# HEAVY DUTY RESIN BONDED MAGNESIA CARBON BRICKS (RBMC SPL) BRICKS FOR EAF & VAD,VOD & LRF LADLES

## 1.0 GENERAL:

This specification governs the quality requirements of RBMC-Special bricks for EAF, VAD, VOD & LRF ladles.

## 2.0 APPLICATION:

*__Metal and slag zone of Electric Arc Furnaces.__ Oxygen lancing is done in EAF for melting and reducing **Phosphorous to 0.004%.**

* **Bottom, metal and slag zone of ladles**. Oxygen lancing in ladles during VOD operation.

* Degassing under vacuum at $\leq 1$ Tor for30 minute atTemp.1720°C(max) to reduce gas contents and achieve Sulphur $\approx$ 0.002%.

*Typical final slag composition after secondary refining is as follows: Cao 40-45%, $SiO_2$ 13- 17%, MgO 10-12%, $Al_2O_3$ 20-25%, $Fe_2O_3$ 1.5-3%, $Cr_2O_3$+MnO <1.2%

## 3.0 CONDITION OF DELIVERY

The different types of bricks shall be supplied as per sizes and drawings indicated at page number 5and 6 of this specification.

* Used to brick slag and metal zone of

6.1: EAF of capacity of 10T and30T

6.2.1:VAD,VOD and LRF ladles

6.2.2: Bottom bricks of VAD,VOD &LRF

6.3: EAF of 70T

6.4: Tap hole refractory for EBT of 70T EAF

## 4.0 COMPLIANCE WITH NATIONAL STANDARDS

There is no Indian standard of resin bonded Magnesia Carbon bricks.

## 5.0 PROPERTIES:

When tested in accordance with the relevant clauses of **IS-1528 or any other International Standard/ Validated instrumental analysis traceable to international standards**, the test samples shall show the following values.

### 5.1: PHYSICAL PROPERTIES:

| | | |
|---|---|---|
| Bulk Density (gm /cc) | 3 | (Min) |
| Apparent Porosity | 5% | (Max) |
| C.C.S ($N/mm^2$) | 35 | (Min) |
| Refractoriness Under Load | 1600°C | (Min) |
| Thermal expansion up to 1400°C | 2% | (Max) |
| HMOR,($Kg/Cm^2$)AT 1400C*30 minutes | 125 | (Min) |

| | | | | | |
|---|---|---|---|---|---|
| RMI | S.N GHOSH | | WORKED BY | M.K SAHU | |
| MPIC | A.K.KUSWAHA | | CHECKED BY | SUNIL KUMAR | |
| CHAIRMAN CPSC | V K AGARWAL | | SUPERVIDED BY | P.K.ROY | |
| | | | APPROVED : PLANT STANDARDS COMMITTEE | | |
| | | | PREPARED : SMS TECH | ISSUED : Steel Melting Shop | DATE 27-04-16 |

### 5.2 CHEMICAL COMPOSITION:

| SL NO. | ELEMENTS | CONTENT | |
|---|---|---|---|
| | | %(Min) | %(Max) |
| a) | MgO (in fused magnesia used) | 97 | |
| b) | MgO (in finished product) | 82 | |
| c) | Residual carbon (British cocking test) | 8 | 12 |
| d) | $Al_2O_3$ | | 2.0 |
| e) | CaO | | 2.0 |
| f) | $SiO_2$ | | 1.5 |
| g) | $Fe_2O_3$ | | 0.5 |

### 6.0: TYPES OF BRICK.

| | DESCRIPTION | SIZE | a mm | b mm | h mm | l mm | r mm | A deg |
|---|---|---|---|---|---|---|---|---|
| 6.1 | Bricks for Lining of 30t and 10T EAF | 30/20 | 160 | 140 | 300 | 100 | 2100 | - |
| | | 30/40 | 170 | 130 | 300 | 100 | - | - |
| 6.2.1 | Bricks for side wall lining of ladles | SU 745 | 210 | 185.2 | 100 | 177.8 | - | 8 |
| 6.2.2 | Bricks for bottom lining of ladles | Bottom Bricks | 225 | 250 | 100 | - | - | - |

**Drawing of bricks are given in page no 4**

### 6.3:Bricks for lining of 70TEAF:

**Quantity indicated below is for one set of lining**

| Sl no | Bricks size | Quantity(Numbers) |
|---|---|---|
| 1 | 400x190/110x100mm | 150 |
| 2 | 400x170/130x100mm | 500 |
| 3 | 400x160/140x100mm | 360 |
| 4 | 350x170/130x100mm | 100 |
| 5 | 350x160/140x100mm | 342 |
| 6 | 400x150/100mm | 402 |
| 7 | 350x150/100mm | 128 |

**(Dimensional tolerances:±1.5% or 2mm which is greater)**

### 6.4. TAP HOLE REFRACTORIES FOR 70T EAF:

Size and set as per drawing given at page no 5 of 7.

