LIST OF ANNEXURES - ILLUMINATION ITEMS PACKAGE			
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A. **SCOPE:** This specification covers the design, manufacture, assembly, testing at manufacturer's works, packing and delivery to site of all items included in Illumination Package of Power Plants and supervision of installation as specified, for efficient and trouble free installation and operation.

B. **CODES & STANDARDS:** The different items covered under this specification shall comply with the latest applicable Indian Standards as listed below:

IS	Standard Description
IS 5	Colours for ready mixed paints and enamels
IS 1777	Industrial luminaire with metal reflectors
IS 1913	General and safety requirements for luminaires
IS 3287	Industrial lighting fittings with plastic reflectors
IS 3528	Waterproof electric lighting fittings
IS 4012	Specification for dust proof electric lighting fittings
IS 4013	Dust tight electric lighting fittings
IS 5077	Decorative lighting outfits
IS 418	Tungsten filament lamps for domestic and similar general lighting purposes
IS 2418	Specification for tubular fluorescent lamp for general lighting service
IS 2215	Starters for fluorescent lamps
IS 3323	Bi-pin lamp holders for tubular fluorescent lamps
IS 1534	Ballasts for fluorescent lamps: Part-1 For switch-start circuits
IS 6616	Ballasts for high pressure mercury vapour lamps
IS 9900	High pressure mercury vapour lamps
IS 9974	High pressure sodium vapour lamps
IS 694	PVC insulated cables for working voltages up to and including 1100V
IS 9537	Conduits for electrical installation
IS 2713	Specification for tubular steel poles for overhead power lines
IS 1161	Steel tubes for structural purposes – Specification
IS 8309	Compression type tubular terminal ends for Al conductors of insulated cables
IS 2678	Dimensions and tolerances for wrought Al and Al alloy drawn round tube
IS 1293	Plugs and socket outlets of rated voltage up to and including 250V and rated current up to and including 16A
IS 8623	Specification for Low-Voltage Switchgear and Controlgear Assemblies
IS 1554	PVC insulated (heavy duty) electric cables
IS 8828	Electrical Accessories - Circuit Breakers for Over Current Protection for Household and Similar Installations
IS 2629	Recommended practice for hot-dip galvanizing of iron and steel
IS 3043	Code of practice for earthing
IS 12640	Residual Current Operated Circuit-Breakers for Household and Similar Uses
IS 4691	Degrees of protection provided by enclosure for rotating electrical machinery
IS 4759	Hot-dip zinc coatings on structural steel and other allied products
IS 9968	Elastomer insulated cables: Part-1 For working voltages up to and including 1100V
IS 13947	Low voltage switchgear and control gear
IS 2206	Flameproof electric lighting fittings
IS 2148	Electrical apparatus for explosive gas atmospheres – Flameproof enclosures "d"
IS 5571	Guide for selection of electrical equipment for hazardous areas
IS 5572	Classification of hazardous areas (other than mines) having flammable gases and vapours for electrical installation
IS 60079	General requirements for electrical apparatus for explosive gas atmospheres

IS 13408	Code of practice for the selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres (other than mining applications or explosives processing and manufacture)

C. INSTRUCTIONS TO BIDDER

1. Bidders are advised to contact BHEL for essential technical queries/clarification in writing within one week of issue of enquiry. It is Bidder's responsibility to thoroughly understand the technical and other documentation related requirements of this specification before submitting the offer. Offers with incomplete information will not be considered for evaluation and are likely to be rejected outright without any further communication with the Bidder.
2. Unsolicited requests from bidders for alterations to their already submitted offers will not be entertained. These would not be taken cognizance, and offers will be evaluated without taking into account such requests/correspondence.
3. Any technical features (over & above BHEL enquiry specification requirements) proposed by Bidder will not be given preference for the purpose of evaluation.
4. Bidders are advised to comply with the specification in total, unless the requirement is not feasible due to technical constraint. Bidder to intimate such constraint in writing in Deviation format (Annexure-V) and shall propose feasible deviations. In case feasible deviations are proposed by Bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder. If any deviation is accepted by BHEL during technical evaluation then also there will be no price implication. Hence, in no case there will be consideration of Price implications.
5. Bidder shall submit duly filled, stamped & signed deviation schedule as per attached format (Annexure-V) along with technical offer. If there are no deviations from the specifications, bidder still has to submit the Deviation schedule by writing "NO Deviations" in this format. If the "Deviation format" is not submitted along with the offer, or submitted without sign & stamp, the bidder's offer is likely to be rejected without any further interaction with the bidder.
6. Bidders are advised to quote model and brand of all standard make items, manufactured by reputed makers or vendors from sub vendor list (Annexure-IV). Offer shall include supporting Catalogue/published literature (Duly highlighting the appropriate variant). In case of discrepancy between Bidder's offer and published documents, details furnished in published documents/catalogues will be taken into consideration for technical evaluation.
7. In the event of any conflicts between these specification, related standards, data sheets, codes, etc. vendor shall refer the matter to BHEL for clarification and only after obtaining the clarification, vendor shall proceed with the manufacture of the items in question.
8. Bidder shall be responsible for providing all items specified at Illumination BOM, attached as Annexure-II. Incomplete Offer for illumination items listed in BOM will not be considered for evaluation and offer will likely be rejected without any communication.
9. All materials shall be as per sub vendor list attached as Annexure-IV. Any deviation in this regard will not be acceptable. Any item or accessories which are not covered in the sub vendor list shall be of reputed make of proven track record and manufactured in accordance with various national and international standards.
10. Bidder to submit duly signed & stamped un-priced price schedule filled in writing "Quoted" against each item as per attached format (Annexure-III) along with technical offer as a token of his concurrence that all items were quoted along with unit prices. **If not submitted**

in this format or any field is left blank, the offer will be liable for rejection. For discrepancies, if any, in the bid with respect to Quantity, Rates & Totals, etc., BHEL discretion shall be applicable.

11. Vendor shall fill up prices of various items and submit to BHEL in separate sealed cover as part of commercial offer. The commercial bid shall be submitted as per commercial terms and conditions.
12. The quantities given in Illumination BOM (Annexure-II) are subject to variation based on the actual Illumination layout Engineering/ Detailed Engineering. For addition/reduction of quantity, unit rate quoted in the present offer shall be considered and shall be valid up to execution of the contract.
13. Bidder to submit duly stamped and signed "Bidder Check list" as per prescribed format (Annexure-VI) as confirmation for compliance to various technical and documentation requirements associated with the offer. Bidder to fill in writing "Yes" in the indicated column against each row of table mentioned in the Check list. **Technical offer submitted without filled in Check list will not be considered for evaluation.** Also if any row of submitted check list is left blank or not confirmed or the check list is submitted without bidder's sign and stamp, the offer will be rejected without any communication.
14. In case of any discrepancy between Illumination BOM (Annexure-2) and Technical specification as per clause D below, Illumination BOM (Annexure-2) is to be followed.

D. TECHNICAL SPECIFICATIONS:

SITE CONDITIONS: For Site conditions of Project Refer Annexure-II (Illumination BOM). Bidder shall supply all materials suitable for satisfactory working in the mentioned site conditions.

I. SAFE AREA LIGHTING PANELS:

1.1 Lighting panels shall conform to IS 8623, IS 13947, IS 8828, IS 694, IS 2147, IS 8623 and IS 12640 and shall have IP-54 (min.) protection for indoor and IPW55 (min.) for outdoor type panel as per IS2147.

1.2 Lighting panels shall be metal enclosed, double door type, fabricated from CRCA sheet steel of minimum 14 SWG (2mm) with dust and vermin proof and facility for padlocking. Outdoor type panels shall be provided with external FRP/Sheet Steel canopy to protect from heavy tropical rains. These shall be suitable for wall/column mounting with external fixing lugs. All hardware provided shall be MS Cadmium plated/zinc passivated.

1.3 Three separate compartments shall be provided, one for incoming TPN RCBO/MCB, one for outgoing RCBOs/MCBs and one for incoming/outgoing terminal blocks. Door for each compartment shall be hinged type with quick release fasteners and have neoprene rubber gaskets. All MCBs/RCBOs should be mounted on a bracket covered with sheet steel barrier plate of 14SWG with only opening for dollies. Dollies of MCB/RCBOs should be accessible only after opening the outer door. Barrier plate shall be hinged / bolted with fixing screws. Sizes of each compartment shall be sufficient enough to accommodate all MCB/RCBOs/TBs/Cable glands etc. along with their internal wiring in orderly manner. The front access door of the panels shall have padlocking arrangement.

1.4 Two numbers 6mm external earthing terminals complete with two plain and one spring/lock washer and a nut on opposite side of the panels shall be provided. Earth Bus of 32x6 Cu. shall be provided along the length at TB compartment for internal earthing &

terminating all earth wires of outgoing circuits. Two nos. grounding pads suitable for fastening Earthing bus also be provided.

1.5 Caution note and panel nameplate shall be provided as per manufacturer standard but these shall be preferably Rear engraved Perspex with white letters on black background. Minimum information to be included in the name plate shall be as per clause E.III. A separate transparent acrylic or equivalent caution name plate" LIVE TERMINALS" in red letters on white background shall be provided above main terminals. Arrangement for keeping 'tabular form circuit card' on the inside of outgoing compartment door shall be provided.

1.6 Terminal blocks suitable for connection of incoming and outgoing circuit cables shall be provided. Terminal blocks shall be stud/clamp type suitable for 35 sq mm Al. wire for incoming feeder and clamp type suitable for 6 sq mm Cu. wire for outgoing circuits if not otherwise specified. Sufficient space shall be provided (200 to 250mm) between gland plate and bottom of terminal block for easy termination of cables.

1.9 For AC lighting panels, electrolytic quality Cu. bus bar with colour coded for R, Y, B & N buses shall be provided. Neutral bus bar shall be colour coded with black band. A copper earth bus shall also run along the length of the panel. For DC lighting panel cu. bus bar shall be color coded with Red and Black bands for positive and negative respectively. Minimum size of the bus bar shall be 25x6mm, however size shall be selected to limit bus bar temperature rise to 90º. Spacing between the bus bars shall be as per IS for the applied voltage to prevent flash over. Short circuit level of the panel shall be 10kA/1sec. Bus bar support shall be non–hygroscopic, insulating, self-extinguishing and fire retardant material of adequate mechanical strength. Bus bar support shall be capable of withstanding the effects of available short–circuit current without any damage.

1.10 For AC lighting panels MCBs/RCBOs Ratings for incomer and outgoing shall be as per Illumination BOM. However if not specified, incomer shall be provided with 63A, 415V, TPN RCBO (4 pole) and neutral link. Outgoing feeders shall be provided with 20A, DP RCBOs. Additionally two nos. 32A TPN RCBOs and terminal block suitable for 35sqmm Al. wire shall be provided at outgoing, if asked specifically in the illumination BOM. All MCBs Shall be suitable for breaking capacity of 10kA(min.) at 240V AC and RCBOs shall be provided with thermal and magnetic release and tripping due to earth leakage with a sensitivity of 100mA.

1.11 For DC lighting panels, incomer shall be provided with 63A, DP MCB (2 pole, 110V DC). Outgoing feeders shall be provided with 10A, DP MCBs with back up fuses..

1.12 For AC lighting panel with contactor if asked and specified in the Illumination BOM, Contactor shall be used for remote controlling of incomer supply in addition to 63A MCB as per detail below.

a) Contactor Coil rating: - 230V AC, heavy duty rated for continuous operation.

b) No. of Contacts & Rating: - 3nos. NO contacts of 63A rating (Power contacts for 415V, 3-phase supply) and 2 set of NO+NC auxiliary contacts of suitably rated and wired for holding the contactor in energised condition whenever switched ON.

c) Controlling of contactor: - Contactor will be switched ON/OFF through push button type ON/OFF Switch. Provision for switching ON/OFF the contactor from three remote locations shall be provided. Refer Annexure-I for internal control wiring details. Suitable number of control terminal blocks shall be provided in addition to power terminal blocks for termination of control cabling / wire.

1.13 The number of outgoing feeders is to be considered as mentioned in Annexure-II.

1.14 All internal wiring shall be done with 1.1kV PVC insulated, 16sq.mm stranded Cu flexible wires. All wires should be neatly bunched & clamped to enclosure at regular interval of their routing. All wires shall be ferruled and terminated by sleeved lugs.

1.15 All component installed in the panels shall have levels; also outgoing and incoming circuits at terminal blocks shall have levels. Wires of internal wiring shall be identifiable with numbered ferrules and shall carry same number at both ends of wire piece. Circuit diagram provided for internal wiring shall be in conformity with the levels of components and wiring.

1.16 Double compression nickel plated brass cable glands shall be provided for incoming and outgoing cables. The quantities shall be equivalent to the number of outgoing and incoming feeder as mentioned in the illumination BOM (annexure-II). Glands for outdoor type panels should be supplied with gland hoods. Incoming and outgoing cable entries shall be from bottom by means of removable undrilled gland plates.

1.17 Crimping type tinned Cu lugs of appropriate sizes suitable for TBs shall be provided for all incoming and outgoing cables. Blanking plug/Rubber Grommet of suitable size shall be supplied for 20% (min) outgoing cable entries to seal the unused entries.

1.18 Sizes of cable glands, Terminal blocks, Cu. Lugs & Blanking plugs are project specific, will be decided during detail engineering at drawing approval stage.

1.19 All electrical components shall be mounted on suitable brackets to match with inner door.

1.20 Lighting panels should be supplied in complete with installed sub components and necessary internal wiring. All loose items like Cable Glands, Blanking plugs, Cu. Tinned Lugs for incoming/outgoing cables and mounting hardware etc, shall be supplied along with panels for fitting at site.

1.21 All metal surfaces shall be thoroughly cleaned and degreased to remove scale, rust, grease and dirt. Fabricated structures shall be pickled and then rinsed to remove any trace of acid. The surface shall be prepared by applying a coat of phosphate paint and coat of yellow zinc chromate primer. The surface shall be made free from all imperfections before undertaking the finished coat. After preparation of the surfaces, the panels shall be powder coated with two coats of epoxy based final paint such that minimum thickness of paint 75 micron is achieved. Colour shade of final paint shall be 632 as per IS: 5. The finished coat shall be dried in stoving ovens in dust free atmosphere. Panel finish shall be free from imperfections like pinholes, orange peels, runoff paint etc.

