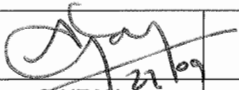
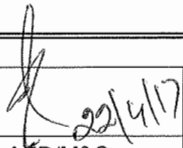

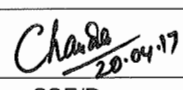


**GOVERNMENT OF INDIA
(Ministry of Railways)**

**SPECIFICATION FOR
HIGH ALUMINA 70% ARCH BRICKS
FOR LADLE SIDE WALL LINING
(PL No. 84983450)**

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

Issued by
SSE/D

 CWEM 21/09	 AED/M&C 22/4/17	 Dy. CME/Mfg. 22/4	 SSE/D Chanda 20.04.17
APPROVED BY	REVIEWED BY	VERIFIED BY	PREPARED BY

SPECIFICATION FOR H.A.70 % ARCH BRICKS FOR LADLE SIDE WALL LINING**1.0 SCOPE**

- 1.1 The specification covers the manufacture and supply of the HA 70% bricks for ladle side wall lining and High Alumina heat setting expansile mortar to Rail Wheel Factory, Yelahanka, Bangalore 560 064, Karnataka State.
- 1.2 Supplier/manufacturer shall be an ISO 9001 certified company. Supplier/manufacturer shall have proven technical capability and experience of having supplied the ladle bricks for similar applications. Evidences shall be furnished by the supplier along with the offer to corroborate the performance.

2.0 GENERAL DESCRIPTION & JOB REQUIREMENT

Six sizes of High Alumina Bricks are used for lining the ladle sidewall. Molten metal is tapped from Electric Arc Furnace at temperature upto 1715 °C. Steel is killed and alloyed in the ladle using ferro-silicon and silico-manganese. The same ladle is used for upward pressure pouring of wheels. Tapping into drain is practised and the metal remains at the bottom till the ladle campaign is terminated. During the pressure pouring, metal front moves over the facing refractory while casting each wheel. The refractory lining shall be capable of withstanding such operating condition. Lined ladles are preheated as per schedule at the rate not more than 100 °C/hr to 1200 °C and soaked at 1200 °C not less than 3 hrs before using for the first time.

Prospective tenderer can visit RWF to see the actual usage at their own interest before making the offer.

3.0 QUALITY ASSURANCE PLAN (QAP)

The manufacturer shall submit their Quality Assurance Plan (QAP) along with their bid for approval by RWF, which will be followed in the manufacturing of High alumina70% Arch Bricks for Ladle Side wall Lining to satisfy the technical requirement as required under this specification. Manufacturer shall ensure that the expected life of HA70 bricked ladle is not less than 24 heats under RWF's standard working condition. Manufacturer shall get their QAP approved from RWF in advance, unless a waiver is given to this effect.

4.0 MATERIAL

The following specification is common for all the four sizes of the bricks.

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4.1 CHEMICAL COMPOSITION
(When tested as per IS 12107:1987 relevant parts)

- 1) Al₂O₃ (Alumina) : 70% Minimum.
- 2) Fe₂O₃ (Iron Oxide) : 2.5% Maximum.
- 3) Alkalis (Na₂O + K₂O) : 1.0% Maximum.

4.2 PHYSICAL PROPERTIES

- i) Pyrometric Cone Equivalent (PCE) : +36 Orton (ORTON cone.)
- ii) Cold Crushing Strength (CCS) : 600 kg/cm² (Min.)
- iii) Apparent porosity (AP) : 20% (Max.)
- iv) Permanent Linear Change (PLC)
after heating at 1600°C for 2 hours : +1 to +2.5%
- v) Size Tolerance : ±1.5% or ±2 mm, whichever is greater.
- vi) Refractoriness Under Load (RUL) : 1500 °C (Min.)
- vi) Bulk Density (BD) : 2.60 gm/cc (Min.)
- vii) Warpage on 230/280 x115 mm face : 0.50 mm (Max)
- viii) Spalling Resistance : 30 cycles (Min.) –{ IS 1528: Part 3 - 1974, Cl. 4 (small prism test in air quenching method at 1000°C)}

(Physical properties will be tested as per IS1528 relevant parts)

4.3 SIZE

The general size for the four types of bricks used is as follows:

- i) High Alumina 70 : 230 X 115 X 76/65 S.A.
- ii) High Alumina 70 : 230 X 115 X 76/70 S.A.
- iii) High Alumina 70 : 255 X 115 X 76/65 S.A.
- iv) High Alumina 70 : 255 X 115 X 76/70 S.A.

