BHEL RANIPET	STANDARD CHECK LIST FOR JUNCTION BOXES (GALVANIZED/PAINTED/FRP) MEANT FOR ESP APPLICATION.	
REF.NO.	**REVISION NO.**	**EFFECTIVE DATE**
CKL:E:816	**00**	**11 08 2012**

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

11/08/2012

ISSUED & CONTROLLED BY :: QUALITY ASSURANCE
BHEL, RANIPET – 632 406

DOCUMENT STATUS

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* 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 revesion.

ISSUED TO :

CONTROL COPY NO.

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.

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RECORD OF REVISION

REV.NO	Effective Date	Remarks
00	11 08 2012	Original Issue

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, adhension 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 ref oxide Epoxy Primer
d. Ensure junction boxes shall be stove Enameled (or) powder coating.

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 Allaids,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.

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

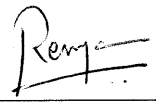
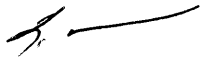
TECI:[redacted]:FRPJB:REV 00

EFFECTIVE DATE : 01.01.2013

TITLE : TECHNICAL SPECIFICATION FOR BOUGHT ITEMS FOR ESP

ITEM : FRP JUNCTION BOX

CUSTOMER : NTPC & NON NTPC

NAME		DESIGNATION	SIGNATURE	DATE
PREPARED	REMYA KUKKILLIYA	ENGINEER		01.01.2013
CHECKED	S.RANGARAJAN	DGM		01.01.2013
APPROVED	S.RANGARAJAN	DGM		01.01.2013

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 lamicoid 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*
BHEL/BAP/RANIPET

* - 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

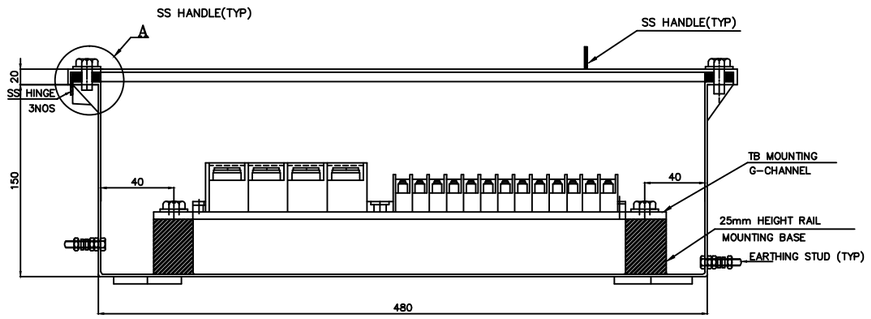
6.1	Terminal block	:	ELMEX
6.2	Crimping type lug	:	DOWELL
6.3	Cable glands	:	COMET / BRACCO / ARUP ENGG. / QPIE/ SUNIL & Co.
6.4	PVC wires	:	ISI (BIS) APPROVED/CERTIFIED MAKES

7.0 PACKING

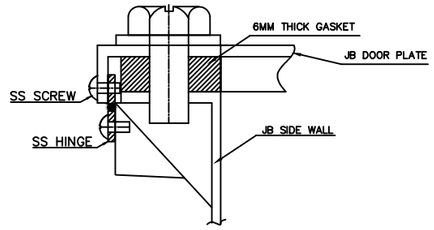
Each JB shall be fully wrapped in a polythene cover to avoid water entry and then packed separately in cardboard box. Finally all such boxes shall be packed in a wooden crate.

