



**CONTROLS & INSTRUMENTATION (FB)**  
**PRE-QUALIFICATION REQUIREMENT (PQR)**

**CI:PE:PQR:024**

**Rev. No: 00**

**Dt. : 20-03-2021**

**FRP JUNCTION BOXES & LOCAL GUN MAINTENANCE SWITCH BOX**

| S.No. | Specification                                   | Bid Requirements (Allowed Values)                                                                                                                                                                                                                                                   | Vendor's Confirmation |
|-------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 1.    | Type of Vendor                                  | Manufacturer                                                                                                                                                                                                                                                                        |                       |
| 2.    | Country of Origin                               | Preferably India                                                                                                                                                                                                                                                                    |                       |
| 3.    | Offloading / Outsourcing allowed                | All machineries and facilities that are required for the complete manufacture of FRP Junction Boxes & Local Gun Maintenance Switch Box shall be available in-house. Vendor to Self-Declare.                                                                                         |                       |
| 4.    | Experience years                                | Min. 5 years of Experience in field of FRP JB/Enclosure Manufacturing.                                                                                                                                                                                                              |                       |
| 5.    | Credentials in Power plant/<br>Heavy Industries | Vendor should have supplied similar design & varieties of FRP Junction Boxes & LGM Switch Boxes to 500MW or higher power plant / industrial installations in India or abroad with satisfactory performance for minimum 3 years supported with credentials/Purchase Order references |                       |

- End of document -

|                               | <b>Commercial conditions</b>                                                                                                                                    | <b>Vendor confirmation</b>     |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Delivery term                 | Vendor shall quote unit price on <b>FOR / Consignee basis inclusive of Packing &amp; Forwarding, Freight &amp; GST.</b><br>Insurance will be on BHEL scope.     | <b>Accepted / Not accepted</b> |
| Delivery days                 | <b>90 days from document approval</b><br>Delivery days shall inclusive of all the activities like manufacturing, inspection, Packing & Forwarding and dispatch. | <b>Accepted / Not accepted</b> |
| Payment term                  | <b>As per present GEM T&amp;C</b>                                                                                                                               | <b>Accepted / Not accepted</b> |
| LD clause                     | <b>As per present GEM T&amp;C</b>                                                                                                                               | <b>Accepted / Not accepted</b> |
| Guarantee/<br>Warranty period | <b>As per specification</b>                                                                                                                                     | <b>Accepted / Not accepted</b> |
| MSE                           | <b>If MSE vendor, submit latest Udyam Registration certificate</b>                                                                                              | <b>Attached / Not attached</b> |



429-024

**MATERIALS MANAGEMENT / BOI**  
**SUB-DELIVERY ENQUIRY DEVIATION FORMAT**

Page : of

Schedule of deviation to  
Sub-delivery Enquiry No. : **GeM Bid no: GEM/2021/B/1292458**

Description : **FRP JUNCTION BOX**  
**LOCAL GUN MAINTENANCE SWITCH BOX**

Documents : **Specification: TCI:252 / REV 03**  
**Specification: TCI:338 Rev 00**

Drawing Nos. :

Quality Plan : **Quality plan for Local Gun Maintenance Switch Box & FRP**  
**Junction Box QA:CI:STD:QP:74 Rev.00**  
**QA:CI:STD:QP:34 Rev.04**

Packing Procedure : **QA:CI:STD:PR:02 Rev.03**

| Document reference | BHEL called for | Firm's alternative offer |
|--------------------|-----------------|--------------------------|
|                    |                 |                          |

Certified that other than the above deviations, we are accepting all the other specifications and requirements in full to your Enquiry.

Station :

Date : Signature of firm's representative Firm seal

Note : 1. Deviations should be taken only in the extreme case  
2. If necessary, use additional sheets with page control number

**/ On Bidder's office letter pad /**

**Self-Declaration**

|                     |                           |
|---------------------|---------------------------|
| <b>Enquiry No.</b>  | <b>GEM/2021/B/1292458</b> |
| <b>Enquiry Date</b> | <b>18.06.21</b>           |

In line with Government public procurement order Number P-45021/2/2017-B.E-II dated 15.06.2017, and further modified order dt.04.06.2020 issued by DPIIT,

I / We hereby declare that I / We are a “Local Supplier” meeting the requirement of minimum local content (.....%) defined in the above government notification for the goods against above mentioned enquiry Number.

Details of location at which local value addition will be made is as follows:

|                    |  |
|--------------------|--|
| Door No.           |  |
| Street / Address 1 |  |
| Street / Address 2 |  |
| District           |  |
| State              |  |
| Country            |  |
| PIN Code           |  |

We also understand that the false declarations will be considered as breach of Integrity and liable for action.

**For Company Name:**

**Seal:**

**Signature:**

**Date:**

**Place:**

(Please fill all the yellow color field)

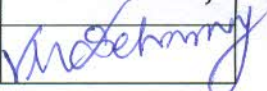


**Bharat Heavy Electricals Limited**  
**HIGH PRESSURE BOILER PLANT, TIRUCHIRAPPALLI 620 014.**  
**CONTROLS AND INSTRUMENTATION / FB**

**TECHNICAL SPECIFICATION FOR LOCAL GUN MAINTENANCE SWITCH BOX**

**Specification Number - TCI:338, Rev. 00**

**Revision History**

| Rev. No. | Date     | Description     | Prepared                                                                                                        | Reviewed                                                                                                          | Approved                                                                                               |
|----------|----------|-----------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 00       | 20-07-17 | Initial Release | Blessing Jany Churchil J<br> | Blessing Jany Churchil J<br> | V M Selvaraaj<br> |

## TECHNICAL SPECIFICATION FOR LOCAL GUN MAINTENANCE SWITCH BOX

Technical Specification Ref.:TCI:338, Rev. 00

| Specification Requirement                                 |                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Site Conditions                                        | Tropical, Dusty, Salty, Corrosive & Highly polluted.                                                                                                                                                                                                                                                                                                                                                                       |
| 2. Applicable Standard                                    | IEC-60529, IS-513, IS-2633, IS-2629, IS-4759 & IS-13229.                                                                                                                                                                                                                                                                                                                                                                   |
| 3. Application                                            | For field marshalling.                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4. Enclosure Protection                                   | IP-65.<br><br>Enclosure protection Type test certificate of a similar design from any of the National Test House/NABL accredited laboratory shall be submitted during the time of Inspection (Typical Certificates produced shall not be earlier than 5 years from the date of Purchase Enquiry).                                                                                                                          |
| 5. Material of the box – As indicated in Purchase Enquiry | FRP - Fibre glass Reinforced Polyester<br>Thickness - 4 mm (minimum) - Painted Finish.<br>or<br>CRCA Sheet Steel<br>Thickness - 2 mm (minimum) - Painted Finish.<br>or<br>CRCA Sheet Steel - Hot Dip Galvanised<br>Thickness - 2 mm (minimum).<br>or<br>Cold rolled Stainless steel (SS-316)<br>Thickness - 2 mm (minimum) - Buffed Finish.<br>or<br>Cast Aluminium (LM-6)<br>Thickness - 4 mm (minimum) - Painted Finish. |
| 6. Finish/Colour of the junction box                      | As Per Purchase Enquiry.                                                                                                                                                                                                                                                                                                                                                                                                   |
| 7. Terminal blocks                                        | 10 nos. of Cage clamp type suitable for 2.5 sq.mm. cables, Model-Side entry, Wago Model No. 281-101 or equivalent model in Phoenix / Elmex make shall be provided.<br><br>Terminal blocks shall be fixed by using suitable DIN rails and shall be mounted in horizontal orientation.<br><br>All terminal blocks shall be properly numbered as per the respective method.                                                   |

