



BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

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PROJECTS	400kV Switchyard at 5X 800 MW Yadadri TPS, Nalgonda						
CONTENTS							
Section	Description						No. of Sheets
1.	SCOPE, SPECIFIC TECHNICAL REQUIREMENTS & BILL OF QUANTITIES						02
2.	EQUIPMENT SPECIFICATION - MARSHALLING KIOSK - JUNCTION BOX						04 04
3.	PROJECT DETAILS AND GENERAL SPECIFICATION						13
4.	Section 4- Not used						0
5.	CHECK LIST (To be filled at TENDER stage) -MARSHALLING KIOSK - JUNCTION BOX						03 04
6.	ENCLOSURE(Marshalling Kiosk & Junction Box)						07
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Customer: TSGENCO
Project: 400kV Switchyard at 5X 800 MW Yadadri TPS.
Technical Specification: Marshalling Kiosk & Junction Box

Bharat Heavy Electricals Limited
Doc. No. TB-4-387-510-050A
Rev 00

SECTION 1

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS & QUANTITIES

1.1 SCOPE

This technical specification covers the requirement of design, manufacture, testing at works, packing and dispatch of Marshalling Kiosk & Junction Box complete with accessories. In case of any conflict between the technical details mentioned in this section and the remaining sections of this document, then Section-1 shall prevail and is to be considered as binding requirement.

1.2 THE EQUIPMENT IS REQUIRED FOR THE FOLLOWING PROJECT.

Name of customer : TELANGANA STATE POWER GENERATION CORPORATION LIMITED (TSGENCO).

Name of the Project: 400kV Switchyard at 5X 800 MW Yadadri TPS, Nalgonda

Refer Section - 3 for Project Details and General Specifications.

1.3 SPECIFIC TECHNICAL REQUIREMENTS

Offered Marshalling Kiosks & CT Junction Boxes shall be as per the TSGENCO-approved drawings attached with Section-6.

1.4 BILL OF QUANTITY:

i. Marshalling Kiosk

S.No.	Item Description	Quantity
1.	Marshalling Kiosk MK 200P	33 Nos.

- Along with all accessories like fixing hardware / foundation bolts etc.

ii. Junction Box

S.No.	Item Description	Quantity
1.	CT JB Type D-130	44 Nos.
2	CVTJB Type N-75	12 Nos.

- Along with all accessories like fixing Hardware etc.

Note: 1) Quantity Variation: Total PO value may vary by $\pm 10\%$, however individual items can vary to any extent.

2) paint shall be as follows: -

"Epoxy based suitable additives. the thickness of finish coat shall be 80 microns (minimum total DFT shall be 100 microns).

3) Gasket size should be 6mm x 30mm as enclosed in drawing in Section-6

1.5 DRAWINGS AND ENGINEERING DOCUMENTS: -

The successful bidder shall have to extend all possible support like timely submission/resubmission of drawings, visits to end customer to facilitate documents approval without any commercial implications to BHEL. Acceptance of bidder's documents shall be subject to end customer approval.

Date of submission of first lot of drawings will be counted only from the date of submission of reasonably correct drawings. List of drawings required for technical clearance of manufacturing are as follows:

1. Approved GTP/Data sheet
2. Approved GA/schematic drawings/BOM/SLD/General notes (with gasket arrangements)
3. Approved type test reports

1.6 TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

- i. All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.
- ii. Bidder to submit the Type test certificates for the type tests (as per technical specifications and other applicable standards) conducted on similar equipment, which is not older than **17.10.2012**. However if these certificates are not acceptable to purchaser, bidder may have to repeat these type tests in presence of Purchaser. There shall be no delivery and cost implications to Purchaser on account of these type tests.

1.7 PACKING

The packing and shipping shall be carried out in accordance as specified in section-3 and the equipment shall be prepared in such a manner as to protect the equipment from damage or deterioration during shipping or outdoor storage for a minimum period of two years.

SECTION-2

EQUIPMENT SPECIFICATION

I. MARSHALLING KIOSK

2.0 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and despatch of MARSHALLING KIOSKS. No deviation from the requirements specified in various clauses of this specification shall be allowed.

2.1 SPECIFIC TECHNICAL REQUIREMENTS

Technical Parameters for Marshalling Kiosk

- | | | |
|--|---|---|
| a) Installation | : | Outdoor |
| b) Design Ambient air temperature | : | 50° C |
| c) Thickness of Sheet Steel | : | At least 3.0mm |
| d) Degree of protection | : | IPW 55 |
| e) Paint Shade | : | Opaline Green to shade 275 of IS:5 (Semi Glossy) |
| f) Control Wiring | | |
| Size of conductor | : | 2.5 sqmm |
| Conductor | : | Stranded copper |
| g) Space Heater Rating | : | 240 V, At least 40 W |
| h) No. of AC incoming feeders | | |
| 3-phase, 4-wire | : | 2 (63A) |
| Changeover between incomers | : | Automatic |
| i) No. of AC outgoing feeders | | |
| 3-phase, 4-wire | : | 16A - 6 Nos
32A - 2 Nos |
| 1-phase, 2-wire | : | 10A - 7 Nos
16A - 3 Nos |
| j) Terminal Block | | |
| Make | : | Elmex or approved Eqv. |
| Earthlinks | : | As required |

2.2 Following type of different Marshalling kiosks are proposed with detailed description as given below-

Table-1

SI No.	Type	No. of Interlocking TBs	No of TBs for CT/ VT connections	100A Receptacle	No of AC Outgoing Feeders Amps- Nos
1	MK-200P	200	Nil	No	As per 2.1 (i) above

Marshalling kiosk shall have distinct compartments for the following purposes as applicable:

1) Auxiliary Power Circuits: The incoming and outgoing supplies shall be marshalled through cables terminated on Stud type terminal blocks. This compartment shall receive two incoming 415V, 3 phase, 63A AC supplies through 2 Nos TPN MCB units with auto-changeover including timers and distribute 16 & 32A, three phase outgoing supplies controlled by TP MCBs. Also it shall distribute 240V, 10 & 16A, single phase supplies to be controlled by SP MCBs to be drawn from above three-phase incomers. The terminal blocks used for above mentioned aux power incomer circuits shall be CBT110 of Elmex/ Eq for making loop-in loop-out connection of 3.5x35 sq mm connected cable. And for outgoing aux power circuits, terminal blocks shall be CBTM5 of Elmex/ Eq. 20% spare TBs of each type are also required to be mounted.

2) Interlocking Circuits: TB Nos as per above selection Table-I shall be provided. Non-disconnecting stud type terminal blocks CATM4 of Elmex/ Eq shall be provided in vertical formation for interlocking facilities

3) Auxiliary circuit (Heater, Lamp and Socket) shall be provided.

4) The Marshalling kiosk shall be supplied with fixing hardware/ foundation bolts.

2.2 (a) Bidder must quote addition /deletion price for each and every type of the fitments viz., MCB, Contactors, Timer, Fuse, Switches, Terminal Blocks etc.

2.3 APPLICABLE STANDARDS

STANDARD	TITLE
IS 13947(Part 1) IS 5039	Low voltage switchgear and control gear: General rules Distribution feeder pillars for voltages not exceeding 1000V ac / 1200V dc.
IS 8623	Specification for Low voltage Switchgear and Control gear Assemblies
IEC 60439	Factory built assemblies of low voltage switchgear and control gear
IS 13703 (All Parts):	Specification for Low-Voltage Fuses for Voltages not exceeding 1000 V AC and 1500 V DC - General Requirements

The equipment shall conform to the latest applicable Indian standard and their amendments. The equipment complying with any authorised international standard will also be considered if it ensures performance equivalent to or superior to Indian standards. In the event of supply of equipment conforming to any internationally recognised standard other than the Indian standards, the salient features of comparison shall be brought out.

2.4 SPECIFIC DESIGN & MANUFACTURING REQUIREMENTS

Marshalling Kiosks shall generally conform to IS-5039, IS-8623 or IEC-60439, and/ or its latest amendments/ issues as applicable.

Marshalling Kiosk (MK) shall be of at least 3mm and shall be dust, water and vermin proof. The thickness of shall not be less than 3 mm. The box shall be properly braced to prevent wobbling. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation. Top of the boxes shall be sloped towards rear.

Marshalling kiosk may be front as well as rear opening type. The Marshalling Kiosks shall be free standing or pedestal-mounting type. The enclosures shall be provided with double hinged doors and /or removable covers with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere. All doors, removable covers and plates shall be gasketed all round with suitable profiled EPDM gaskets. The gasket shall be tested in presence of

purchaser as per approved quality plan. All gasketed surfaces shall be smooth, straight and reinforced if necessary to minimize distortion and to make a tight seal. The quality of gaskets shall be such that it does not get damaged/ cracked during ten years of operation of the equipment or its major overhaul whichever is earlier. Ventilating louvers, if provided, shall be with screens and filters. The screen shall be fine wire mesh made of brass.

All housings shall be designed for the entry of cables from the bottom by means of weatherproof and dust-proof connections. MK shall be designed with generous clearance to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the housing. A suitably gasketed undrilled cable gland plate projecting at least 150mm above the base of the housing shall be provided for this purpose. The gland shall project at least 25 mm above the gland plate to prevent entry of moisture in the cable crutch. *The gland plate meant for each section shall be split in to two parts. The minimum cut-out depth available shall be 250mm for control cable entry.*

Each MK shall be provided with a 15A, 240 V AC, 2 -pole, 3-pin industrial grade receptacle with switch. For incoming supply, SPN MCB of suitable rating shall be provided. Illumination of each compartment of each MK shall be with suitable number of door-operated 20W fluorescent tube or watts CFL 15. Suitable 240 V, single phase, 50 Hz AC heaters with thermostats controlled by switch and fuse shall be provided to maintain inside temperature 10 deg. above the ambient. The fittings shall be complete with switchfuse unit and switching of the fittings shall be controlled by the respective panel door switch. All control switches shall be of rotary switch type and Toggle/ Piano switches shall not be accepted.