8.0 DRAWING

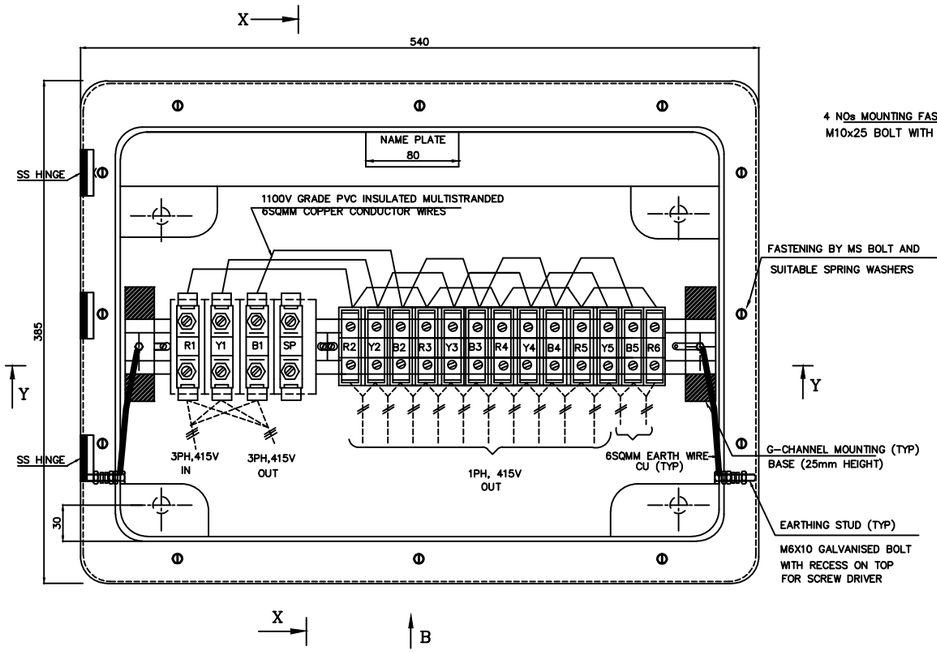
Manufacturing drawings prepared in AUTO CAD shall be submitted in SOFT MEDIA in addition to **4 sets of** hard copies for approval by BHEL, (prior to start of manufacture) within 10 days from the date of purchase order.

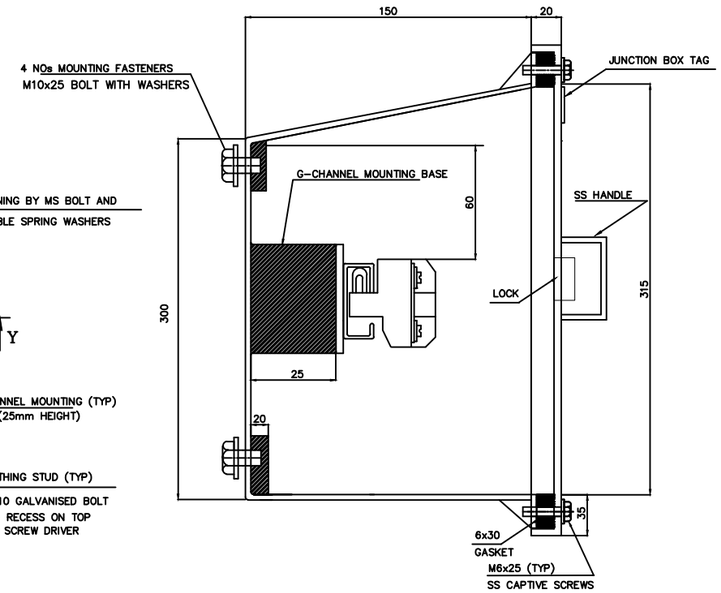


SECTION–YY

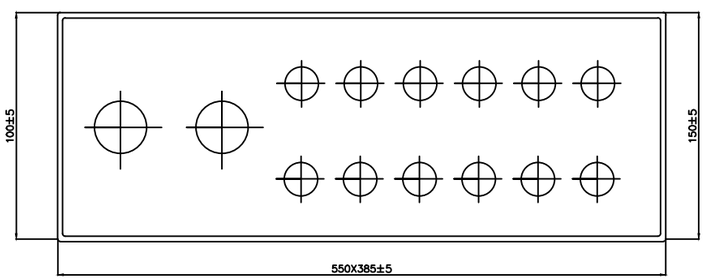


DETAIL–A





SECTION – XX



GLAND DETAILS (TYP)
VIEW–B

NOTE :

ALL DIMENSIONS ARE IN MILLIMETRES

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 0.4gm/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–CHANNELL/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 SUPPPORTING 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 1100V 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 BOLTS & NUTS.
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 LAMICOID NAME PLATE WITH SUITABLE INSCRIPTION SHALL BE PROVIDED WITH CLEAN TRANSPARENT SHEET AS FOLLOWS :

ESP JUNCTION BOX VAR * BHEL/BAP/RANIPET	* – AS APPLICABLE

11. ALL THE TERMINALS BLOCKS SHALL BE PROVIDED WITH CRIMPING TYPE LUGS FOR INCOMING AND OUTGOING CABLES AS RECOMMANDED 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 ELMEX TERMINAL BLOCK AND DOWELL LUG. EQUIVALENT TYPE NO.CAN BE USED FOR OTHER NTPC APPROVED MAKES.