### 7.0 INSPECTION AT SUPPLIER'S WORKS:

- CFFP reserves the right to witness the testing of the material at supplier works and therefore the supplier shall notify the readiness of the material in advance.
- CFFP may, at its discretion, test the material after receipt and acceptance of the material will be based on the CFFP's test results. . ***In case of any dispute in chemical analysis referee method shall be IS.***
- For result of analysis and properties of material the decision of CFFP shall be final and binding on the supplier.

### 8.0 TEST CERTIFICATES:

One Original and three copies of Test Certificate from the **Manufacturer** containing the following information **along with test result of all properties given in clause no 5 should be provided. The T.C should contain the packing details of material.**

Manufacturer's Name
Name of the material
Batch/Lot No.
Quantity.

**The TC should also contain the BHEL's P.O. No. and Challan No. and packing detail of the material.**

### 9.0 PACKING AND MARKING:

Packing should be such as to prevent loss / deterioration in quality during handling, transport and storage. It should be in the **Manufacturer's packing**. Each package should be marked with the following details.

Name of the material
Manufacturer's Name / Trade mark
Batch/Lot No.
Net weight.

## 10.0 PERFORMANCE OF MATERIAL:

Guaranteed heat in working lining(**Slag zone +Metal zone**) of EAF and VAD/VOD/LRF, under working conditions mentioned below against types of bricks.

| Equipment. | Bricks | Working condition | LIFE |
|---|---|---|---|
| 30T&10T EAF | 30/20 &30/40 | Oxygen lancing, removal of P to 0.004% | 80 heats minimum with intermediate repair near tap hole area and arch cooler area. |
| 70T EAF | SET | Oxygen lancing, removal of P to 0.004% | 25 Heats minimum |
| VAD/VOD/LRF Ladles | SU 745 | Temp achieved-1720°C Max Degassing at Vacuum level ≤1 torr for ≈ 30 minutes | **Minimum 5000** minutes of purging with one slag line repair. |

Record of Life:

Furnace life → Record from **Heat Process Sheet/Furnace Log Book.**

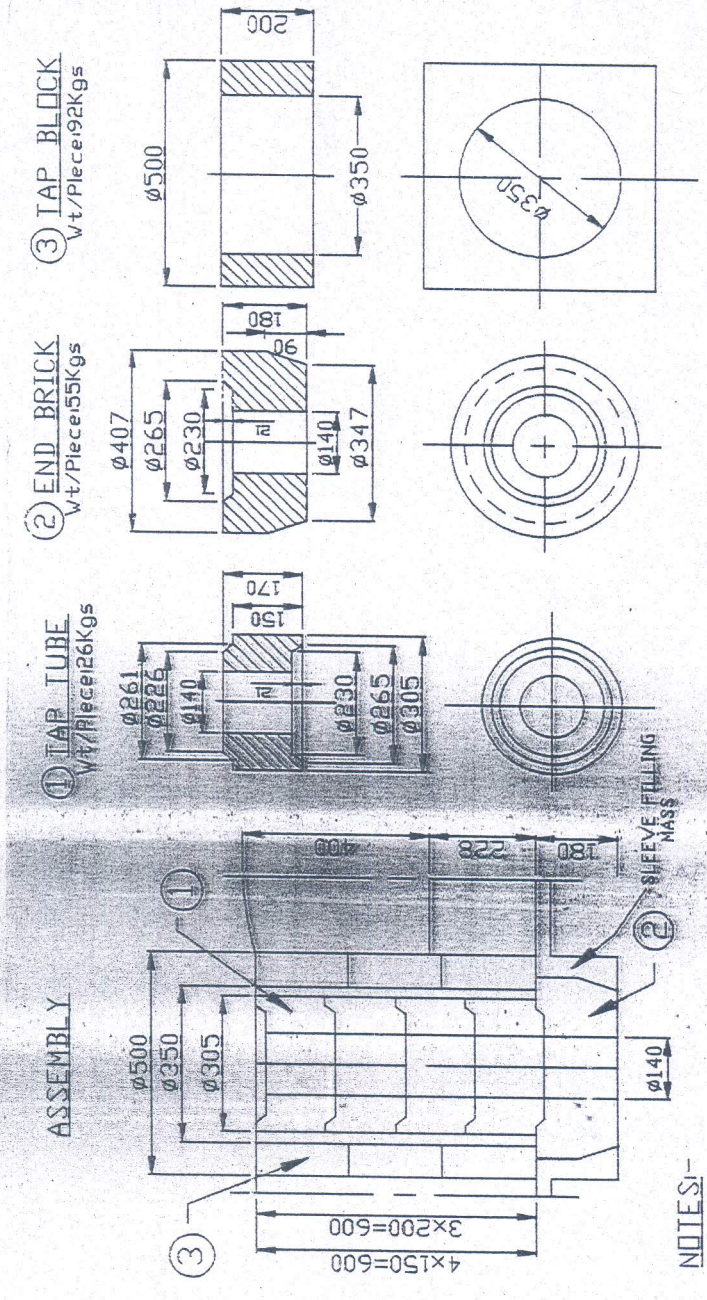
Ladle life → Record from **Heat Process Sheet/Ladle Life Record** Book in pit side.