# TECHNICAL SPECIFICATION FOR LOCAL GUN MAINTENANCE SWITCH BOX

Technical Specification Ref.:TCI:338, Rev. 00

| Specification Requirement      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |           |           |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----|------|-------|-------|--------|-------|------|-------|----------|-------|-------|------|
| 8. Selector Switch Requirement | 3 Position Selector Switch (without OFF) with 3 NO contacts. Current Rating – 6 A.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |           |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
|                                | All the 3 positions shall be named as indicated below.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |           |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
|                                | Position-1 – “OFF”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |           |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
|                                | Position-2 – “REMOTE”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |           |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
|                                | Position-3 – “SCAVENGE”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |           |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
|                                | <table><tr><th>Position</th><th>Contact-1</th><th>Contact-2</th><th>Contact-3</th></tr><tr><td>Off</td><td>Make</td><td>Break</td><td>Break</td></tr><tr><td>Remote</td><td>Break</td><td>Make</td><td>Break</td></tr><tr><td>Scavenge</td><td>Break</td><td>Break</td><td>Make</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Position  | Contact-1 | Contact-2 | Contact-3 | Off | Make | Break | Break | Remote | Break | Make | Break | Scavenge | Break | Break | Make |
| Position                       | Contact-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Contact-2 | Contact-3 |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
| Off                            | Make                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Break     | Break     |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
| Remote                         | Break                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Make      | Break     |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
| Scavenge                       | Break                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Break     | Make      |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
|                                | <p>The selector switch wiring diagram shall be as per the drawing indicated in Sheet 05 of 06.</p> <p>Make : Kaycee / Siemens / L&amp;T / Salzer/ GEPC / C &amp; S / Schneider Electric / Switron</p> <p>Vendor to indicate the make &amp; model number of the selector switch in the drawing submitted for approval.</p> <p>Selector Switch shall be mounted inside the junction box as indicated in the drawing. 2 mm thick, mild steel, painted sheet steel plate shall be used for mounting the selector switch. Typical mounting arrangement applicable for Sheet steel box / Galvanized sheet steel box / Stainless steel box is indicated in sheet 06 of 06.</p> <p>For FRP box and Cast aluminium box, vendor’s standard practices shall be followed, without affecting the basic design.</p> |           |           |           |           |     |      |       |       |        |       |      |       |          |       |       |      |
| 9. Canopy                      | <p>Requirement shall be as per purchase enquiry.</p> <p>Material of Canopy shall be same as that of the junction box, except for Cast aluminium Junction box. Material of Canopy for Cast aluminium Junction box shall be Sheet steel, 2 mm thick.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |           |           |           |     |      |       |       |        |       |      |       |          |       |       |      |

## TECHNICAL SPECIFICATION FOR LOCAL GUN MAINTENANCE SWITCH BOX

Technical Specification Ref.:TCI:338, Rev. 00

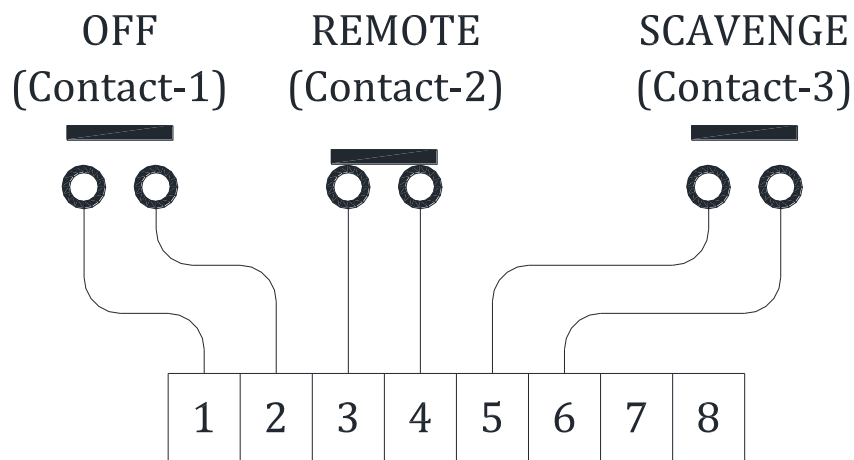
| Specification Requirement                        |                                                                                                                                                                                                                                                           |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  | The arrangement of canopy shall be as per vendor's standard.                                                                                                                                                                                              |
| 10. External earthing/<br>Grounding<br>Terminals | SS-304, M6, earth bolt arrangement shall be provided at both sides of the junction box.<br><br>Earth Symbol sticker (Black lines on Yellow back-ground) shall be provided near earth terminal.                                                            |
| 11. Door arrangement                             | Hinged door shall be provided with Industrial type metal Lock arrangement with common key, suitable for the enclosure protection of IP-65.<br><br>Door Gasket shall be of Neoprene Rubber or PUF material to meet with Enclosure protection requirements. |
| 12. Minimum<br>Dimensions                        | Height 200 mm x Width 150 mm x Depth 130 mm                                                                                                                                                                                                               |
| 13. Mounting                                     | Suitable for mounting on walls, columns, structures etc.<br><br>SS-304 Mounting Bolts, Nuts, Plate & Spring washers shall be supplied.                                                                                                                    |
| 14. Name Plates                                  | SS-304 Name Plate, 1 Number, size 75 mm X 25 mm and thickness 0.5mm shall be suitably fixed on to the door.<br><br>Name plate Engraving shall be " <b>LOCAL GUN MAINTENANCE SWITCH BOX</b> ". Colour of Engraving shall be Black                          |
| 15. Cable Entry                                  | Cable Entry - $\frac{3}{4}$ "dia. Plain hole - 1 Number shall be provided at the bottom.                                                                                                                                                                  |
| 16. Inspection & Testing                         | As per Quality plan - as per purchase enquiry                                                                                                                                                                                                             |
| 17. Packing                                      | Packing shall be as per Packing Procedure, QA:CI:STD:PR:02, Revision as per purchase enquiry                                                                                                                                                              |

## TECHNICAL SPECIFICATION FOR LOCAL GUN MAINTENANCE SWITCH BOX

Technical Specification Ref.:TCI:338, Rev. 00

| Specification Requirement |                                                                                                                                                                                                                                                                                                |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18. Guarantee             | A Guarantee certificate for 18 months from the date of shipment or 12 months from the date of commissioning whichever is earlier shall be furnished.                                                                                                                                           |
| 19. Documents             | <p>Vendor shall fill in "No Deviation" in the Sub-Delivery enquiry Deviation format indicating the Technical Specification and Project related information references and submit along with the offer.</p> <p>In the absence of No Deviation format, vendor's offer will not be evaluated.</p> |

