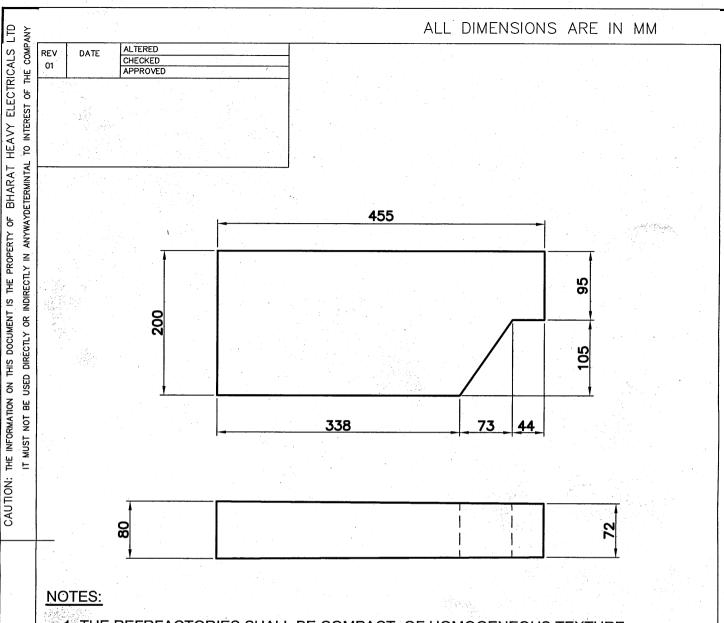
# M ATERIAL SPECIFICATION

1	HEARTH TOP OUTER SLAB BLOCK DRG NO :4-7-1101-01-06278/00 MATERAL :80% AL2O3 Specification: AL2 O3 %MIN : 80 +or- 1.5 PCE SK MIN : 36 RUL ta deg C MIN : 1630 PLC %MAX :+/- 0.5 @ 1600 deg C For 1 hour AP %MAX : 16 for M/C, 19 for HM CCS Kgs/ cm sq MIN :8 00 FOR M/C, 500 FOR HM BD qm/cc MIN :2.8 FOR M/C, 2.7 FOR HM SPALLING CYCLES -MIN :+ 30 air quenching at 1600 C For 1 hr Si ze tolerence whichever is greater: +or -1% or +/- 2mm
<u>2</u>	HEARTH TOP INNER SLAB BLOCK DRG NO: 4-7-1101-01-06279/00 MATERIAL: 80% AL203 Specification: AL2 03 %MIN: 80 +or-1.5 PCE SK MI N: 36 RUL ta deg C MIN: 1630 PLC %MAX: +or-0.5 @ 1600 deg C FOR 1 hour AP %MAX: 16 for M/C 19 for HM C CS Kgs/cm sq MIN: 800 FOR M/C 500 FOR HM BD qm/cc MIN: 2.8 FOR M/C 2.7 FOR HM SPALLING CYCLES -MIN: +30 air quenching at 1600 deg C FOR 1 hour Size tolerence whichever is greater: +or-1% or +/- 2m m
<u>3</u>	HEARTH MIDDLE OUTER CIRCLE BLOCK DRG NO :4-7-1101-01-06280/00 MATERIAL :80% AL203 Specification: AL2 03 %MIN : 80 +or- 1.5 PC E SK MIN : 36 RUL ta deg C MIN : 1630 PLC %MAX :+or-0.5 @ 1600 deg C For 1 hour AP %MAX :16 for M/C 19 for HM CCS K gs/ cm sq MIN :800 FOR M/C 500 FOR HM BD qm/cc MIN :2.8 FOR M/C 2.7 FOR HM SPALLING CYCL ES-MIN :+ 30 air quenching at 1600 deg C For 1 hour Size tolerence whichever is greater: + or -1% or +/- 2mm
<u>4</u>	HEARTH MIDDLEA INNER CIRCLE BLOCK DRG NO :4-7-1101-01-6281/00 MATERIAL:80% AL203 Specification: AL2 03 %MIN : 80 +or-1.5 PCE SK M IN : 36 RUL ta deg C MIN : 1630 PLC %MAX :+/- 0.5 @ 1600 deg C For 1 hr AP %MAX : 16 for M/C 19 for HM C CS Kgs/ cm sq MIN :800 FOR M/C 500 FOR HM BD qm/cc MIN :2.8 FOR M/C 2.7 FOR HM SPAL LING CYCLES-MIN :+30 air quenching at 1600 deg C FOR 1 hour Size tolerence whichever is greater :+or- 1% or +/- 2mm
<u>5</u>	HEARTH BOTTOM OUTER CIRCLE BLOCK DRG NO :4-7-1101-01-06282/00 MATERIAL :80% AL203 Specification: AL2 03 %MIN :80+or-1.5 PCE SK MIN : 36 RUL ta deg C MIN : 1630 PLC %MAX :+/-0.5 @ 1600 deg C For 1 hour AP %MAX : 16 for M/C, 19 for HM CCS Kgs/cm sq M IN :800 FOR M/C, 500 FOR HM BD qm/cc MIN :2.8 FOR M/C, 2.7 FOR HM SPALLING CYCLES -MIN :+30 air quenching at 1600 C For 1 hr Size tolerence whichever is greater: + or -1% or+/- 2mm
<u>6</u>	HEARTH BOTTOM INNER CIRCLE BLOCK DRG NO :4-7-1101-01-06283/00 MATERIAL :80% AL2O3 Secification: AL2 O3 %MIN : 80+or-1.5 PCE SK MI N : 36 RUL ta deg C MIN : 1630 PLC %MAX :+/-0.5 @ 1600 deg C For 1 hr AP %MAX :16 for M/C, 19 for HM CCS Kgs/ cm sq MIN : 800 FOR M/C, 500 FOR HM BD qm/cc MIN :2.8 FOR M/C, 2.7 FOR HM SPALLING CYCLES -MIN :+30 air quenching at 1600 C For 1 hr S ize tolerence whichever is greater: + or-1% or +/- 2mm
7	INNER WALL SUPPORTING BRICK DRG NO :4-7-1101-01-06305/00 MATERIAL : 55%-60% Al203 SPECIFICATION : AL203 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY :22-2 5% C C S :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C