1.22 Makes of major components shall be as follows **if not** otherwise specified in sub vendor list:-

(i) MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.
(ii) Fuses: L & T, GE, Indo-Asian, Seimens.
(iii) Cable gland: Baliga, Commet,Flexipro, FCG
(iv) Terminal Block: Elemax, Connectwell

1.23 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

II. HAZARDOUS AREA LIGHTING PANELS:

1.0 Certification: The equipment shall be certified by testing authorities like CMRI/CIMFR/BASEEFA/ERTL/UL/FM, ATEX certification as applicable for the service and the area of installation and shall be approved by CCOE. All indigenous flameproof equipment Ex(d) shall be under BIS license & shall have marking as required by statutory authorities.

2.0 Technical Particulars:

2.1 Flame proof Lighting panels shall have IP65 degree of protection and shall be suitable for area classification as mentioned in the illumination BOM (i.e. Zone – I & II, Gas Group IIA&IIB or IIC as per IS 2148). The lighting panels shall be flameproof type Ex (d) with temperature class T4. Outdoor type panels shall be provided with external FRP canopy to protect from heavy tropical rains.

2.2 The enclosure shall be of Cast Al LM6 with modular construction.

2.3 All the accessories and loose items supplied with panel shall be suitable for applicable classified area.

2.4 Warning inscription: "Isolate power supply elsewhere before opening" is to be provided on the nameplate or the warning inscription is to be embossed on the enclosure.

2.5 Additionally following details are to be embossed on the nameplate:
(i) Details of testing agency (CMRI or equivalent)
(ii) Test certificate no. with date
(iii)Statutory approval no. with date and agency like CCE, DGFASLI, DGMS etc.
(iv)BIS License no. and date
(v) Applicable gas group etc.

2.6 All panels shall be provided with NPT cable entries suitable for approved type flame proof DC nickel plated brass cable gland. Cable entry sizes shall be as per Illumination BOM (Annexure-II).

2.7 All other technical requirement mentioned in the safe area lighting panels at I above also applicable for flame proof lighting panels.

2.8 Makes of major components shall be as follows if not otherwise specified in sub vendor list:-
(i) MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.
(ii) Fuses: L & T, GE, Indo-Asian, Seimens.
(iii) Cable glands (Flame proof type): Baliga, Flameproof equpment, Prompt, FCG
(iv) Terminal Block: Elemax, Connectwell

III. FLEXIBLE WIRES:

1.1 Flexible wires shall be single core, unsheathed, PVC insulated suitable for voltage grade 1.1kV.

1.2 The conductor shall be stranded Cu conductor. The cross-sectional area of conductor and colour of insulation shall be as indicated in Annexure-II.

1.3 The standard length of bundle shall be 100m + 5%.

1.4 Internal resistance and insulation thickness of the wire should be as per IS.

1.5 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

IV. SAFE AREA FIXTURES AND LAMPS:

1.1 All fixtures, lamps and accessories shall be designed for continuous operation without exceeding permissible temperature rise as specified in the applicable standards. Fixtures shall have proper enclosure to suit site conditions.

1.2 In general light fitting shall have following construction features:
a) Body- FRP in safe areas & Die cast aluminum in hazardous area.
b) Gasket-EPDM or neoprene with u/v resistant and corrosion resistant properties.
c) Reflector-Aluminum stainless steel/chromium plated steel-mirror finished.
d) Hardware-stainless steel (316).
e) Guard- stainless steel (316)
f) Painting-Epoxy painting

1.3 Unless specified otherwise, operating voltage is 110V DC +10%, -15% for DC lamps and associated equipment, 240V±10% 1-phase 50Hz±5% AC for AC lamps and associated equipment. All fixtures shall be suitable for operation on available power supply.

1.4 All fixtures shall be provided with power factor correction capacitor, choke, starter, ballast etc. The choke shall be copper wound. The power factor of fixture and CG box shall not be less than 0.9. In case of multi-lamp fixtures, separate set of accessories (ballasts, capacitors, igniters etc.) shall be provided for each lamp.

1.5 Terminal block of all the fixtures and associated accessories like CG Box shall be suitable for 4 sq mm Cu. wire.

1.6 All accessories, control devices, internal wiring and fittings which form part of the equipment and which are necessary for safe and satisfactory installation and operation shall be provided.

1.7 All hardware provided shall be MS Cadmium plated/zinc passivated.

1.8 All Well glass, flood light and street lighting fixtures and their associated accessories shall have IPW 65 (min.) protection if not otherwise specified. Other fixtures should have protection class as per IS in conformity of their use.

1.9 CG Boxes provided with non-integral type Well glass / High bay /Flood lighting fixtures shall be suitable for loop-in-loop-out by 3Cx2.5 sq mm Cu. cable. CG Boxes of these type of fixtures shall be designed to be placed minimum 30M away from lamp compartment.

1.10 All FTL type fixtures (Normal or Corrosion resistant) should be suitable for industrial application and necessary reflectors/enclosure shall be provided. Fixtures shall be suitable for surface/wall/suspension mounting with 20mm down conduit.

1.11 External reflector shall be provided for FTL fixtures and shall be of sheet steel with epoxy powder coated / vitreous enameled (to be finalized during detail engineering).

1.12 Fluorescent lamps shall be energy efficient, slim line type if not otherwise specified.

1.13 Recess mounted fixtures shall be designed for glare free operation and should have P5 paralite vacuum metalized louvers if not otherwise specified.

1.14 All Well glass fixtures shall be dust proof, vapor-proof and suitable for Indoor as well as outdoor application and suitable for Ceiling/ Column/ Pole mounting. The fixtures' glass shall be heat resistant toughened glass and should be fitted with wire guard of MS hot dip galvanized wire of 50mm (max.) dia. Necessary mounting hardware like mounting bracket, Eye bolt, Pole reducer shall be supplied along with fixtures in loose. External stove enameled/powder coated reflector shall also be supplied with all mounting accessories for Well glass fixture, if specifically asked in illumination BOM (Annexure-II).

1.15 All High bay type fixtures shall be fully closed type cover with glass and suitable for Purlin/Ceiling mounting. Reflector of high bay fixtures shall be spun, electrochemically brightened, polished and anodized aluminum. High bay fixtures shall have provision for vibration damper in turbine hall to ensure rated lamp life.

1.16 All street lighting fixtures shall have in built igniter/Ballast etc. and heat resistant clear Glass/acrylic cover unless otherwise specified. These fixtures shall be fitted with an electrochemically brightened anodized aluminum reflector optic with POT for excellent light control with high optic efficiency and shall be suitable for mounting with 50 dia (outer) steel pipe.

1.17 All DC fixtures (Bulkhead/Well glass/Down light) shall be compatible with the DC voltage specified in the project. Fixtures shall have in built suitable DC to AC convertor if CFL Lamp is used. Alternatively DC/AC converter may be supplied separately housed in suitable enclosure/JB of sheet steel, epoxy painted. Such enclosure shall be suitable for column/wall mounting and shall have IP 55 (Min.) protection. Cable entries of the enclosure shall be suitable for 3Cx2.5 sq.mm Cu. cable and shall have DC brass cable gland. Enclosure for convertor used for hazardous area shall be flame proof type and suitable for specified area classification.

1.18 Cable entries of fixtures and control gear boxes shall be suitable for 3Cx2.5sq.mm Cu cable. For Well glass and High bay fixtures cable entry should be from side only. Double compression nickel plated brass cable glands suitable for specified area classification shall be provided for all cable entries. Spacing between the holes of cable entries shall be sufficient to accommodate all DC Brass cable gland. Suitable blanking plugs shall be provided (min. 1 no.).

1.19 Fixtures should be provided with earthing terminals.

1.20 General Lighting Service (GLS) lamps shall be clear type.

1.21 In general, lamps shall be compatible with the fixture especially in terms of rated voltage and type of fixing (screwed type for all except bi-pin type for fluorescent lamps).

1.22 Fixtures and CG Boxes shall be supplied complete in all respect with installed internal accessories like ballast/igniter etc. All loose items like mounting hardware, Cable Glands, Cu. Lugs, Blanking plug shall be supplied in loose along with each fixture.

1.23 Unless otherwise specified Self-contained emergency lighting unit shall comprise of one 20W fluorescent lamp with 6V rechargeable batteries, charger and suitable inverter circuit. Provision of switching of lamp independent of availability of power supply (230V AC) from either available 230V AC supply or battery should be there. Also emergency lamp should also have provision of switching on automatically in the absence of power supply. The battery shall be sized for at least 2 hours continuous operation under fully charged condition. 2m of flexible cord with 3-pin plug suitable for receiving 240V, 1-phase, and 50Hz input supply shall be provided. This unit shall be suitable for wall/column mounting.

1.24 Ballast for mercury vapour shall be of copper wound provided with suitable tappings to set the voltage within range specified.

1.25 Fixture catalogue details /name plate as per E-I of this spec. shall be provided for easy identification.

1.26 All fixtures and associated accessories should be appropriately epoxy painted with Paint shade of RAL 7032 /631/632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified & minimum paint thickness shall be 75 micron.

1.25 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

1.26 Makes of major components shall be as follows if not otherwise specified in sub vendor list:-

(i) Cable gland: Baliga, Comet, Flexipro, FCG

V. HAZARDOUS AREA FIXTURES AND LAMPS:

1.0 Certification: The equipment shall be certified by testing authorities like CMRI/CIMFR/BASEEFA/ERTL/UL/FM, ATEX certification as applicable for the service and the area of installation and shall be approved by CCOE. All indigenous flameproof equipment Ex(d) shall be under BIS license & shall have marking as required by statutory authorities.

2.0 Technical Particulars:

2.1 Fixtures and lamps shall have IP65 degree of protection and shall be suitable for area classification as mentioned in the illumination BOM (i.e. Zone – I & II, Gas Group IIA&IIB or IIC as per IS 2148). The light fittings shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T4 (min.).

2.2 The enclosures of fixtures and CG Box shall be of Cast Al LM6 material and free from frictional sparking hazard.

2.3 The Control Gear Boxes (CG Boxes) wherever applicable and other accessories shall be suitable for the specified area classification.

2.4 Glass used for lighting fixture shall be clear type and suitable for use under condition involving exceptional risk of mechanical damage.

2.5 Well glass fixture for Zone-2 area shall meet requirement of IS 6381 and mechanical strength shall meet requirement of IS 2206 (for type A glass).

2.6 All fixtures and CG boxes shall be provided with ¾" NPT cable entries suitable for approved type flame proof DC nickel plated brass cable gland.

2.7 Additionally following details are to be embossed on the nameplate of light fittings & CG boxes:

(i) Details of testing agency (CMRI or equivalent)
(ii) Test certificate no. with date
(iii)Statutory approval no. with date and agency like CCOE, DGFASLI, DGMS etc.
(iv)BIS License no. and date
(v) Applicable gas group etc.

2.8 In addition to above, all particulars specified for safe area fixtures and lamps (IV above) will also be applicable.

2.9 Make of cable glands suitable for the specified area classification shall be as per the makes given under "Hazardous Area Lighting Panels" (II above)

VI. SAFE AREA WEATHER PROOF JUNCTION BOXES:

1.1 The safe area weather proof junction boxes shall have IP55 degree of protection and shall be weather proof.

1.2 Enclosure of rectangular JBs shall be of material (i.e. FRP/sheet steel/cast Iron/Die cast Aluminium/Thermoplastic) as per mentioned in the Illumination BOM(Annexure-II). Also JBs shall be epoxy painted with shade of RAL 7032 /631/632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified & minimum paint thickness shall be 75 micron.

1.3 Size of the JB shall be project specific as indicated in annexure-II (Illumination BOM). The internal and external surface shall have smooth finish, completely free from dents, defects and blow holes. All screws / hinges shall be of stainless steel and all hardware provided shall be MS Cadmium plated/zinc passivated.

1.4 JB shall have cable entries from bottom only to protect from heavy tropical rains.

1.5 Clamp type Terminal blocks of rating & qty. as indicated in the project illumination BOQ shall be provided. There should be sufficient space between bottom of Terminal Block and Top of Cable gland for easy termination of wires. Required no. of suitable crimping type tinned round Cu lugs shall be supplied in loose for cable termination.

1.6 The no. of entries required and their sizes shall be project specific as indicated in the illumination BOM. 4 Nos. of double compression nickel plated brass cable glands with PVC shroud of required sizes suitable for cable entries shall be supplied in loose.

1.7 One blanking plug for each type of cable entry shall be provided. In addition, all the entries should be plugged with PVC plugs before dispatch.

1.8 Doors shall be screwed / bolted as per manufacturer's design and enclosure should have neoprene gasket.

1.9 JB should be suitable for Wall/Column mounting and mounting lugs shall be provided in the enclosure. Necessary mounting hardware/Mounting bracket shall be provided in loose.

1.10 JBs shall be provided with earthing studs (2 nos. internal and 2 nos. external) with washers.

1.11 Inscription plate / nameplate as per E.II of this spec. with caution note shall be provided on front cover.

1.12 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

1.13 Makes of major components shall be as follows if not otherwise specified in sub vendor list:-

(i) Cable gland: Baliga, Comet, Flexpro, FCG, Prompt
(ii) Terminal Block: Elemax, Wago, phonix.

VII. HAZARDOUS AREA JUNCTION BOXES:

1.0 Certification: The equipment shall be certified by testing authorities like CMRI/CIMFR/BASEEFA/ERTL/UL/FM, ATEX certification as applicable for the service and the area of installation and shall be approved by CCOE. All indigenous flameproof equipment Ex(d) shall be under BIS license & shall have marking as required by statutory authorities.

2.0 **Technical Particulars:**

2.1 The hazardous area junction boxes shall have IP65 degree of protection and shall be suitable for area classification as mentioned in the illumination BOM (i.e. Zone – I & II, Gas Group IIA&IIB or IIC as per IS 2148). The JB shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T4 (min.).

2.2 Enclosure of JBs shall be of die cast Al alloy LM6 with adequate thickness to withstand at least 80kg weight. The internal and external surface shall have smooth finish, completely free from dents, defects and blow holes. All screws / hinges shall be of stainless steel.

2.3 Neoprene gaskets shall be provided wherever required based on area classification.

2.4 Make of cable glands suitable for the specified area classification shall be as per the makes given under "Hazardous Area Lighting Panels" (II above)

2.5 All JBs shall be provided with NPT cable entries suitable for approved type flame proof DC nickel plated brass cable gland.

2.6 Warning inscription: "Isolate power supply elsewhere before opening" is to be provided on the nameplate or the warning inscription is to be embossed on the enclosure.