### Selector Switch Wiring Diagram

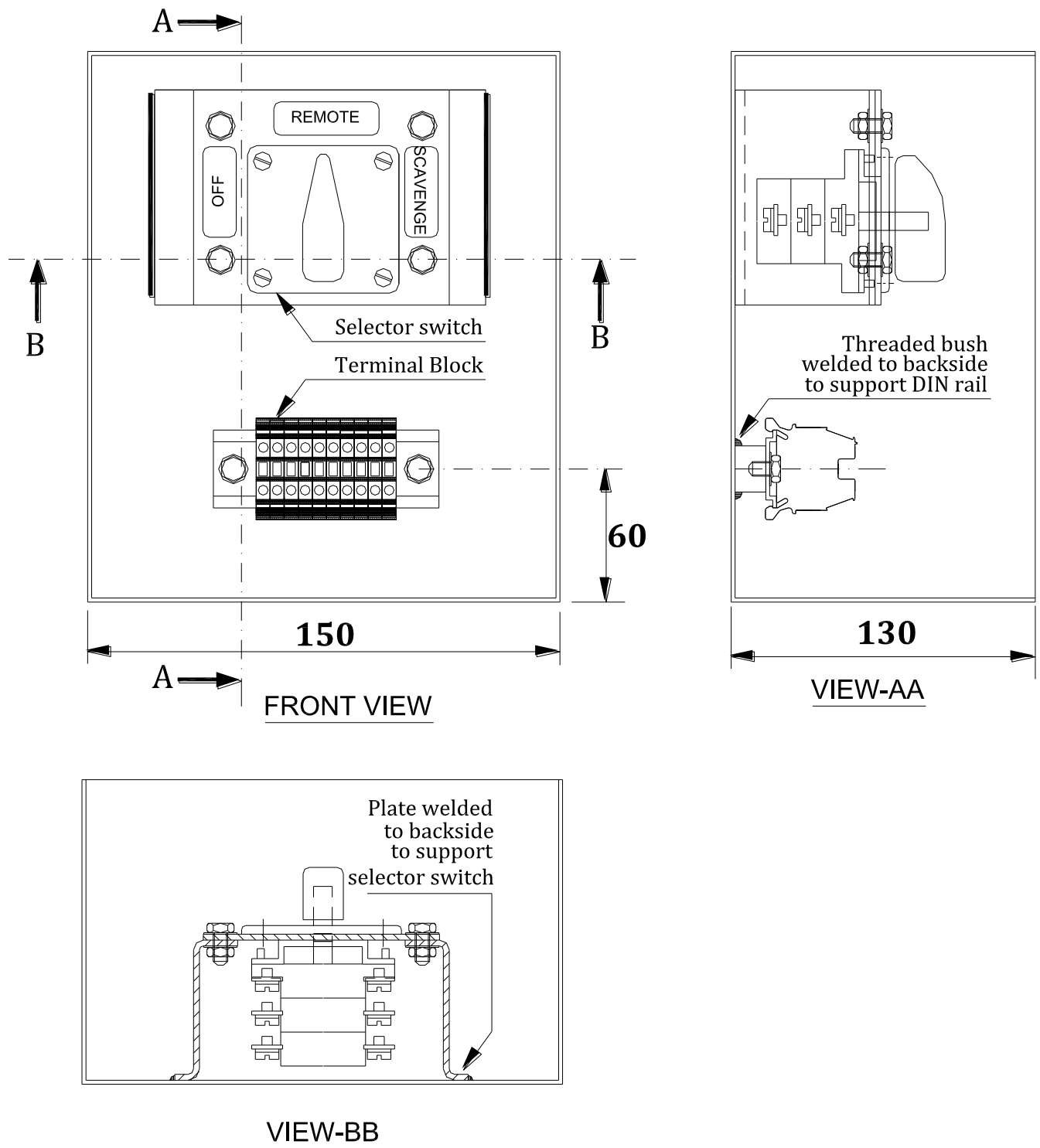


Selector Switch wiring Diagram  
(Shown for "Remote" position)

# TECHNICAL SPECIFICATION FOR LOCAL GUN MAINTENANCE SWITCH BOX

Technical Specification Ref.:TCI:338, Rev. 00

## General Arrangement of Selector switch and Terminal block





**BHARAT HEAVY ELECTRICALS LIMITED**  
**TIRUCHIRAPALLI - 14**

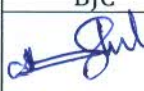
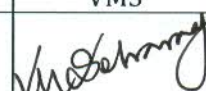
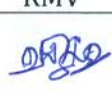
**CONTROLS & INSTRUMENTATION/FB**

SHEET 01 OF 07

**Technical Specification for**  
**FIBRE GLASS REINFORCED POLYESTER (FRP) JUNCTION BOX**

**Specification Number - TCI:252, Rev. 03**

**Revision History**

| REV.<br>NO. | DATE       | DESCRIPTION                           | PREPARED                                                                            | REVIEWED                                                                             |                                                                                       | APPROVED                                                                              |
|-------------|------------|---------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|             |            |                                       |                                                                                     | ENGINEERING                                                                          | QAC                                                                                   | ENGINEERING                                                                           |
| 00          | 23-09-2008 | Initial Release                       | -Sd-                                                                                | -Sd-                                                                                 | -Sd-                                                                                  | -Sd-                                                                                  |
| 01          | 12-02-2014 | Revisit                               | -Sd-                                                                                | -Sd-                                                                                 | -Sd-                                                                                  | -Sd-                                                                                  |
| 02          | 30-03-2016 | Revisit                               | -Sd-                                                                                | -Sd-                                                                                 | -Sd-                                                                                  | -Sd-                                                                                  |
| 03          | 10-07-2017 | Revised to include<br>TT mountable JB | BJC                                                                                 | VMS                                                                                  | RMV                                                                                   | VM                                                                                    |
|             |            |                                       |  |  |  |  |



### SPECIFICATION REQUIREMENT

|                                  |                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Site Conditions :- Atmosphere | Dusty, Salty, corrosive & Heavily polluted.                                                                                                                                                                                                                                                                                                                                            |
| 2. Applicable Standard           | IS/IEC-60529.                                                                                                                                                                                                                                                                                                                                                                          |
| 3. Application                   | For field marshalling.                                                                                                                                                                                                                                                                                                                                                                 |
| 4. Enclosure protection          | Water and dust proof – IP 65 protection as per IS/IEC-60529.<br><br>Enclosure protection Type test certificate from any of the National Test House shall be submitted during the time of Inspection (Typical Certificates produced shall not be earlier than 5 years from the date of Purchase Enquiry).                                                                               |
| 5. Material of the Junction box  | Fibre glass Reinforced Polyester (FRP)<br><br>Wall thickness – 4 mm (Minimum).                                                                                                                                                                                                                                                                                                         |
| 6. Finish - Colour               | As per Purchase Enquiry                                                                                                                                                                                                                                                                                                                                                                |
| 7. Number of Ways (Variant)      | Item No. 01 : Standard Junction Box - 24, 48 & 72 way – as per purchase enquiry.<br><br>Item No. 02 : MTM Junction Box - 24, 48 & 72 way – as per purchase enquiry.<br><br>Item No. 03 : Junction box with DIN Rail provision to mount 4 or 6 Nos. of Temperature Transmitters (TT) – as per purchase enquiry.                                                                         |
| 8. Terminal Blocks               | <b><u>Standard Junction Box :</u></b><br>Side Entry, Cage clamp type, suitable for 4 sq.mm. cables. Wago Model No. 281-101. Colour: Grey.<br><br><b><u>MTM Junction Box (for Thermocouple) :</u></b><br>Side Entry, Screw clamp type, Thermocouple Terminal blocks suitable for 'K' type Thermocouple, suitable for 2.5 Sq.mm size.<br>Connectwell Model No. CTT2.5U.<br>Colour: Grey. |



### SPECIFICATION REQUIREMENT

**Junction box (JB) with DIN Rail provision to mount 4 or 6 Nos. of Temperature Transmitters (TT):**

Side Entry, Cage clamp type, suitable for 4 sq.mm. cables. Wago Model No. 281-101. Colour: Grey.