<u>8</u>	ANCHOR BRICK DRG NO :4-7-1101-01-06311/00 MATERIAL : 55%-60% Al2O3 SPECIFICATION : AL2O3 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY :22-25% CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C
9	INNER WALL SHAPE BRICK-I DRG NO :4-7-1101-01-06312/00 MATERIAL : 55%-60% A1203 SPECIFICATION : AL20 3 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY :22-25% CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C
<u>10</u>	INNER WALL SHAPE BRICK-II DRG NO :4-7-1101-01-06313/00 MATERIAL : 55%-60% A1203 SPECIFICATION : AL203 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY :22-25% CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C
11	INNER WALL SHAPE BRICK-III DRG NO :4-7-1101-01-06314/00 MATERIAL : 55%-60% A1203 SPECIFICATION : AL203 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY :22-25 % CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C
12	INNER WALL SHAPE BRICK-IV DRG NO: 4-7-1101-01-06315/00 MATERIAL: 55%-60% A1203 SPECIFICATION: AL2 03:55-60 % Fe2 03:1% MAX P.C.E: 35 ORTON CONE R.U.L ta:1560 deg C APPARENT POROSITY :22-25% C C S:OVER 350Kg/cm.Sq SERVICE TEMP:1600 deg C
<u>13</u>	OUTER WALL SUPPORTING BRICK-1 DRG NO :4-7-1101-01-06301/00 MATERIAL : 55%-60% A1203 SPECIFICATION : AL203 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY :2 2-25% CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C
14	OUTER WALL SUPPORTING BRICK-II DRG NO :4-7-1101-01-06302/00 MATERIAL : 55%-60% A1203 SPECIFICATION AL203 :55-60 % P.C.E : 35 ORTON CONE R.U.L ta :1560 deg CAPPARENT POROSITY :22-25% CCS :OVER 35 OKg/cm.Sq SERVICE TEMP :1600 deg C
<u>15</u>	OUTER WALL SUPPORTING BRICK-III DRG NO: 4-7-1101-01-06303/00 MATERIAL: 55%-60% A1203 SPECIFICATION: AL203:55-60% Fe2 03:1% MAX P.C.E: 35 ORTON CONE R.U.L ta:1560 deg C APPARENT PO ROSITY: 22-25% C C S: OVER 350Kg/cm.Sq SERVICE TEMP: 1600 deg C
<u>16</u>	OUTER WALL SUPPORTING BRICK-IV DRG NO :4-7-1101-01-06304/00 MATERIAL: 55%-60% A1203 SPECIFICATION: AL203: 55-60% Fe2 03:1% MAX P.C.E: 35 ORTON CONE R.U.L ta:1560 deg C APPARENT POROSITY:2 2-25% CCS:OVER 350Kg/cm.Sq SERVICE TEMP:1600 deg C
<u>17</u>	OUTER WALL BASE BRICK-I DRG NO :4-7-1101-01-06306/00 MATERIAL : 55%-60% A1203 SPECIFICATION : AL203 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY : 22-25% CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C