## 11.0 ACCEPTANCE OF MATERIAL:

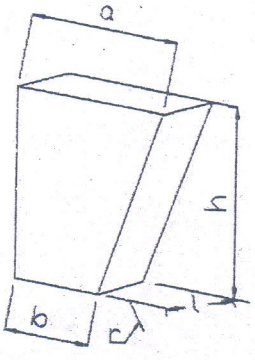
Acceptance of material will be based on conditions defined in clause number 5 and 6 and drawings mentioned in page 5 and 6 of the specification.



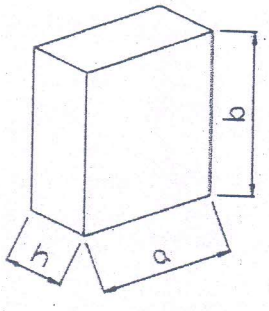
| | | | |
|---|---|---|---|
| WORKED BY | M K SAHU | | 23/4/16 |
| CHECKED BY | SUNIL KR. | | 23/04/16 |



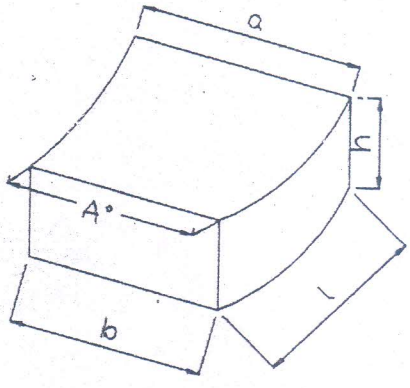

| | | | |
|---|---|---|---|
| WORKED BY | M KSAHU | | 23/4/16 |
| CHECKED BY | SUNIL KR. | | 23/04/16 |




SIZE: 30/20 & 30/40




BOTTOM BRICK




SIZE: SU 745

| | | | |
|---|---|---|---|
| WORKED BY | M KSAHU | | 23/4/16 |
| CHECKED BY | SUNIL KR. | | 28/04/16 |

## REVISION RECORD SHEET

| SL NO | REVISION NO | DATE | |
|---|---|---|---|
| 1 | 03 | 17.07.2006 | -Packing clause modified |
| 2 | 04 | 20.04.2010 | 1- Clause 5 modified.<br>1. MgO % changed from 94.5%min to 97% min and this is in used magnesia. Residual carbon % changed to 8-12%from max of 12%.Al2O3 content changed to 2.0% max from 0.65%max.Fe2O3 content limited to 0.5%.<br>2- DBMC spl. bricks removed from spec. Tap hole Refractory for 70TEAF incorporated in the spec. SU 645 size removed.<br>3- Clause no 7: inspection by third party included.<br>4- Clause no 8: All properties mentioned at Clause no % are to be given in T.C. The T.C should contain the packing details. |
| 3 | 05 | 23/04/2016 | 1. Clause no 02 modified, working condition, temp and vacuum level specified.<br>Final slag composition mentioned.<br>2.- Clause no 05 modified: Validated instrumental Analysis traceable to internal standards added.<br>3.- **clause no 5.3** chemical composition MgO in finished product added.<br>4.- Clause no 6.3: number of bricks at sl. No 1,2 and 4 (for 70T) increased.<br>4.- **Clause no 7** modified: in case of any dispute in chemical analysis referee method shall be IS<br>5.- **Clause no 10** performance of material : life of bricks in EAF & Ladles mentioned.<br>6.- Clause no 11,acceptance criteria added. |

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|---|---|---|---|
| WORKED BY | MK SAHU | | 23/4/16 |
| CHECKED BY | SUNIL KR. | | 23/04/16 |