




**PRODUCT STANDARD**  
**EDC-ECI**  
**BAP/BHEL/RANIPET – 632 406**

**TECI: [REDACTED]:FRPJB:REV 00**  
**PAGE 01 OF 04**  
**EFFECTIVE DATE : 01.01.2013**

**TITLE : TECHNICAL SPECIFICATION FOR BOUGHT ITEMS FOR ESP**  
**ITEM : FRP JUNCTION BOX**  
**CUSTOMER : NTPC & NON NTPC**

	<b>NAME</b>	<b>DESIGNATION</b>	<b>SIGNATURE</b>	<b>DATE</b>
<b>PREPARED</b>	<b>REMYA KUKKILLIYA</b>	<b>ENGINEER</b>		<b>01.01.2013</b>
<b>CHECKED</b>	<b>S.RANGARAJAN</b>	<b>DGM</b>		<b>01.01.2013</b>
<b>APPROVED</b>	<b>S.RANGARAJAN</b>	<b>DGM</b>		<b>01.01.2013</b>

**ISSUED BY**

**EDC – ECI**

**REVISION NO: 00**

**INITIAL RELEASE: 01.01.2013**

**1.0 SCOPE OF SUPPLY:**

The scope of supply of Junction box includes manufacturing, inspection, testing, packing and delivery of junction Boxes (FRP) as per this specification and attached drawings.

**2.0 APPLICATION:**

The junction boxes are used in power station to interconnect various field-mounted electrical equipments pertaining to boiler auxiliaries.

**3.0 APPLICABLE STANDARDS:**

The Junction boxes shall be manufactured and tested as per the following standards.

IS 13947 - Low voltage Switchgear and Control Gear specification.

IS 694 - PVC insulated Cables for working voltages up to and including 1100 specification

**4.0 SITE CONDITIONS:**

4.1 Ambient temperature : 1 Deg.C to 50 Deg.C

4.2 Relative humidity : 100% RH

4.3 Atmospheric condition : Highly dusty, abrasive and polluted, conducive to fungus growth, climate is tropical. Environment is as prevalent in a coal fired thermal power station.

4.4 Design temperature : 50 Deg.C

4.5 Location : Out door

**5.0 GENERAL REQUIREMENTS:**

5.1 Enclosure material & gland plate : 4 mm FRP sheet steel

5.2 Enclosure protection : IP 65 as per IS 13947

5.3 Terminal block type & arrangement : ELMEX or equivalent type of BHEL approved make mounted on DIN rail.

5.4 Terminal block insulating material : Melamine

5.5 Terminal block voltage grade : 650 V (Minimum)

- 5.6 Door Gasketing : Neoprene gasket 6 mm thick of shore hardness 20 to 30 & density 0.4 gm/cc shall be provided on all mating surfaces.
- 5.7 Door Opening : Removable door
- 5.8 Lug type : Annealed tinned solder less crimping type copper lugs shall be provided for all the terminals on both sides. Lug type shall be as mentioned in attached drawing.
- 5.9 Cable Gland type : Nickel chromium plated Brass Double Compression type cable glands fixed on the gland plate, with dummy plugs.
- 5.10 Number of earthing terminals : Two as per attached drawing.
- 5.11 Location of earthing symbol : Just above the earthing terminal. Symbol to be black lines on yellow background.
- 5.12 Rated voltage grade of junction box : 415V
- 5.13 Mounting fasteners : 4 sets of chromium plated bolts, nuts and spring washers for mounting the JB shall be supplied.
- 5.14 Suitable DIN rails along with clamps and screws shall be provided for terminal block mounting. All terminals are to be numbered serially by suitable identification label of PVC material in white background with black numbers. Terminal blocks shall be fixed to TB supporting DIN rail by means of suitable end plates with screws.
- 5.15 Stickers have to be fixed over the cable glands to indicate the cable size.
- 5.16 Non rusting name plate of 2 ply lamicoide in white colour with the following inscription in black letters shall be fixed to the name plate mounting bracket on top of the junction box with plated screws.

EP JUNCTION BOX (POWER) VAR*
<b>BHEL/BAP/RANIPET</b>

\* - As applicable in the enquiry drawing

The name plate indicating the name of the supplier shall be provided on the door.name plate shall contain vendor details like year of manufacture, weight of the job, BHEL PO number & date.