<u>18</u>	OUTER WALL BASE BRICK-II DRG NO :4-7-1101-01-06307/00 MATERIAL : 55%-60% A1203 SPECIFICATION : AL20 3 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY :22-25% CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C
<u>19</u>	OUTER WALL ANCHOR BRICK-II DRG NO :4-7-1101-01-06309/00 MATERIAL : 55%-60% A1203 SPECIFICATION : AL 203 :55-60 % Fe2 O3 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSIT Y :22-25% CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C
<u>20</u>	SKEW BACK - RH FOR CHARGING & DISCHARGING DOORS DRG NO :4-7-1101-01-06284/00 MATERIAL: 55-60% AL203 SPECIFICATI ON: AL203:55-60% Fe2 03:1%(MAX) P.C.E:36 ORTON CONE RUL ta:1560 degree C APPARANT POROSITY:22-25% C C S:OVER 350kgs/cmsq SERVICE TEMP:1600 deg C
<u>21</u>	SKEW BACK - LH FOR CHARGING & DISCHARGING DOORS DRG NO :4-7-1101-01-06285/00 MATERIAL: 55-60% AL203 SPECIFICATION: AL203:55-60% Fe2 03:1% (MAX) P.C.E:36 ORTON CONE RUL ta:1560 degree C APPARANT POROSITY:22-25% C C S:OVE R 350KGS/CM.SQ SERVICE TEMP:1600 DEGREE C.
<u>22</u>	SKEW BACK - LH DRG NO :4-7-1101-01-04457/00 MATERIAL : 55%-60% A1203 SPECIFICATION : AL203 :55-60 % Fe2 03 :1% MAX P.C.E : 35 ORTON CONE R.U.L ta :1560 deg C APPARENT POROSITY :22-25% CCS :OVER 350Kg/cm.Sq SERVICE TEMP :1600 deg C
<u>23</u>	SIDE BLOCK for RHF Charging & Dis-charging Doors. DRG NO:3-7-1101-01-04699/00 MATERIAL SPECIFICATIONS: AL203 Min.: 70 %. Fe2 O3 Max.: 0.5 % P.C.E.: 36 RUL ta:1720 deg.C APPARANT POROSITY (Min.): 17 %. C.C.S. (Min.):600 Kgs/cm.sq. PLC (Max.): ± 0.20 % at 1550°C/2 Hours. SERVICE TEMP:1700 deg. C
<u>24</u>	SILL BLOCK FOR RHF CHARGING & DISCHARGING DOORS DRG NO :4-7-1101-01-06288/00 MATERIAL :55 TO 60% AL203 SPECIFICATION: AL203 :55-60% Fe203 :1% (MAX) P.C.E :360 RTON CONE RUL ta :1560deg C APPARANT POROSITY :22-25% C.C.S :OVER 350kgs/cmsq SE RVICE TEMP :1600degC
<u>25</u>	END ARCH FOR RHF CHARGING & DISCHARGING DOORS. DRG NO :4-7-1101-01-06286/00 MATERIAL SPECIFICATION: RAW MATERIAL BASE ANDALUSITE MULLITE Fe2 03 :1% (MAX) P.C.E :36 ORTON CONE R.U.L.ta :1560 degree C APPARENT POROSITY :22-25% C C S :OVE R 350KGS/CM.SQ SERVICE TEMP :1600 DEGREE C
<u>26</u>	END ARCH FOR CHARGING & DISCHARGING DOORS DRG NO: 4-7-1101-01-06287/00 MATERIAL SPECIFICATION: RAW MATERIAL BASE ANDALUSITE MULLIT E Fe2O3:1% (MAX) P.C.E:36 ORTON CONE R.U.L.ta:1560 degree C APPARENT POROSITY:22-25% C C S:OVER 350KG S/CM.SQ SERVICE TEMP:1600 DEGREE C
<u>27</u>	STD END ARCH SIZE :230X113X75/65mm MATERIAL :55% -60% Al2O3 SPECIFICATION: AL2O3 :55-60% Fe2 03 :1%(MAX) P.C.E :36 ORTON CONE R.U.L.ta :1560 deg.C APPARENT POROSITY :22-25% C C S :OVE R 350KGS/CM.SQ SERVICE TEMP :1600 DEGREE C

<u>28</u>	STD END ARCH SIZE :230X113X75/50mm MATERIAL :55%-60% Al2 O3 SPECIFICATION: AL2O3 :55-60% Fe2 O3 :1%(MAX) P.C.E :36 ORTON CONE R.U.L.ta :1560 deg.C APPARENT POROSITY :22-25% CCS :OVER 350 KGS/CM.SQ SERVICE TEMP :1600 DEGREE C.
<u>29</u>	STRAIGHT BRICK SIZE :230X113X75mm MATERIAL SPECIFICATION :- AL2O3 :55-60% Fe2 03 :1% (MAX) P.C.E :36 ORTON CONE R.U.L.ta :1560 deg.C APPARENT POROSITY :22-25% C.CS :OVER 350KGS/CM.SQ SERVICE TEMP :1600 DEGREE C.
<u>30</u>	HOT FACE INSULATION STANDARD BRICKS OF SIZE: 230x115x75mm SPECIFICATION: AL203 %: min = 40 PCE SK: min = 32 AP %: min = 65 BD gm/sq.cm: max = 0.9 CCS kg/sq.cm: min = 20 SWT Deg.C min = 1400 THERMAL CONDUCTIVITY VALUE K.c al/m.hr/deg.c: 0.2 @ 600 deg.c SIZE TOLERANCE: +/-0.2% or +/- 1mm WHICHEVER IS GREATER.
<u>31</u>	STD BRICKS OF COLD FACE INSULATION QUALITY SIZE: 230x115x75mm  SPECIFICATION AL203 % min = 30 PCE: OC min = 30 AP  % above 70 BD gm/cc max = 0.6 CCS kg/sq.cm min = 10 SWT deg C min = 1200 THERMAL CONDUCTIVITY K.cal/m/hr/ deg C: 0  .25 @ 600 deg C SIZE TOLERANCE:+/-0.2% or1mm WHICHEVER IS GREATER.