5.0 REFRACTORY PARTICLE SIZE AND GRANULOMETRY

Bricks should be compact having close grains. The raw material should not have more than 3 m size refractory particles. The manufacturer shall select appropriate particle size distribution to achieve the specified properties. When bricks are cut either for sampling or for lining purpose, they should not show any signs of lamination or refractory particle loosening due to large grains or inadequate bonding, or coring due to improper firing.

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6.0 TESTING FACILITIES

The firm should have complete testing facilities to check and control the raw material and the product as per the specification given above.

7.0 INSPECTION NORM

- a. **SAMPLING NORM** : IS-1528 Pt. VII – 1974.
- b. **ACCEPTANCE CRITERIA** : IS-1528 Pt. VII - 1974.

8.0 HIGH ALUMINA HEAT SETTING EXPANSILE MORTAR

Supply shall be accompanied with a quantity of 50 kg/set, of High Alumina heat setting expansile mortar having the following specification, for lining the ladle. The mortar is used in between gap of sidewall brick joints and shall have expansion properties under service temperature so that no gap is formed in the joints. The mortar shall have higher softening temperature than the brick and shall not show abnormal erosion resulting in 'coble storing' appearance in the joints of the used ladles or seepage of liquid metal to the safety lining through the joint.

- (1) Alumina Content (Al_2O_3) : 70% min.
- (2) Iron Oxides content (Fe_2O_3) : 2.0% max.
- (3) Pyrometric Cone Equivalent : +37 Orton (1820°C)
- (4) Expansion characteristic : $\geq +1.0\%$ (at 1500°C / 2hours)
- (5) Grading : 95% passing through 150-micron sieve.
- (6) Maximum particle size : 0.5 mm

(Physical properties will be tested as per IS1528 relevant parts)

High Alumina heat setting expansile mortar shall be supplied in polythene lined double walled paper / gunny bags weighing 25 kg each. Manufacturer's name, material name, batch number and date of manufacture shall be marked on the bags. Use eco-friendly biodegradable packing material.

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9.0 HANDLING

Special care should be taken by the supplier to ensure that the edges do not get chipped off during manufacturing and subsequent handling. The bricks that are chipped off are liable to be rejected and would have to be replaced by the firm at their expense.

10.0 STORAGE

The supplier should have arrangement to store the subject item under covered accommodation to protect them from water.

11.0 PACKING AND MARKING

The bricks shall be packed in disposable wooden base and top pallets of 1 to 1.5 MT capacity, capable of being handled by 3 Ton Forklifts as shown in Annexure- I. The edges of the bricks should be protected with cardboard paper and strapped on to the base and top pallets. Additional corrugated cardboard of adequate thickness has to be used on all faces including inter layers to avoid damage to brick edges due to strapping force, handling and transportation. The manufacturer's name/brand shall be marked or sealed on the bricks.

12.0 TRANSPORT

The bricks should be transported to RWF stores by road directly from the firm's premises to avoid any damages to the bricks. Utmost care should be taken during the transportation of these bricks by adequately covering them with tarpaulin, etc to avoid bricks getting exposed to rain water during transit.