- 5.17 The un -toleranced dimensions shall be as per IS 2102.
- 5.18 For cable glands, lugs & TBs, the type reference indicated in above table is that of a particular manufacturer. Equivalent type of cable glands, lugs & TBs of other BHEL approved makes given in this specification can also be used.
- 5.19 Terminal block to supplied and mounted by vendor. Terminal block shall be of NTPC approved make and rating as recommended in the table. Terminal blocks are to be mounted horizontally. Suitable din rail/base for mounting terminal shall be provided. All terminals are to be identified by suitable identified label. The strip shall be of PVC white background with black letters.
- 5.20 Bolts and nuts required for mounting the junction boxes and fitting are to be electro galvanised and supplied by the vendor.
- 5.21 Internal looping shall be made with 1100v grade PVC insulated stranded copper conductor cable and termination with crimping type annealed tinned copper lugs of dowels make.
- 5.22 Earthing bolts and nuts with rose Courtney washer shall be provided at opposite points on outside of the junction box body with earth symbol made of aluminium.
- 5.23 For external cable termination, two numbers in as shall be fitted and supplied in each terminal. The TB shall be suitable for terminating two in a single block for both incoming and outgoing cables.

## **6.0 MAKE OF COMPONENTS**

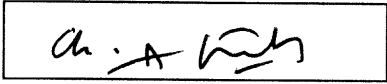
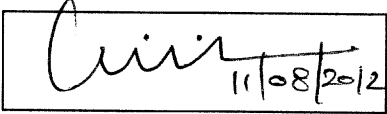
- |     |                   |   |  |
|-----|-------------------|---|--|
| 6.1 | Terminal block    | : | ELMEX  |
| 6.2 | Crimping type lug | : | DOWELL   |
| 6.3 | Cable glands      | : | COMET / BRACCO / ARUP ENGG. / QPIE/<br>SUNIL & Co. |
| 6.4 | PVC wires         | : | ISI (BIS) APPROVED/CERTIFIED MAKES                 |

## **7.0 PACKING**

Each JB shall be fully wrapped in a polythene cover to avoid water entry and then packed separately in cardboard box. Finally all such boxes shall be packed in a wooden crate.

## **8.0 DRAWING**

Manufacturing drawings prepared in AUTO CAD shall be submitted in SOFT MEDIA in addition to **4 sets of** hard copies for approval by BHEL, (prior to start of manufacture) within 10 days from the date of purchase order.

<b>BHEL RANIPET</b>	<b>STANDARD CHECK LIST FOR JUNCTION BOXES (GALVANIZED/PAINTED/FRP) MEANT FOR ESP APPLICATION.</b>	
<b>REF.NO.</b>	<b>REVISION NO.</b>	<b>EFFECTIVE DATE</b>
<b>CKL:E:816</b>	<b>00</b>	<b>11 08 2012</b>
TITLE : JUNCTION BOXES (GALVANIZED/PAINTED/FRP) MEANT FOR ESP APPLICATION.		
		SIGNATURE
PREPARED BY	: CH.ANILSINGH ASST.ENGINEER/QA	
REVIEWED & APPROVED BY	: C.SRINIVASAN SR.MANAGER/QA	
ISSUED & CONTROLLED BY	:: QUALITY ASSURANCE BHEL, RANIPET – 632 406	
DOCUMENT STATUS	<input type="checkbox"/>	INFORMATION COPY
	<input type="checkbox"/>	CONTROL COPY
	* It is a control of copy only if the mark against the control copy is in other than black color. Otherwise it will be an uncontrolled copy. Check for current revision.	
ISSUED TO :	CONTROL COPY NO.	
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Note:

1. This is a standard check list for JUNCTION BOXES (Galvanized/Painted/FRP). Any additional project specific requirements highlighted in PO or relevant TEP shall be complied with. Any contradiction noticed in this check list with respect to enquiry requirements/TEP shall be highlighted in the offer.
2. If the acceptance criteria given in PO or TEP or approved data sheet is stringent than the one specified in this above, the requirement as per PO/TEP/data sheet will supersede the one given in the check list.

<b>BHEL RANIPET</b>	<b>STANDARD CHECK LIST FOR JUNCTION BOXES (GALVANIZED/PAINTED/FRP) MEANT FOR ESP APPLICATION.</b>							
<b>REF.NO.</b>	<b>REVISION NO.</b>	<b>EFFECTIVE DATE</b>						
<b>CKL:E:816</b>	<b>00</b>	<b>11 08 2012</b>						
<p><b>RECORD OF REVISION</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">REV.NO</th> <th style="width: 40%;">Effective Date</th> <th style="width: 35%;">Remarks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">00</td> <td style="text-align: center;">11 08 2012</td> <td style="text-align: center;">Original Issue</td> </tr> </tbody> </table>			REV.NO	Effective Date	Remarks	00	11 08 2012	Original Issue
REV.NO	Effective Date	Remarks						
00	11 08 2012	Original Issue						
		PAGE 02 OF 04						