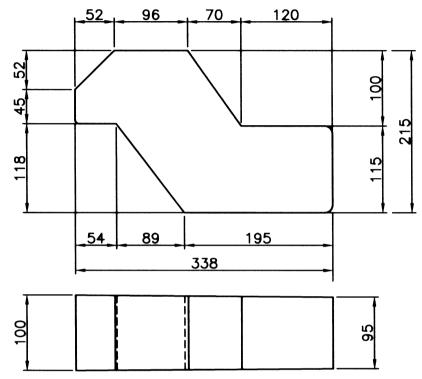


- 1. THE REFREACTORIES SHALL BE COMPACT, OF HOMOGENEOUS TEXTURE
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  NO SOFT CORNERS.
  - 2. ALL CORNERS TO BE MINIMUM 3 mm.RADII, UNLESS OTHERWISE STATED.
  - 3. TOLERANCE ON SIZE +0

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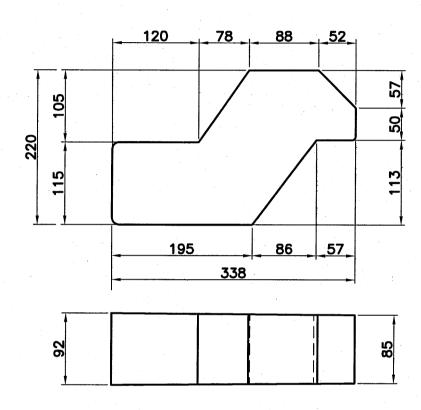
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  NO SOFT CORNERS.
- 2. ALL CORNERS TO BE MINIMUM 3 mm.RADII, UNLESS OTHERWISE STATED.
- 3. TOLERANCE ON SIZE 4

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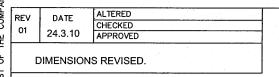
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- 2. ALL CORNERS TO BE MINIMUM 3 mm.RADII, UNLESS OTHERWISE STATED.
- 3. TOLERANCE ON SIZE +0

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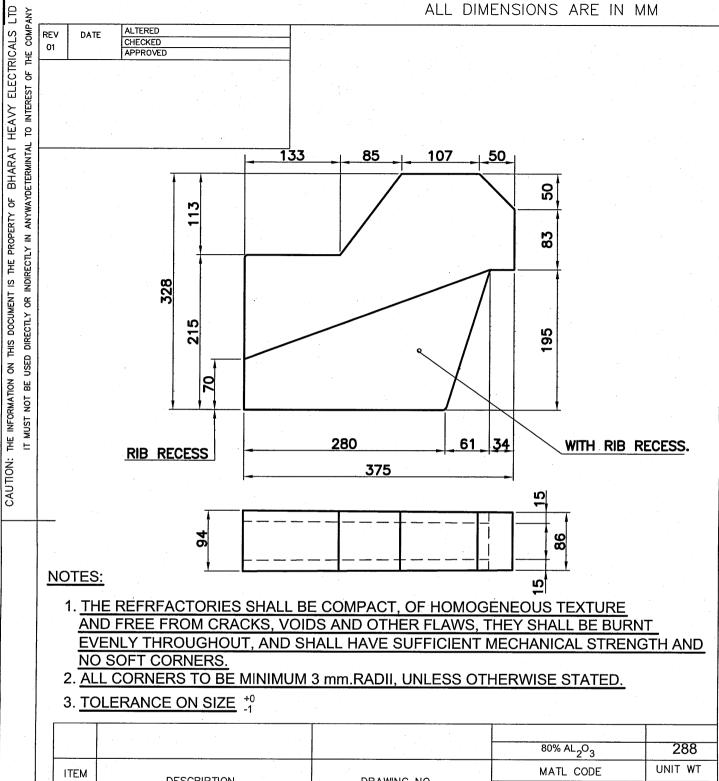
#### ALL DIMENSIONS ARE IN MM



## NOTES:

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- 3. TOLERANCE ON SIZE +0
- 4. TO BE READ IN ACCORDANCE WITH DRAWING 4-7-1101-01-06278 & 06280 TO BE CHECKED IN ASSEMBLED CONDITION DURING INSPECTION.

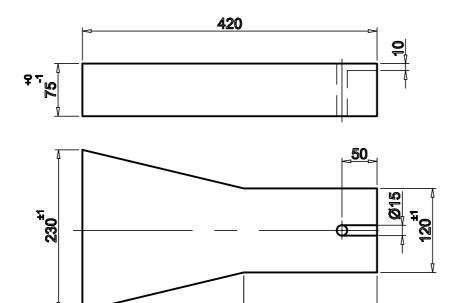
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### ALL DIMENSIONS ARE IN MM

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## **NOTES:**

1) THE REFRACTORIES SHALL BE COMPACT, OF HOMOGENEOUS
TEXTURE AND FREE FROM CRACKS, VOIDS AND OTHER FLAWS.
THEY SHALL BE BURNT EVENLY THROUGHOUT AND SHALL
HAVE SUFFICIENT MECHANICAL STRENGTH AND NO SOFT CORNERS.

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2) ALL CORNERS TO BE MIN. 5mmRADII.