2.7 Additionally following details are to be embossed on the nameplate of Junction boxes:

(i) Details of testing agency (CMRI or equivalent)
(ii) Test certificate no. with date
(iii) Statutory approval no. with date and agency like CCE, DGFASLI, DGMS etc.
(iv) BIS License no. and date
(v) Applicable gas group etc.

2.8 In addition to above, all particulars specified for safe area Junction boxes (VI above) will also be applicable for flame proof junction boxes.

2.9 Make of cable glands suitable for the specified area classification shall be as per the makes given under "Hazardous Area Lighting Panels" (II above).

VIII. MCB BOX.

1.1 The MCBs are intended for controlling lighting circuits and shall be of industrial dust proof type. Each unit shall have MCBs (i.e TPN/DP) of required Rating as per mentioned in the illumination BOM and shall be designed as per IS8828/IEC898.

1.2 The unit shall be housed in dust proof/ vermin proof 1.6mm thick galvanized sheet steel box/cast aluminum box having gasketted, screwed front cover plate in such a way that only dollies of MCBs are protruded outside.

1.3 The unit shall have fixing lugs suitable for wall or column mounting and minimum two nos. cable/conduit knock out at bottom for loop in/out 3Cx2.5sqmm cable.
1.4 Outdoor type unit shall have external canopy with minimum protection of IPW55.
1.5 Necessary Double Compression Brass cable glands and mounting accessories of approve make shall be supplied with each unit.
1.6 Inscription plate/ nameplate shall be provided as per D.IV of this spec.
1.7 Internal and external earthing screws with washers shall be provided.
1.8 MCB Box should be painted with Paint shade of RAL 7032 /631/632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified & minimum paint thickness shall be 75 micron.
1.9 Makes of major components shall be as follows if not otherwise specified in sub vendor list:-
a) MCBs: MDS, Havell's, Indo-Asian, Legrand, Standard Electricals, Datar Switchgear
b) Cable gland: Baliga, Comet, Flexipro, FCG, Prompt

1.10 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

IX. PUSH BUTTON STATION.

1.1 Push button type switch box unit is intended for controlling supply to lighting panel contactor so that controlled illumination can be achieved from the entry/exit point.
1.2 Each unit shall be consist of two nos. push button type switch of different coloured. i.e. one for switch ON and another for switch OFF. All push buttons shall be of sturdy design of 22.5mm dia and suitable for controlling 1-phase 230V supply to Contactor coil. The component shall be conform to IS:13947 for their mechanical and electrical design features.
1.3 Each push button shall be provided with minimum 2 NO & 2 NC contacts. The contacts shall be designed such as to provide enhanced contact reliability. Suitable numbers of terminal blocks shall be provided if necessary, for connecting external control cable/wire. All NO and NC contacts of the push buttons shall be wired to the terminal blocks.
1.4 The push button unit shall be housed in dust proof/ vermin proof 1.6mm thick galvanized sheet steel box/cast aluminum box having gasketted, screwed front cover plate in such a way that only button colored switches with shroud are protruded outside.
1.5 The unit shall have fixing lugs suitable for wall or column mounting and minimum two nos. cable/conduit knock out at bottom.
1.6 Outdoor type unit shall have external canopy with minimum protection of IPW55.
1.7 Inscription plate/ nameplate shall be provided as per E.IV of this spec.
1.8 Earthing screws with washers shall be provided.
1.9 Push button switch Box should be painted with Paint shade of RAL 7032 /631/632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified & minimum paint thickness shall be 75 micron.
1.10 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

X. CONDUIT BRANCHING ROUND JB.

1.1 Round JB should be made of galvanized steel and shall have smooth finish, completely free from dents, defects and blow holes. JB should have internal dia of 60mm for dummy JB and 88mm for JB which have terminal block within it.

1.2 JB should have conduit entries in all the four sides suitable for 25mm GI conduit.
1.3 JB should be supplied with GI flat cover screwed to the JB and shall have PVC blanking in all the entries before dispatch. In addition to that Round JB of 88mm with TB should have 3 nos. terminal block suitable for 6 sq.mm (min) wire within it.
1.4 JB should be compatible with spring loaded ball socket such that when used for mounting of FTL type fixture through 20mm down conduit, the combination should be able to sustain the conduit & Fixture load.
1.5 Make of JB shall be from reputed vendor with proven track record unless otherwise specified in Sub-vendor list.
1.6 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XI. FLEXIBLE CONDUIT AND ACCESSORIES :

1.1 Flexible conduits shall be made with bright, cold rolled annealed and electro-galvanized mild steel strips & coated with PVC.
1.2 Internal dia of conduit is specified in annexure-II (Illumination BOM).
1.3 Flexible conduit connector/reducer shall be suitable for specified size GI conduit to connect flexible conduit to the GI conduit.
1.4 Make of conduit shall be from reputed vendor with proven track record.
1.5 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XII. CABLE CLAMPS :

1.1 Cable clamps and base shall be provided of size as mentioned in Annexure-II (Illumination BOM) to suit the cable size as specified.
1.2 Cable clamps shall be of 1.6mm thick GI and base shall be of GI with 3mm thickness and required width.
1.3 All hardware including clamp base mounting screw and cable clamp mounting end screws, shall be provided along with each Cable clamp. All hardware shall be galvanized or zinc passivated.

XIII. FLUSH MOUNTED SWITCHBOARD (FSB):

1.1 All switchboards shall be of modular construction with piano type switches mounted on it. Switches shall be flush mounted on front cover made of Polypropylene sheet of 3mm thickness. Color of the front cover and switches shall be milky white. Front cover is arranged such that only cover with switch will be visible after installation of switchboard.
1.2 Switchboard shall be made of M.S sheet having minimum thickness of 14 gauge and shall be minimum 65mm deep. The board shall be galvanized after fabrication.
1.3 Front cover plate shall be fixed by cadmium plated brass screws & cup washers.
1.4 Conduit knockouts shall be provided on each switchboard suitable for 25mm diameter conduit entry.
1.5 No. of switches on the switchboard shall be as specified in the Illumination BOM.
1.6 Switchboards shall be provided with earthing screw and washer for body earthing.
1.7 Makes of switchboard & switches shall be of reputed make like Anchor, Cona Electrical Solutions, ABB, Schneider etc if not otherwise specified in the sub vendor list.

1.8 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XIV. 5/15A, 240V, 2-POLE, 3-PIN COMMERCIAL TYPE SWITCH SOCKET:

1.1 Receptacles box shall be heavy duty, complete with individual 5/15A Socket & piano type switch.
1.2 Receptacles box shall be suitable for flush mounted such that only cover with Socket & switch will be visible after installation of receptacle box. All mounting hardware shall be supplied along with receptacles.
1.3 Receptacles & the controlling ON/OFF switch shall be mounted in the same enclosure but these shall be separate units to facilitate replacement by part.
1.4 Receptacle and the switch shall be flush mounted on front cover made of Polypropylene sheet of 3mm thickness. Color of the front cover and receptacle shall be milky white.
1.5 Receptacle box shall be made of M.S sheet having minimum thickness of 14gauge and shall be minimum 65mm deep. The box shall be galvanized after fabrication.
1.6 Front cover plate shall be fixed by cadmium plated brass screws & cup washers.
1.7 Conduit knockouts shall be provided suitable for 25mm GS conduit in the receptacle box.
1.8 Receptacle box shall be provided with earthing screws with washer and nuts welded on the surface for grounding.
1.9 Spring loaded shutter shall be provided in the socket such that it will automatically close the pin hole when plug is removed from the socket.
1.10 Makes of socket box, socket & switches shall be of reputed make like Anchor, Cona Electrical Solutions, ABB, Schneider etc if not otherwise specified in the sub vendor list.
1.11 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XV. 20A, 240V, 2-POLE, 3-PIN, INDUSTRIAL WEATHERPROOF METAL CLAD PLUG SOCKET :

1.1 Receptacles shall be dustproof/vermin proof with metal clad gasketted construction conform to IS 1293 and shall be weather proof with IP 55(Min.) degree of protection.
1.2 Receptacles shall be heavy duty in complete with individual socket & 20A MCB or rotary switch as per project requirements mentioned in the annexure-2 (Illumination BOM). The isolating switches shall be of industrial type of category AC22 confirming to IS:13947 (Part-3). The Isolating MCB shall be industrial type conforming to IS:8828.
1.3 Receptacle with rotary switches shall have interlocking facility such that it will not be possible to insert or withdraw the plug without switching off the supply.
1.4 Receptacles enclosure shall be CRCA sheet steel 14 SWG (2mm) with epoxy powder coating after galvanization and paint shade of RAL 7032 /631/632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified & minimum paint thickness shall be 75 micron.
1.5 Outdoor type of receptacle shall have external FRP/sheet steel canopy to protect from heavy tropical rain.
1.6 Receptacles shall be suitable for wall / column mounting. All mounting hardware shall be supplied along with receptacles.

1.7 Front cover with neoprene gasket shall be screwed to the fabricated box by cadmium plated brass screws & cup washers. This box shall have outlets at the bottom for incoming and outgoing cables.

1.8. Receptacle box shall be provided with internal and external earthing screws with washer and nuts for grounding.

1.9 Receptacle shall be supplied with suitable plug. The plug assembly shall be mechanically rugged, light and shall not unduly stress the socket or its own pins when fitted on the socket. Earth pin of the plug shall first engage with pin of socket / receptacle.

1.10 Rail mounted terminal block suitable for 6 sq mm wire or rated for 30A shall be supplied with tined Cu lugs for 4 sq.mm Cu cable for all outgoing and incoming cables with loop in and loop out facility.

1.11 All internal power wiring shall be done with 660V grade PVC insulated Cu wires of 4sqmm cu. wire.

1.12 Each outlet shall be provided with either a spring loaded hinged cover or a cap connected metallic chain to close the outlet when not in service.

1.13 Each socket shall have two cable entries for looping facility and supplied with two numbers of suitable weather proof double compression brass cable glands with PVC shroud and one number sealing plug to seal the unused cable entry. Necessary suitable DC Brass cable gland & Al. blanking plug shall be supplied with each socket. The sizes of cable entries & Cable glands shall be project specific as indicated in the illumination BOM or will be decided during drawing approval stage.

1.14 Inscription plate/Name plate shall be provided indicating voltage rating of the socket as per clause E-V. of this spec..

1.15 Makes of major components shall be as follows if not otherwise specified in the sub vendor list:

(i) MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.

(ii) Cable glands: Comet, Baliga, FCG Flameproof Control Gears, Flameproof Equipments, Flexpro, Prompt.

(i) Terminal block: Elemax, Connectwell .

1.16 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XVI. 20A, 240V, 2-POLE, 3-PIN, FLAME PROOF PLUG SOCKET FOR HAZARDOUS AREA.

1.0 Certification: The equipment shall be certified by testing authorities like CMRI/CIMFR/BASEEFA/ERTL/UL/FM, ATEX certification as applicable for the service and the area of installation and shall be approved by CCOE. All indigenous flameproof equipment Ex(d) shall be under BIS license & shall have marking as required by statutory authorities.

2.0 Technical particulars.

2.1 All plug-sockets shall have IP65 degree of protection and shall be suitable for area classification as mentioned in the illumination BOM (i.e. Zone – I & II, Gas Group IIA&IIB or IIC as per IS 2148). The socket shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T4 (min.).

2.2 The enclosures of plug sockets shall be of Cast Al LM6 material. External FRP canopy shall be provided for outdoor type socket.

2.3 All hardware provided shall be MS Cadmium plated/zinc passivated. Gasket shall be of neoprene rubber.

2.4 Receptacles shall be heavy duty in complete with individual 20A, 3 pin, socket & interlocking rotary switch such that it cannot be switched ON unless plug is fully inserted and Plug cannot be withdrawn when switch is ON.

2.5 To avoid accidental removal of plug from socket, the engagement & disengagement shall be by two separate and distinct movement and position.

2.6 Each outlet shall be provided with either a spring loaded hinged cover or a cap connected metallic chain to close the outlet when not in service

2.7 Sockets shall be provided with NPT cable entries suitable for approved type flame proof DC nickel plated brass cable gland. The sizes of cable entries & Cable glands shall be project specific as indicated in the illumination BOM or will be decided during drawing approval stage. 1no. brass blanking plug shall also be supplied with each outlet.

2.8 Make of cable glands suitable for the specified area classification shall be as per the makes given under "Hazardous Area Lighting Panels" (II above).

2.9 Warning inscription: "Isolate power supply elsewhere before opening" is to be provided on the nameplate or the warning inscription is to be embossed on the enclosure.

2.10 Additionally following details are to be embossed on the nameplate of socket enclosure:

(i) Details of testing agency (CMRI or equivalent)
(ii) Test certificate no. with date
(iii)Statutory approval no. with date and agency like CCE, DGFASLI, DGMS etc.
(iv)BIS License no. and date
(v) Applicable gas group etc.

2.11 In addition to above, all particulars specified for weather proof Industrial sockets (XII above) will also be applicable for flame proof sockets.

XVII. 16A, 24V, 1 Ph, 3-PIN SOCKET OUTLET (SAFE AREA):

1.1 Construction design and material composition of enclosure of 24V socket outlet will be similar to the 15A, 240V Industrial metal clad socket outlet mentioned at XV above. Name plate shall clearly indicate voltage rating i.e. '24V socket'.

1.2 Construction of socket and plug out let shall be designed in such a way that inadvertent insertion of 240V plug to 24V socket or 24V plug to 240V socket can be avoided.

1.3 All technical requirement of 240V industrial metal clad socket also applicable to 24V socket outlet.

1.4 Each socket outlet shall be supplied with suitable plug along with one 24V hand lamp with holder, connecting cable etc.. The details are as below.

i) The lamp shall be of 60W GLS suitable for 24V, 50Hz supply and lamp holder shall be with ES cap.
ii) The metal casing of the hand lamp shall be of corrosion resistant alloy LM6. Suitable handle for carrying hand lamp on a stand type guard suspension hook shall be provided.
iii) The well glass provided shall be clear, suitable for use under conditions involving exceptional risk of mechanical damage. Mechanical strength of well glass shall satisfy requirement of IS 2206 (for Type – A glass).
iv) Hand lamp shall be provided with galvanized steel wire protective cage having mesh dimension not exceeding 50mm.
v) Each hand lamp shall supplied with 15m length of 3Cx1.5sq.mm Cu conductor, PVC insulated, metal braided flexible, duly terminated in the hand lamp at one end and to the 24V plug at the other end.