Minimum number of Terminal block (TB) to be provided is as below :-

| JB Variety | No. of input TB | No. of output TB |
|------------|-----------------|------------------|
| 4TT        | 40              | 16               |
| 6TT        | 60              | 24               |

All terminal blocks shall be properly numbered as per the respective method.

Terminal blocks shall be mounted by using suitable Zinc plated DIN RAIL and other mounting accessories.

Terminal blocks shall be mounted in vertical orientation for all the varieties of junction boxes.

Vendor can also offer equivalent models for the above items from the approved makes indicated in QA:CI:STD:QP:34, Rev. 04.

9. Canopy

Requirement as per purchase Enquiry.  
Material shall be FRP, with a minimum thickness of 5 mm. Colour shall be same as junction box, as per Purchase enquiry  
Canopy shall have 30 mm over-hanging on both sides and 50 mm projection at front (with door closed).  
Canopy mounting shall not hinder Door opening and IP rating of the junction box.  
Canopy shall be supplied as loose with fixing accessories. Fixing accessories shall be SS-304.



### SPECIFICATION REQUIREMENT

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10. Component Mounting Plate                  | 2 mm thick, Mild steel / Aluminium sheet, Powder coated/Painted/Zinc passivated. Requirement as per purchase enquiry.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 11. Cable duct                                | Salzer make, flame retardant type PVC cable duct of suitable size and length shall be provided between rows of terminal blocks and at the bottom.                                                                                                                                                                                                                                                                                                                                                                                               |
| 12. External earthing/<br>Grounding Terminals | 1 No. SS-304, M6, earth bolt with 2 Nos. SS Nuts & washers, shall be provided at both sides of the junction box.<br><br>Earth Symbol sticker (Black lines on Yellow background) shall be provided near earth terminal.                                                                                                                                                                                                                                                                                                                          |
| 13. Shield Bus                                | Shield bus-10 mm x 3 mm, 150 mm long, Connectwell Model, NEB-10.<br><br>10 numbers of Sliding type Earth Links, Connectwell Model, CENC-4.<br><br>Shield bus shall be mounted using Bus-bar mounting support, Connectwell Model, NES.                                                                                                                                                                                                                                                                                                           |
| 14. Door Arrangement                          | Door Gasket shall be of Neoprene Rubber or PUF material to meet with Enclosure protection requirements.<br><br>Door shall be provided with Industrial type metal Lock arrangement with common key suitable for the enclosure protection of IP-65.<br><br>Door Handle shall be provided as per Vendor's standard practice.<br><br>Doors shall be removable or hinged - as per purchase enquiry.<br><br><b><u>Removable Door :</u></b><br>Doors shall be fixed by using SS-304 Bolts, at four sides. Door shall be provided with Retention chain. |



### SPECIFICATION REQUIREMENT

**Hinged Door :-**

Door shall be fixed with Stainless Steel Hinge. Stainless Steel bolt & nut shall be used for fixing the hinge. Number of Hinges shall be as per Clause No. 15. Hinge shall be 2" in size, minimum.

**15. Dimensions :-**

As per vendor's standard. However, the minimum dimensions shall be maintained as indicated below.

| No. of Ways/Dimensions            | 24 Way                        | 48 Way | 72 way | 4TT | 6TT |
|-----------------------------------|-------------------------------|--------|--------|-----|-----|
|                                   | Standard & MTM junction boxes |        |        |     |     |
| Minimum Height (mm)               | 390                           | 420    | 450    | 400 | 500 |
| Minimum Width (mm)                | 310                           | 420    | 450    | 460 | 460 |
| Minimum Depth (mm) (without Door) | 130                           | 130    | 130    | 220 | 220 |
| No. of SS Hinges                  | 3                             | 3      | 4      | 3   | 4   |

**16. Mounting**

Suitable for mounting on walls, columns, structures etc.

**17. Junction box mounting Accessories**

SS-304 Mounting Brackets, Bolts, Nuts, Plate & Spring washers shall be supplied.

**18. Name Plate**

2 Nos. of SS-304 Name Plate of size 75 mm X 25 mm and thickness 0.5mm shall be provided for each Junction box. Mounting hole of 4 mm dia. shall be provided at both ends of the name plate.

2 Sets of SS-304, M3 x 10 size bolt, nuts & washers shall be supplied with each name plate.

Name plate Engraving details will be furnished during the time of purchase order. Colour of Engraving shall be Black.



### SPECIFICATION REQUIREMENT

#### 19. Cable Entries :-

Plain holes as per the details below shall be provided in each variety of the junction box.

| Junction box         | Cable Entry                                               |
|----------------------|-----------------------------------------------------------|
| 24 way – Standard JB | 1" dia. Hole – 2 Nos. $\frac{3}{4}$ " dia. Hole – 8 Nos.  |
| 48 way – Standard JB | 1" dia. Hole – 3 Nos. $\frac{3}{4}$ " dia. Hole – 10 Nos. |
| 72 way – Standard JB | 1" dia. Hole – 4 Nos. $\frac{3}{4}$ " dia. Hole – 15 Nos. |
| 24 way – MTM JB      | 1" dia. Hole – 2 Nos. $\frac{1}{2}$ " dia. Hole – 6 Nos.  |
| 48 way – MTM JB      | 1" dia. Hole – 3 Nos. $\frac{1}{2}$ " dia. Hole – 12 Nos. |
| 72 way – MTM JB      | 1" dia. Hole – 4 Nos. $\frac{1}{2}$ " dia. Hole – 16 Nos. |
| JB suitable for 4 TT | 1" dia. Hole – 2 Nos. $\frac{1}{2}$ " dia. Hole – 6 Nos.  |
| JB suitable for 6 TT | 1" dia. Hole – 2 Nos. $\frac{1}{2}$ " dia. Hole – 8 Nos.  |

However, exact size and number of cable entries will be indicated during Dimensional Drawing Approval.

|                          |                                                                                                                                                      |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20. Dummy Plugs          | All Cable entries shall be plugged with suitable Dummy Plugs.<br><br>Material: Neoprene or Equivalent material.                                      |
| 21. Inspection & Testing | Quality plan No. QA:CI:STD:QP:74. Revision as per Purchase enquiry.                                                                                  |
| 22. Packing              | Packing procedure No. QA:CI:STD:PR:02. Revision as per Purchase enquiry.                                                                             |
| 23. Guarantee            | A Guarantee certificate for 18 months from the date of shipment or 12 months from the date of commissioning whichever is earlier shall be furnished. |