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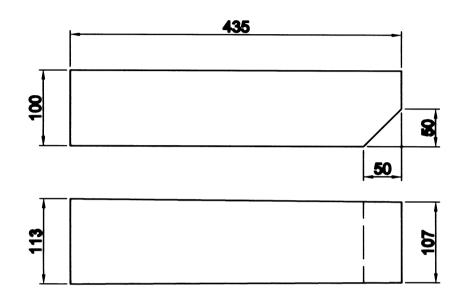
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CAUTION: THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD

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		TIRUCHIRA	APALLI – 620	014	APPD	B.8HW8	MUGASUNDARAL	8. augu	~ 0	1/01/09
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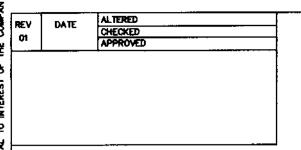
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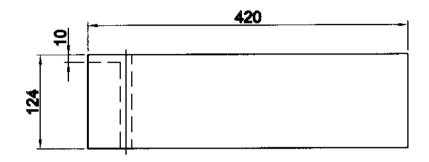
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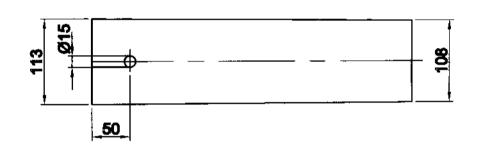
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- 1) THE REFRACTORIES SHALL BE COMPACT, OF HOMOGENEOUS
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- 2) ALL CORNERS TO BE MIN. 5mmRADII.