1.5 All necessary loose accessories like Cable Gland, Blanking plug, Cu. Lugs and mounting hardwires shall be supplied with socket outlets.

1.6 Inscription plate/Name plate shall be provided indicating voltage rating of the socket as per clause E-V. of this spec..

1.7 Makes of major components shall be as follows if not otherwise specified in the sub vendor list:

(i) MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.

(ii) Cable glands: Comet, Baliga, FCG Flameproof Control Gears, Flameproof Equipments, Flexpro, Prompt.

(iii) Terminal block: Elemax, Connectwell

1.8 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XVIII. **16A, 24V, 1-Ph, 3-PIN FLAME PROOF SOCKET MODULE WITH HAND LAMP:**

1.0 Certification: The equipment shall be certified by testing authorities like CMRI/CIMFR/BASEEFA/ERTL/UL/FM, ATEX certification as applicable for the service and the area of installation and shall be approved by CCOE. All indigenous flameproof equipment Ex(d) shall be under BIS license & shall have marking as required by statutory authorities.

2.0 Technical particulars.

2.1 All socket module and hand lamp unit shall have IP65 degree of protection and shall be suitable for area classification as mentioned in the illumination BOM (i.e. Zone – I & II, Gas Group IIA&IIB or IIC as per IS 2148). The socket shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T4 (min.).

2.2 The enclosures of plug sockets shall be of Cast Al LM6 material. External FRP canopy shall be provided for outdoor type socket.

2.3 All hardware provided shall be MS Cadmium plated/zinc passivated. Gasket shall be of neoprene rubber.

2.4 Receptacles shall be heavy duty in complete with individual 16A, 3 pin, socket & interlocking rotary switch such that it cannot be switched ON unless plug is fully inserted and Plug cannot be withdrawn when switch is ON.

2.5 To avoid accidental removal of plug from socket, the engagement & disengagement shall be by two separate and distinct movement and position.

2.6 Provision shall be made so that it shall not be possible to insert 24V plug on to a 240V Socket.

2.7 Socket outlet shall be provided with built in 240/24V transformer. The transformer shall be designed for 100VA rating continuous basis.

2.8 HRC fuses shall be provided on primary and secondary side of the transformer. The transformer shall have an earthed screen between primary and secondary winding. The socket outlet unit with built in transformer, switch, fuse, internal wiring shall be flameproof as a complete assembly.

2.9 Each outlet shall be provided with either a spring loaded hinged cover or a cap connected metallic chain to close the outlet when not in service.

2.10 Each socket outlet shall be supplied with suitable plug along with one Flame proof 24V hand lamp with handle, connecting cable etc.. The details are as below.

i) The lamp shall be of 60W GLS suitable for 24V, 50Hz supply and lamp holder shall be with ES cap.

ii) The metal casing of the hand lamp shall be of corrosion resistant alloy LM6.

iii) Suitable handle for carrying hand lamp and stand type guard suspension hook shall be provided.

iv) The well glass provided shall be clear, suitable for use under conditions involving exceptional risk of mechanical damage. Mechanical strength of well glass shall satisfy requirement of IS 2206 (for Type – A glass).

v) Hand lamp shall be provided with a galvanized steel wire protective cage having dimension not exceeding 50mm.

vi) Each hand lamp shall supplied with 50m length of 3Cx1.5sq.mm Cu conductor, PVC insulated, metal braided flexible, duly terminated in the hand lamp at one end and to the 24V plug at the other end.

2.11 Sockets shall be provided with NPT cable entries suitable for approved type flame proof DC nickel plated brass cable gland. The sizes of cable entries & Cable glands shall be project specific as indicated in the illumination BOM or will be decided during drawing approval stage. 1no. brass blanking plug shall also be supplied with each outlet.

2.12 Make of cable glands suitable for the specified area classification shall be as per the makes given under "Hazardous Area Lighting Panels" (II above).

2.13 Warning inscription: "Isolate power supply elsewhere before opening" is to be provided on the nameplate or the warning inscription is to be embossed on the enclosure.

2.14 Additionally following details are to be embossed on the nameplate of socket enclouser:

(i) Details of testing agency (CMRI or equivalent)
(ii) Test certificate no. with date
(iii)Statutory approval no. with date and agency like CCE, DGFASLI, DGMS etc.
(iv)BIS License no. and date
(v) Applicable gas group etc.

2.15 In addition to above, all particulars specified for Flame proof 240V, 1ph, 3 pin sockets (XVI above) will also be applicable for 24V flame proof sockets.

XIX. 63A, 415V, 3-PHASE, 5-PIN WELDING RECEPTACLE WITH PLUG (SAFE AREA):

1.1 Receptacles shall be dust proof / vermin proof metal clad gasketted construction and shall be weatherproof with IP 55 degree of protection. Outdoor type socket shall be provided with external canopy to protect from tropical rain.

1.2 Receptacles enclosure shall be CRCA sheet steel of 14 SWG (2mm) and painted with epoxy powder coating after galvanization. Paint thickness shall be minimum 75 micron and paint shade of RAL 7032 /631/632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified.

1.3 Receptacle shall be provided with 5-pin (3P+1N+1E) socket & Plug non reversible type.

1.4 The socket outlet shall be provided with interlocking switch such that it cannot be switched ON unless plug is fully inserted and Plug cannot be withdrawn when switch is ON.

1.5 Receptacles shall be suitable for wall / column mounting. All mounting hardware shall be supplied along with receptacles. Outdoor type receptacle shall have FRP canopy to protect from heavy tropical rains. Receptacle box shall be provided with internal & external earthing stud with washer & nuts welded on the surface for grounding.

1.6 The plug assembly shall be mechanically rugged, light and shall not unduly stress the socket or its own pins when fitted on the socket.

1.7 In order to prevent accidental removal of plug from socket, the engagement and disengagement shall be by two separate and distinct movements and positions.

1.8 Stud type terminals rated for 100A (50sqmm) along with tinned Cu. lugs suitable for 50 sq.mm Al. wire shall be provided for all outgoing and incoming cables.

1.9 All internal power wiring shall be done with 16sqmm Cu. wire of 660V grade PVC insulated.

1.10 Each outlet shall be provided with either a spring loaded hinged cover or a cap connected metallic chain to close the outlet when not in service.

1.11 Each socket shall have two cable entries of 4C x 35 sq mm Al. XLPE Cable (if not specified) with looping facility along with two numbers of weather proof double compression brass cable glands and one number sealing plug to seal the unused cable entry.

1.12 Inscription plate / name plate shall be provided indicating tag no. of receptacle and voltage rating as per clause E-V of this spec.

1.13 Makes of major components shall be as follows if not otherwise specified in the sub vendor list:

(i) MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.

(ii) Cable glands: Comet, Baliga, FCG Flameproof Control Gears, Flameproof Equipments, Flexpro, Prompt.

iii) Terminal block: Elemax, Connectwell

1.14 Receptacle Boxes shall be supplied complete in all respect with all internal accessories like Socket, Switch, TBs etc. Other accessories like mounting hardware, Cable Glands, Cu. Lugs, Al. blanking plug shall be supplied in loose.

1.15 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XX. 63A, 415V, 3 PHASE, 5-PIN, FLAME PROOF WELDING RECEPTACLE FOR HAZARDOUS AREA.

1.0 Certification: The equipment shall be certified by testing authorities like CMRI/CIMFR/BASEEFA/ERTL/UL/FM, ATEX certification as applicable for the service and the area of installation and shall be approved by CCE. All indigenous flameproof equipment Ex(d) shall be under BIS license & shall have marking as required by statutory authorities.

2.0 Technical particulars.

2.1 All receptacle and plug shall have IP65 degree of protection and shall be suitable for area classification as mentioned in the illumination BOM(i.e. Zone – I & II, Gas Group IIA&IIB or IIC as per IS 2148). The socket shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T4(min.).

2.2 The enclosures of plug sockets shall be of Cast Al. LM6 material. External FRP canopy shall be provided for outdoor type socket.

2.3 All hardware provided shall be MS Cadmium plated/zinc passivated. Gasket shall be of neoprene rubber.

2.4 Receptacle shall be provided with 5-pin(3P+1N+1E) socket & Plug non reversible type.

2.5 The socket outlet shall be provided with interlocking switch such that it cannot be switched ON unless plug is fully inserted and Plug cannot be withdrawn when switch is ON.

2.6 To avoid accidental removal of plug from socket, the engagement & disengagement shall be by two separate and distinct movement and position.

2.7 Each outlet shall be provided with either a spring loaded hinged cover or a cap connected metallic chain to close the outlet when not in service

2.8 Sockets shall be provided with ET cable entries suitable for approved type flame proof DC nickel plated brass cable gland. The sizes of cable entries & Cable glands shall be as per

project specific as indicated in the illumination BOM or will be decided during drawing approval stage. 1no. brass blanking plug shall also be supplied with each outlet.

2.9 Make of cable glands suitable for the specified area classification shall be as per the makes given under "Hazardous Area Lighting Panels" (II above).

2.10 Warning inscription: "Isolate power supply elsewhere before opening" is to be provided on the nameplate or the warning inscription is to be embossed on the enclosure.

2.11 Additionally following details are to be embossed on the nameplate of socket enclouser:

(i) Details of testing agency (CMRI or equivalent)
(ii) Test certificate no. with date
(iii) Statutory approval no. with date and agency like CCE, DGFASLI, DGMS etc.
(iv) BIS License no. and date
(v) Applicable gas group etc.

2.12 In addition to above, all particulars specified for 63A, 5 Pin welding receptacle for safe area (XVI. above) will also be applicable for flame proof receptacle.

XXI. STREET LIGHTING POLES (7.5m, 8.0m, 9.5m, 10.0m, 11.0m & 12.0m):

1.1 Lighting poles shall conform to IS 2713-1980.

1.2 Lighting poles shall be swaged & welded steel poles from tubes confirming to Yst 240 or Yst 310 of IS-1161. The poles shall confirm to following types:

7.5 m pole	-	410 SP-8
8.0 m pole	-	410 SP-15
9.5 m pole	-	410 SP-38
10.0 m pole	-	410 SP-42
11.0 m pole	-	410 SP-54
12.0 m pole	-	410 SP-58

1.3 The pole shall be coated with bituminous compound paint internally and externally up to the level which goes inside the earth. Exposed surface shall be coated with one coat of red oxide primer & finished with two coats of aluminum paint.

1.4 The lighting pole shall be completed with fixing base plate for mounting of pole in concrete foundation.

1.5 Poles shall be supplied with Fixing brackets, weather proof marshalling box or Junction box, 50/100 dia bend pipe & all other accessories as shown in the drawings(Annexure-1).

1.6 The marshalling box to be supplied with street lighting poles shall have IP 55 degree of protection provided with hinged door & suitable locking arrangements. This box shall be of 250x200x150mm (min.) size and contain cable entries with cable gland, fuses, neutral links, terminal blocks, ground studs, etc. Marshalling box shall be and painted with epoxy powder coating after galvanization. Paint thickness shall be minimum 75 micron and paint shade of RAL 7032 /631/632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified.

1.7 Street lighting pole shall have either swan neck arrangement or straight pipe on the top as shown in the drawing(Annexure-I). Final type will be decided during drawing approval.

1.8 Flood lighting poles should have fixture mounting ISMC on top of pole as indicated in the drawing(Annexure-I).

1.9 All poles should have required size holes at indicated location as shown in the drawing for routing of cable to the fixture.

1.10 Junction box shall be supplied with flood lighting poles and should have technical requirements as mentioned in the safe area junction box(VI above) with minimum size is 250x200x150mm. Junction box should have cable entries 2 nos. suitable for 4Cx35 sqmm Al PVC/XLPE cable and 2 nos. suitable for 3Cx2.5 sqmm cu. PVC/XLPE Cable

with required terminal block, cu. Lugs and cable glands. Necessary glands & blanking blug shall be supplied with JB. Junction box shall be painted with epoxy powder coating after galvanization. Paint thickness shall be minimum 75 micron and paint shade of RAL 7032 /631/632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified.

1.11 Makes of major components shall be as follows if not otherwise specified in the sub vendor list:
- (i) MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.
- (ii) Cable glands: Comet, Baliga, FCG Flameproof Control Gears, Flameproof Equipments, Flexpro, Prompt.
- (iv) Terminal block: Elemax, Connectwell

1.12 Inscription plate / name plate for JB/Marshalling box shall be provided indicating tag no. and voltage rating as per clause E-II of this spec.

1.13 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XXII. LIGHTING POLES (2.5m, 3.0m, 3.75m & 4.75m):

1.1 Lighting pole shall be of heavy grade GI pipe with 100mm diameter for 3.0 meter and above height pole and 50mm dia for 2.5 meter height pole as specified in the Drawing (Annexure-1).

1.2 Construction and other required accessories shall be as per drawing (Annexure-I) attached with this document.

1.3 The lighting poles with 3.0 mtr. and above height shall have fixing base plate for mounting of pole in concrete foundation as per drawing (Annexure-I).

1.6 The poles shall have swan neck made of medium grade 50mm GI pipe with radius of 250mm as shown in the drawings (Annexure-I).

1.7 All poles should have required size holes at indicated location as shown in the drawing (Annexure-I) for routing of cable to the fixture.

1.8 All the accessories like reducer, coupler, bend pipe, U bolt etc. as indicated in the drawing (Annexure-I) should be supplied with poles.

XXIII. GI /PVC CONDUIT AND ACCESSORIES:

1.0 CONDUIT

1.1 Minimum wall thickness of conduit shall be 16 Gauge.

1.2 GI Conduits shall be heavy gauge steel, hot-dip galvanized, furnished in standard length of 3m threaded at both ends conform to IS 9537.

1.3 Conduits shall be straight and free from blister, sharp edge, burrs and other defects. The ends of all conduits shall be reamed and covered with capped bushing.

1.4 PVC conduits shall be straight and free from blisters, sharp edge, burrs and other defects and conform to IS 9537.

1.5 Make of conduit & conduit accessories should be from reputed vendor of proven track record.

2.0 CONDUIT COUPLER AND BEND

2.1 Couplers and Bend shall be of same material as conduit for which it will be used and shall conform to IS 3837 and IS 2667.. They shall have internal threading suitable to join one conduit with another conduit.

3.0 SADDLE AND SADDLE BAR

3.1 Saddles and saddle bars shall be provided of size as mentioned in the project specific data sheet to suit the conduit.

3.2 Saddles shall be of 1.6mm thick GI and saddle bars shall be of GI with 3mm thickness and required length and width.

3.3 All hardware including saddle bar mounting screw and saddle mounting end screws, for saddles and saddle bars shall be provided along with each saddle and saddle bar. All hardware shall be galvanized or zinc passivated.