Each MK shall be provided with two Earthing pads to receive 75 mm x12 mm or 50mm x 6mm GS flat. The connection shall be bolted type with 2 bolts per pad. The hinged door shall be provided with danger plate, and internal wiring diagram pasted on inside of the door. The front label shall be on a 3 mm thick plastic plate white letters engraved on black background.

10 mm wide plastic plates bearing identification mark shall be fixed suitably under each circuit. Each control cable shall be properly marked with ferrules.

2.5 TERMINAL BLOCKS AND WIRING

Terminal blocks shall be 1100V grade and have continuous rating to carry the maximum expected current on the terminals. These shall be moulded, complete with insulating barriers, stud type terminals, complete with washers, nuts and lock nuts.

The terminal shall be such that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from terminal clamp unless it is done intentionally. The conducting part in contact with the cable shall preferably be tinned or silver-plated.

The terminal blocks shall be of extensible design. The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails. Terminal block design shall include a white-fiber marking strip. Markings on terminal strips shall correspond to numbers on wiring diagrams. The terminal blocks shall be fully enclosed with removable covers of transparent, non-deteriorating type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing barriers. The arrangement shall be such that it is possible to safely connect or disconnect terminals on the live circuits and replace fuse links when the cabinet is live.

Unless otherwise specified, terminal blocks shall be suitable for connecting minimum of two of 2.5 sq. mm copper flexible conductors on each side.

- | | | |
|----|-------------------------------------|---|
| a) | All circuits except CT/CVT circuits | Minimum of two of 2.5 sq. mm copper flexible on each side. |
| b) | All CT/CVT circuits | Minimum of four of 2.5-sq. mm copper flexible on each side. |

20% of the terminal block including fuse and link unit shall be kept as spare. **There shall be a minimum clearance of 300 mm between the first/ bottom row of terminal blocks and the associated cable gland plate. Also the clearance between two adjacent rows of terminal blocks shall be a minimum of 150 mm.**

All internal wiring shall be carried out with single core, stranded copper conductor wires with PVC insulation and shall be flame, vermin and rodent proof.

The minimum size of stranded copper conductor used for internal wiring shall be 2.5-sq. mm.

All internal wiring shall be securely supported, neatly arranged, readily accessible and connected to equipment terminals and terminal blocks. Wiring gutters /troughs shall be provided for this purpose and for interlocking TBs as well.

Wire termination shall be made with solder less crimping type of tinned copper lugs, which firmly grip the conductor and insulation. Insulated sleeves shall be provided at all the wire terminations.

Engraved/ painted core identification plastic ferrules marked to correspond with panel wiring diagram numbering shall be fitted at both ends of each wire. Ferrules shall fit tightly on wires and shall not fall off when the wire is disconnected from the terminal blocks.

2.6 TESTING

- i. All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.
- ii. Bidder to submit the Type test certificates for the type tests (as per technical specifications and other applicable standards) conducted on similar equipment, which is not older than **17.10.2012**. However if these certificates are not acceptable to purchaser, bidder may have to repeat these type tests in presence of Purchaser. There shall be no delivery and cost implications to Purchaser on account of these

type tests:

- a) **2.5 kV withstand for one minute**
- b) **Insulation Resistance**
- c) **Functional tests**

ROUTINE TESTS

The Marshalling Kiosks shall be subjected to following routine tests, as per IS 5039:

- a) **2.5 kV rms. for one minute test**
- b) **Check for wiring**
- c) **Visual and dimensional check**
- d) **Checking for paint.**

II. CT & CVT JUNCTION BOX

2.0 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and despatch of CT & CVT JUNCTION BOX. No deviation from the requirements specified in various clauses of this specification shall be allowed.

2.1 SPECIFIC TECHNICAL REQUIREMENTS

Technical Parameters for Junction Box

- a) Installation : Outdoor
- b) Design Ambient air temperature : 50° C
- c) Thickness of Sheet Steel : At least 3.0 mm
- d) Degree of protection : IPW 55
- e) Paint Shade : Opaline Green to shade 275 of IS:5 (Semi Glossy)
- f) Control Wiring
 - Size of conductor : 2.5mm²
 - Conductor : Stranded copper
- g) Space Heater Rating : 240 V, At least 40 W
- h) Terminal Block
 - Make : Elmex or approved Eqv.
 - Earthlinks : As required

2.2 Following different type of Junction Boxes are proposed

Table-2

Sl No.	Type	No of TBs	Type of TBs
1	JB-N75	75	Stud Type, Non Disconnecting CATM4/ Eq
2	JB-N30	30	Stud Type, Non Disconnecting CATM4/ Eq
3	JB-D130	130	Stud Type, Disconnecting CATDM4/ Eq
4	JB-D30	30	Stud Type, Disconnecting CATDM4/ Eq

Junction Box shall have terminals strips in vertical formation exclusively used for shorting the CT & VT secondary circuits. The type and number of TBs shall be as per selection Table-2 above.

Auxiliary circuit (Heater, Lamp and Socket) shall be provided.

The Junctions Boxes shall be supplied along with fixing hardware/ bolts etc.

2.3 Bidder must quote addition /deletion price for each and every type of the fitments viz., Fuse, Switches, Terminal Blocks etc.

2.4 APPLICABLE STANDARDS

STANDARD	TITLE
IS 13947(Part 1) IS 5039	Low voltage switchgear and control gear: General rules Distribution feeder pillars for voltages not exceeding 1000V ac / 1200V dc.
IS 8623	Specification for Low voltage Switchgear and Control gear Assemblies
IEC 60439	Factory built assemblies of low voltage switchgear and control gear
IS 13703 (All Parts):	Specification for Low-Voltage Fuses for Voltages not exceeding 1000 V AC and 1500 V DC - General Requirements

The equipment shall conform to the latest applicable Indian standard and their amendments. The equipment complying with any authorised international standard will also be considered if it ensures performance equivalent to or superior to Indian standards. In the event of supply of equipment conforming to any internationally recognised standard other than the Indian standards, the salient features of comparison shall be brought out.

2.5 SPECIFIC DESIGN & MANUFACTURING REQUIREMENTS

Junction Box shall generally conform to IS-5039, IS-8623 or IEC-60439, and/ or its latest amendments/ issues as applicable.

Junction Box (JB) shall be dust, water and vermin proof. The thickness of the sheet steel shall be at least 3.0mm. The box shall be properly braced to prevent wobbling. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation.

The JB shall be structure mounted type. They shall have hinged doors with padlocking arrangement. All doors, removable covers and plates shall be gasket all round with suitable profiled EPDM gaskets. The gasket shall be tested in presence of purchaser as per approved quality plan. All gasket surfaces shall be smooth, straight and reinforced if necessary to minimize distortion and to make a tight seal. The quality of gaskets shall be such that it does not get damaged/ cracked during ten years of operation of the equipment or its major overhaul whichever is earlier. Ventilating louvers, if provided, shall be with screens and filters. The screen shall be fine wire mesh made of brass.

The enclosures shall be provided with hinged doors and /or removable covers with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere.

All housings shall be designed for the entry of cables from the bottom by means of weatherproof and dust-proof connections. JB shall be designed with generous clearance to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the housing. A suitable undrilled cable gland plate projecting at least 150mm above the base of the housing shall be provided for this purpose. The gland shall project at least 25 mm above the gland plate to prevent entry of moisture in the cable crutch.

Each JB shall be provided with a 15A, 240 V AC, 2 -pole, 3-pin industrial grade receptacle with switch. For incoming supply, SPN MCB of suitable rating shall be provided. Illumination of each compartment of each JB shall be with door-operated 20W fluorescent tube or 15 watts CFL. Suitable 240 V, single phase, 50 Hz ac heaters with thermostats controlled by switch and fuse shall be provided to maintain inside temperature 10 deg. above the ambient. The fittings shall be complete with switch fuse unit and switching of the fittings shall be controlled by the respective panel door switch. All control switches shall be of rotary switch type and Toggle/ Piano switches shall not be accepted.

Each JB shall be provided with two earthing pads to receive 75 mm x12 mm or 50mm x 6mm GS flat. The connection shall be bolted type with 2 bolts per pad. The hinged door shall be provided with danger plate, and internal wiring diagram pasted on inside of the door. The front label shall be on a 3 mm thick plastic plate white letters engraved on black background.

10 mm wide plastic plates bearing identification mark shall be fixed under each connection at the marshalling kiosk to indicate the CT secondary circuit used for different protections.

2.6 TERMINAL BLOCKS AND WIRING

Terminal blocks shall be 1100V grade and have continuous rating to carry the maximum expected current on the terminals. These shall be moulded, complete with insulating barriers, stud type terminals, complete with washers, nuts and lock nuts.

The terminal shall be such that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from terminal clamp unless it is done intentionally. The conducting part in contact with the cable shall preferably be tinned or silver-plated.

The terminal blocks shall be of extensible design. The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails. Terminal block design shall include a white-fiber marking strip. Markings on terminal strips shall correspond to numbers on wiring diagrams. The terminal blocks shall be fully enclosed with removable covers of transparent, non-deteriorating type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing barriers. The arrangement shall be such that it is possible to safely connect or disconnect terminals on the live circuits and replace fuse links when the cabinet is live.