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REF TO OLD DRG

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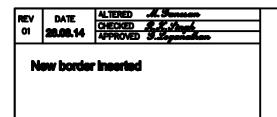
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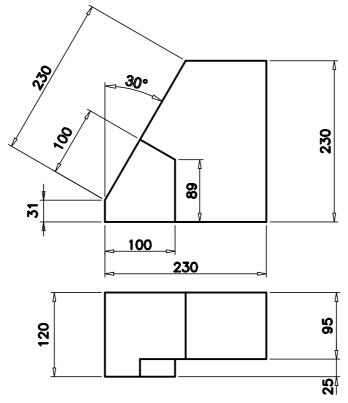
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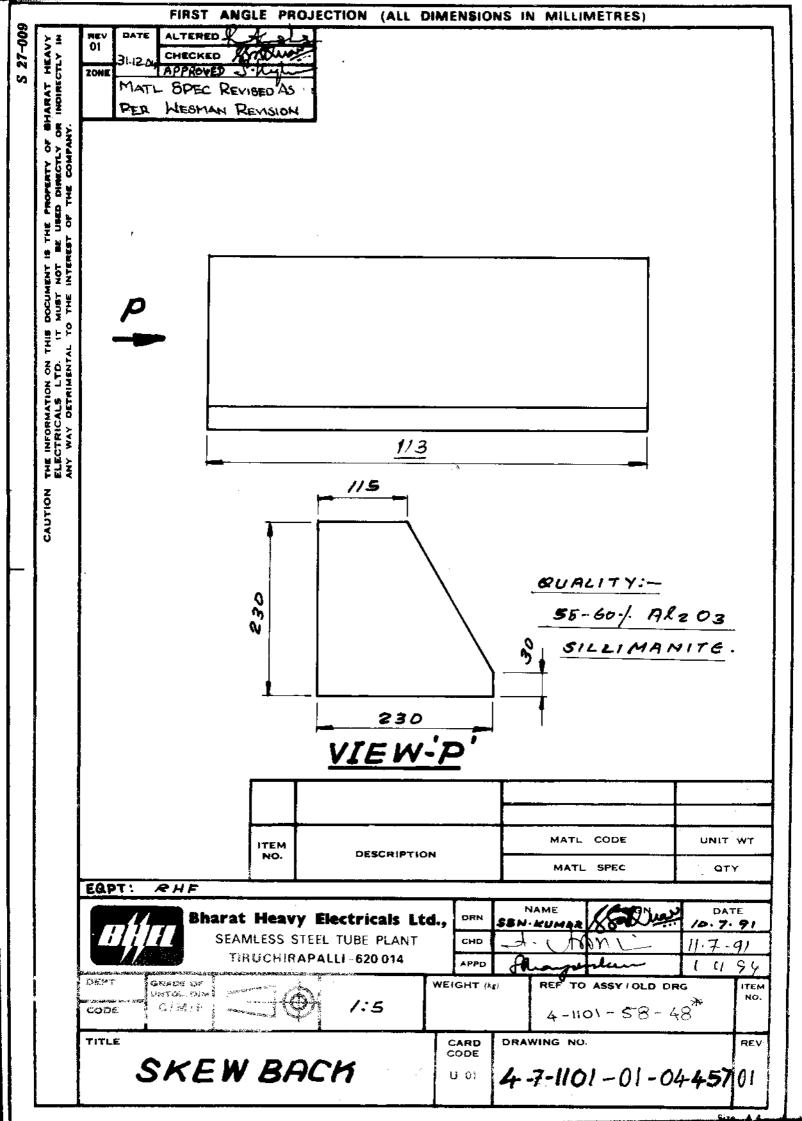
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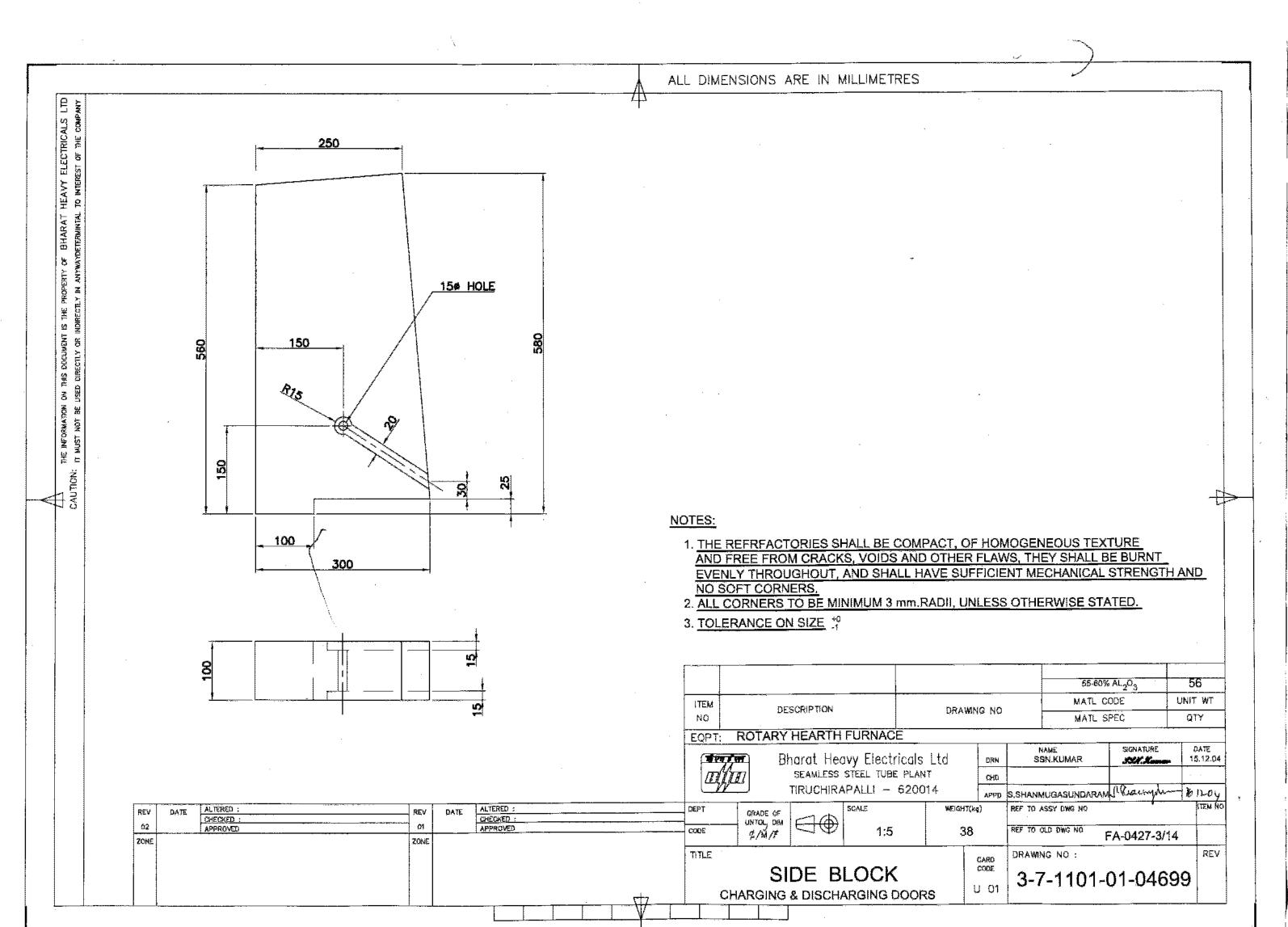