3.4 PVC Rawl Plug suitable for saddle bar mounting screw shall be provided along with each set of saddle and saddle bar.

XXIV. MISCELLANEOUS ITEMS:

1.0 S- Hooks:

1.1 Hooks shall be of GI with 6mm thickness. Overall length and width of hook shall be minimum 75mm and 40mm and shall be suitable for fixture mounting eye bolt supplied with High bay/Well glass fixture.

1.2 Hook shall be designed to withstand fixture load of maximum weight (i.e. flame proof High bay /wellglass fixture)

2.0 Anchor fastener:

2.1 Anchor fasteners size shall be as per project specific requirement. Design and technical requirement shall be as per standard design conforming to IS and shall be of reputed make.

3.0 120 /150 deg bend pipe :

3.1 1200mm length , 50mm(Max) outer Dia GI pipe with 120/150 degree bend at 600mm shall be supplied. Pipe shall be heavy gauge steel, hot-dip galvanized.

3.2 The pipe shall have smooth finish and free from dents/defects and blow holes etc.

3.3 One end of the pipe shall be provided with nipple suitable for 3C x 2.5sqmm cable(50/19mm nipple).

3.4 Each bend shall be supplied with 2Nos of suitable mounting clamp and its hardware like anchor fastener/nut and bolt etc for wall mounting.

4.0 STEEL CHAIN:

4.1 Steel chain shall be chromium plated and should have sufficient strength to withstand Fixture load of recess mounted CFL/FTL fixture.

5.0 CHECK NUTS

5.1 Check nuts shall be GI / cadmium plated with 6mm thickness and should be suitable for 20mm down conduit.

6.0 METSEC CHANNEL:

6.1 Each segment of METSEC Channel shall be made of mild steel cold rolled of 18SWG and of length as specified in the project specific data sheet. Each segment shall be provided with covers.

6.2 The internal dimension of channel shall be 100mm width and 50mm depth.

6.3 Technical requirement of METSEC and associated accessories which are to be supplied are as per drawing (annexure-1).

6.4 Each piece of METSEC and associated accessories should be epoxy painted with smooth finish, free from dent. Minimum paint thickness is 75 micron and paint shade should be of RAL 7032/631/632 as per IS (will be decided during drawing approval).

XXV. 240/24V AC TRANSFOMER MODULE (WITHOUT 24V SOCKET):

1.1 240/24V transformer module will be used to feed 24V socket outlet. The module will get 1 ph, 230V supply from Power panel. Each Transformer module shall have one air

cooled dry synthetic resin vacuum impregnated type two-winding 1kVA, 1-phase, 50Hz, 240/24V transformer of standard as per IS 1416. Core of the transformer shall be of high quality low loss silicon laminations insulated with materials of high insulation resistance. Winding shall be of electrolytic grade copper and shall have class F insulation.

1.2 The transformer shall be housed in a CRCA sheet steel enclosure of 2mm thick. The enclosure shall have separate chambers for incoming/outgoing MCBs, terminal block and Transformer. Door for each compartment shall be hinged type with quick release fasteners and have neoprene rubber gaskets. The transformer chamber shall be provided with louvers suitably protected with fine wire mesh for heat dissipation. MCBs compartment shall be dust proof type. The housing shall be suitable for wall/ column mounting and necessary mounting bracket shall be provided. All hardware provided shall be MS Cadmium plated/zinc passivated.

1.3 Indoor type module shall have minimum IP 52 protection and outdoor type enclosure shall be weather proof and shall have IP55 (Min.) protection. Necessary external canopy shall be provided for outdoor type module.

1.4 The module shall have 20A DP MCB as incomer and 10A SPN MCB as outgoing, which shall be mounted in the MCBs chamber and covered with sheet barrier in such a way that only dollies is protruded outside. MCBs shall have direct acting thermal overload and short circuit trip. MCBs shall be designed as per IS8828/IEC898. One indicating neon lamp shall be placed on front panel to indicate availability of AC supply

1.5 24V module shall have aluminum earthing bus at terminal box chamber and colour coded Cu. Bus bar for Phase and neutral. Bus bar temperature rise shall be limited to 85º and spacing between the shall be as per IS for the applied voltage to prevent flush over. Short circuit level of the panel shall be 10kA/1sec Two nos. grounding pads suitable for fastening Earthing bus also be provided.

1.6 Caution note, circuit directory and nameplate shall be provided. These shall be of anodized Al with etched inscriptions. Minimum information to be included in the name plate shall be as per clause E.III. 2mm thick 400mm x 300mm acrylic sheet shall be provided inside outer door for keeping circuit directory.

1.7 Terminal blocks suitable for connection of incoming and outgoing circuit cables shall be provided. Terminal blocks shall be suitable for 6 sq mm Cu. Wire, if not otherwise specified. Sufficient space shall be provided (200 to 250mm) between gland plate and bottom of terminal block for easy termination of cables.

1.8 All internal wiring shall be done with 1.1kV PVC insulated, 16sq.mm stranded Cu flexible wires. All wires should be neatly bunched & clamped to enclosure at regular interval of their routing. All wires shall be ferruled and terminated by sleeved lugs.

1.9 All component installed in the module enclosure shall have levels and outgoing and incoming circuits at terminal blocks shall also have levels. Wires of internal wiring shall carry same number bits at both ends of wire piece. Circuit diagram provided for internal wiring shall be in conformity with the levels of components and wiring.

1.10 Double compression nickel plated brass cable glands shall be provided for incoming and outgoing cables. The quantities shall be equivalent to the number of outgoing feeders and incoming feeder as mentioned in the project specific data sheet/annexure-II. Glands for outdoor type module should be supplied with gland hoods. Incoming and outgoing cable entries shall be from bottom by means of removable undrilled gland plates.

1.11 Crimping type tinned Cu lugs of appropriate sizes suitable for TBs shall be provided for all incoming and outgoing cables. Aluminum blanking plug of suitable size shall be supplied for 20%(min) outgoing cable entries to seal the unused entries.

1.12 Sizes of cable glands, Terminal blocks, Cu. Lugs & Blanking plugs are project specific, will be decided during detail engineering at drawing approval stage.

1.13 All electrical components shall be mounted on suitable brackets to match with inner door.

1.14 All module enclosure should be epoxy painted with smooth finish, free from dent. Minimum paint thickness is 75 micron and paint shade should be of RAL 7032/631/632 as per IS (will be decided during drawing approval).

1.15 Transformer module should be supplied in complete with installed sub components and necessary internal wiring. All loose items like Cable Glands, Blanking plugs, Cu. Tinned Lugs for incoming/outgoing cables and mounting hardware etc, shall be supplied along with module for fitting at site.

1.16 Makes of major components shall be as follows if not otherwise specified in sub vendor list:-

(i) MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.
(ii) Fuses: L & T, GE, Indo-Asian, Seimens.
(iii) Cable gland: Baliga, Commet,Flexipro, FCG
(iv) Terminal Block: Elemax, Connectwell

1.17 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

XXV. 24V SOCKET MODULE WITH INBUILT 240/24V TRANSFORMER (SAFE AREA)

1.1 The enclosure of socket module shall be of CRCA sheet steel 2mm thick, dust proof and vermin proof and shall have minimum IP 55 protection. Module shall be designed stand alone type and shall have carrying handle for easy transportation.

1.2 Each socket module shall have one air cooled dry synthetic resin vacuum impregnated type two-winding 500VA, 1-phase, 50Hz, 240/24V transformer of standard as per IS 1416. Core of the transformer shall be of high quality low loss silicon laminations insulated with materials of high insulation resistance. Winding shall be of electrolytic grade copper and shall have class F insulation. Necessary louvers shall be provided in the transformer enclosure for ventilation.

1.3 Front cover of module shall have 20A DP MCB at incomer and 16A, 3 pin socket with 16A SPN MCB at outgoing. One indicating neon lamp shall be placed on front door to indicate availability of AC supply.

1.4 Construction of socket and plug in the out let shall be designed in such a way that inadvertent insertion of 240V plug to 24V socket or 24V plug to 240V socket can be avoided.

1.5 Module shall have 15M length un armoured PVC insulated metal braided 3Cx2.5 sqmm cu. cable connected at incoming terminal with 3 pin plug connected at other end. Plug shall be suitable for connecting the unit to any of the 20A Metal cladded socket supplied with the package. Necessary provision for coiling of cable in the enclosure shall be available.

1.6 Each module shall be supplied with suitable plug along with one 24V hand lamp with holder, connecting cable etc.. The details are as below.

i) The lamp shall be of 60W GLS suitable for 24V, 50Hz supply and lamp holder shall be with ES cap.
ii) The metal casing of the hand lamp shall be of corrosion resistant alloy LM6. Suitable handle for carrying hand lamp on a stand type guard suspension hook shall be provided.
iii) The well glass provided shall be clear, suitable for use under conditions involving exceptional risk of mechanical damage. Mechanical strength of well glass shall satisfy requirement of IS 2206 (for Type – A glass).

iv) Hand lamp shall be provided with galvanized steel wire protective cage having mesh dimension not exceeding 50mm.

iv) Each hand lamp shall supplied with 15m length of 3Cx1.5sq.mm Cu conductor, PVC insulated, metal braided flexible, duly terminated in the hand lamp at one end and to the 24V plug at the other end.

1.7 Inscription plate/Name plate shall be provided indicating voltage rating of the socket module as per clause E-V. of this spec.

1.8 All module enclosure should be epoxy painted with smooth finish, free from dent. Minimum paint thickness is 75 micron and paint shade should be of RAL 7032/631/632 as per IS (will be decided during drawing approval).

1.9 Makes of major components shall be as follows if not otherwise specified in the sub vendor list:

(v) MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.

(vi) Cable glands: Comet, Baliga, FCG Flameproof Control Gears, Flameproof Equipments, Flexpro, Prompt.

(vii) Terminal block: Elemax, Connectwell

1.10 All necessary test certificates from qualified agency in support of the technical requirement should be produced during approval of drawings and inspection or whenever asked.

E. MARKING AND IDENTIFICATION:

I. Fixture & CG Box: Each fixture and CG box shall have marking with details like manufacturer name, Model no., applicable voltage and lamp wattage, applicable classified area (IP Class & Hazardous area classification with Certificate No. & Date with name of certifying agency, if applicable) etc.

II. Junction Box/Marshalling Box Name Plate: Each junction box/Marshalling Box shall have name plate fixed firmly on the front cover with details as per manufacturer standard. However minimum following details shall be provided in the name plate:

a) Manufacturer's name & Model No.
b) Material code
c) Enclosure classification for flame proof JB (Certificate No. & Date with name of certifying agency)

III. Lighting Panel /24V Module Name Plate: Each lighting panel/24V module shall have anodized Al name plate fixed firmly on the front cover by stainless steel screws. The following details shall be engraved / punched with appropriate letter size (not less than 3 mm):

a) Manufacturer's name & Model No.
b) Complete Description of panel/ Module with mention of applicable classified area (i.e. Indoor/ Outdoor /Hazardous Classification etc.)
c) Voltage rating & Applicable IP class
d) Enclosure classification for flame proof Panel (Certificate No. & Date with name of certifying agency)
e) Tag no. - Tag nos. shall be furnished during detail engineering.

IV. MCB Box/Push Button Station:- Each MCB/Push Button Station shall have a name plate with details as per manufacturer standard. However minimum following details shall be provided in the name plate.

a) Manufacturer's name & Model No.
b) Description of MCB Box/Push button station

V. Power Socket Name Plate: Each 1ph/3ph socket shall have a name plate with details as per manufacturer standard. However minimum following details shall be provided in the name plate.

a) Manufacturer's name & Model No.
b) Complete Description of socket with mention of applicable classified area (i.e. Indoor/ Outdoor /Hazardous Classification etc.).
c) No. of phase & Voltage rating (i.e.1ph or 3 ph, 24V/230V/415V)
d) Enclosure classification for flame proof socket (Certificate No. & Date with name of certifying agency)

F. PAINTING

1. All equipment shall be painted with epoxy based paint using following method.
   a) All metal surfaces shall be thoroughly cleaned and degreased to remove scale, rust, grease and dirt.
   b) Fabricated structures shall be pickled and then rinsed to remove any trace of acid.
   c) The surface shall be prepared by applying a coat of phosphate paint and coat of yellow zinc chromate primer. The surface shall be made free from all imperfections before undertaking the finished coat.
   d) After preparation of the surfaces, the panels shall be powder coated with two coats of epoxy based final paint such that minimum thickness of 75 micron is achieved.
   e) Colour shade of final paint should be of RAL 7032/631/632 as per IS (will be decided during drawing approval).
   f) The finished coat shall be dried in stoving ovens in dust free atmosphere.
   g) Equipment finish shall be free from imperfections like pinholes, orange peels, runoff paint etc.

G. PACKING INSTRUCTION

I. PACKING:

a) Vendor is advised to include packing details in the datasheet of the item and obtain approval of the same from BHEL. All item must be packed as per approved datasheet and include the packing detail in the packing slip. Any item for which datasheet are not submitted for approval, vendor to submit packing detail for the same before dispatch.
b) All items shall be packed in very good quality packing, the packing shall be such that the items should not be damaged during loading, unloading and transportation.
c) The equipment may be stored outdoors for long periods before installation. The packing should be suitable for outdoor storage areas with heavy rains / high ambient temperature/ coastal area unless otherwise agreed.
d) Primary packing of fragile items like lighting panels, fixtures, Junction boxes, CG boxes, switchboards, receptacles etc. shall be done individually with bubble polythene sheet. Secondary packing shall be done in Ply box/Cartoon box with cushioning materials to sustain above mentioned at point "c".
e) Miscellaneous hardware items like clamps, glands, hooks, fasteners, steel chains, couplers, pole accessories(reducer/nipple/U bolt/) etc. shall be packed in sealed gunny bags wrapped in polythene materials. Separate bag must be used for each type of item.
f) Packing of conduits, pipes, Metsec channels shall be done with hessian bitumen coated polythene Kraft paper.
g) Standard packing shall be adopted for poles & Lamps as per OEM recommendation to avoid any damage.

h) Pole accessories may be packed separately in sealed Gunny bags wrapped in polythene materials. However separate bag must be used for each type of pole accessories.

i) Mandatory spares items as listed at PART-B, C, D, E, F, G & H of illumination BOM (Annexure-II) **shall be packed and dispatched separately** using the packing methods specified above.

j) It is vendor's responsibility to see that all the item along with its accessories are supplied. Query if any is received from site regarding discrepancy of illumination package, shall be clarified by the vendor immediately.

k) Vendor shall visit to site in to resolve issue related to illumination package, if any as and when informed by BHEL.