Terminal blocks for cables going to a common destination shall as far as possible be grouped to each other. All input and output terminals of each control cubicle shall be tested for surge withstand capability in accordance with the relevant IEC publications, in both longitudinal as well as transverse modes. The Supplier shall also provide all necessary filtering, surge protection, interface relays and any other measures necessary to achieve an impulse withstand level at the cable interfaces of the equipment.

Space shall be provided for mounting 20% spare terminal blocks on each junction box. There shall be a minimum clearance of 300mm between the first/ bottom row of terminal blocks and the associated cable gland plate. Also the clearance between two adjacent rows of terminal blocks shall be a minimum of 150 mm.

All internal wiring shall be carried out with single core, stranded copper conductor wires with PVC insulation and shall be flame, vermin and rodent proof.

The minimum size of stranded copper conductor used for internal wiring shall be 2.5-sq. mm

All internal wiring shall be securely supported, neatly arranged, readily accessible and connected to equipment terminals and terminal blocks. Wiring gutters /troughs shall be provided for this purpose and for CT/ CVT circuits as well.

Wire termination shall be made with solder less crimping type of tinned copper lugs, which firmly grip the conductor and insulation. Insulated sleeves shall be provided at all the wire terminations.

Engraved/ painted core identification plastic ferrules marked to correspond with panel wiring diagram numbering shall be fitted at both ends of each wire. Ferrules shall fit tightly on wires and shall not fall off when the wire is disconnected from the terminal blocks.

2.7 TESTING

TYPE TESTS

The Junction Boxes shall have been subjected to type test for the IPW 55 degree of protection of enclosure as per IS 2147. The bidder shall furnish the type test report at contract stage. In case the Test reports are more than five years old from the date of inspection, fresh testing has to conducted and report shall be submitted. The type test for degree of protection of enclosure shall be preceded and followed by following tests:

- a) 2.5 kV withstand for one minute
- b) Insulation Resistance
- c) Functional tests

ROUTINE TESTS

The Junction Box shall be subjected to following routine tests, as per IS 5039:

- a) 2.5 kV rms. for one minute test
- b) Check for wiring
- c) Visual and dimensional check
- d) Checking for paint.



Project: 5x800 MW YADADRI THERMAL POWER STATION.
Customer: TELANGANA STATE POWER GENERATION CORPORATION LTD

Section-3: Project Details & General Specifications

Rev. No. 00

SECTION - 3

PROJECT DETAILS AND GENERAL SPECIFICATIONS

GENERAL TECHNICAL REQUIREMENTS

1.0 PROJECT DETAILS

Customer	:	M/s Telangana State Power Generation Corporation Ltd.
Project Title	:	5x800MW Yadadri Thermal Power Station
Project Location	:	Veerlapalem Village, Damercherla Mandal, Nalgonda District, Telangana
Nearest Railway station	:	Vishnupuram railway station.
Nearest Road Head	:	NH-9 is at 45km North SH-2 is at 7km South
Nearest Airport	:	Hyderabad (about 120 Km) Chief Engineer (O&M), 5X800MW Yadadri Thermal Power
Postal Address	:	Station, TSGENCO, Village - Veerlapalem, Mandal- Dameracheral, Dist. – Nalgonda, Telangana

1.1 SITE CONDITIONS (FOR DESIGN PURPOSES)

1.1.1 SITE CONDITIONS

a).	Average rainfall per year	:	1124 mm
b).	Maximum hourly rainfall intensity	:	102 mm
c).	Altitude	:	1000 m

1.1.2 DESIGN AMBIENT

a).	Minimum Temperature	:	13.5°C
b).	Maximum Temperature	:	45°C
c).	Design Ambient Temperature	:	50 °C

1.1.3 RELATIVE HUMIDITY

a).	Maximum	::	85%
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Project: 5x800 MW YADADRI THERMAL POWER STATION.
Customer: TELANGANA STATE POWER GENERATION CORPORATION LTD

Section-3: Project Details & General Specifications

Rev. No. 00

1.1.4 WIND PRESSURE (AS PER IS:875-1987)

a). Design wind speed : 44 m/sec.

1.1.5 SEISMIC FACTORS

a). Horizontal Seismic Coefficient : As per latest IS : 1893
b). Vertical Seismic Coefficient : As per latest IS : 1893 } *Zone – III*

1.1.6 ELECTRICAL DATA

		400 kV System	415V AC System	240V AC System	220 V DC System	48 V DC System
1.	Nominal Voltage	400 kV	415 V	240 V	220 V	48 V
2.	Highest System Voltage	420 kV	457 V	264 V	242 V	55 V
3.	No. of phases	3	3	1	NA	NA
4.	Frequency	50 Hz	50 Hz	50 Hz	NA	NA
5.	Voltage variation	± 5%	± 10 %	± 10 %	+10 % to -15%	± 10 %
6.	Neutral Earthing	Effectively Earthed	Solidly Earthed	Solidly Earthed	-	-
7.	Fault Level	50 kA for 1 sec.	50 kA for 1 sec.	50 kA for 1 sec.	15 kA for 1 sec.	-

1.1.7 SYSTEM PARAMETERS

Dry and wet one minute power frequency withstand voltage : 630 kVrms
Dry impulse withstand voltage positive and negative : 1425 kVpeak
Minimum Total Creepage : 25 mm/kV

1.1.8 MINIMUM CLEARENCE (AS PER IS: 10118)

Phase to phase (PP) : 4200 mm
Phase to earth (PE) : 3500 mm
Section clearance : 6500 mm
Minimum ground clearance from plinth level (Plinth level : 300 mm) : 8000 mm



Project: 5x800 MW YADADRI THERMAL POWER STATION.
Customer: TELANGANA STATE POWER GENERATION CORPORATION LTD

Section-3: Project Details & General Specifications

Rev. No. 00

Vertical ground clearance to nearest part not at earth potential of an insulator supporting live conductor/ equipment 2440 mm

1.2 INSTRUCTION TO BIDDERS

The bidders shall submit the technical requirements, data and information as per the technical data sheets, provided in Section-4.

The bidders shall furnish catalogues, engineering data, technical information, design documents, drawings etc fully in conformity with the technical specification. It is recognised that the Manufacturer may have standardised on the use of certain components, materials, processes or procedures different than those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to the Purchaser. Unless brought out clearly, the Bidder shall be deemed to conform to this specification scrupulously.

1.3 STANDARDS

The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

The equipment to be furnished under this specification shall conform to latest issue (with all amendments) of specified standards.

In addition to meeting the specific requirement called for in Sections 1 and 2 of the Technical Specification, the equipment shall also conform to the general requirement of the applicable standards, which shall form an integral part of the specification. The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other. When the specific requirements stipulated in the specifications exceed or differ from those required by the applicable standards, the stipulation of the specification shall take precedence.

Other internationally accepted standards, which ensure equivalent or better performance than that specified in the standards referred, shall also be accepted. The bidder shall submit copies of such standards.

In case governing standard for the equipment is different from IS or IEC, the salient points of difference shall be clearly brought out in the offer along with English language version of standard or relevant extract of the same. The equipment conforming to standards other than IS/IEC shall be subject to Purchaser's / owner's approval. The bidder shall clearly indicate in his bid the specific standards in accordance with which the works will be carried out.



1.4 TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

All equipment being supplied shall conform to type tests and shall be subject to routine and acceptance tests in accordance with requirements stipulated under respective sections. Purchaser reserves the right to witness any or all the tests. The Manufacturer shall intimate the Purchaser the detailed programme about the tests at least three (3) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies. Purchaser reserves the option for getting any or all the type tests repeated on the equipment. The Manufacturer shall also submit type test procedure for approval of the Purchaser.

In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the technical specification or any/all additional type tests not carried out without any additional cost implication to the Purchaser.

The price of conducting all tests and additional type tests is deemed to be included in Bid price. In case any bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected.

The purchaser intends to repeat the type tests and additional type tests on cables for which test charges shall be payable as per provision of contract.

The Purchaser, his duly authorised representative and/or outside inspection agency acting on behalf of the Purchaser shall have at all reasonable times free access to the Contractors premises or Works and shall have the power, at all reasonable times to inspect and examine the materials and workmanship of the Works during its manufacture or erection if part of the Works is being manufactured or assembled at other premises or works, the Manufacturer shall obtain for the Engineer and for his duly authorized representative permission to inspect as if the works were manufactured or assembled on the Manufacturer's own premises or works. Inspection may be made at any stage of manufacture, dispatch or at site at the option of the Purchaser and the equipment if found unsatisfactory due to bad workmanship or quality, material is liable to be rejected.

The Manufacturer shall give the Purchaser/inspector thirty (30) days written notice of any material being ready for testing. Such tests shall be to the Manufacturer's account except for the expenses of the inspector. Unless witnessing of the tests is virtually waived, the Purchaser/ inspector will attend such tests within thirty (30) days of the date of which the equipment is notified as being ready for test/ inspection, failing which the Manufacturer may proceed with the test which shall be deemed to have been made in the Inspector's presence and the Manufacturer shall forthwith forward duly certified copies of test reports in triplicate to the Inspector.

The Purchaser or Inspector shall, within fifteen (15) days from the date of inspection as defined herein, give notice in writing to the Manufacturer, of any objection to any drawings and all or any equipment and workmanship which in his opinion is not in accordance with the Contract. The



Manufacturer shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Purchaser/ inspector giving reasons therein, that no modifications are necessary to comply with the Contract.