### SPECIFICATION REQUIREMENT

24. Documents to be submitted by the vendor

**Along with Offer :-**

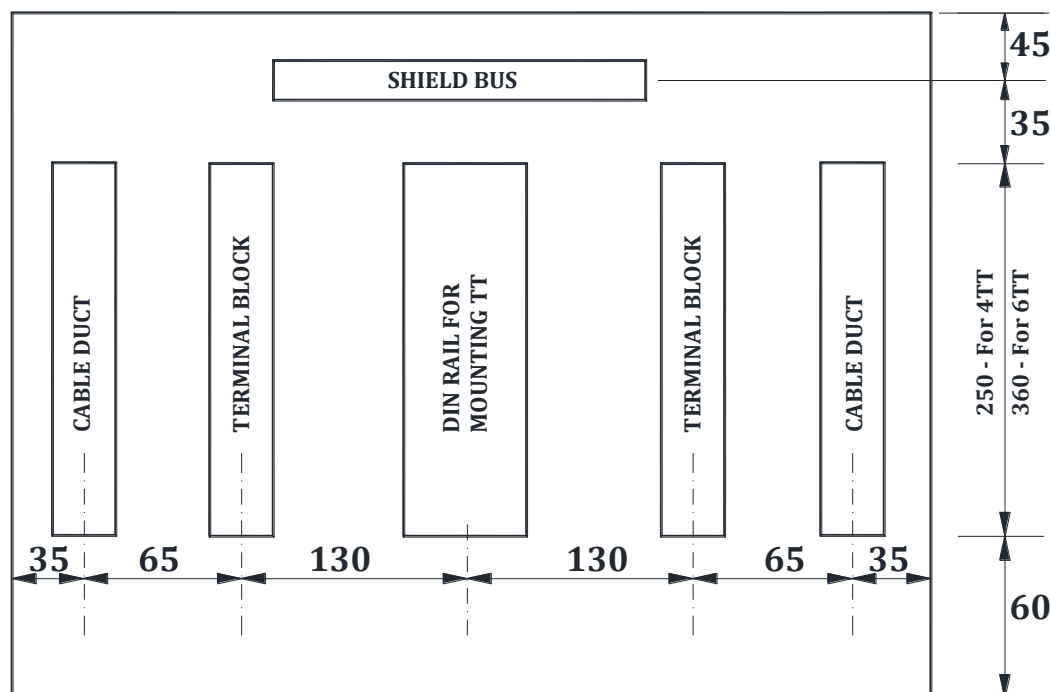
Sub-Delivery Enquiry Deviation format indicating "No Deviation" with the references of Technical Specification and Quality Plan and Packing Procedure.

In the absence of No Deviation format, the vendor's offer will not be evaluated.

**After Placement of Purchase order :-**

Vendor to forward the Dimensional Drawings for all the varieties of Junction boxes, indicating the references of Purchase Order, Quality Plan, complete BOM (Materials for various components) and get the same approved by BHEL(T), before start of manufacture.

### TERMINAL BLOCK & SHIELD BUS ARRANGEMENT FOR TEMPERATURE TRANSMITTER MOUNTABLE JUNCTION BOX

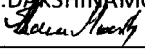


|                                                                                   |                                                                            |  |                                                                     |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------|--|---------------------------------------------------------------------|
|  | <b>BHARAT HEAVY ELECTRICALS LIMITED</b><br><b>TIRUCHIRAPPALLI - 620014</b> |  | <b>QA:CI:STD:QP:74</b><br>Rev: 00                      Page: 1 of 3 |
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## CONTROLS AND INSTRUMENTATION/QA/FB

### STANDARD QUALITY PLAN FOR

### FRP JUNCTION BOX

| REV | DATE       | PREPARED                                                                                         | REVIEWED                                                                                            | APPROVED                                                                                                   | REVISION HISTORY |
|-----|------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------|
| 00  | 19/01/2015 | V.AVINASH<br> | RM.VAIRAVAN<br> | S.DAKSHINAMOORTHY<br> | Initial Release  |

|                                                                                  |                                                                            |                                                    |                                                              |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------|
|  | <b>BHARAT HEAVY ELECTRICALS LIMITED</b><br><b>TIRUCHIRAPPALLI - 620014</b> | <b>QUALITY PLAN FOR</b><br><b>FRP JUNCTION BOX</b> | <b>QA:CI:STD:QP:74</b><br><b>Rev: 00</b> <b>Page: 2 of 3</b> |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------|

| Sl. No. | Components & Operation                                     | Characteristics                                                                                                        | Class    | Type Of Check | Quantum Of Check |         | Ref Doc. & Acceptance STD          | Format Of Record | Agency |   |   | Remarks                   |
|---------|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------|---------------|------------------|---------|------------------------------------|------------------|--------|---|---|---------------------------|
|         |                                                            |                                                                                                                        |          |               | M                | B/ C    |                                    |                  | M      | B | C |                           |
| A       | RAW MATERIALS                                              |                                                                                                                        |          |               |                  |         |                                    |                  |        |   |   |                           |
| 1.      | Polyester Resin, C. S. Mat, Accelerator, Pigment, Catalyst | Review Of Manufacture T.C Check for Proper Labels. Identification Check For Batch Number and Date To Ensure Shelf Life | Major    | VISU          | 100%             | -       | Manufacturer Spec.                 | LGB / TC         | P      | - | - |                           |
| 2       | Pre Treatment Of Moulds                                    | Rectification Of Moulds For Any Undulations Scratches Etc.                                                             | Major    | VISU          | 100%             | -       | Manufacture Procedure              | LGB              | P      | - | - |                           |
| 3.      | Mechanical Operation Preparation                           | A) Weighment Of Resin Pigments Accelerator In Correct Proportions                                                      | Major    | MEAS          | 100%             | -       | Manufacture Procedure              | LGB              | P      | - | - |                           |
|         |                                                            | B) Templates For Cutting Glass Fibre                                                                                   | Major    | VISU MEAS     | One Lot          | -       | -Do-, Drawing                      | LGB              | V      | - | - |                           |
|         |                                                            | C) Curing                                                                                                              | Major    | PHYS          | 100%             | -       |                                    | LGB              | V      | - | - |                           |
| 4.      | Post Moulding                                              | Check For Thickness, Dimension & Finish                                                                                | Major    | VISU, MEAS    | 100%             | -       | Manufacture Drawing                | LGB              | V      | - | - |                           |
| B       | INPROCESS INSPECTION                                       | Component Fitment To Chassis                                                                                           | Major    | VISU, FUNC    | 100%             | -       | -Do-                               | LGB              | P      | - | - |                           |
| C       | FINAL INSPECTION & TESTING                                 | 1. MECHANICAL<br>a. BOM Check                                                                                          | Critical | VISU          | 100%             | 10%     | Approved BOM / Manufacture Drawing | IR               | P      | W | - |                           |
|         |                                                            | b. Physical & Dimensional Verification                                                                                 | Critical | MEAS          | 100%             | 10%     | Manufacture Drawing                | IR               | P      | W | - |                           |
|         |                                                            | c. Lock and Door Arrangement                                                                                           | Major    | MECH          | 100%             | 10%     | Manufacture Drawing                | IR               | P      | W | - |                           |
|         |                                                            | d. Paint thickness                                                                                                     | Critical | MEAS          | 100%             | 1 place | Approved Drawing                   | IR               | P      | W | - | on each side              |
|         |                                                            | e. Surface Finish                                                                                                      | Critical | VISU          | 100%             | Random  | Manufacture Drawing                | IR               | P      | W | - |                           |
|         |                                                            | f. Earth point and Marking                                                                                             | Critical | VISU          | 100%             | 100%    |                                    | IR               | P      | W | - |                           |
|         |                                                            | g. Interchangeability of cover                                                                                         | Critical | MECH          | 100%             | 10%     | Manufacture Drawing                | IR               | P      | W | - |                           |
|         |                                                            | 2. ELECTRICAL<br>a. Insulation Resistance Test with 500 V DC Megger                                                    | Critical | ELEC          | 100%             | 10%     | IS60947-1                          | IR               | P      | W | - | Before and after HV test. |