II. MARKING OF PACKING

a) All Packing which will be loaded in a consignment (Cartoon Box/Ply box/Gunny bags/Conduit bundle/ Poles etc.) shall assign a Identification number with PO number as prefix and tag no as suffix (i.e. PO NOXXXXX /01, 02…etc.). The Identification number shall be marked with indelible paint on top and minimum two sides of such packing.

b) Vendor shall allot Identification number serially for packing dispatched from various locations depending upon no. of such packing in consistence with main package. Allotted Identification number shall be marked in each packing of the consignment following the above mentioned method. **Vendor to ensure that no packing is dispatched without Identification number.**

c) Vendor shall securely attach Packing slip in a rain proof transparent enclosure to each packing to be dispatched in a consignment. Packing slip must contain Identification number of the packing, LR No. & date as header and PO sl.No., Item description and qty. packed within the packing in a table form.

d) Pallets / crates / cases shall have skid bottoms for handling. Special notations such as 'Fragile', 'This side up', 'Weight', 'Owner's particulars', etc. shall be clearly marked on the package.

e) **Additionally**, each Packet of Mandatory Spare Items shall be clearly marked with "MANDATORY SPARE ITEM" on top and minimum two sides.

III. PACKING SLIP

a) Detailed packing list shall be prepared by the vendor and submitted to BHEL for review. Item shall be dispatched only after clearance from BHEL.

b) Separate packing slip shall be prepared for each consignment dispatched as per attached format (Annexure-IX). Each Packing slip shall have Project Name, consignment No. with date & PO NO. as header. PO sl. no., item description, type of packing (i.e. Carton Box/Ply box/Gunny bags), Identification Nos. of packing, Quantity of item per package, Total quantity of item & No. of packing used for an item shall be listed in a row. Accessories of an item which has been packed in another package, can be listed in subsequent rows of packing slip using mentioned method.

c) Separate rows of packing slip shall be used for listing each item being dispatched in a consignment.

d) Separate packing slip with details mentioned above shall be provided for each Package of Mandatory spares items. IN NO CASE, MAIN PACKAGE ITEMS AND MANDATORY SPARE ITEMS SHALL BE COMBINED IN ONE PACKING LIST.

e) Items like poles, GI pipes etc., which are being dispatched in loose as per standard packing, shall be listed in packing slip reflecting total quantity dispatched in a

consignment. However accessories for the same which are dispatched in package shall be listed in packing slip using above mentioned method at "b".

f) In the consignment receipt, total no. of Carton Box/Ply box/Gunny Bags/ pipe &conduit bundle /poles etc. shall be clearly written and acknowledgement of the same shall be obtained from site and submitted to BHEL for review and records.

H. INSPECTION, TESTING & QUALITY ASSURANCE:

I. GENERAL. Quality assurance shall follow the requirements of BHEL Quality Assurance documents as applicable. Detail instruction pertaining to inspection, Quality Assurance Plan , inspection / testing procedure is enclosed as Annexure-VII.

II. INSPECTION INSTRUCTION (For Inspector & Vendor)

a) Following document must be referred during inspection
   i) Illumination Spec. for general requirement of material.
   ii) Datasheet of item duly approved as Code-1, stamped and signed by design engineer for specific detail like dimension, paint shade, accessories detail, BOQ and any comment which are marked on the datasheet. In case any contradiction is observed between Spec. and approved datasheet, only technical specification of approved datasheet shall be referred.
   iii) Inspection check list as per format at Annexure-VIII.
   iv. Other quality documents as listed in QAP.

b) Inspector shall fill the respective field of inspection check list attached at Annexure-VIII and sign against each inspection check point listed in the Format. The signed copy of format shall be submitted to BHEL for review.

c) If any anomaly is observed during inspection w.r.t. Spec./Approved datasheet/Inspection check list regarding quality, quantity or accessories, same shall be immediately brought to the notice of BHEL in writing. Such material shall not be approved without consent of BHEL.

d) Inspection of any item will not be termed as completed until satisfactory report from Inspector is submitted to BHEL.

e) Items which are to be dispatched in parts, Inspector shall inspect each and every sub item and satisfy himself for suitability of the same during assembly. Vendor shall demonstrate the assembling of such item.

h) Some item may require functional test, Inspector is advised to witness the test at manufacturer's work before clearing the material.

i) Inspector shall inspect the packing of material w.r.t. method mentioned in approved datasheet and Packing instruction indicated in this specification.

j) Inspector is advised to check that correct quantity of material along with its associate accessories is packed with correct packing material.

k) Inspector shall also check that marking of packing enclosure is done in line with procedure mentioned at "Marking of Packing" in this specification.

I. DOCUMENTATION:

Documentation shall be in three steps, during offer submission as response to BHEL Enquiry stage, drawing approval stage and during delivery of items stage (As built). All the documents shall be preferably in A3/A4 size. The documentation aesthetics shall be in line with international standards. Document shall have title block, Name of the item,

Document/Drg. Number, revision no, page no. etc, additionally PO. Sl. No,PO No. and Project name shall be included in the "AS built" drawing and drawing submitted during approval. Document/drawing without title block and incomplete information will not be acceptable. Bidder shall be responsible for creating, making and arranging complete documentation as per BHEL requirements at all stages. Vendor shall visit BHEL office within one week of PO/LOI to collect the project specific information for incorporating the same in the drawing/document.

a) <u>During Technical offer submission: Two copies of following</u>

(i) Filled up Bidder check list as per annexure-VI.
(ii) Un-priced price schedule as per clause C- 10 and annexure-III.
(iii) Deviation list as per deviation format (Annexure-V).
(iv) Catalogue, datasheet.

b) <u>During Drawing approval after PO Placement: Three copies of following</u>

(i) Data sheet, GA drawings and single line diagrams of all items in the PO as applicable.
(ii) Type test certificates of all items as applicable.
(iii) CMRI or equivalent test house certificates as applicable.
(iv) Quality plan of individual item including all requirements as per annexure-VII.

NOTE:-The drawings, data sheets, single line diagrams as applicable shall be furnished within 15 days of LoI/ PO for BHEL's approval. BHEL shall provide comments/ approval within 15 days of receipt of drawings. Vendor shall incorporate comments, if any and submit revised drawings within 7 days. ***Vendor is responsible for completion of approval cycle and minimizing number of revisions***.

C. <u>Alongwith material, final documentation:</u>

1. Packing slip: Along with material 2 copies, BHEL project site – 3 copies, BHEL design office- 3 copies.
2. Inspection report - BHEL project site – 3 copies, BHEL design office- 3 copies.
3. Test certificates- BHEL project site – 3 copies, BHEL design office- 3 copies.
4. Warrantee certificates of equipment if any- BHEL project site – 3 copies, BHEL design office- 3 copies.
5. Operation & Maintenance manual of equipment, if any- BHEL project site – 3 copies, BHEL design office- 3 copies.
6. Photocopies of BHEL Approved equipment Datasheet/Drawing - Along with material 2 copies, BHEL project site – 3 copies, BHEL design office- 2 copies.

Vendor shall submit all other documents as per commercial terms and condition separately.

J. <u>PRICE SCHEDULE:</u>

1.1 The items to be supplied as a part of illumination package along with their quantities are listed in the Annexure-II (Illumination BOQ) which is project specific.

1.2 Vendor shall quote unit prices and total prices in the format indicated in Annexure-III (Price schedule).The evaluation shall be done on the basis of the overall package price.

1.3 The quantities are subjected to variation based on the actual Illumination Layout Engineering/Detailed Engineering. Vendor has to quote unit prices and in case of change in quantities at a later stage, unit prices will prevail.

1.4 BHEL reserves the right to cancel an item if not required for the project.

J. BHEL MATERIAL CODES:

Variant No.	Description	Material Code
01	Illumination Items Package of ONGC Hazira	PY9755158014

HYDERABAD

PRODUCT STANDARD

PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD

RECORD OF REVISIONS

Rev. No.	Date	Revision Details	Revised By	Approved By
00	10-08-2015	Original Issue	--	K. Rangamani

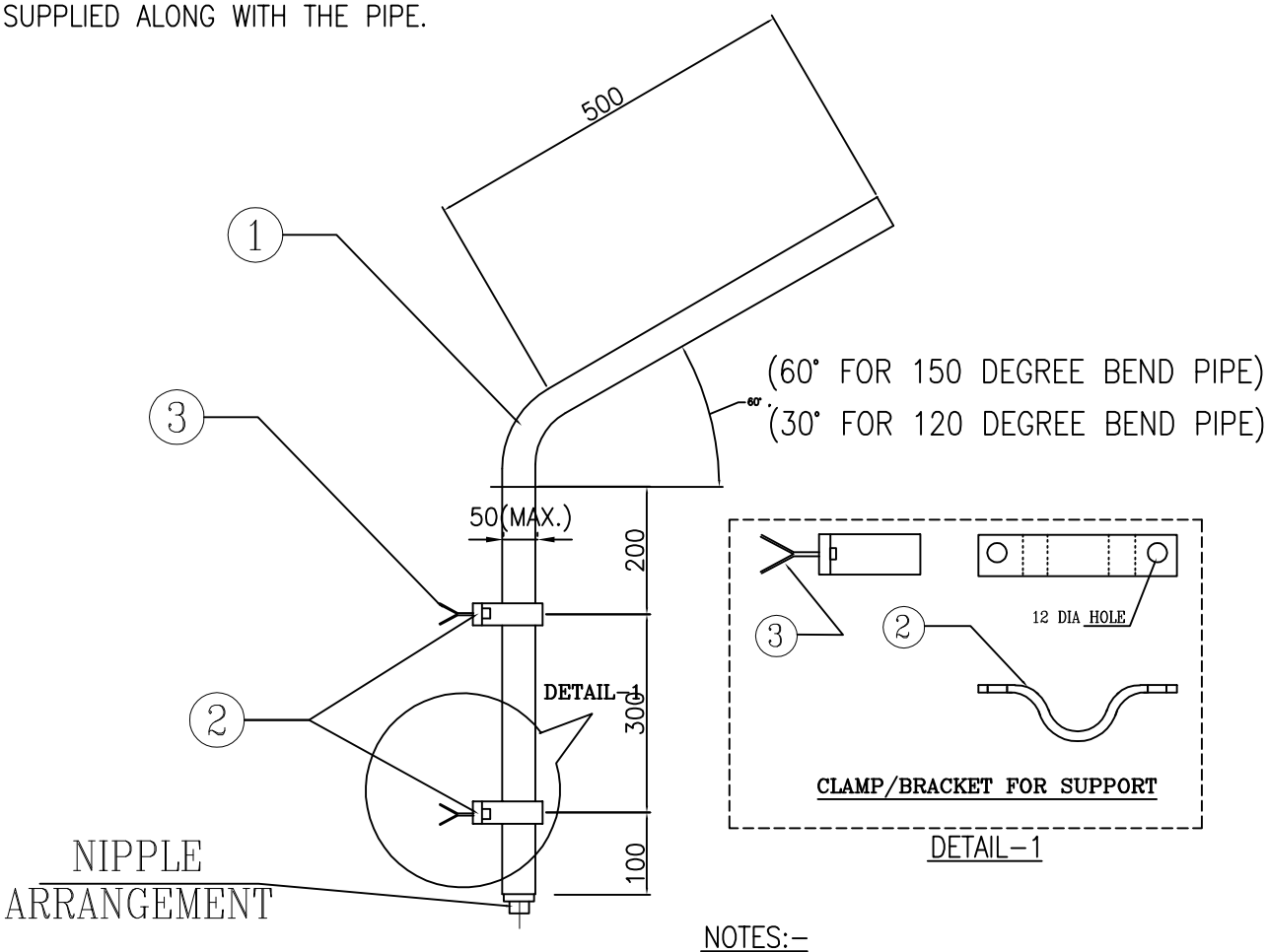
Ref. Doc.

ANNEXURE – I

(TYPICAL ENGINEERING DRAWING OF MAJOR ILLUMINATION ITEMS)

TITLE: ANGLE BEND PIPE

THIS DRAWING INDICATES ARRANGEMENT OF ANGLE BEND PIPE. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE PIPE.



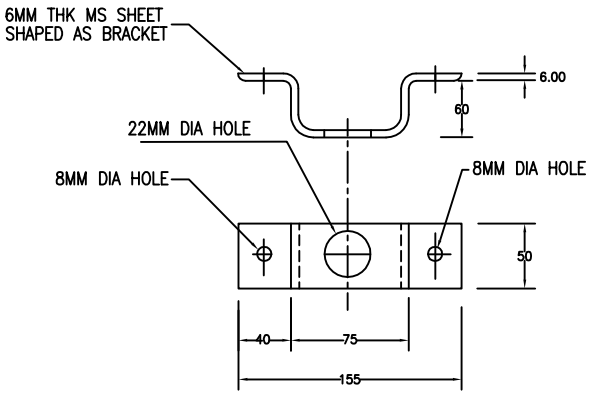
ANGLE BEND PIPE

NOTES:-

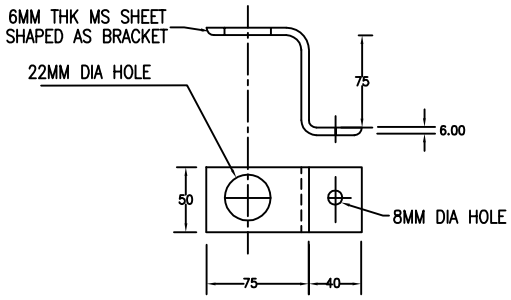
1. ALL DIMENSIONS ARE IN MM.
2. OUTER DIA OF PIPE BEND SHALL BE MAXIMUM 50MM WITH TOLERANCE.

SUPPLY BOQ.