TABLE–1

VARIENT	GLAND QTY		INCOMING		OUTGOING	
	INCOMING	OUTCOMING	CABLE SIZE (AL)	TERML BLOCK	CABLE SIZE (CU)	TERML BLOCK
01	02	12	3C–16 SQMM	CST–16	2C–2.5 SQMM	CST–10
02	02	12	3C–35 SQMM	CBT–110	2C–2.5 SQMM	CST–10
03	02	12	3C–70 SQMM	CBT–170	2C–2.5 SQMM	CST–10

14. NICKEL CHROMIUM PLATED BRASS,HEAVY DUTY,DOUBLE COMPRESSION CABLE GLANDS ALON GWITH 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
17. TERMINALS & TUBE TERMINAL FOR CBT–170,CBT–110 & CST–16 INCOMING TERMINALS. 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,BHEL P.O NUMBER & DATE.
18 VOLTAGE GRADE OF TERMINAL BLOCK SHALL BE 1100V.
19 PAINT COLOUR – RAL 9002.

JOB NO.				
STATUS CONTRACT				
DISTRIBUTION				
TO				
NO.OF				
REV	DATE	ALTD	CHD	APPD

NTPC STANDARD

BHARAT HEAVY ELECTRICALS LIMITED, UNIT: BOILER AUXILIARIES PLANT, RANIPET:632 406.

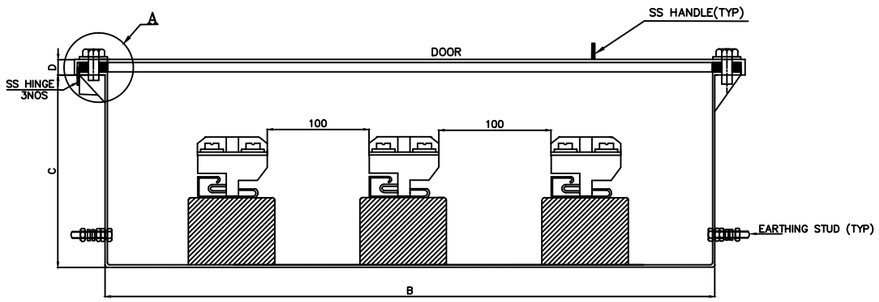
DEPT CODE		NAME	SIGN	DATE
M	DRN	KUMARLM		22.04.2013
	DESN	D.S		22.04.2013
	CHD	D.S		22.04.2013
	APPD	M.J.M		22.04.2013

TITLE: FRP POWER JUNCTION BOX

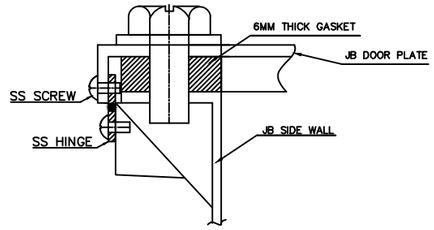
BHEL/BAP DRG NO. 1–00–114–28774 | SCALE : NTS | – | SHEET 01 OF 02 | REV 00