**M- MANUFACTURER/ SUB-VENDOR; B - BHEL / TPI; C - CUSTOMER / TPI**  
**P - PERFORM; W - WITNESS V – VERIFICATION.**

|                                                                                  |                                                                            |                                                    |                                                              |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------|
|  | <b>BHARAT HEAVY ELECTRICALS LIMITED</b><br><b>TIRUCHIRAPPALLI - 620014</b> | <b>QUALITY PLAN FOR</b><br><b>FRP JUNCTION BOX</b> | <b>QA:CI:STD:QP:74</b><br><b>Rev: 00</b> <b>Page: 3 of 3</b> |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------|

| Sl. No.  | Components & Operation        | Characteristics                                      | Class    | Type Of Check | Quantum Of Check |               | Ref Doc. & Acceptance STD | Format Of Record | Agency |   |   | Remarks |
|----------|-------------------------------|------------------------------------------------------|----------|---------------|------------------|---------------|---------------------------|------------------|--------|---|---|---------|
|          |                               |                                                      |          |               | M                | B/ C          |                           |                  | M      | B | C |         |
|          |                               | b. High Voltage Test At 2.0 KV For 1 Min.            | Critical | ELEC          | 100%             | 10%           | IS60947-1                 | IR               | P      | W | - |         |
| <b>D</b> | <b>TYPE TEST</b>              | Enclosure Protection Test                            | Major    | ENVI          | One of Design    | One of Design | IS60529                   | TC               | V      | V | - |         |
| <b>E</b> | <b>PACKING &amp; DESPATCH</b> | A) Check For Completeness Of Equipment & Accessories | Major    | VISU          | 100%             | 100%          | BHEL Spec.                | LGB              | P      | - | - |         |

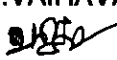
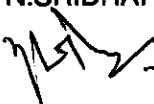
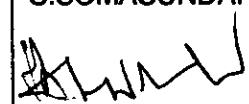
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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-------------------|--------------------|-------------------|-----------------|------------------------|--------------------------------|----------------|------------------------|-----------------------|----------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------|---------|------------------------------------------------|
| <p><b>F. NOTES:</b></p> <p>1. LEGEND :</p> <table> <tr> <td>VISU : Visual</td> <td>ELEC : Electrical</td> </tr> <tr> <td>MEAS : Measurement</td> <td>FUNC : Functional</td> </tr> <tr> <td>PHYS : Physical</td> <td>BOM : Bill Of Material</td> </tr> <tr> <td>FRP : Fiber Reinforced Polymer</td> <td>LGB : Log Book</td> </tr> <tr> <td>IR : Inspection Report</td> <td>TC : Test certificate</td> </tr> <tr> <td>ENVI : Environmental</td> <td>MECH : Mechanical</td> </tr> </table> <p>2. Vendor shall arrange all test facilities at their works. Tests for which facilities are not available are to be carried out at recognized national test houses like ETDC/CIL/ NPL/ ERTL/ NABL accredited lab at vendor's cost.</p> <p>3. Through logbooks/ any other documents available at the vendor's works, it shall be possible to correlate the finished product with raw material and in process stage checks / inspection carried out.</p> <p>4. All measuring and testing instruments shall be periodically calibrated from recognized test houses and certificates made available during Inspection.</p> | VISU : Visual                                  | ELEC : Electrical | MEAS : Measurement | FUNC : Functional | PHYS : Physical | BOM : Bill Of Material | FRP : Fiber Reinforced Polymer | LGB : Log Book | IR : Inspection Report | TC : Test certificate | ENVI : Environmental | MECH : Mechanical | <p>5. Test certificates for type test to be furnished by the vendor. Type test certificates shall not be earlier than 5 years from the date of Enquiry. Otherwise type test have to be conducted and T.C shall be submitted</p> <p>6. Vendor to give tentative inspection program in advance and confirm exact date, two weeks in advance for arranging BHEL inspection.</p> <p>7. Packing shall be as per the 'PACKING PROCEDURE' as indicated in the Specification.</p> <p><b>G. REFERENCE STANDARDS:</b><br/>(For Indicated Standards Refer the Latest Version)</p> <table> <tr> <td>IS60947-1</td> <td>: General rules for low voltage switch gear</td> </tr> <tr> <td>IS60529</td> <td>: Specification for Enclosure Protection Test.</td> </tr> </table> | IS60947-1 | : General rules for low voltage switch gear | IS60529 | : Specification for Enclosure Protection Test. |
| VISU : Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ELEC : Electrical                              |                   |                    |                   |                 |                        |                                |                |                        |                       |                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                             |         |                                                |
| MEAS : Measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | FUNC : Functional                              |                   |                    |                   |                 |                        |                                |                |                        |                       |                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                             |         |                                                |
| PHYS : Physical                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | BOM : Bill Of Material                         |                   |                    |                   |                 |                        |                                |                |                        |                       |                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                             |         |                                                |
| FRP : Fiber Reinforced Polymer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | LGB : Log Book                                 |                   |                    |                   |                 |                        |                                |                |                        |                       |                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                             |         |                                                |
| IR : Inspection Report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | TC : Test certificate                          |                   |                    |                   |                 |                        |                                |                |                        |                       |                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                             |         |                                                |
| ENVI : Environmental                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | MECH : Mechanical                              |                   |                    |                   |                 |                        |                                |                |                        |                       |                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                             |         |                                                |
| IS60947-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | : General rules for low voltage switch gear    |                   |                    |                   |                 |                        |                                |                |                        |                       |                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                             |         |                                                |
| IS60529                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | : Specification for Enclosure Protection Test. |                   |                    |                   |                 |                        |                                |                |                        |                       |                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                                             |         |                                                |

SQP74R0.DOC

**M**- MANUFACTURER/ SUB-VENDOR; **B** - BHEL / TPI; **C** - CUSTOMER / TPI  
**P** - PERFORM; **W** - WITNESS **V** – VERIFICATION.

**BHARAT HEAVY ELECTRICALS LIMITED / TIRUCHIRAPPALLI  
CONTROLS AND INSTRUMENTATION/QA/FB**

**STANDARD QUALITY PLAN  
FOR  
ELECTRICAL PANEL ACCESSORIES**

| REV | DATE     | PREPARED                                                                                         | REVIEWED                                                                                        | APPROVED                                                                                               |                                                                                                        | REVISION HISTORY                                                                                                                                                                                                                                                                                                        |
|-----|----------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |          |                                                                                                  |                                                                                                 | ENGG.                                                                                                  | QUALITY                                                                                                |                                                                                                                                                                                                                                                                                                                         |
| 00  | 16.06.97 | -Sd-                                                                                             | -Sd-                                                                                            | -Sd-                                                                                                   | -Sd-                                                                                                   | Initial release                                                                                                                                                                                                                                                                                                         |
| 01  | 22.02.99 | -Sd-                                                                                             | -Sd-                                                                                            | -Sd-                                                                                                   | -Sd-                                                                                                   | New Vendors Added                                                                                                                                                                                                                                                                                                       |
| 02  | 21.03.02 | -Sd-                                                                                             | -Sd-                                                                                            | -Sd-                                                                                                   | -Sd-                                                                                                   | Dept. name changed & General revision-Based on Engg. discussion.                                                                                                                                                                                                                                                        |
| 03  | 08.01.04 | -Sd-                                                                                             | -Sd-                                                                                            | -Sd-                                                                                                   | -Sd-                                                                                                   | Revised to include the comments /Feedback of internal discussion                                                                                                                                                                                                                                                        |
| 04  | 07.12.07 | RM.VAIRAVAN<br> | N.SRIDHAR<br> | L.A.E.Fernandez<br> | S.SOMASUNDARAM<br> | Vendor list updated. Inputs considered are: <ul style="list-style-type: none"> <li>• TCE approved List for Jojobera</li> <li>• NTPC approved list for BAP( Sipat).</li> <li>• NTPC approved list for Korba-III.</li> <li>• NTPC approved list for Barh STPP.</li> <li>• Feedbacks obtained during discussion</li> </ul> |