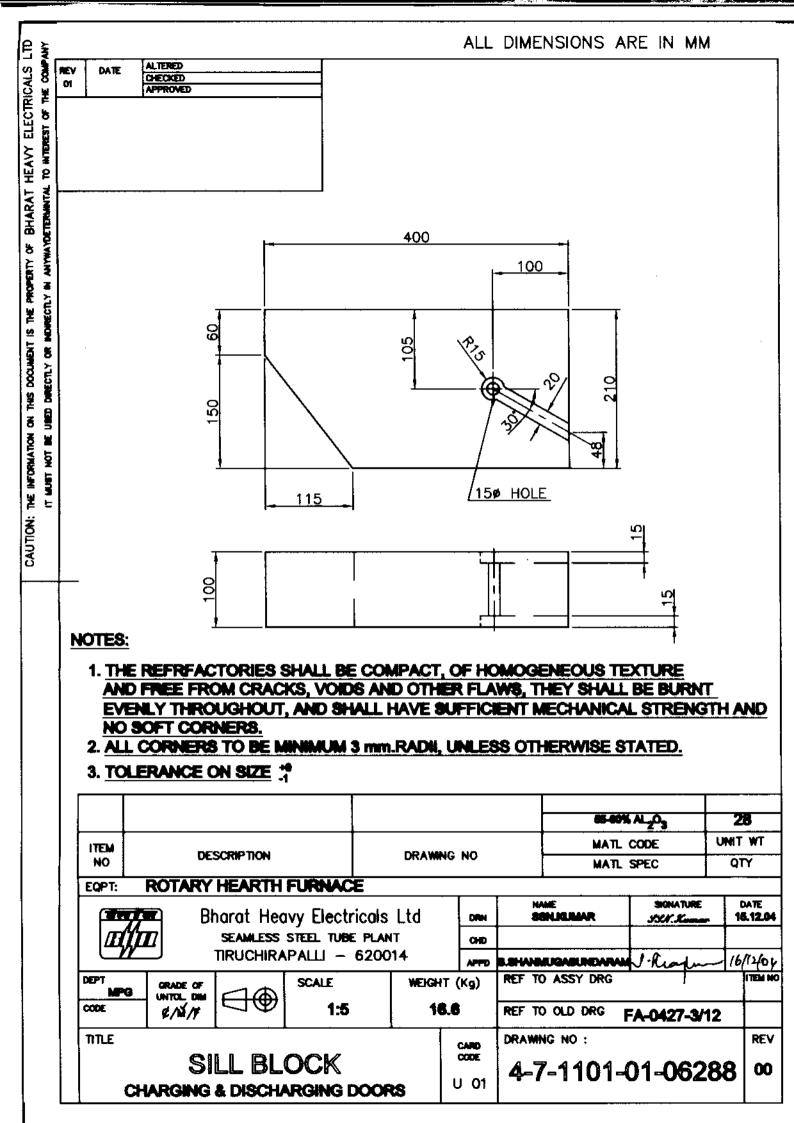


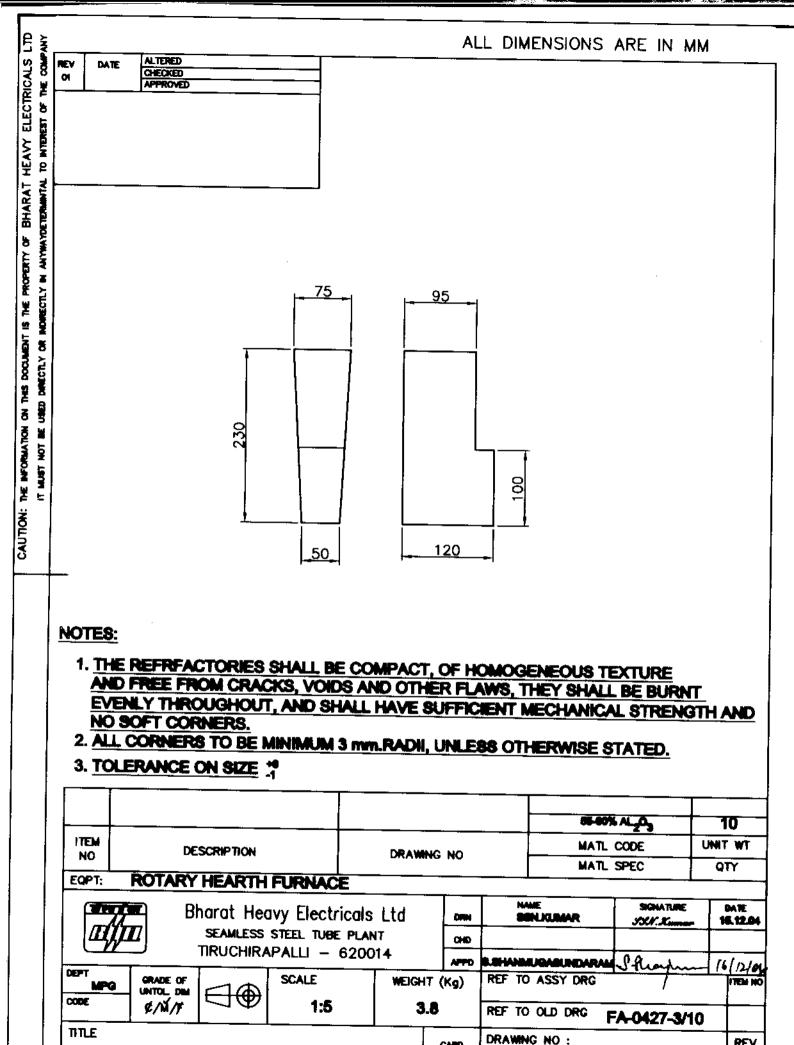
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- 3. TOLERANCE ON SIZE 40