When the factory tests have been completed at the Manufacturer's works, the Purchaser/ inspector shall issue a certificate to this effect within fifteen (15) days after completion of tests but if the tests are not witnessed by the Purchaser/inspector, the certificate shall be issued within fifteen (15) days of receipt of the Manufacturer's Test certificate by the Engineer/ Inspector. Failure of the Purchaser/inspector to issue such a certificate shall not prevent the Manufacturer from proceeding with the Works. The completion of this test or the issue of the certificate shall not bind the Purchaser to accept the equipment should it, on further tests/ after erection, be found not to comply with the Contract. The equipment shall be dispatched to site only after approval of test reports and issuance of MICC by the Purchaser.

In all cases where the Contract provides for tests whether at the premises or at the works of the Manufacturer or of any Sub-Contractor, the Manufacturer except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Purchaser /Inspector or his authorised representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Purchaser Inspector or to his authorised representative to accomplish testing.

The inspection by Purchaser and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Manufacturer in respect of the agreed quality assurance programme forming a part of the Contract.

The Purchaser will have the right of having at his own expenses any other test(s) of reasonable nature carded out at Manufacturer's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

The Purchaser reserves the right for getting any field tests not specified in respective sections of the technical specification conducted on the completely assembled equipment at site. The testing equipment for these tests shall be provided by the Purchaser.

1.5 MATERIAL/WORKMANSHIP

1.5.1 GENERAL REQUIREMENT

Where the specification does not contain characteristics with reference to workmanship, equipment, materials and components of the covered Equipment it is understood that the same must be new, of highest grade of the best quality of their kind conforming to best engineering practice and suitable for the purposes for which they are intended.



The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements and shall be used throughout the design. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfil their required function. In general screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from purchaser.

Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall be interchangeable with, and shall be made of the same materials and workmanship as the corresponding parts of the Equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.

All materials and equipment shall be installed in strict accordance with the manufacturer's recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be construed as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting, levelling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer's tolerances /instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacture's limits. Suitable guards shall be provided for the protection of personal on all exposed rotating and / or moving machine parts and shall be designed for easy installation and removal for maintenance purpose. The spare equipment(s) shall be installed at designated locations and tested for healthiness.

The Contractor shall apply oil and grease of the proper specification to suit the machinery, as is necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The Contractor shall apply all operational lubricants to the equipment installed by him.

All oil, grease and other consumables used in the Works/ Equipment shall be purchased in India unless the Contractor has any special requirement for the specific application of a type of oil or grease not available in India. If such is the case, he shall declare in the proposal where such oil or grease is available. He shall help purchaser in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

1.5.2 PROVISIONS FOR EXPOSURE TO HOT AND HUMID CLIMATE

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favourable to



the growth of fungi and mildew. The indoor equipments located in non-air conditioned areas shall also be of same type.

1.6 COLOUR SCHEME AND CODES FOR PIPE SERVICE

The contractor shall propose a colour scheme for those equipment/Items for which the colour scheme has not been specified in the specification for the approval of purchaser. The decision of purchaser shall be final. The scheme shall include:

Finishing colour of Indoor equipment

Finishing colour of Outdoor equipment.

Finish colour of all cubicles.

Finishing colour of various auxiliary system equipment including piping

Finishing colour of various building items.

All steel structures, plates etc. shall be painted with non-corrosive paint on a suitable primer. It may be noted that normally all electrical equipment in switchyard are painted with shade 631 of IS-5. All The indoor cubicles shall be of same colour scheme and for other miscellaneous items, colour scheme will be approved by the purchaser.

1.7 PAINTING

- a) All sheet steel work shall be phosphated in accordance with the following procedure and in accordance with IS: 6005 "Code of practice for Phosphating Iron and Steel".
- b) Oil, grease, dirt and swerve shall be thoroughly removed from emulsion by cleaning.
- c) Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.
- d) After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute bichromate solution and over drying.
- e) The phosphate coating shall be sealed by the application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be "Flash dried" while the second coat shall be stoved.
- f) After application of the primer, two coats of finishing epoxy paint shall be applied, each coat followed by stoving. The panel shall have colour conforming to shade 631 of IS-5 for outside and inside of the panel with black colour for base frame.
- g) Each coat of primer and finishing paint shall be of a slightly different shade to enable inspection of the painting.



- h) Finished painted appearance of panel shall present an asthetically pleasing appearance free from dents and uneven surface.
- i) A small quantity of finishing paint shall be supplied for minor touching up required at site after the installation of the panels.

1.8 PROTECTION

- a) All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves, pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.
- b) All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.
- c) The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner.
- d) Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent entry of insects.

1.9 FUNGISTATIC VARNISH

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on the parts, which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interface with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application to the varnish.

1.10 SURFACE FINISH

All interiors and exteriors of tanks, control cubicles and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter. All steel surfaces in contact with insulating oil as far as accessible shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paints.

All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or other wise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limit specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling.



1.11 GALVANIZING

All ferrous parts including all sizes of nuts, bolts, Plain and spring washers, support channels, structures, shall be hot dip galvanised conforming to latest version of IS:2629 or any other equivalent authoritative standard. However, hardware less than M12 size shall be electro-galvanized. Minimum weight of zinc coating shall be 610 gm/sq.mm and minimum thickness of coating shall be 85 microns for all items thicker than 6mm. For items lower than 6 mm thickness, requirement of coating shall be as per relevant ASTM.

1.12 AUXILIARY POWER SUPPLY

1.12.1 A.C power supply for auxiliaries will be available at 240 V, 50 C/s 1-phase, 2 wire and 415V, 50 C/s, 3-phase, 4 wire, neutral solidly earthed with variation in frequency of +/-5% and variation in voltage +/-10%

1.12.2 D.C. power supply at 220 V, 2-wire ungrounded will be available 187 V to 242 V.

1.13 INSPECTION AND TESTING

All tests and inspection of the equipment specified shall be performed to the extent and in the manner as stipulated in the relevant standards and in this specification. All type tests/routine tests/acceptance tests as specified shall be conducted in the presence of purchaser. Wherever equipment similar to the one being offered has already been type tested within 5 years from the date of opening the bid. Type tests done in an independent government laboratory or in the presence of representative of State Electricity Board or other reputed public undertakings, the type test reports of the same shall be submitted for scrutiny /approval. If these are found suitable and technically acceptable, conducting of type tests shall be waived off. Otherwise the subcontractor will have to carry out the type tests without any extra cost and without any delivery implications.

1.14 PACKAGING

Aluminium Tube shall be partially packed with Hessians cloths. Similar items shall be grouped and tied with steel wires/strip for convenient handling during transits.

MARKINGS

The following details are to be clearly indicated in the material forwarding documents:

- a) Name and address of the consignee.
- b) Purchase order number.
- c) Name of supplier/s.
- d) Description of equipment / material.



e) Tare weight.

f) Gross weight.

All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. On request of the purchaser, the Contractor shall also submit packing details/associated drawing for any equipment material under his scope of supply, to facilitate the purchaser to repack any equipment/material at a later date, in case the need arises, while packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken account of. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. Any demurrage wagons and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor. Purchaser takes no responsibility of the availability of the wagons.

1.15 HANDLING, STORING AND INSTALLATION

In accordance with the specific installation instructions as shown on manufacturer's drawings or as directed by the purchaser or his representative, the Contractor shall unload, store, erect, install, wire, test and place into commercial use all the equipment included in the contract. Equipment shall be installed in a neat, workmanlike manner so that it is level, plumb, square and properly aligned and oriented. Commercial use of switchyard equipment means completion of all site tests specified and energisation at rated voltage.

Contractor may engage manufacturer's Engineers to supervise the unloading, transportation to site, storing, testing and commissioning of the various equipment being procured by them separately. Contractor shall unload, transport, store, erect, test and commission the equipment as per instructions of the manufacturer's supervisory Engineer(s) and shall extend full cooperation to them.

In case of any doubt/misunderstanding as to the correct interpretation of manufacturer's drawings or instructions, necessary clarifications shall be obtained from the purchaser.

Contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer's drawings/instructions correctly.

Where assemblies are supplied in more than one section, contractor shall make all necessary mechanical and electrical connections between sections including the connection between buses. Contractor shall also do necessary adjustments/alignments necessary for proper operation of circuit breakers, isolators and their operating mechanisms. All components shall be protected against damage during unloading, transportation, storage, installation, testing and commissioning. Any equipment damaged due to negligence or carelessness or otherwise shall be replaced by the contractor at his own expenses.

Contractor shall be responsible for examining all the shipment immediately of any damage, shortage, discrepancy etc. for the purpose of Purchaser's information only. The Contractor shall submit to the



purchaser every week a report detailing all the receipts during the weeks. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection of the equipment at Site. Any demurrage, pilferage and other such charges claimed by the transporters, railways etc. shall be to the Contractor' account.

The Contractor shall be fully responsible, for the equipment/material until the same is handed over to the purchaser in an operating condition after commissioning. Contractor shall be responsible for the maintenance to the equipment/material while in storage as well as after erection until taken over by Purchaser, as well as protection of the same against theft, element of such nature, corrosion, damages etc.

The Contractor shall be responsible for making suitable indoor storage facilities, to store all equipments which require indoor storage.

The words erection and installation used in the specification are synonymous. Exposed live parts shall be placed high enough above ground to meet the requirements of electrical and other statutory safety codes.

The minimum phase to earth, phase to phase and section clearance along-with other technical parameters for the various switchyard voltage levels to be maintained shall be strictly as per the approved drawings.