| SL.NO | PRODUCT                              | APPROVED VENDORS                                                                                                                                     |
|-------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01    | Air Circuit Breaker.                 | L&T / GEPC / SIEMENS / CONTROLS & SWITCHGEAR Co.LTD / SCHNEIDER-MERLIN GERIN ENERPACT                                                                |
| 02    | Miniature circuit breaker (MCB).     | MDS / CROMPTON GREAVES / INDO - ASIAN / IM / LUPUS / SCHNEIDER ELECTRIC / SIEMENS / L&T – HAGER /INDOKOPP/COOPER BUSMANN /STANDARD                   |
| 03    | Moulded case circuit breaker (MCCB). | L&T / GEPC./ CROMPTON GREAVES / BCH / ABB / SIEMENS / CONTROLS & SWITCHGEAR Co.LTD/ SCHNEIDER ELECTRIC / ANDREW YULE /AREVA                          |
| 04    | Power contactors – AC.               | L&T / SIEMENS / CONTROLS & SWITCHGEAR CONTACTORS LTD (TC) / SPRECHER & SCHUH / ANDREW YULE / BCH / GEPC / CROMPTON GREAVES / SCHNEIDER ELECTRIC      |
| 05    | Power & Auxiliary Contactors – DC.   | GEPC / BCH / CONTROLS & SWITCHGEAR CONTACTORS LTD(TC) / SIEMENS / SPRECHER & SCHUH / L&T / SCHNEIDER ELECTRIC/ANDREW YULE.                           |
| 06    | Auxiliary Contactors – AC.           | L&T / SIEMENS / ABB / BCH / CONTROLS & SWITCHGEAR CONTACTORS LTD(TC) / CROMPTON GREAVES / GEPC/ SPRECHUR & SCHUH / SCHNEIDER ELECTRIC / ANDREW YULE. |
| 07    | Indicating lamp.                     | SIEMENS / VAISHNAO / GEPC / BCH / L&T - ESBEE / CANDS / TEKNIC / CONCORD / ESSEN / CONTROLS & SWITCHGEAR CONTACTORS LTD(TC)-RASS Series              |
| 08    | Push Button.                         | SIEMENS / BCH / TEKNIC / CANDS / L&T - ESBEE / VAISHNAO / GEPC / CONTROLS & SWITCHGEAR CONTACTORS LTD(TC)-RASS Series / SCHNEIDER ELECTRIC/CONCORD.  |
| 09    | Illuminated Push button              | PARAMOUNT / BCH                                                                                                                                      |
| 10    | Indicating Instruments.              | AE / IMP / MECO / L&T-RISHAB / SIETEX / MASSIBUS/ALSTOM.                                                                                             |
| 11    | Switches ( Power / Control ).        | KAYCEE / SIEMENS / L&T / SALZAR/ GEPC / CONTROLS & SWITCHGEAR Co. LTD / SCHNEIDER ELECTRIC / SWITRON (For Control switch only)                       |

| SL.NO | PRODUCT                                                                                             | APPROVED VENDORS                                                                                                                                      |
|-------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12    | Thermal Overload Relays.                                                                            | L&T / SIEMENS / CONTROLS & SWITCHGEAR CONTACTORS LTD (TC) / BCH / GEPC / SPRECHER & SCHUH / CROMPTON GREAVES / SCHNEIDER ELECTRIC/ ANDREW YULE.       |
| 13    | Protective Relays(Electromechanical).                                                               | AREVA / EASUN REYROLLE / ABB / SEG & CONTROLS / SIEMENS.                                                                                              |
| 14    | Protective Relays(Microprocessor).                                                                  | AREVA / ABB / L&T                                                                                                                                     |
| 14    | Timers - Electronic.                                                                                | SIEMENS / ABB / CONTROLS & SWITCHGEAR CONTACTORS LTD((TC) / GEPC / OMRON / SPRECHER & SCHUH / SELECTRON. / BCH                                        |
| 15    | Timers - Electro – Pneumatic.                                                                       | BCH / CONTROLS & SWITCHGEAR CONTACTORS LTD(TC)/ SPRECHER & SCHUH                                                                                      |
| 16    | Timers - Synchronous.                                                                               | L&T - G I C.                                                                                                                                          |
| 17    | Annunciators.                                                                                       | IIC / L&T / PROCON / ADVANI OERLIKON / OMRON / PIRI / PECON / SIEMENS/MINILEC                                                                         |
| 18    | Current & Potential transformers.                                                                   | AE / KAPPA / INDCOIL / PRAYOG / CONTROLS & SWITCHGEAR CONTACTORS LTD(TC) / SIEMENS / APPOLO / PRAGATI / PRECISE / JYOTI / SILKAANS/G&M(For PT only) . |
| 19    | Control supply transformers.                                                                        | AE / KAPPA / INDCOIL / SOUTHERN ELECTRIC / SIEMENS / APPOLO / CONTROLS & SWITCHGEAR / PRECISE / LOGICSTAT/PRAGATI/PRAYOG                              |
| 20    | Terminal block - screw type<br>( terminals & fasteners shall be brass with nickel cadmium plated ). | ESSEN / ELMEX (THERMO –PLASTIC TYPE) / TOSHA / ASIA ELECTRIC ( IEC MAKE ) / CONNECT WELL / TECHNOPLAST / VEECON / PHOENIX/WAGO                        |
| 21    | Terminal Block – Cage Clamp type.                                                                   | WAGO / PHOENIX / ELMEX                                                                                                                                |
| 22    | Fuse Carriers.                                                                                      | SIEMENS / L&T / S&S / CROMPTON GREAVES / CONTROLS & SWITCHGEAR Co. LTD / GEPC / COOPER BUSSMAN.                                                       |
| 23    | Fuse Links/Neutral Links.                                                                           | SIEMENS / L&T / CROMPTON GREAVES / CONTROLS & SWITCHGEAR Co.LTD/ GEPC / CANDS / COOPER BUSSMAN.                                                       |