COMPANY.										85-60% AL2	108	2	2
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l	<u> </u>		TIRUCI	HRAPALLI -	- 620014			4PPD	S.S.SU	INDARAM	S.S.Sundaram	15	5.12.04
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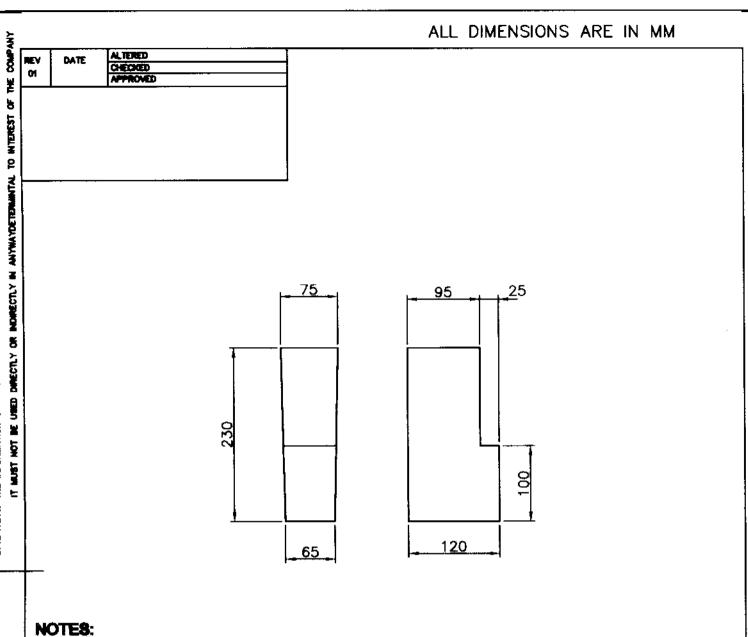
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**NECONIATION** 

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CAUTION

- 1. THE REFREACTORIES SHALL BE COMPACT, OF HOMOGENEOUS TEXTURE AND FREE FROM CRACKS, VOIDS AND OTHER FLAWS, THEY SHALL BE BURNT EVENLY THROUGHOUT, AND SHALL HAVE SUFFICIENT MECHANICAL STRENGTH AND NO SOFT CORNERS.
- 2. <u>ALL CORNERS TO BE MINIMUM 3 mm.RADII, UNLESS OTHERWISE STATED.</u>
- 3. TOLERANCE ON SIZE 4

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\\rightarrow\formalford			STEEL TUBE PLAN		CHID				
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BID NO: DATE:

#### TECHNICAL DELIVERY CONDITIONS

- Materials to be delivered through pallet packing to prevent damages during transit. Acceptance of material is based on condition at receipt only.
- Original Test Certificates for all specifications and Chemical Composition to be produced along with supply.
  If the submitted specifications do not meet the lab test conducted at BHEL Plant lab (NABL Accredited) or
  any independent lab, the entire lot is liable to be rejected and is to be taken back by the vendor at his own
  cost.
- Dimensional reports to be provided by random sampling of 1% of total shaped refractory brick, including weight. Weight of each shaped refractory brick can be referred from the reference drawing No.
- Material Inspection will be carried out by M/S. BHEL Inspector or BHEL authorised third party Inspection at Supplier's works if necessary prior to dispatch of all materials. Relevant parts IS: 1528 will be reference standard during inspection.
- Offer is considered only on free door delivery at SSTP STORES including unloading charges

# ANNEXURE-I

BID NO: Date:

SLNO	PRE QUALIFICATION REQUIREMENT	VENDORSCOMMENTS
1	Vendors shall be Manufacturer of Refractory bricks containing alumina minimum 55%. The vendor shall be in the field of refractory manufacturing for a minimum period of 5 years from the date of tender. Udyam certificate/registration certificate to indicate the experience in refractory manufacture for past 5 years or more to be provided.	
2	Vendor should have supplied similar Refractory shape bricks containing alumina minimum 55% to projects with operating temperatures exceeding 1500°C within the past 5 years. The proof of such supply (Executed Purchase Order Copy along with TDS (Tax Deducted at Source) certificate issued by the organization or Form 26 AS or Bank statement for transaction of payment for completion of supply), along with technical specifications of the supplied bricks to be provided as proof of experience and shall be submitted with the offer.	
3	The vendor shall submit detailed technical specification of Refractory bricks containing alumina minimum 55%, and of their make, equivalent to BHEL required specification.	
	COMMON FOR ALL	
4	If the submitted specifications of vendor supplied material do not match the lab test of supplied bricks conducted at BHEL Plant lab (NABL Accredited) or any independent lab, the entire lot is liable to be rejected and is to be taken back by the vendor at his own cost within 3 months, failing which the material will be disposed off by BHEL.	
5	Offers not meeting the above requirements shall be liable for rejection. Kindly submit only one OR two relevant document related to Pre- Qualification requirement of previous supply. Avoid sending multiple documents which is liable for rejection.	

# **ANNEXURE-II**

SLNO	Documents requirements	VENDORS COMMENTS
1	Signed copy of technical specification and drawing with organization seal/stamp	
2	Executed Purchase Order Copy of Refractory bricks containing alumina minimum 55%, Form 26 AS or Bank statement for transaction of payment for completion of supply to meet the requirements in Annexure I SI No 2A. Copy of the tax invoice / Delivery challan from the customer for the purchase order should be submitted as the documentary proof	
3	Filled in & signed copy of Annexure I - PQR details with organization seal /stamp	
4	Filled in & signed copy of Annexure B & C (BHEL Technical Cum Commercial Terms And Conditions ) for Indigenous Vendor with organization seal / stamp	
5	The vendor shall submit detailed technical specification and MSDS of bricks of their make, equivalent to or better than BHEL required specification.	