The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance throughout the service life. If at any stage during the execution of the Contract, it is observed that the erected equipment(s) do not meet the above minimum clearances, the Contractor shall immediately proceed to correct the discrepancy at his risks and costs.

1.16 TOOLS AND TACKLES

The Contractor shall supply with the equipment one complete set of all special tools and tackles for the erection, assembly, dis-assembly and maintenance of the equipment. However, these tools and tackles shall be separately, packed and brought on to Site.

1.14 EQUIPMENT BASES

A cast iron or welded steel base-plate shall be provided for all rotating equipment, which is to be installed on a concrete base unless otherwise agreed to by the Purchaser. Each base-plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units shall have a raised lip all around, and shall have threaded drain connections.

1.15 QUALITY

BHEL quality plan to be followed subject to TBEM / customer's approval.



1.16 DOCUMENTATION

1.16.1 DRAWINGS

All drawings shall be prepared in AutoCAD and ultimate documentation would include drawings/documents on CDs. All dimensions and data shall be in SI metric units.

All items of the equipment should be clearly identified by proper part nos. in the contract drawings. Such parts, which are to be dispatched to site from works in dispatchable units and are reassembled at site, should be marked by proper identification marks at works and indicated in the drawings and quantified. The shipping list should be sent along with the general arrangement drawings for engineer's approval. All the items of the shipping list should be identified in the drawing.

The drawing submitted by the supplier shall be reviewed by the purchaser as far as practicable within two weeks of receipt of drawings and shall be modified by the sub-contractor if any modifications and/or corrections are required by the purchaser. The sub-contractor shall incorporate such modifications and / or corrections and submit the final drawings for approval. Any delay arising out of failure of the subcontractor to rectify the drawings shall not alter the contract completion date.

Further work by the subcontractor shall be in strict accordance with these drawings and no deviation shall be allowed without the written approval of the purchaser.

All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at supplier's risk.

Approval of drawing or work by the purchaser/consultant shall not relieve the subcontractor of any of his responsibilities and liabilities under the contract.

In case of any modifications that may be necessary during erection or commissioning of the equipment, the subcontractor shall carry out modifications in the original drawing & submit 'As Built drawings' and required no. of prints thereof.

1.16.2 INSTRUCTION MANUALS

The supplier shall submit to the purchaser, draft instruction manuals for approval within 30 days of placement of order. The final instruction manuals complete in all respects shall be submitted 60 days before the first shipment of the equipment. The instruction manuals shall contain full details and drawings of all the equipment furnished, the erection procedures, testing, operation & maintenance procedures of the equipment.

If after the commissioning and initial operation of the plant, the instruction manuals require any modification/ addition / changes, the same shall be incorporated and the up- dated final instruction manuals shall be submitted as required.



1.16.3 TITLE BLOCK & DRAWING/ DOCUMENT NUMBERING SCHEME

Title block for drawing / document should be followed as per ANNEXURE-3

1.16.4 DOCUMENTATION SCHEDULE AT CONTRACT STAGE

A.	<u>For approval</u>	<u>No of Copies</u>
	Copies of all drawings with project details, dimension, shipping weights, No. of cases & dimensions, fixing details, tolerance etc.	10
	Copies of type test reports.	5
	Copies of works quality plan & field quality plan.	5
	Copies of installation, operation & maintenance manual.	5
	Copies of drawings on floppies/CDs	1 set
B.	<u>After approval and for information / distribution</u>	
	Copies of all drawings	15
	Copies of installation, operation & maintenance manual including Routine test reports	15
	Sets of RTF of drawings	2
	CDs of Drgs and O & M Manuals	4
C.	<u>As Built Drawings</u>	
	Hard copies of Drawings	15
	CDs	4
	NOTE:	
	1. Any revision of drawings / documents shall be submitted in the same no. of copies submitted first time for approval	
	2. Final drawings / documents shall be submitted in bound volume with customer and project details etc. written on the top.	

Customer: TSGENCO
 Project: 400kV Switchyard at 5X 800 MW Yadadri TPS
 Technical Specification: Marshalling Kiosk & Junction Box

Bharat Heavy Electricals Limited
 Doc. No. TB-4-377-510-050A
 Rev 00

SECTION-5

I. APPLICABLE FOR MARSHALLING KIOSK

CHECK LIST FOR INFORMATION TO BE FURNISHED WITH OFFER

RETURN THIS CHECKLIST AS PART OF THE OFFER DULY SIGNED

The offer may not be considered if the following information and this Checklist are not enclosed with the Offer.

BHEL ENQUIRY. NO:

BIDDER:OFFER REFERENCE:

(1)	(2)	(3)				(4)	(5)
S.No.	Parameters	Data				Yes / No	Remarks in case reply in Col (4) is NO
1.	Applicable Standard	Latest IS -5039,IS-8623 or IEC-60439, IS-13947					
2.	Type						
3.0	Construction feature						
3.1	Thickness of Sheet Steel	Atleast 3.0mm					
3.2	Degree of protection	IPW 55					
3.3	Control Wiring	2.5 mm ² , Stranded copper					
3.4	Space Heater / Lamp for illumination /Socket	Provided					
3.5	Distinct compartments for aux. Power circuits, interlocking circuit, receptacle (if applicable), CT& VT circuit (if applicable)	Provided					
4.0	Power circuit Incoming						
4.1	No. of AC Incomer feeders	Two					
4.2	Rating of Incomer feeders	63amp, 3-Phase, 4 -wire to be controlled by TPN MCB					
4.3	Changeover between incomers	Automatic					
4.4	Terminal blocks of Incomer	CBT 110 of Elmex / Eq. For making loop-in loop- out connection of 3.5 x 35 sq.mm connected cable.					
5.0	Power circuit - Outgoing						
5.1	No. of 3-phase AC outgoing feeders (Indenter to tick)	4	5	6	6 Nos. - (16A) 2 Nos. - (32A)		
5.2	Rating of 3 -phase AC outgoing feeder	As per drawings attached with Section-6					
(1)	(2)	(3)				(4)	(5)

Customer: TSGENCO

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Bharat Heavy Electricals Limited

Doc. No. TB-4-377-510-050A

Rev 00

S.No.	Parameters	Data						Yes / No	Remarks in case reply in Col (4) is NO
5.3	Type of terminal blocks for 3-phase outgoing feeders	CBT M5 of Elmex / Eq.							
5.4	No. of 1- phase, AC outgoing feeders (Indenter to tick)	5	6	7 Nos.- (10A) 3 Nos.- (16A)					
5.5	Rating of 1- phase AC outgoing feeders	As per drawings attached with Section-6							
5.6	Type of terminal blocks for 1-phase outgoing feeders	CBT M5 of Elmex / Eq.							
5.7	Provision of spare TBs of each type for power circuit	20 %							
6.0	Interlocking circuit								
6.1	No. of Interlocking terminal block (Indenter to tick)	120	180	200	300	Nil			
6.2	Type of Interlocking terminal block	Non - disconnecting stud type CAT M4 of Elmex /Eq.							
7.0	Clearance between TBs								
7.1	Clearance between two rows of terminal blocks (End to End)	150 mm minimum							
7.2	Clearance between first/bottom row of terminal blocks and associated cable gland plate	300 mm minimum							
8	Feeder names with purpose shall be indicated in drawings	Yes							
9	Name plate details, type etc. shall be mentioned in notes of drawings	Yes							
10	Door handle with integral lock & master key	Provided							
11	TBs fully enclosed with removable covers of transparent, non-deteriorating type plastic material	Provided							

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Bharat Heavy Electricals Limited
 Doc. No. TB-4-377-510-050A
 Rev 00

12	Fixing Hardware (Nuts, Bolts and Washers) for mounting MK	Provided		
13	Base Frame for MK	Provided		

B) TYPE TESTS

i) Whether type test reports of the following test conducted earlier on identical or similar material are available (not older than five years from the date of inspection).
 (YES)

S.No.	TESTS	REPORT NO.	Date	Conducted at accredited laboratory or witnessed by independent authority
1	Degree of protection test			

ii) If type test reports are not acceptable to BHEL/Customer then above tests shall be conducted by the bidder free of cost.
 (YES)

C)

S.No.	Description	Confirmation of Supplier
1.	Bidder to confirm that all standard approved drawings / data sheets/QP/ valid type tests reports/ all relevant information shall be submitted to BHEL for organising approval extension from ultimate customer.	
2.	Bidder to confirm that it will offer approved Make of the components and fitments at contract stage. In case the offered make is not approved by the customer, then alternate make shall be supplied without any commercial implications to BHEL.	

Date:

Signature of the authorized representative of Bidder

Company Seal

II.APPLICABLE FOR CTJB

CHECK LIST FOR INFORMATION TO BE FURNISHED WITH OFFER RETURN THIS CHECKLIST AS PART OF THE OFFER DULY SIGNED

The offer may not be considered if the following information and this Checklist are not enclosed with the Offer.