<b>BHEL</b> <b>RANIPET</b>	<b>STANDARD CHECK LIST FOR</b> <b>JUNCTION BOXES</b> <b>(GALVANIZED/PAINTED/FRP) MEANT</b> <b>FOR ESP APPLICATION</b>	Ref no: CKL:E: 816 Rev No: 00 Date : 11 08 2012 Page: 03 OF 04
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**FOLLOWING TESTS / CHECKS ARE TO BE DONE**

**1.) Routine Tests (Sample Size: IS 2500(Part I), ISO 2859 (Part-1) AQL 4% )**  
**by vendor.**

- a) Visual Inspection
- b) Dimensional Checks on random selected samples.
- c) Checks on mounting whole dimension, overall dimension, thickness, verification of verticality and squareness.
- d) Provision of gaskets at door and gland plate
- e) Operation of door and door locking arrangement.
- f) Matching of door with box.
- g) IR( IR > 1M ohm When Checked with 500V meggar ) HV Test( 2KV for 1 Minute)
- h) Verification on wiring, terminal blocks and provision of suitable cable glands and Lugs as per specification/drawing / PO condition.
- i) Provision of dummy covers for cable glands.
- j) Check degree of protection as per specification by inserting thin paper.
- k) Review of raw material test certificate
- l) Provision of label with inscription and earthing bolt and star washers and symbol for earthing.( Applicable only Painted and Galvanized Junction boxes)

**2.) Type Tests Requirements**

Review of type test certificate for enclosure protection test conducted on identical designs as per TEP / drawing.

**3.) For Painted Junction Boxes**

- a. Test /check for verifying the coating thickness, adhesion test including paint shade and the same shall be as per BHEL Drawing (or) supplier drawing approved by BHEL/Engg/BHEL Specification/Po Condition.
- b. Ensure Surface preparation( 7 tank Process as per IS 6005 or Equivalent practices)
- c. Ensure Primer is two coat of Anti corrosive Red Oxide Epoxy Primer and finish paint is Two coat of anti corrosive red oxide Epoxy Primer
- d. Ensure junction boxes shall be stove Enameled (or) powder coating.

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**4.) For Galvanised Junction Boxes**