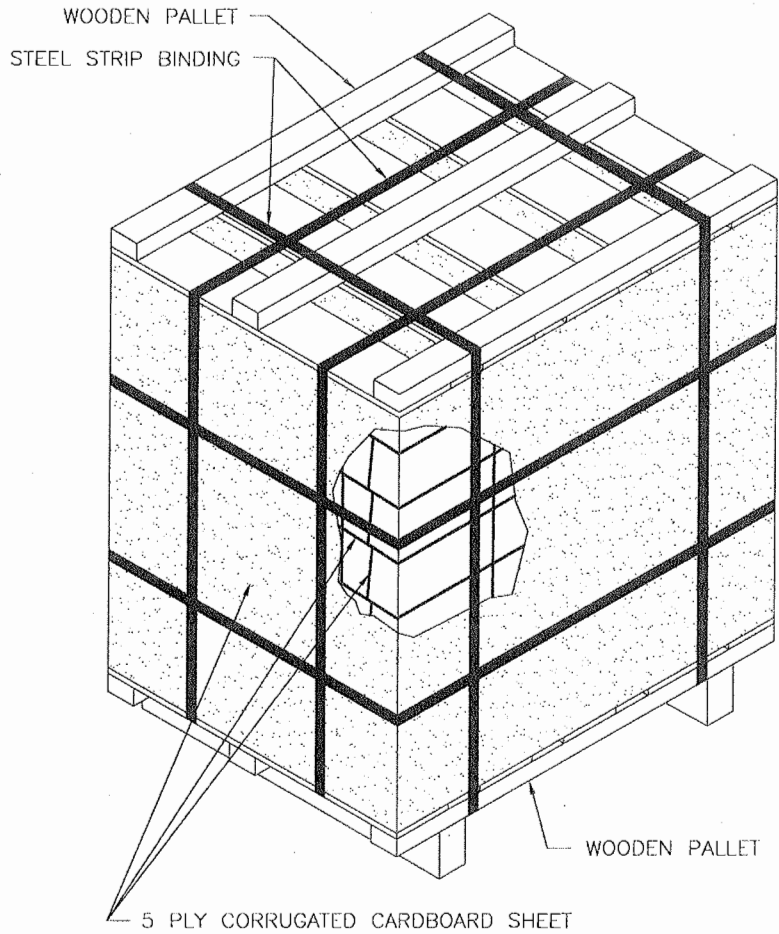
13.0 TRIAL OF THE SUPPLY

The material for trial shall necessarily meet all the requirements mentioned elsewhere in this specification prior to shop floor trial. Only after this, the material will be taken up for shop floor trial by RWF as per Trial Scheme at Annexure-2 and the corresponding Trial Report shall be prepared as per Annexure-3.

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ANNEXURE-1

PACKING ARRANGEMENT FOR HA70 BRICKS



NOTE: USE CORRUGATED CARDBOARD SHEETS FOR PACKING ALL FACES.

<i>9.9.04</i>		<i>9/9/04</i>	<i>9/9/04</i>
CME	CWE/Mfg	Dy. CME/Mfg	SSE/D
APPROVED	REVIEWED	VERIFIED	PREPARED

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TRIAL SCHEME OF HA 70% LADLE BRICKS S/A FOR LADLE LINING

1	Trial scheme No.	RWF/M/SPECN-1/039/1991 alt --- / Trial Scheme PL NO.....
2	Objective of Trial	To establish the suitability of HA 70% Ladle bricks S/A for ladle lining as per above specification.
3	Description of Material PO Number & PO date PO Qty. Supplier	HA 70% Ladle bricks S/A for ladle lining
4	IDN Number & Date IDN Qty.
5	Authority for conducting Trial	Dy.CME/ Mfg
6	Earlier trial details	Fist Time Supply/ Second time/ Third time/...../.....
7	Trial Parameters	As mentioned in Trial Scheme.
8	Specification	RWF/M/SPECN-1/039/1991 alt ---
9	Pre-trial Testing details	Met. Lab Report & MTC
10	Trial qty	Full IDN Qty/ 5% of the tendered quantity
11	Equipment / Station process	Ladle lining

(..... to be filled by Team Members)

Trial Parameters:

- 1.Total quantity of HA 70% Ladle bricks S/A for ladle lining to be drawn and trial conducted on the entire quantity under the purchase order/5% of the tendered quantity, whichever is less.
- 2.Inspection & testing by shop and whenever required by laboratory completely in line (not in part) with the specification. Sampling for inspection as per specification.
- 3.Examination of MTC (Manufacturer's Test Certificate) and comments on its suitability

Specific Requirements:

The over all performance w.r.t shrinkage, erosion, spalling, life should be at par with established brands already in use, when tried in matching number by ensuring same process parameter during use and in the same period (or just preceding/succeeding period).