BHEL ENQUIRY. NO:

BIDDER:OFFER REFERENCE:

A)

(1)	(2)	(3)					(4)	(5)
S.No.	Parameters	Data					Yes / No	Remarks in case reply in Col (4) is NO
1	Applicable Standard	Latest IS -5039,IS-8623, or IEC-60439, IS 13947						
2	Type of JB							
3.0	Construction Feature							
3.1	Thickness of Sheet Steel	Atleast 3.0mm						
3.2	Degree of protection	IPW 55						
3.3	Control Wiring	2.5 mm ² , Stranded copper						
3.4	Space Heater / Lamp for illumination /Socket	Provided						
4.0	Type of terminal block (Indenter to tick)	Disconnecting stud type CATD M4 of Elmex /Eq.		Non disconnecting stud type CAT M4 of Elmex /Eq.				
4.1	No. of terminal block (Indenter to tick)	30	45	75	90	130		
5.0	Clearance between TBs							
5.1	Clearance between two rows of terminal blocks (End to End)	150 mm minimum						
5.2	Clearance between first/bottom row of terminal blocks and associated cable gland plate	300 mm minimum						
6.0	Name plate details, type etc. shall be mentioned in notes of drawings	Yes						
7.0	Door handle with integral lock & master key	Provided						
8.0	TBs fully enclosed	Provided						

Customer: TSGENCO
 Project: 400kV Switchyard at 5X 800 MW Yadadri TPS
 Technical Specification: Marshalling Kiosk & Junction Box

Bharat Heavy Electricals Limited
 Doc. No. TB-4-377-510-050A
 Rev 00

	with removable covers of transparent, non-deteriorating type plastic material			
9.0	Fixing Hardware (Nuts, Bolts and Washers) for mounting JB	Provided		

B) TYPE TESTS

i) Whether type test reports of the following test conducted earlier on identical or similar material are available (not older than five years from the date of inspection).).

(YES)

S.No.	TESTS	REPORT NO.	Date	Conducted at accredited laboratory or witnessed by independent authority
1	Degree of protection test			

ii) If type test reports are not acceptable to BHEL/Customer then above tests shall be conducted by the bidder free of cost.

(YES)

C)

S.No.	Description	Confirmation of Supplier
1.	Bidder to confirm that all standard approved drawings / data sheets/QP/ valid type tests reports/ all relevant information shall be submitted to BHEL for organizing approval extension from ultimate customer.	
2.	Bidder to confirm that it will offer approved Make of the components and fitments at contract stage. In case the offered make is not approved by the customer, then alternate make shall be supplied without any commercial implications to BHEL.	

Date:

Signature of the authorized representative of Bidder

Company Seal

III. APPLICABLE FOR CVTJB

CHECK LIST FOR INFORMATION TO BE FURNISHED WITH OFFER RETURN THIS CHECKLIST AS PART OF THE OFFER DULY SIGNED

The offer may not be considered if the following information and this Checklist are not enclosed with the Offer.

BHEL ENQUIRY. NO:

BIDDER:OFFER REFERENCE:

A)

(1)	(2)	(3)					(4)	(5)
S.No.	Parameters	Data					Yes / No	Remarks in case reply in Col (4) is NO
1	Applicable Standard	Latest IS -5039,IS-8623, or IEC-60439, IS 13947						
2	Type of JB							
3.0	Construction Feature							
3.1	Thickness of Sheet Steel	Atleast 3.0mm						
3.2	Degree of protection	IPW 55 as per IS 13947						
3.3	Control Wiring	2.5 mm ² , Stranded copper						
3.4	Space Heater / Lamp for illumination /Socket	Provided						
4.0	Type of terminal block (Indenter to tick)	Disconnecting stud type CATD M4 of Elmex /Eq.		Non disconnecting stud type CAT M4 of Elmex /Eq.				
4.1	No. of terminal block (Indenter to tick)	30	45	75	90	180		
5.0	Clearance between TBs							
5.1	Clearance between two rows of terminal blocks (End to End)	150 mm minimum						
5.2	Clearance between first/bottom row of terminal blocks and associated cable gland plate	300 mm minimum						
6.0	Name plate details, type etc. shall be mentioned in notes of drawings	Yes						
7.0	Door handle with integral lock & master key	Provided						
8.0	TBs fully enclosed	Provided						

Customer: TSGENCO
 Project: 400kV Switchyard at 5X 800 MW Yadadri TPS
 Technical Specification: Marshalling Kiosk & Junction Box

Bharat Heavy Electricals Limited
 Doc. No. TB-4-377-510-050A
 Rev 00

	with removable covers of transparent, non-deteriorating type plastic material			
9.0	Fixing Hardware (Nuts, Bolts and Washers) for mounting JB	Provided		

B) TYPE TESTS

i) Whether type test reports of the following test conducted earlier on identical or similar material are available (not older than five years from the date of inspection). (YES)

S.No.	TESTS	REPORT NO.	Date	Conducted at accredited laboratory or witnessed by independent authority
1	Degree of protection test			

ii) If type test reports are not acceptable to BHEL/Customer then above tests shall be conducted by the bidder free of cost. (YES)

C)

S.No.	Description	Confirmation of Supplier
1.	Bidder to confirm that all standard approved drawings / data sheets/QP/ valid type tests reports/ all relevant information shall be submitted to BHEL for organizing approval extension from ultimate customer.	
2.	Bidder to confirm that it will offer approved Make of the components and fitments at contract stage. In case the offered make is not approved by the customer, then alternate make shall be supplied without any commercial implications to BHEL.	

Date:

Signature of the authorized representative of Bidder

Company Seal

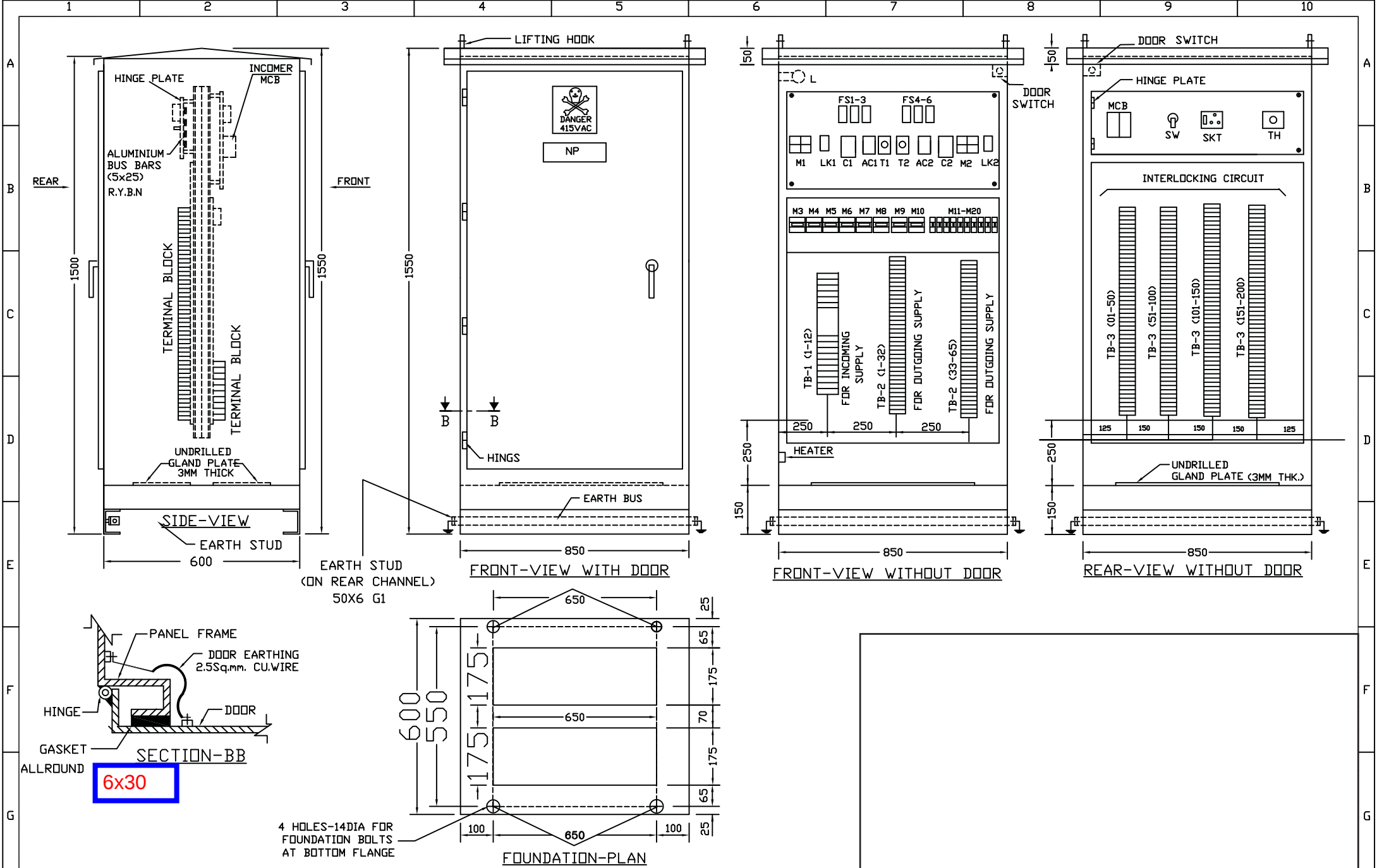
Customer: TSGENCO
Project: 400kV SWYD at Yadadri S/s
Technical Specification: Marshalling Kiosk & Junction Box