Size A1

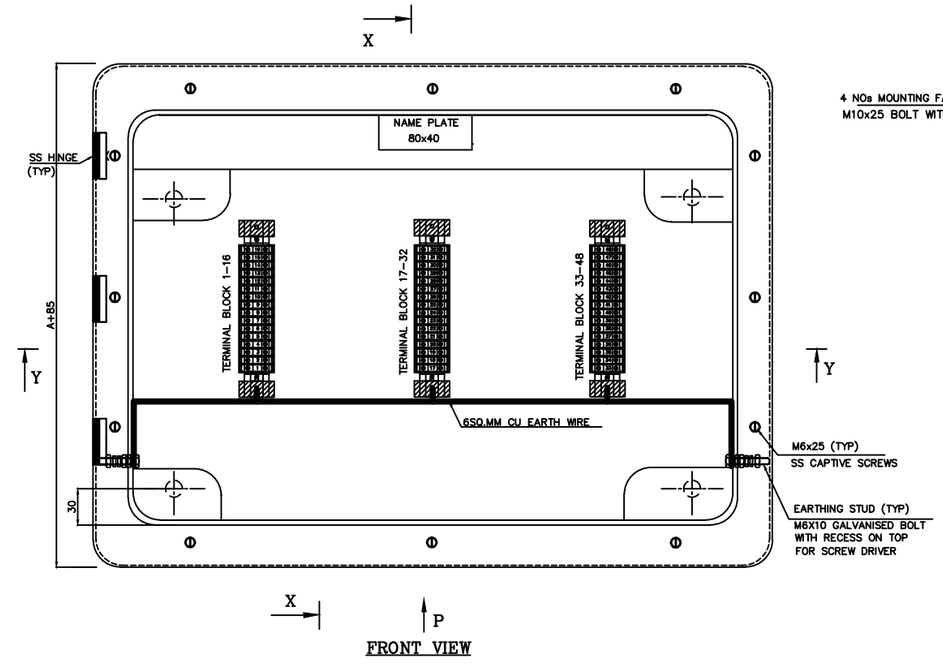
ALL DIMENSIONS ARE IN MILLIMETRES



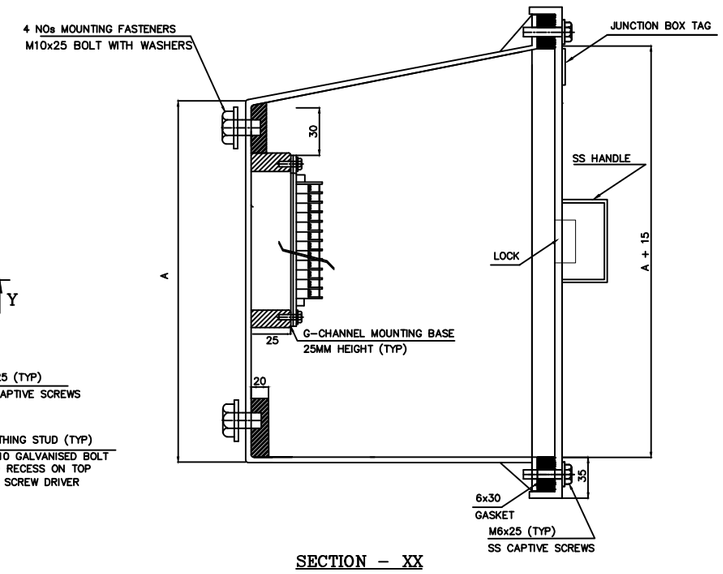
SECTION–YY



DETAIL–A



FRONT VIEW



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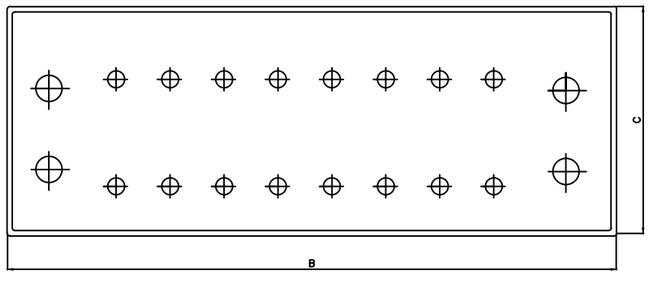

GLAND DETAILS (TYP)
VIEW–P

NOTE :