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TRIAL REPORT OF HA 70% LADLE BRICKS S/A FOR LADLE LINING

1	Trial No.	RWF/M/SPECN-1/039/1991 alt --- / Trial Scheme PL NO.....
2	Objective of Trial	To establish the suitability of HA 70% Ladle bricks S/A for ladle lining as per above specification.
3	Description of Material PO Number & PO date PO Qty. Supplier	HA 70% Ladle bricks S/A for ladle lining
4	IDN Number & Date IDN Qty.
5	Authority for conducting Trial	Dy. CME/ Mfg
6	Earlier trial details	Fist Time Supply/ Second time/ Third time/...../.....
7	Trial Parameters	As mentioned in Trial Scheme.
8	Specification	RWF/M/SPECN-1/039/1991 alt ---
9	Pre-trial Testing details	Met. Lab Report & MTC
10	Trial qty	Full IDN Qty/ 5% of the tendered quantity
11	Equipment / Station process	Ladle lining
12	Nominated Officers	ACMT/W & AWM/SMS

(..... to be filled by Team Members)

Application Test: Shop Floor test conducted from date ____ to date ____ & H. No. ____

Trial Parameters:

- 1 Total quantity of HA 70% Ladle bricks S/A for ladle lining to be drawn and trial conducted on the entire quantity under the purchase order/5% of the tendered quantity, whichever is less.

Comments:

- 2 Inspection & testing by shop and whenever required by laboratory completely in line (not in part) with the specification. Sampling for inspection as per specification.

Enclosure Details:

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3 Examination of M Lab report & MTC (Manufacturer's Test Certificate) and comments on its suitability

Comments :

4 The relevant Production & XC Data shall be compared with a similar quantity in use of other make, in addition to any specific performance requirement given in specification.

Comments with documents:

Specific Requirements:

The over all performance w.r.t shrinkage, erosion ,spalling ,life should be at par with established brands already in use when tried in matching number by ensuring same process parameter during use and in the same period (or just preceding/succeeding period).

Observations:

AWM/WM

ACMT/W

SSE/SMS

WM/W

Remarks of Dy CME/Mfg.

Remarks of AED/M&C

CWE/W

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AMENDMENT SHEET FOR RECORD

Alt 'n' Cl. No.	Alt 'o' Cl. No.	Description	Job No	Sign
3.0	--	(Clause 3.0 of alt 'n' on EXPECTED LIFE deleted and the same matter is made a part of QAP clause under clause No.3 of alt 'o')	6963	<i>Chand</i>
--	3.0	QUALITY ASSURANCE PLAN (QAP) The manufacturer shall submit their Quality Assurance Plan (QAP) along with their bid for approval by RWF, which will be followed in the manufacturing of High alumina 70% Arch Bricks for Ladle Side wall Lining to satisfy the technical requirement as required under this specification. Manufacturer shall ensure that the expected life of HA70 bricked ladle is not less than 24 heats under RWF's standard working condition. Manufacturer shall get their QAP approved from RWF in advance, unless a waiver is given to this effect.		
4.3	4.3	SIZE Two sizes iv) High Alumina 70: 280 X 115 X 76/65. S.A. v) High Alumina 70: 280 X 115 X 76/70 S.A. modified respectively to: iv) High Alumina 70: 255 X 115 X 76/65 S.A. v) High Alumina 70 : 255 X 115 X 76/70 S.A.		
--	13.0	<i>Added</i> TRIAL OF THE SUPPLY The material for trial shall necessarily meet all the requirements mentioned elsewhere in this specification prior to shop floor trial. Only after this, the material will be taken up for shop floor trial by RWF as per Trial Scheme at Annexure-2 and the corresponding Trial Report shall be prepared as per Annexure-3		
	Annexure-2	<i>Added</i> Annexure -2 TRIAL SCHEME OF HA 70% LADLE BRICKS S/A FOR LADLE LINING		
	Annexure-3	<i>Added</i> Annexure -3 TRIAL REPORT OF OF HA 70% LADLE BRICKS S/A FOR LADLE LINING		

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