS 1760 (Part 1): 1991, IS 1760 (Part 2): 1991 and IS 1760 (Part 3): 1992. The material will also be subjected to field trial to establish that it meets with the job requirement specified vide Clause 2.0.

9.0 TEST CERTIFICATE:

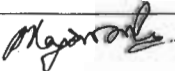
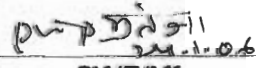
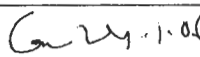
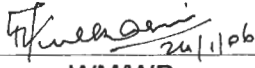
The manufacturers test certificate indicating all tested (physical and chemical) properties of the product required under Clause 4.0, 5.0 and 6.0 is to be enclosed along with the supply. Tests are required to be conducted as per IS 1760 (Part 1): 1991, IS 1760 (Part 2): 1991 and IS 1760 (Part 3): 1992. or ASTM C: 574/1971 or any other equivalent internationally accepted standard. The certificate shall also indicate the source of sintered magnesia.

10.0 PACKAGING:

10.1 The Magnesite Dry Ramming Mass shall be supplied in multi-walled paper sacks capable of withstanding conditions of handling, transit and storage.

10.2 Enough care shall be taken to pack the material to avoid the ingress of moisture available in ambient conditions and sea and coastal geographic conditions as sintered Magnesite products are susceptible for water (high humidity) absorption causing damage to Dry Ramming Mass. Each bag shall bear the supplier's name, quantity, product name, grade, date of manufacture, batch number and shelf life of the material.

10.3 Individual bags of 25kg packed in jumbo bags capable of handling by a 3T forklift.

			
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11.0 SHELF LIFE

The material should have a minimum shelf life of 6 months from the date of manufacture

12.0 WARRANTY

12.1 The supplier shall guarantee for maximum consumption of 2.5 kg Dry Ramming Mass per MT of molten metal. If the specific consumption exceeds 2.5 kg per MT of molten metal, then on pro-rata basis for every additional 0.1 kg/MT consumed, the supplier will have to compensate by supply of extra material at their cost covering the purchase order quantity.

<i>M. Srinivas</i>	<i>(D. Srinivas)</i> 24.1.06	<i>Caru-1.06</i>	
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