01. THE BOX SHALL BE MADE FROM MINIMUM 4 MM FRP.
02. THIS ARRANGEMENTS SHALL BE DESIGNED FOR IS–13947 REQUIREMETS OF WATER TIGHT AND DUST TIGHT (IP 65)
03. SINGLE PIECE NEOPRENE GASKET 6MM THICK OF SHORE HARDNESS 20 & DENSITY 0.4gm/cc. SHALL BE PROVIDED IN ALL MATING SUFACES TO ENSURE WATER TIGHT SEAL.
04. TERMINAL BLOCKS TO BE SUPPLIED AND MOUNTED BY VENDOR.
05. TERMINAL BLOCK SHALL BE ELMEX,TOSHA OR CONNECTWELL MAKE. ALL TERMINAL BLOCKS ARE TO BE MOUNTED VERTICALLY PROPERLY STACKED.SUITABLE G–CHANNEL ALONG WITH CLAMPS AND SCREWS SHALL BE PROVIDED.ALL TERMINALS ARE TO NUMBERED 1 THRO.48, BY SUITABLE IDENTIFICATION LABEL AND FIXING IT ON TO THE TERMINAL BLOCK.TERMINAL BLOCK IDENTIFICATION LABEL. SHALL BE PVC WHITE BACK GROUND WITH BLACK NUMBERS.
06. BOLTS AND NUTS REQUIRED FOR MOUNTING THE JUNCTION BOXES ARE TO BE ELECTRO GALVANISED AND SUPPLIED BY VENDOR. NECESSARY SPRING WASHERS SHALL ALSO BE SUPPLIED.
07. ALL THE TERMINAL BLOCKS SHALL BE PROVIDED BY SUPPLIER WITH CRIMPING TYPE INSULATED ATC LUGS FOR INCOMING AND OUTGOING FEEDERS WITH LUG TYPE CPI 17 OF DOWELL'S MAKE.
08. DOOR SHALL BE FITTED WITH HINGES AND SUITABLE BOLTS & NUTS.
09. EARTH TAG (BLACK LINES ON YELLOW BACK–GROUND) OF DIA 20 MM SHALL BE PROVIDED NEAR EACH EARTH TERMINAL WITH CO–ORDINATES AS 30 MM FROM REAR OF THE BOX AND 25 MM ABOVE CENTER LINE OF EARTH TERMINAL.
10. THE TERMINAL BLOCK SHALL BE CLIP ON TYPE(CSLT–1) WITH MALAMINE HOUSING MOUNTED IN STANDARD CHANNEL WITH END PLATE AND END CLAMPS.
11. EARTHING STUDS AND NUT WITH WASHER SHALL BE PROVIDED AT OPPOSITE POINTS ON OUTSIDE OF THE JUNCTION BOX BODY WITH EARTH SYMBOL.
12. NON RUSTING 3 PLY LAMICOID MAKE NAME PLATE WITH SUITABLE INSCRIPTION SHALL BE PROVIDED WITH CLEAN TRANSPARENT SHEET AS FOLLOWS:

ESP JUNCTION BOX(CONTROL)
BHEL/BAP/RANIPET

13. ONE LUG SHALL BE PROVIDED FOR EACH TB ON EACH SIDE OF EACH TB. (TOTAL 2 NUMBERS LUGS PER TB). THE TB SHALL BE SUITABLE FOR TERMINATING TWO LUGS IN A SINGLE BLOCK FOR BOTH INCOMING AND OUTGOING CABLES.

TABLE–1

VARIENT	NO OF WAYS	NO OF ROWS x TB/ROW	DIMENSION IN MM				GLAND FOR ARMOURED COPPER CABLES					
							INCOMING			OUTGOING		
			A	B	C	D	CABLES SIZE	GLANDS SIZE	QTY	CABLES SIZE	GLANDS SIZE	QTY
C1	24	1X24	300	300	150	20	7C–2.5 12C–2.5	CBW 03 CBW 04	2 2	4C–2.5	CBW 02	8
C2	48	3X16	300	480	150	20	10C–2.5 14C–2.5	CBW 03 CBW 04	2 2	4C–2.5	CBW 02	16
C3	24	1X24	300	300	150	20	2C–2.5 4PAIR–0.5	CBW 01S CBW 01S	2 2	–	–	–
C4	48	3X16	300	480	150	20	2C–2.5 4PAIR–0.5	CBW 01S CBW 01S	2 4	–	–	–

14. NICKEL CHROMIUM PLATED BRASS,HEAVY DUTY,DOUBLE COMPRESSION CABLE GLANDS ALONG WITH DUMMY PLUG SHALL BE PROVIDED AND FIXED IN GLAND HOLES BY VENDOR. QUANTITY AND SIZE OF GLANDS SHALL BE AS PER ABOVE TABLE–1.
15. VOLTAGE GRADE OF TERMINAL BLOCK SHALL BE 1100V.
16. 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, BHEL P.O NUMBER & DATE.
17. PAINT COLOUR –RAL 9002

JOB NO.	
STATUS	CONTRACT
DISTRIBUTION	
TO	
NO.OF	

REV	DATE	ALTD	CHD	APPD

NTPC STANADARD

BHARAT HEAVY ELECTRICALS LIMITED,
UNIT: BOILER AUXILIARIES PLANT,
RANIPET:632 406.

DEPT CODE: M

	NAME	SIGN	DATE
DRN	KUMARM		22.04.2013
DESN	D.S		22.04.2013
CHD	D.S		22.04.2013
APPD	M.J.M		22.04.2013

TITLE: FRP CONTROL JUNCTION BOX

BHEL/BAP DRG NO. 1–00–114–28775

SCALE : NTS

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SHEET 01 OF 02 | REV 00

Size A1