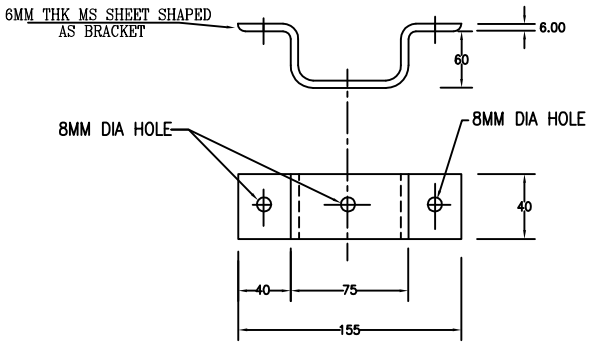
SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	GI ANGLE BEND PIPE OF 50MM MAX. OUTER DIA (CLASS HEAVY) WITH NIPPLE ARRANGEMENT AT ONE END AS PER DETAILS.	NO.	01
02	MS CLAMP WITH BASE.	NO.	2
03	M10X90MM LONG ANCHORING STUD	NO.	04



GI CLAMP FOR METSEC/FTL(TYPE CL-I)



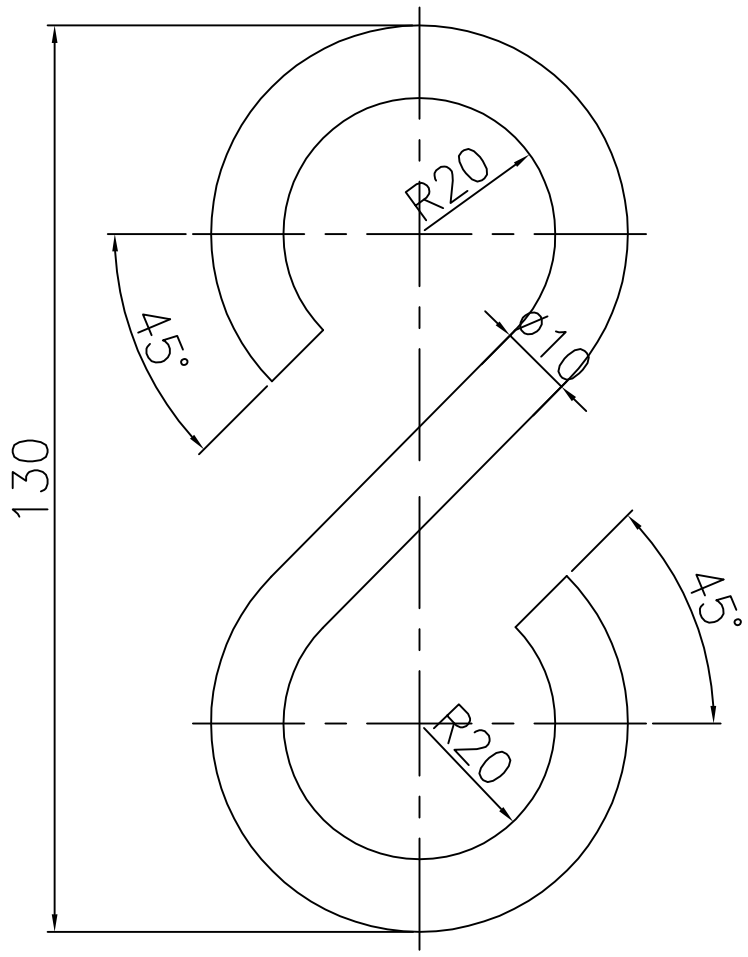
GI CLAMP FOR CR FTL(TYPE-CL-II)



GI CLAMP FOR WALL MOUNTED FTL/CR FTL(TYPE-CL-III)

NOTES:-

1. ALL DIMENSIONS ARE IN MM.



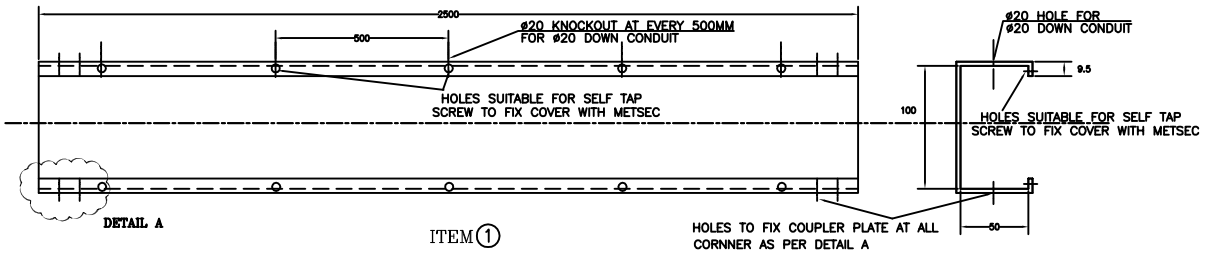
S-HOOK

NOTE-

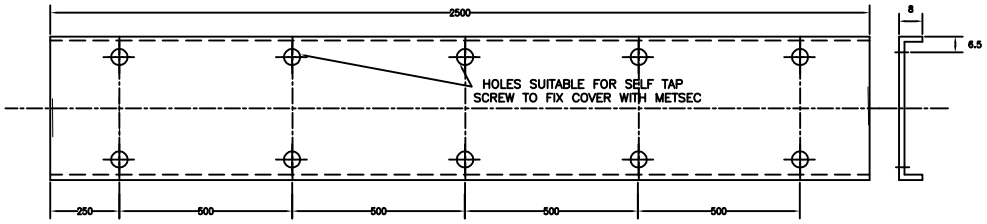
1. ALL DIMENSIONS ARE IN MM.

TITLE: METSEC CHANNEL

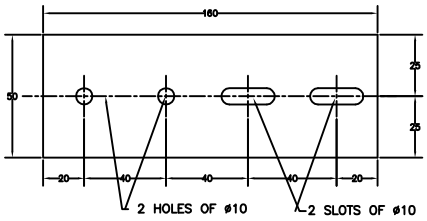
THIS DRAWING INDICATES TECHNICAL DETAILS OF METSEC CHANNEL. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE EACH PIECE OF METSEC.



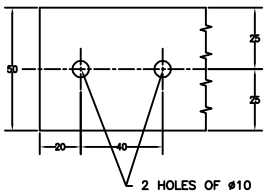
ITEM ①



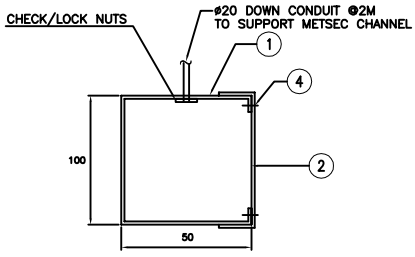
ITEM ②



ITEM ③



DETAIL A



METSEC CHANNEL ASSEMBLY

NOTE:-

1. ALL DIMENSIONS ARE IN MM ONLY.
2. METSEC CHANNEL, COVER AND COUPLER PLATE SHOULD BE OF 16SWG COLD ROLLED MILD STEEL.
3. ALL HARDWARE LIKE SCREWS SHOULD BE OF BRASS MACHNIE.

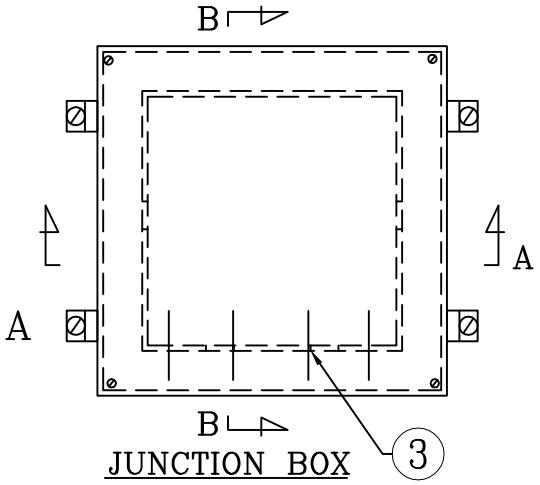
SUPPLY OF B.O.Q

SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	METSEC CHANNEL 2.5M PIECE WITH DRILLED HOLE AND KNOCKOUT AS PER DETAIL	NO.	01
02	COVER 2.5M PIECE WITH DRILLED HOLE AS PER DETAIL	NO.	01
03	COUPLER PLATE WITH DRILLED HOLE AS PER DETAIL	NO.	02
04	SELF TAPPED SCREW M6	MTR	10
05	NUTS AND BOLTS WITH WASHER SUITABLE TO FIX COUPLER PLATE WITH METSEC	NO.	08
06	CHECK NUTS SUITABLE FOR 20MM DIA CONDUIT	NO.	02

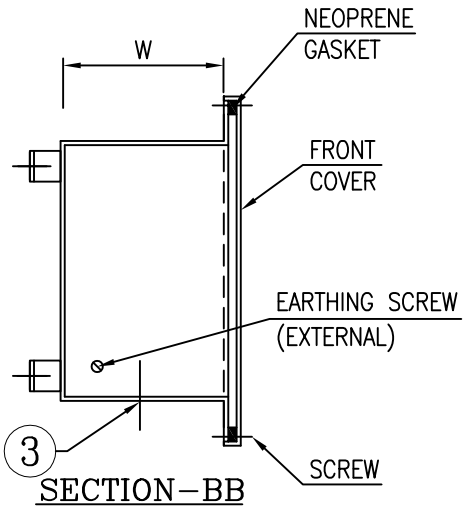
Ref. Doc.

*

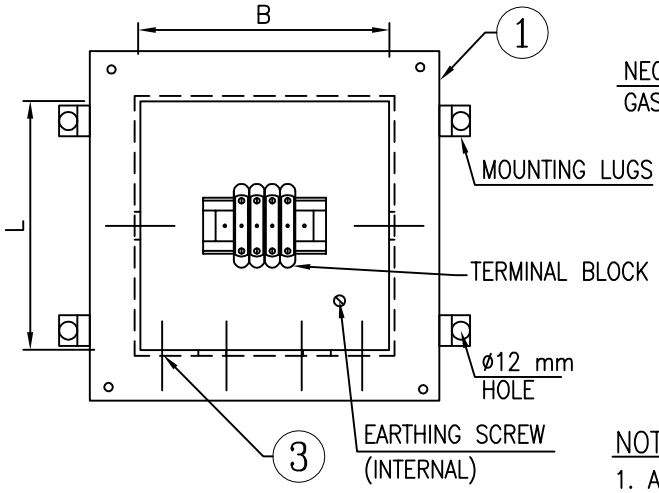
THIS DRAWING INDICATES TECHNICAL DETAILS OF JUNCTION BOX.IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE JB.



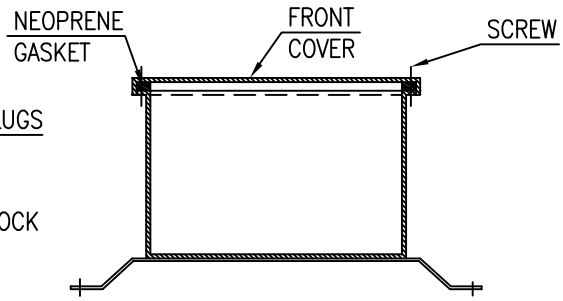
JUNCTION BOX
WITH COVER



SECTION-BB



JUNCTION BOX
WITH OPEN COVER



SECTION-AA

NOTES:-

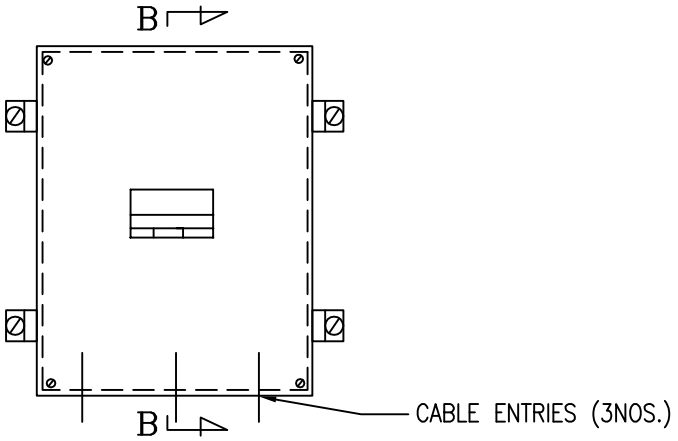
1. ALL DIMENSIONS ARE IN MM.
2. ENCLOUSER SHOULD BE 14SWG/2MM THICK AND ALL HARD. WARE LIKE SCREW ARE OF BRASS MACHINE.
3. DIMENSION OF JB SHALL BE AS PER PROJECT REQUREMENT AND SHALL BE MEASURED FOR INTERNAL DIMENSION OF JB OPENING ONLY.
4. JB SHALL HAVE IP55 (MIN.) PROTECTION.

SUPPLY BOQ

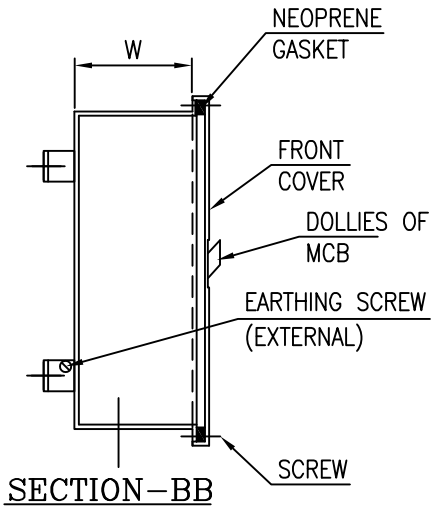
SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	4 WAY WEATHER PROOF JUNCTION BOX WITH IP55 PROTECTION.	NO.	01
02	DOUBLE COMPRESSON CABLE GLAND SUITABLE FOR CABLE ENTRIES.	NO.	04
03	BLANKING PLUG	NO.	01
04	CU. LUGS	NO.	AS REQD.
05	M10X40MM NUTS & BOLTS WITH WASHER.	NO.	04
06			
07			

TITLE: MCB BOX WITH

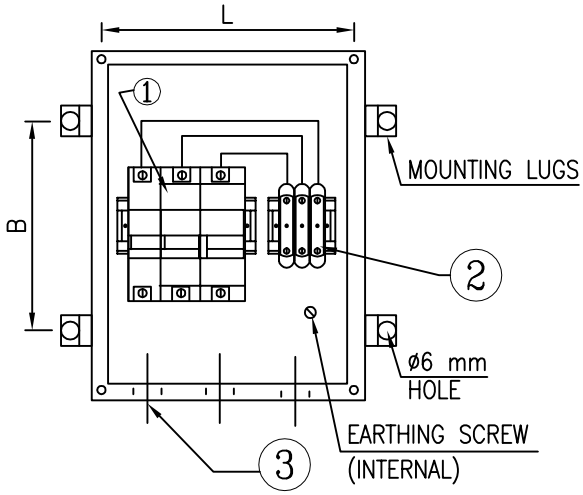
THIS DRAWING INDICATES MOUNTING ARRANGEMENT OF MCB BOX.IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE JB.