Bharat Heavy Electricals Limited
Doc. No. TB-4-387-510-050A
Rev 00

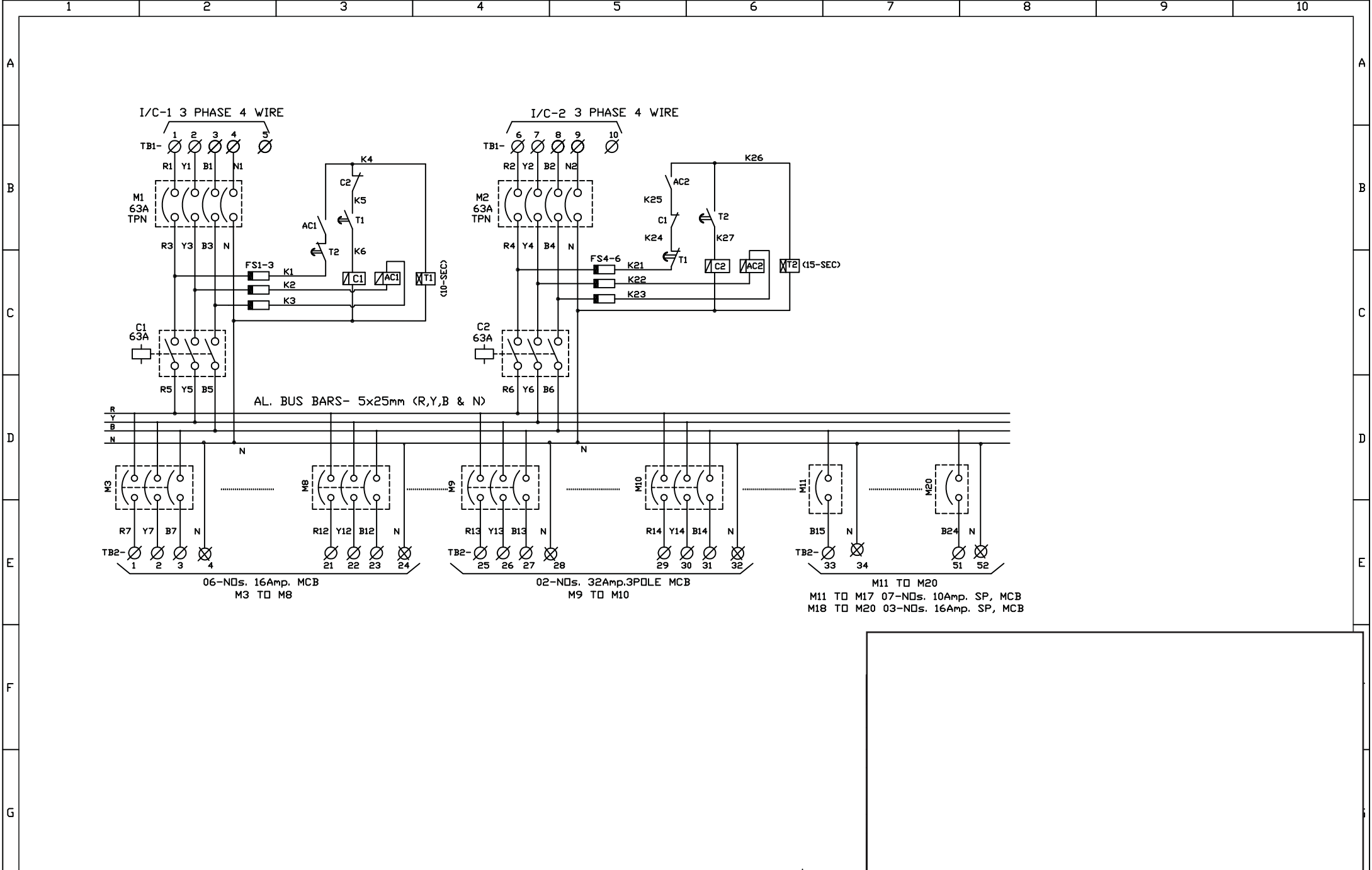
SECTION-6

ENCLOSURE

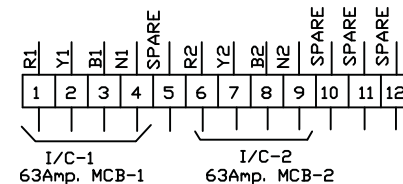
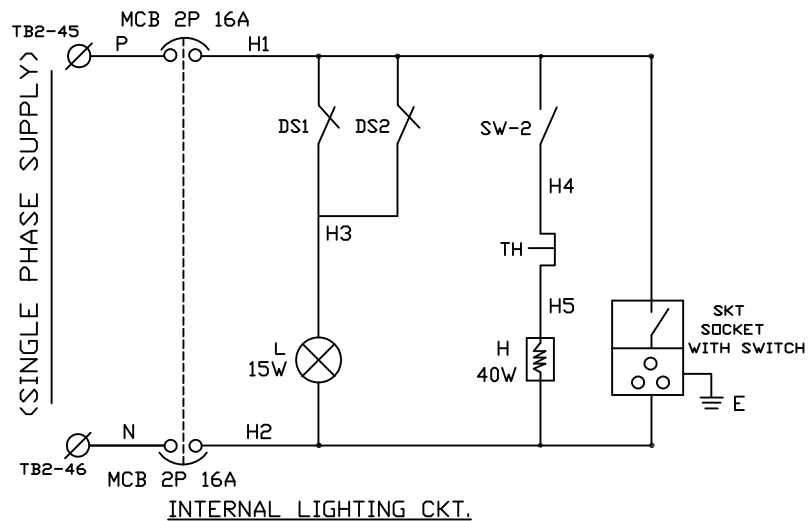
1. Drawing for Marshalling Kiosk & Junction Box, these drawings are only for reference approved in other projects of TSGENCO and may be used for reference while preparing drawings in line with TS requirements



06		04		02	AS PER CUSTOMER REQUIREMENT	21.09.201
05		03		01	AS PER CUSTOMER COMMENTS BY MAIL ON 24.AUG.2017	25.08.201
REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE	DATE

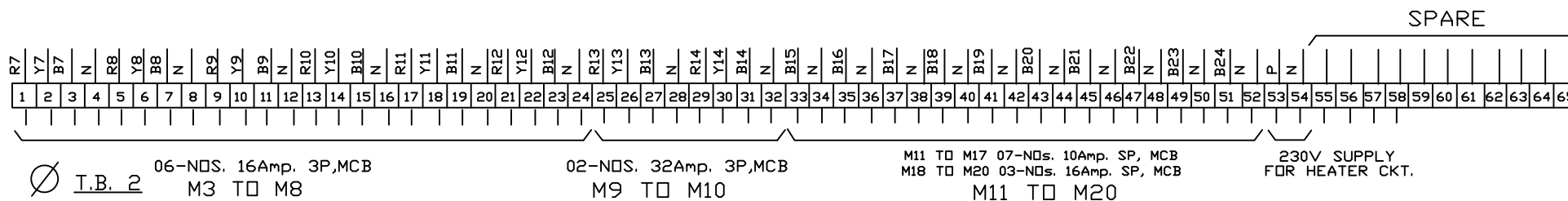


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05		03	01	AS PER CUSTOMER COMMENTS BY MAIL ON 24.AUG.2017	25.08.2017
REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE



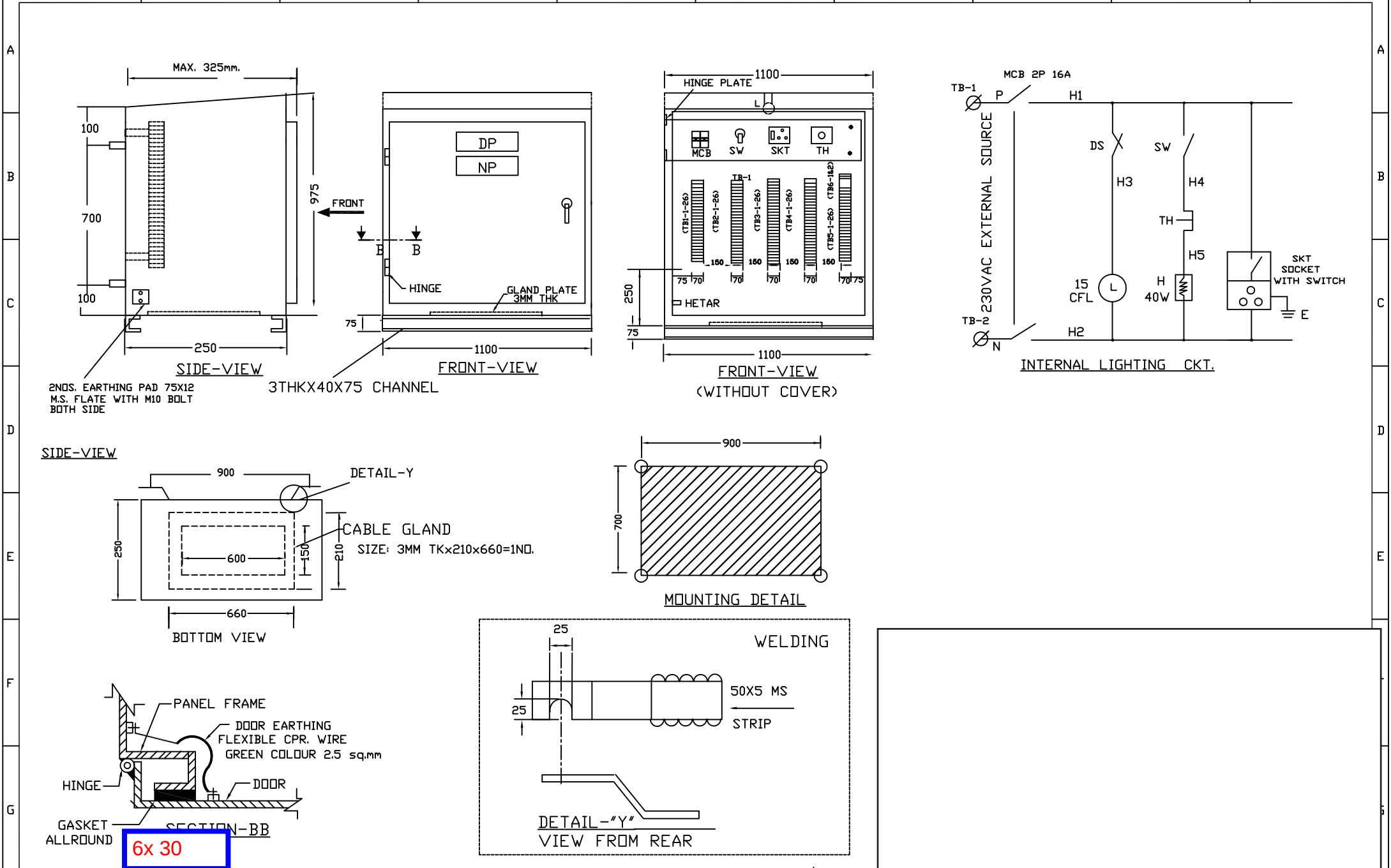
Ø I.B. 1

ADDITIONAL TBs TO BE
SUPPLIED
FOR LOOP-OUT I/C FEEDERS



06		04		02	AS PER CUSTOMER REQUIREMENT	21.09.2017
05		03		01	AS PER CUSTOMER COMMENTS BY MAIL ON 24.AUG.2017	25.08.2017
REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE	REV.