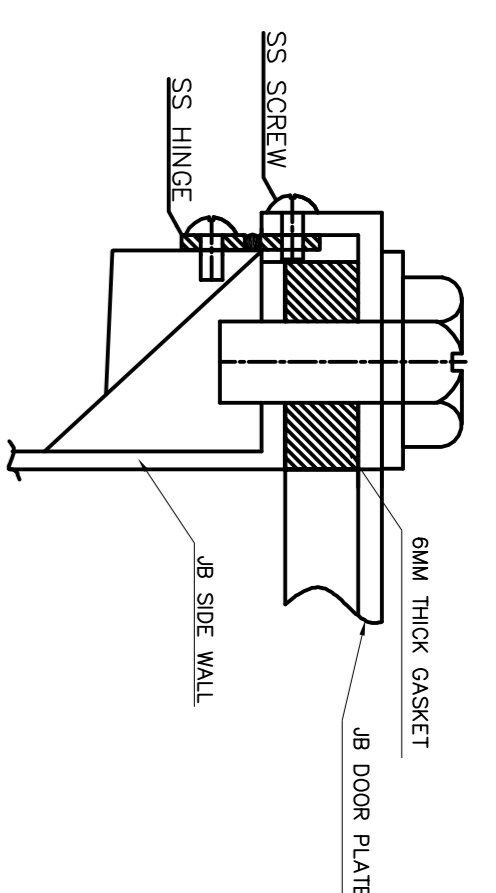
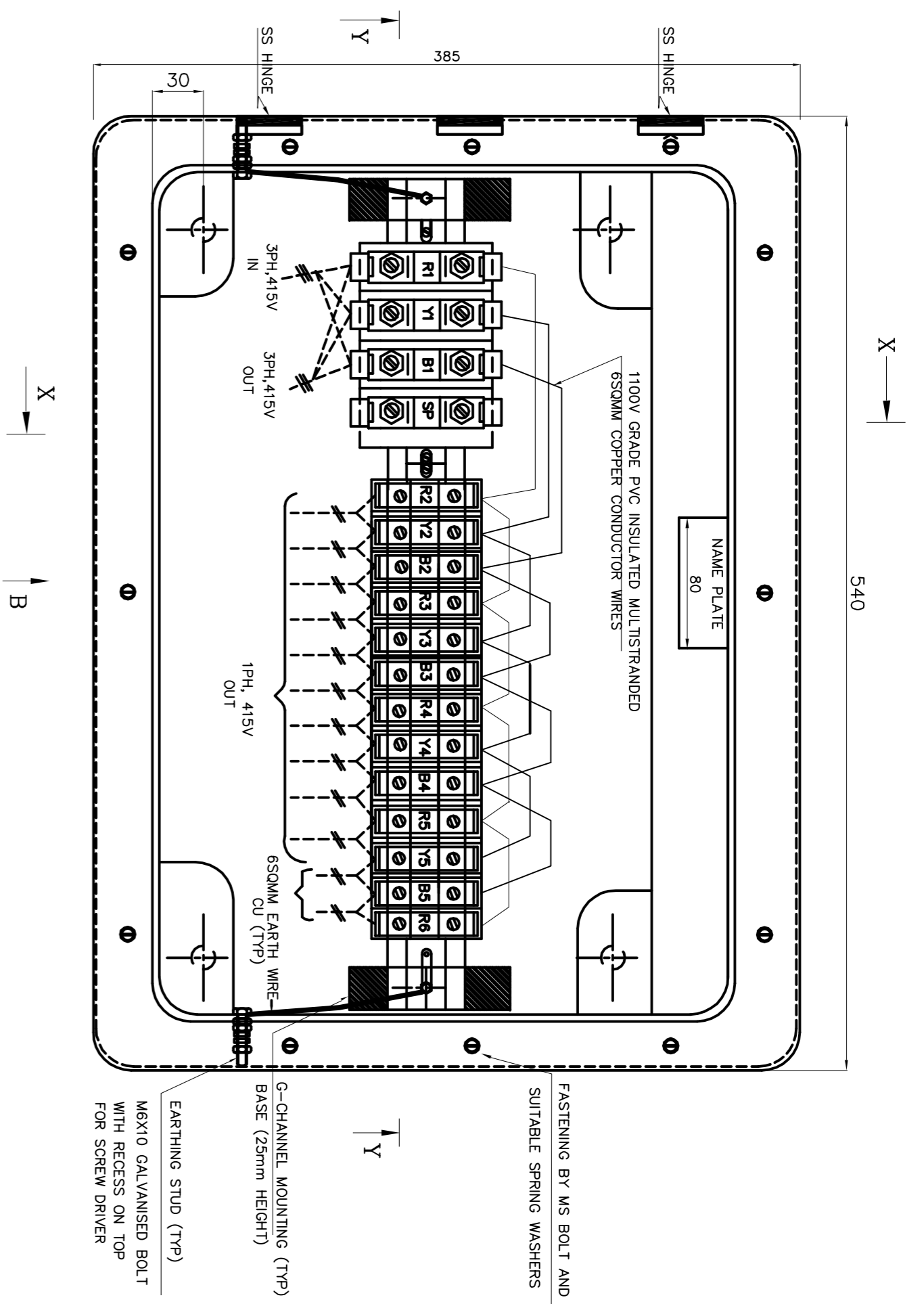
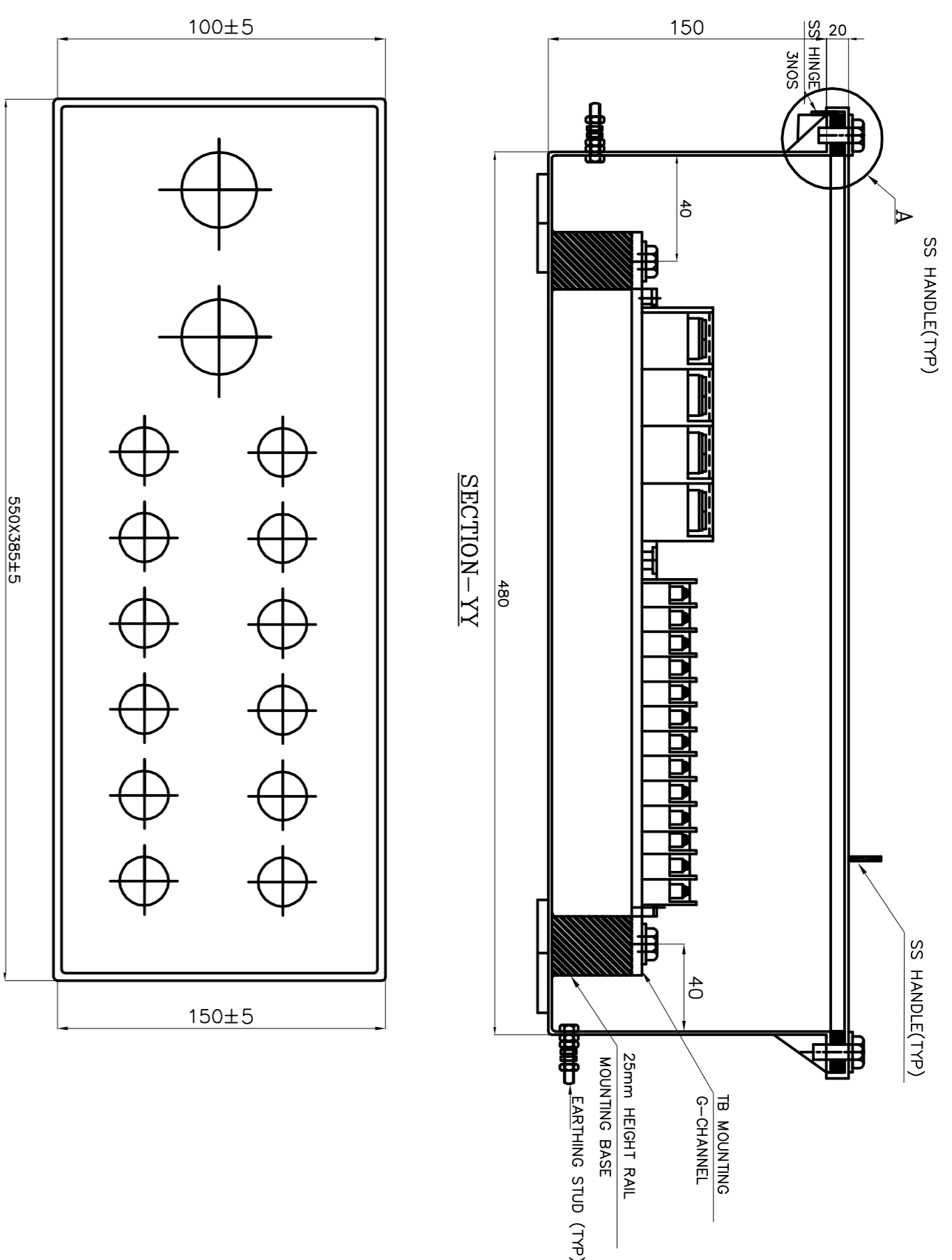
- a) Test /check for verifying quality of galvanizing including uniformity of zinc coating as per IS 4759/IS 2633 and dichromatization and the same shall be as per drawing/specification/PO Condition.
- b) Hot Dip Galvanizing Source for NON NTPC Projects is to be done in any one of the BHEL approved sources for which vendor shall obtain galvanizing sources from Purchase Department, BAP BHEL/Ranipet before proceeding for the same.
- c) Hot Dip Galvanizing Source for NTPC Projects is to be done in any one of the \*\*\* NTPC approved Sources as indicated below w.r.t NTPC projects.