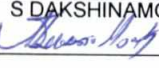
| SL.NO | PRODUCT                                                                                   | APPROVED VENDORS                                                                                                                         |
|-------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 24    | Panel Wires                                                                               | BIS APPROVED                                                                                                                             |
| 25    | Cable Glands – (weather proof).                                                           | COMET / POWER ENGG / SUNIL & CO / SMI / BRACCO / ARUP ENGG. WORKS / QPIE / GLANDMECH / CONTROLS & SWITCHGEAR Co. LTD / QUALITY PRECISION |
| 26    | Ferrules                                                                                  | MICROSIGN/MAY FAIR/OESER                                                                                                                 |
| 27    | Lugs.                                                                                     | DOWELL / 3D / DIVYA JYOTHI / CHETNA / JAINSONS                                                                                           |
| 28    | Space Heater.                                                                             | SOPHIA / CANDS / CROMPTON GREAVES / PYRO SYSTEM / VELCO / CONTROLS & SWITCHGEAR Co.LTD.                                                  |
| 29    | 15/5 A Power Supply Switch With Plug & Socket ( Metal Clad Type With Spring Loaded Cap ). | CROMPTON GREAVES/ AJMERA / BCH / BEST & CROMPTON./GEWIS INDIA                                                                            |
| 30    | Cubicle Illumination Lamp.                                                                | PHILIPS / BAJAJ / CROMPTON GREAVES / <b>MYSORE LAMPS / HMT.</b>                                                                          |
| 31    | Door Switch.                                                                              | ESSEN / IEC.                                                                                                                             |
| 32    | Cooling Fan.                                                                              | RALLI-WOLF / KHAITAN / USHA.                                                                                                             |
| 33    | Interposing Relay (Low Burden).                                                           | JYOTHI / OMRON / ABIL / ABB / SIEMENS / GEPC / OEN / L&T/OWN MAKES OF APPROVED PLC VENDORS.                                              |
| 34    | Cable Glands - Flame Proof.                                                               | BALIGA / SUDHIR / CEAG / PROMPT / COMET                                                                                                  |
| 35    | Indicating Lamp – LED.                                                                    | SRISHYLA / TEKNIC / PARAMOUNT / BINAY / KWALITY / HEWLETT PACKARD                                                                        |
| 36    | Motor Protection Circuit Breaker                                                          | L&T / GEPC / SIEMENS / SCHNEIDER ELELCTRIC / SPRECHER & SCHUH .                                                                          |
| 37    | Cable Dressing Material.                                                                  | MICROSIGN.                                                                                                                               |
| 38    | Wire Duct.                                                                                | SALZAR.                                                                                                                                  |

| SL.NO | PRODUCT               | APPROVED VENDORS                                       |
|-------|-----------------------|--------------------------------------------------------|
| 39    | Electrical Transducer | ABB / AE / SOUTHERN TRANSDUCER/ELSTER/RISHAB.          |
| 40    | Thermostat            | APT / TEMPTROL / VIKAS ELECTRIC / AI / RENUTROL / ANCO |
| 41`   | Trivector Meter       | ALSTOM / BHEL/AREVA/IMP                                |

**BHARAT HEAVY ELECTRICALS LIMITED  
TIRUCHIRAPPALLI**

**CONTROLS AND INSTRUMENTATION / FB  
QUALITY ASSURANCE**

**STANDARD PACKING PROCEDURE  
FOR  
ELECTRICAL AND ELECTRONIC PANELS  
(INCLUDING BOXES, CABINETS, CUBICLES, SYSTEMS AND CHASSIS)**

| Rev | Date       | Prepared                                                                                         | Checked                                                                                            | Approved                                                                                                  | Revision History                                |
|-----|------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| 00  | 01.01.96   | Sd/-                                                                                             | Sd/-                                                                                               | Sd/-                                                                                                      | Initial History                                 |
| 01  | 28.03.02   | A.J.OMPRAKASH<br>Sd/-                                                                            | R.VARADARAJAN<br>Sd/-                                                                              | G.MATHIYALAGAN<br>Sd/-                                                                                    | Department name changed                         |
| 02  | 26.02.07   | RM.VAIRAVAN                                                                                      | N.SRIDHAR                                                                                          | S.SOMASUNDARAM                                                                                            | Revised after discussion with<br>Shipping Dept. |
| 03  | 07.02.2017 | AVINASH V<br> | RM VAIRAVAN<br> | S DAKSHINAMOORTHY<br> | Type of wood for packing<br>changed             |

**1.0 SCOPE**

- 1.1 This procedure gives minimum guidelines to be complied with for packing of Electrical, Electronics and Instrumentation panels. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage for periods more than one year.

**2.0 WOOD SPECIFICATION FOR PACKING**

- 2.1 Any seasoned wood or plywood as per relevant international standard  
2.2 Sea worthy packing is envisaged for international shipments.

**3.0 PACKING**

- 3.1 Any seasoned wood or plywood shall be used .It shall be free from knots, etc. and any kind of decay caused by insects and fungus.
- 3.2 The required wood case for the equipment to be packed shall be made out of individual planks of single length and no joint is permissible. Using such planks, the required wood case for the panel shall be made,
- 3.3 Sufficient number horizontal, vertical and diagonal planks (dimension depending upon case size) shall be used for binding and strengthening. Runners have to be provided with metallic sling plates for handling.
- 3.4 Support planks are to be provided such that, no force is acting on the parts of equipment or its parts.
- 3.5 Panels above 1.5 metre shall be bolted at the bottom.
- 3.6 The equipments covered with a polythene sheet shall be kept inside the box, followed by coir, wooden bottoms, thermo coal, etc to prevent vibration effect during loading, transportation, etc.
- 3.7 On all sides of the inner case, black polythene sheet shall be nailed.
- 3.8 Loose items of the equipment, if any, shall be packed separately.
- 3.9 Delicate components likely to be damaged, example PCB – Electronic modules, instrument, etc are to be covered individually in anti-static bags and packed in cartons and filled with fillers like thermo coal, paper cuttings, etc.
- 3.10 Such cartons shall be packed with overall polythene rapping and packed in wooden cases. Mark prominently as "ELECTRONIC COMPONENTS".

**4.0**     **MARKING**

- 4.1     After completing the packing, Stencil marking, as per dispatch instructions and symbol marking as per Annexure – I shall be made. Please ensure the box is stenciled with "FRAGILE ITEM", "HANDLE WITH CARE"

**5.0**     **PACKING SLIP**

- 5.1     A copy of the packing slip, kept in a polythene cover shall be kept inside the box. Another copy of the packing slip, kept in a polythene cover shall be kept out side the box and covered with a metallic plate to the case.

**6.0**     **CAUTION**

Do not pack any other Mechanical items with this case.

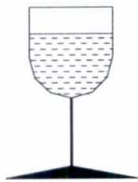
**7.0**     **GENERAL**

- 7.1     These packing procedures are the minimum requirements in addition to the standard instructions mentioned in the Purchase Order and Specification.

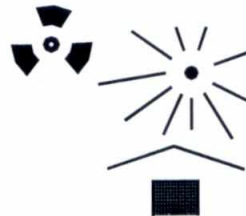
ANNEXURE - 1

TO

PROCEDURE NO:CI:QAC:PR:02/00 ; PR:03/00 ; PR:04/00



FRAGILE, HANDLE WITH CARE



PROTECT FROM HEAT AND RADIOACTIVE SOURCES



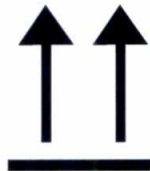
USE NO HOOKS

NOTE: The design of heavy goods packages cannot always resist top lifting by grabhooks.



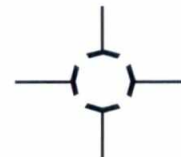
KEEP DRY

NOTE: Not all cases have waterproof internal liners: plywood used in the construction may not have a waterproof glueline.



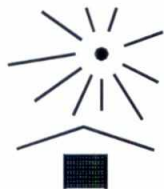
THIS WAY UP

NOTE: Certain designs of small cases make it difficult to distinguish top from bottom.



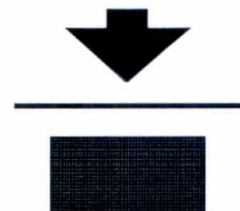
CENTRE OF GRAVITY

NOTE: This should be stencilled as a minimum on the two longest case sides (this information will normally be supplied by the manufacturer of the item(s) packed).



KEEP AWAY FROM HEAT

... kg max



STACKING LIMITATION



INTERNATIONAL "SLING HERE" SYMBOL

NOTE: The maximum load in kilograms should be marked above the arrow.