1	2	3	4	5	6	7	8	9	10
BILL OF MATERIAL					NOTES:-				
SL.NO.	DESN.	DESCRIPTION		MAKE	QTY.	1. ALL DIMENSIONS ARE IN MM., TOLERANCE ± 10MM.			
1.	M1&M2	63Amp. TP MINIATURE CIRCUIT BREAKER		SCHNEIDER/ABB/HAVELLS	02	2. ALL SHEET METAL WORKS ARE OF 3mm. THK. SHEET STEEL.CR.			
2.	M3TOM8	16Amp. 3POLE, MINIATURE CIRCUIT BREAKER		SCHNEIDER/ABB/HAVELLS	06	3. ENCLOSURE WILL BE PAINTED WITH SYNTHETIC ENAMEL			
3.	M11-M17	10Amp. SP, MINIATURE CIRCUIT BREAKER		SCHNEIDER/ABB/HAVELLS	07	OUTSIDE PAINT AS PER SHADE 631 OF IS:5 &			
4.	M18-M20	16Amp. SP, MINIATURE CIRCUIT BREAKER		SCHNEIDER/ABB/HAVELLS	03	INSIDE GLOSSY WHITE PAINT AS PER IS:13947 (PART-1)			
5.	TB3	TERMINALS BLOCKS, 4 Sq.mm. NON DISCONNECTING AND STUD TYPE (TYPE: CATM4)		ELMEX.	200	4. DEGREE OF PROTECTION IPW-55 PER IS:13947 (PART-1)			
6.	TB1	TERMINAL BLOCK FOR I/C SUPPLY (TYPE: CBT 110)		ELMEX	12	5. DETACHABLE GLAND PLATE 50MM FOR CABLE ENTRY WILL BE PROVIDED.			
7.	TB2	TERMINAL BLOCK FOR O/G SUPPLY (TYPE: CBTM5)		ELMEX	65	6. CONTROL WIRING SHALL BE DONE AS 6 Sq.mm. STANDARD COPPER 1100VOLT GRADE FLEXIBLE WIRE & POWER WIRING SHALL BE DONE AS PER CKT. REQUIREMENT.			
8.	DS1&DS2	DOOR OPERATED SWITCH		IEC.	02	7. EPDM RUBBER GASKET 6mm x 30mm WILL BE PROVIDED FOR DOOR. (SIZE 6mm x 30mm)			
9.	SW	ROTARY SWITCH FOR HEATER		KAYCEE.	01	8. ALL TERMINALS WAYS SHALL BE NUMBERED FROM BOTTOM AND EACH TERMINAL BLOCK MARKED WITH TERMINAL NUMBER MARKER.			
10.	H	240V, 40W, SPACE HEATER		ENTERPISENG ENGRS.	01	9. PANEL WEIGHT - 160KG. (APPROX)			
11.	L	240V, 15W ILLUMINATION LAMP (CFL)		REPUTED	01	10. EARTH BUS SIZE- 50x6 GI.			
12.	SKT	16Amp.,3PIN,240V /SOCKET SWITCH		ANCHORE	01	11. TESTS :- FOLLOWING TESTS WILL BE CONDUCTED AT OUR WORKS			
13.	TH	THERMOSTAT 30-85°		REPUTED	01	i) CONTINUITY TEST			
14.	MCB	16Amp. 2P MINIATURE CIRCUIT BREAKER		SCHNEIDER/ABB/HAVELLS/EQ	01	ii) I.R. TEST BY 1000/500 VOLT MEGGER.			
						iii) H.V. TEST 2 KV FOR 1MINUTE.			
						12. FERRULES :- WHITE FERRULES WITH BLACK LETTERS			
						13. ALL BUS BAR TO BE SHROUDED BY COLOUR SLIVE.			
						14. DOOR HANDLE WITH INTEGRAL LOCK & MASTER KEY.			
						15. T.B. COVER TO BE PROVIDED TRANSPARENT, PLASTIC.			



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A	BILL OF MATERIAL					NOTES:-																													
	SL.NO.	DESN.	DESCRIPTION	MAKE	QTY. CT. J.B.	1. ALL DIMENSIONS ARE IN MM., TOLERANCE ± 10MM. 2. ALL SHEET METAL WORKS ARE OF 3mm. THK. SHEET STEEL.(CR). 3. ENCLOSURE WILL BE PAINTED WITH SYNTHETIC ENAMEL OUTSIDE PAINT.AS PER SHADE 631 OF IS:5 & INSIDE GLOSSY WHITE. PAINT THK. 50 MICRONS MIN. 4. DEGREE OF PROTECTION SUITABLE FOR IP-55 AS PER IS:13947 (PART-1) 5. DETACHABLE GLAND PLATE AT BOTTOM FOR CABLE ENTRY WILL BE PROVIDED.(THICKNESS-3MM) 6. EPDM RUBBER GASKET WILL BE PROVIDED FOR DOOR. (SIZE: 6mmx30) 7. ALL TERMINALS WAYS SHALL BE NUMERED FROM TOP AND EACH TERMINAL BLOCK MARKED WITH TERMINAL NUMBER MARKER. 8. PANEL WEIGHT - 80KG. (APPROX) 9. TESTS :- FOLLOWING TESTS WILL BE CONDUCTED AT OUR WORKS i) CONTINUITY TEST ii) I.R. TEST BY 1000/500VOLT MEGGER. iii) H.V. TEST 2 KV FOR 1 MINUTE. 10. FERRULES :- WHITE FERRULES WITH BLACK LETTERS. 8. ELECTRICAL COMPONENT SUIT TO ASSY. 9. CONTROL WIRING SHALL BE DONE 2.5 S.Q. MM STANDARD COPPER 1100 VOLT GRADE FRLS WIRE. 10. THE FOUNDATION BOLT 4NDS. (12MMx150MM LG)PROVIDED. 11. DOOR HANDLE WITH INTEGRAL LOCK & MASTER KEY. 12. T.B. COVER TO BE PROVIDED TRANSPARENT, PLASTIC.																													
B	1.	TB1 TO TB5	TERMINAL BLOCKS (CATD-M4)	ELMEX.	130																														
C	2.	L	240V, 15W CFL	PHILIPS/BAJAJ/HAVELLS	01																														
	3.	DS	DOOR OPERATED SWITCH	IEC.	01																														
D	4.	SW	TOGGEL SWITCH FOR HEATER (TYPE-KT1021BY)	KAYCEE.	01																														
	5.	MCB	16Amp. 2P MINIATURE CIRCUIT BREAKER	ABB/SCHNEIDER/HAVELLS	01																														
E	6	SKT	16 AMP,3 PIN, 240V/ SOCKET SWITCH	ANCHORE	01																														
	7	TH	THERMOSTAT 30-85°	GIRISH,SHREE SAI,VIKASH	01																														
F	8	TB	T.B. FOR LIGHTING CKT. (CST6)	ELMEX.	03																														
	9	H	240V, 40W, SPACE HEATER	ENTERPISING ENGRS.	01																														
G	N.P.																																		
	ENGRAVED ALUMINIUM NAME PLATE SIZE : 80x200mm. WHITE LETTER ON ON BLACK BACKGROUND NAME PLATE DETAILS :- CT JUNCTION BOX-D130																																		
H	D.P.																																		
	ALUMINIUM DANGER PLATE SIZE : 97x97mm. RED LETTER ON WHITE BACKGROUND ALL LABELELS SHALL BE ENGRAVED IN ENGLISH																																		
<table><tr><td>06</td><td></td><td></td><td>04</td><td></td><td>02</td><td>AS PER CUSTOMER REQUIREMENT</td><td>21.09.2017</td></tr><tr><td>05</td><td></td><td></td><td>03</td><td></td><td>01</td><td>AS PER CUSTOMER COMMENTS BY MAIL ON 24.AUG.2017</td><td>25.08.2017</td></tr><tr><td>REV.</td><td>DESCRIPTION</td><td>DATE</td><td>REV.</td><td>DESCRIPTION</td><td>DATE</td><td>REV.</td><td>DESCRIPTION</td><td>DATE</td></tr></table>										06			04		02	AS PER CUSTOMER REQUIREMENT	21.09.2017	05			03		01	AS PER CUSTOMER COMMENTS BY MAIL ON 24.AUG.2017	25.08.2017	REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE	
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