\*\*\*

- M/s Kanade Anand Udyog, Mumbai
- m/s MJ Engg., New Delhi/Bhiwadi
- M/s Vishaka Steel Allaid, Anakapally
- M/s Karamtara., Thane
- M/s Industrial Perfortion., Kolkata
- M/s BG Shirke., Pune
- M/s Jamuna Metals, New Delhi/Sonpet
- M/s Gurupreet., Hyderabad
- M/s Sigma Glavanisers., Mumbai
- M/s T.M Radha Krishna Galvanisers, Chennai.
- M/s Poona Galvanisers, Pune
- Other NTPC approved Sources.

- 5.) All other requirements if any shall be ensured as per BHEL PO and BHEL specification / drawings.





NOTE :

01. THE BOX SHALL BE MADE FROM MINIMUM 4MM FRP.
02. THE JB ASSEMBLY SHALL BE DESIGNED FOR IP65 AS PER IS 13947 REQUIREMENTS OF WATER TIGHT AND DUST TIGHT .
03. SINGLE PIECE NEOPRENE GASKET 6MM THICK OF SHORE HARDNESS 20 & DENSITY 0.49g/cc. SHALL BE PROVIDED IN ALL MATING SURFACES TO ENSURE WATER TIGHT SEAL. MATERIAL CERTIFICATE INDICATING HARDNESS NUMBER, DENSITY AND COMPOSITION SHALL BE FURNISHED ON DEMAND.
04. TERMINAL BLOCKS TO BE SUPPLIED AND MOUNTED BY VENDOR. TERMINAL BLOCKS SHALL BE OF NTPC APPROVED MAKES AND RATING AS RECOMMENDED IN TABLE 1. TERMINAL BLOCKS ARE TO BE MOUNTED HORIZONTALLY. SUITABLE G-CHANNEL/BASE FOR MOUNTING TERMINAL SHALL BE PROVIDED. ALL TERMINALS ARE TO BE IDENTIFIED BY SUITABLE IDENTIFICATION LABEL. THE STRIP SHALL BE OF PVC WHITE BACKGROUND WITH BLACK LETTERS.
05. TERMINAL BLOCK SHALL BE FIXED TO TERMINAL BLOCK SUPPORTING STRIP OR DIN RAIL BY MEANS OF SUITABLE SCREWS AND CLAMPS AT BOTH SIDES OF INCOMER TERMINAL BLOCK AND ALSO AT BOTH SIDES OF OUTGOING TERMINAL BLOCK ENDS.
06. BOLTS AND NUTS REQUIRED FOR MOUNTING THE JUNCTION BOXES AND FITTINGS ARE TO BE ELECTRO GALVANISED AND SUPPLIED BY THE VENDOR.
07. INTERNAL LOOPING SHALL BE MADE WITH 110V GRADE PVC INSULATED STRANDED COPPER CONDUCTOR CABLE AND TERMINATION WITH CRIMPING TYPE ANNEALED TINNED COPPER LUGS OF DOWELLS MAKE.
08. REMOVABLE DOOR SHALL BE FILLED WITH SUITABLE MAKE. 09. EARTHING STUD WITH NUTS AND WASHERS SHALL BE PROVIDED AT OPPOSITE POINTS ON OUTSIDE OF THE JUNCTION BOX BODY WITH EARTH SYMBOL. MADE OF ALUMINIUM.
10. NON RUSTING 3 PLY LAMICOD NAME PLATE WITH SUITABLE INSCRIPTION SHALL BE PROVIDED WITH CLEAN TRANSPARENT SHEET AS FOLLOWS :

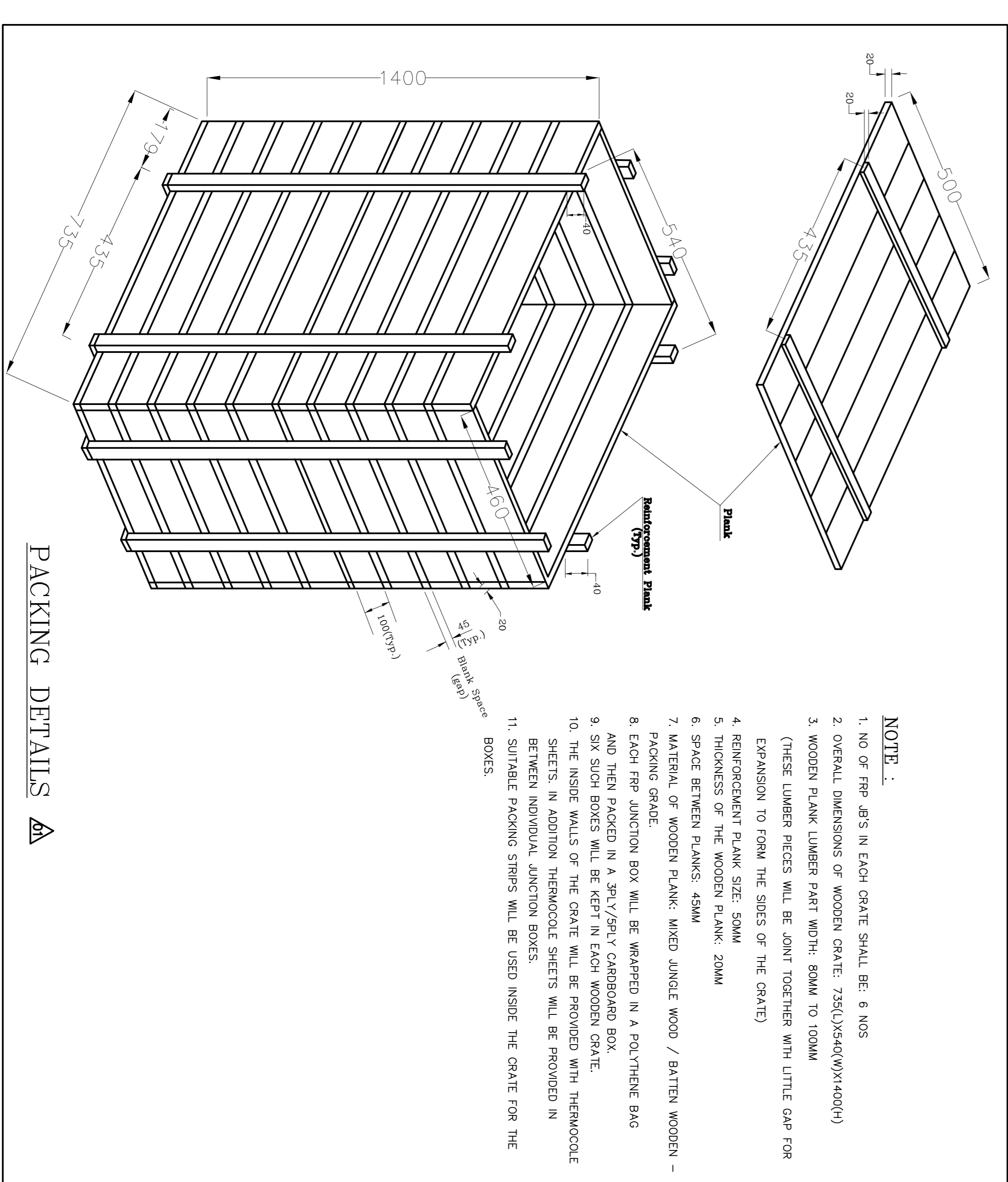
ESP JUNCTION BOX VAR \* - AS APPLICABLE  
BH/EL/BAP/RAN/PET

11. ALL THE TERMINALS BLOCKS SHALL BE PROVIDED WITH CRIMPING TYPE LUGS FOR INCOMING AND OUTGOING CABLES AS RECOMMENDED IN TABLE-1.
12. LUGS SHALL BE PROVIDED FOR EACH INCOMING AND OUTGOING TERMINALS. SUITABLE NUMBER OF LUGS FOR INTERNAL WIRING SHALL BE PROVIDED.
13. TYPE NUMBER INDICATED IS FOR EMEX TERMINAL BLOCK AND DOWELL LUG. EQUIVALENT TYPE NO.CAN BE USED FOR OTHER NTPC APPROVED MAKES.

TABLE-1

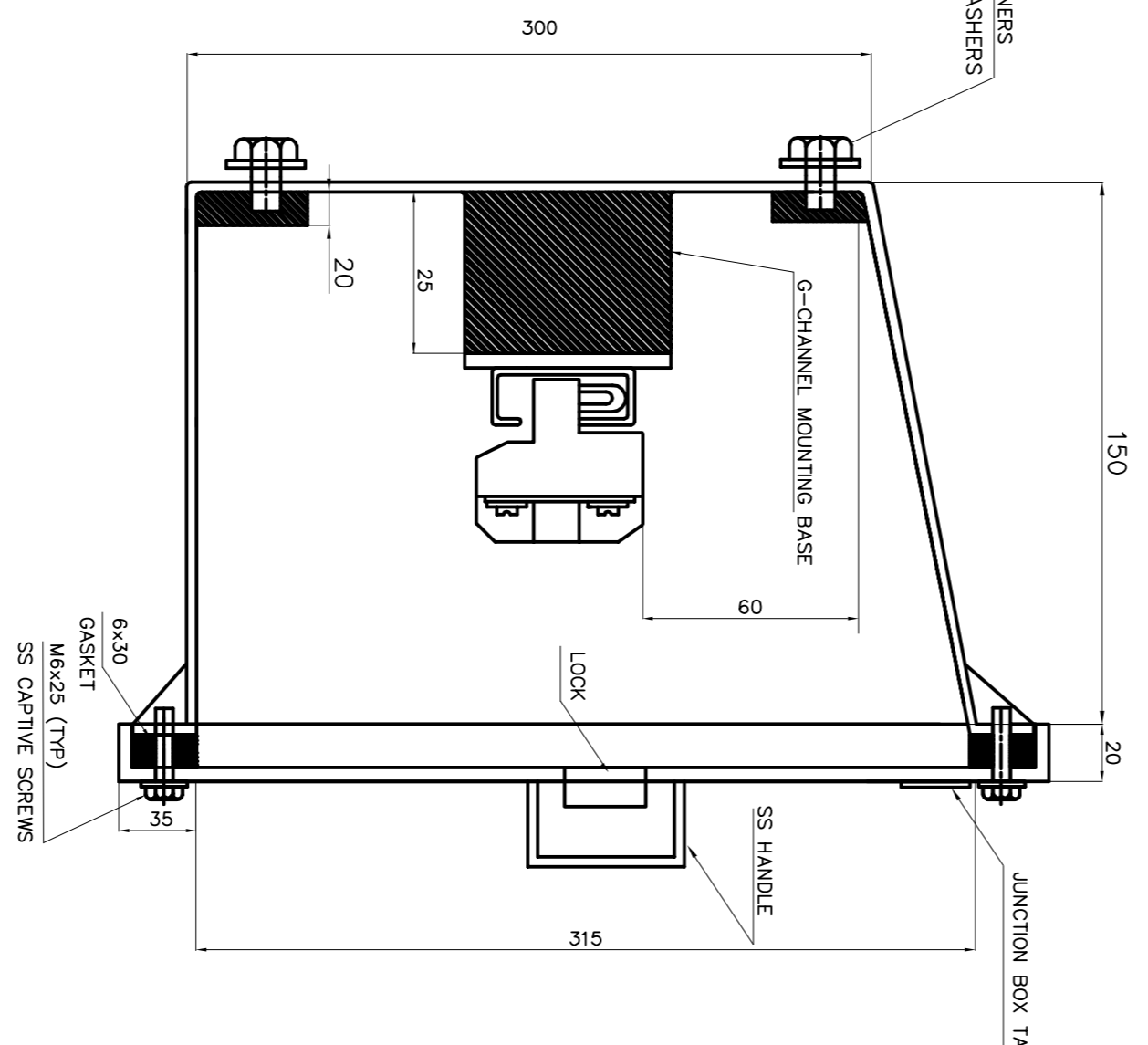
VARIANT	GLAND QTY	INCOMING CABLE SIZE (A)	TERML BLOCK	CABLE SIZE (CU)	TERML BLOCK
01	02	3C-16 SQMM	CST-16	2C-2.5 SQMM	CST-10
02	02	3C-35 SQMM	CBT-110	2C-2.5 SQMM	CST-10
03	02	3C-70 SQMM	CBT-170	2C-2.5 SQMM	CST-10

14. NICKEL CHROMIUM PLATED BRASS HEAVY DUTY DOUBLE COMPRESSION CABLE GLANDS ALON GIMTH DUMMY PLUG SHALL BE PROVIDED AND FIXED IN GLAND HOLES BY VENDOR. QUANTITY AND SIZE SHALL BE AS INDICATED THE ABOVE TABLE - 1.
15. FOR EXTERNAL CABLE TERMINATION, TWO NUMBERS LUGS SHALL BE FITTED AND SUPPLIED IN EACH TERMINAL. THE TB SHALL BE SUITABLE FOR TERMINATING TWO LUGS IN A SINGLE BLOCK FOR BOTH INCOMING OUT OUTGOING CABLES.
16. THE LUGS SHALL BE FLAT PIN CRIMPING TYPE FOR CST-10 OUTGOING TERMINALS & TUBE TERMINAL FOR CBT-170, CBT-110 & CST-16 INCOMING TERMINALS.
17. NAME PLATE INDICATING NAME OF THE SUPPLIER SHALL BE PROVIDED ON THE DOOR. THE NAME PLATE SHALL CONTAIN VENDOR DETAILS LIKE YEAR OF MANUFACTURE, WEIGHT OF THE JOB, BH/EL, P.O NUMBER & DATE.
18. VOLTAGE GRADE OF TERMINAL BLOCK SHALL BE 1100V.
19. PAINT COLOUR WILL BE INFORMED DURING DRAWING APPROVAL.



- NOTE :
1. NO OF FRP JBS IN EACH CRATE SHALL BE 6 NOS
  2. OVERALL DIMENSIONS OF WOODEN CRATE: 735(L)X540(W)X1400(H)
  3. WOODEN PLANK LUMBER PART WIDTH: 80MM TO 100MM (THESE LUMBER PIECES WILL BE JOINT TOGETHER WITH LITTLE GAP FOR EXPANSION TO FORM THE SIDES OF THE CRATE)
  4. REINFORCEMENT PLANK SIZE: 50MM
  5. THICKNESS OF THE WOODEN PLANK: 20MM
  6. SPACE BETWEEN PLANKS: 45MM
  7. MATERIAL OF WOODEN PLANK: MIXED JUNGLE WOOD / BATTEN WOODEN - PACKING GRADE.
  8. EACH FRP JUNCTION BOX WILL BE WRAPPED IN A POLYTHENE BAG AND THEN PACKED IN A 3PLY/5PLY CARBOBOARD BOX.
  9. SIX SUCH BOXES WILL BE KEPT IN EACH WOODEN CRATE.
  10. THE INSIDE WALLS OF THE CRATE WILL BE PROVIDED WITH THERMOCOLE SHEETS. IN ADDITION THERMOCOLE SHEETS WILL BE PROVIDED IN BETWEEN INDIVIDUAL JUNCTION BOXES.
  11. SUITABLE PACKING STRIPS WILL BE USED INSIDE THE CRATE FOR THE BOXES.

SECTION - XX



NTPC STANDARD

DEPT	CRN	NAME	SIGN	DATE
DESIGN	05	RAHMAN	[Signature]	22.04.2015
CHKD	05	[Signature]	[Signature]	22.04.2015
APPR	MAH	[Signature]	[Signature]	22.04.2015

JOB NO.	CONTRACT	TITLE
		FRP POWER JUNCTION BOX

STATUS	REV	DATE	ALTD	CHKD	APPD
	01	07-05-14	[Signature]	[Signature]	[Signature]

DISTRIBUTION	NO OF	DATE	ALTD	CHKD	APPD

DEPT	CRN	NAME	SIGN	DATE
DESIGN	05	RAHMAN	[Signature]	22.04.2015
CHKD	05	[Signature]	[Signature]	22.04.2015
APPR	MAH	[Signature]	[Signature]	22.04.2015

BH/EL/BAP DRG. NO. 1-00-114-28774  
SCALE : NTS  
SHEET 01 OF 02  
REV 01  
Size A1

PACKING DETAILS