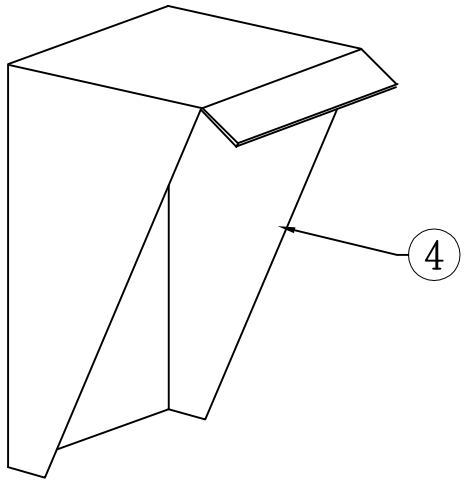
MCB BOX WITH COVER



SECTION-BB



MCB BOX WITH OPEN COVER



EXTERNAL CANOPY REQUIRED FORM OUTDOOR TYPE MCB BOX

SUPPLY BOQ

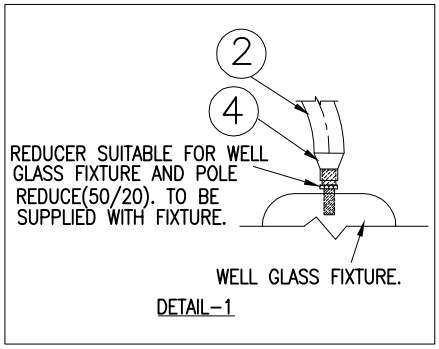
SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	MCB	NO.	01
02	3 NOS. 2PIN TB SUITABLE FOR 50 sq.mm WIRE	NO.	2
03	DOUBLE COMPRESSON CABLE GLAND SUITABLE FOR INCOMMING AND OUTGOING CABLE	NO.	03
04	EXTERNAL CANOPY (REQUIRED FOR OUTDOOR TYPE MCB BOX). SIZE OF THE CANOPY SHALLL BE SUITABLE FOR MCB BOX FOR PROTECTION AGAINST RAIN.	NO.	01

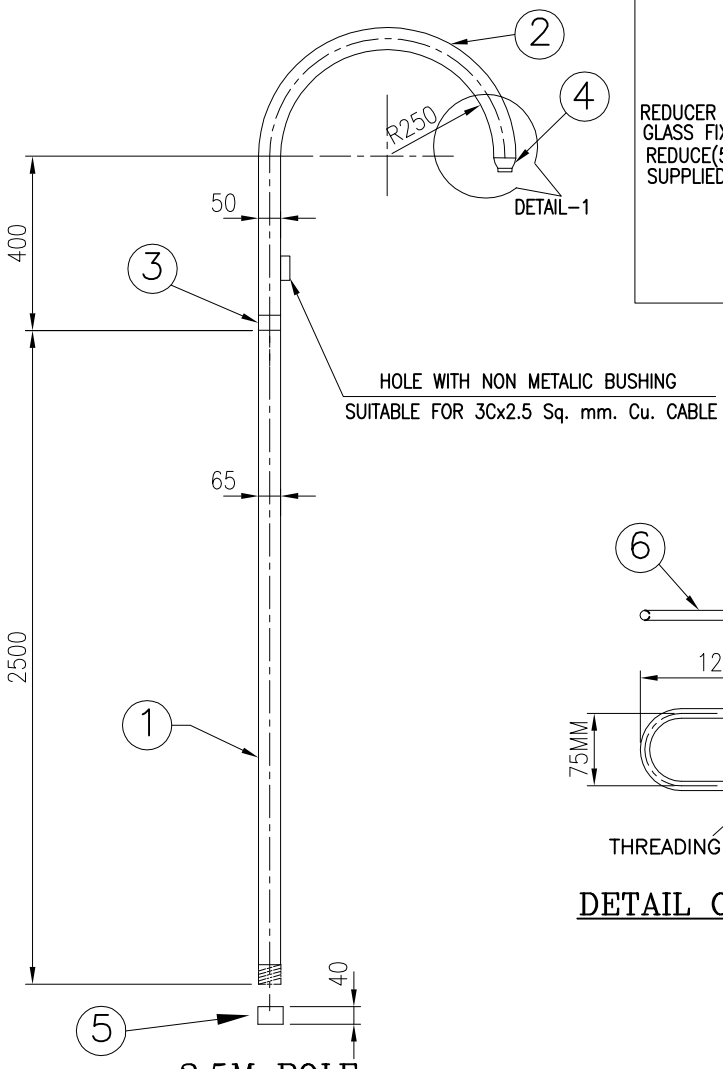
NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. ENCLOUSER SHOULD BE 14SWG/2MM THICK AND ALL HARDWARE LIKE SCREW ARE OF BRASS MACHINE.
3. DIMENSION OF MCB BOX SHALL BE SUITABLE FOR ACCOMODATING ALL INTERNAL COMPONENT AS INDICATED.
4. MINIMUM IP CLASS SHALL BE IP54 FOR INDOOR TYPE & IP55 FOR OUTDOOR TYPE BOX.
5. ENCLOUSER SHALL BE EPOXY PAINTED WITH SHADE 631 AS PER IS-5.

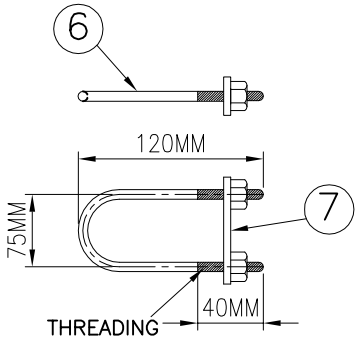
TITLE- 2.5M POLE

THIS DRAWING INDICATES TECHNICAL DETAIL OF 2.50 MTR. POLE. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE POLE.





2.5M POLE



DETAIL OF U-BOLT

NOTE:-

1. ALL DIMENSIONS ARE IN MM.

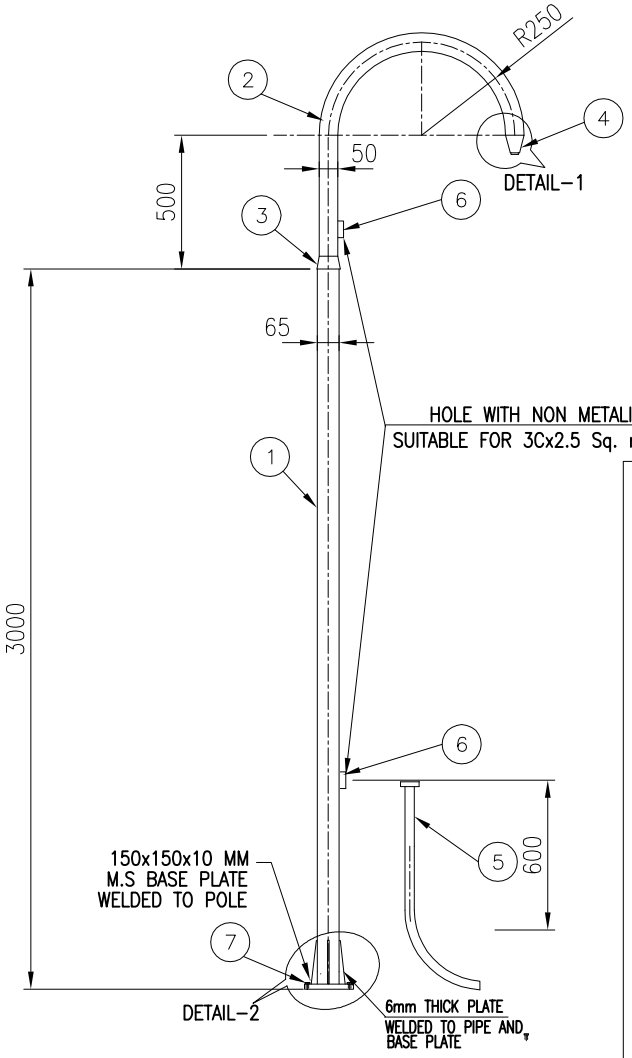
SUPPLY OF B.O.Q

SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	ø50mm GI PIPE (CLASS HEAVY) WITH BOTH SIDE THREADING, LENGTH 2.5 Mtrs.	NO.	01
02	ø50mm G.I. PIPE (CLASS MED.) WITH ONE END SWAN NECK 250mm RADIUS 180° BEND & BOTH END THREADED.MAXIMUM LENGTH 1.2 Mtrs.	NO.	01
03	G.I. COUPLER-50x50mm	NO.	01
04	G.I. REDUCER 50X20MM SUITABLE FOR SWAN NECK	NO.	01
05	G.I. COUPLING OF HEIGHT 40mm SUITABLE FOR 50mm ø G.I. PIPE	NO.	01
06	ø10mm 'U' BOLT WITH BOTH ENDS THREADED, SUITABLE NUTS, 2 NOs. PLAIN AND 1 No. SPRING WASHER	SET	02
07	50x6x150mm LONG G.I. FLAT WITH 2Nos. ø12mm HOLES	NO.	02

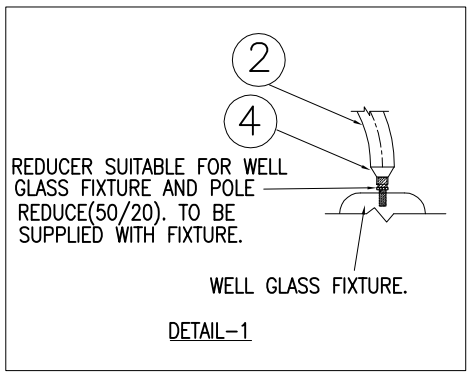
Ref. Doc.

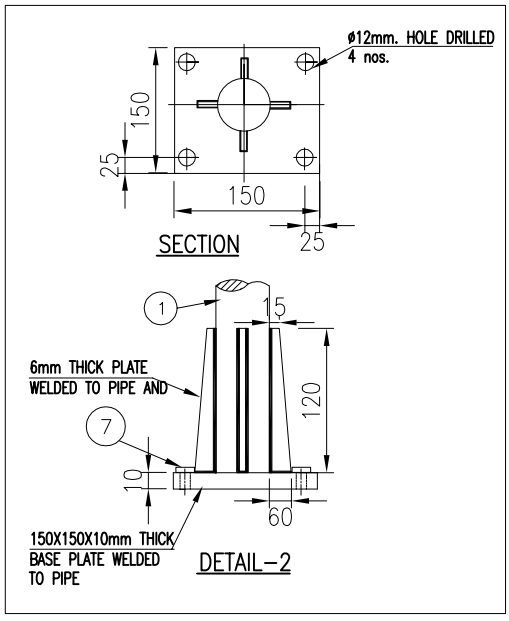
TITLE- 3M. POLE

THIS DRAWING INDICATES TECHNICAL DETAIL OF 3 MTR. POLE. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE POLE.



3.75M POLE





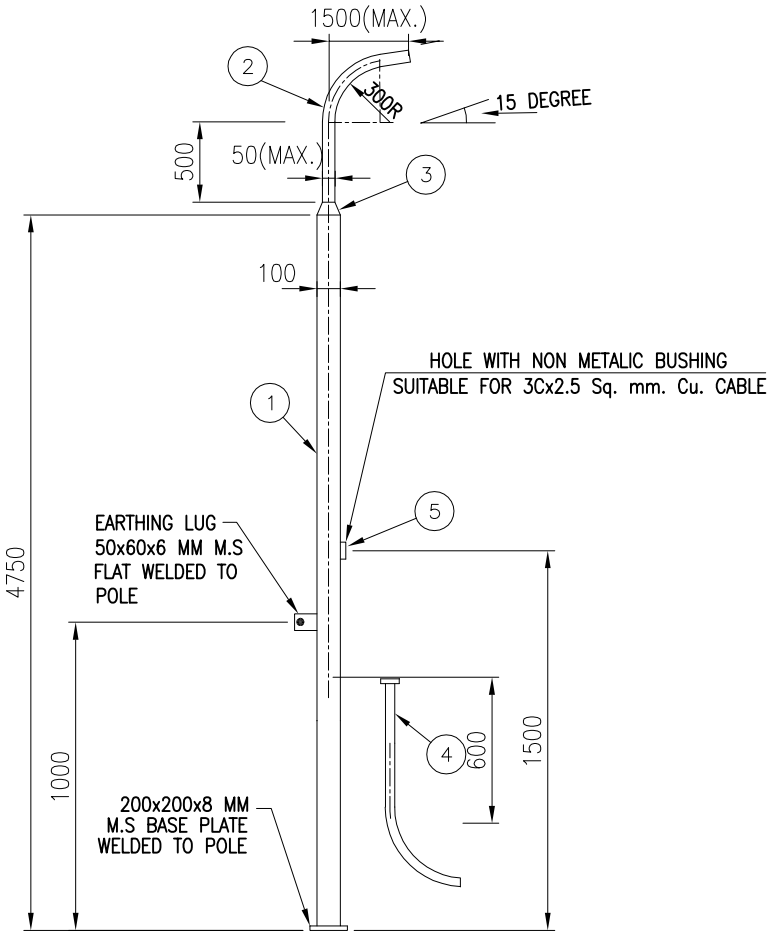
NOTE:-

1. ALL DIMENSIONS ARE IN MM ONLY.

SUPPLY OF B.O.Q AGAINST EACH POLE			
SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	65MM DIA GI PIPE (CLASS HEAVY)WITH ONE END THREADED AND OTHER END WELDED BASE PLATE AS PER DETAIL-2. (LENGTH 3 MTR).	NO.	01
02	50mm ø G.I. PIPE (CLASS HEAVY.) WITH ONE END SWAN NECK 250mm RADIUS 180° BEND & BOTH END THREADED.MAXIMUM LENGTH 1.3 Mtrs.	NO.	01
03	G.I. REDUCER-65x50mm	NO.	01
04	G.I. REDUCER 50/20 SUITABLE FOR SWAN NECK.	NO.	01
05	G.I PIPES FOR INCOMING AND OUTGOING CABLES ø100mm&1MTR. LENGTH WITH BEND OF 300 DEGREE RADIUS & NIPPLE ARRANGEMENTS FOR TAKING OUT UG CABLE	NO.	01
06	NON METALIC BUSHING SUITABLE FOR 3CX2.5 SQMM CABLE AND HOLE AT POLE TO TAKE OUT CABLE FROM POLE	NO.	02
07	M10 X 40MM LONG ANCHORING STUD WITH PLAIN & SPRING WASHER.	NO.	04

TITLE- 4.75M. POLE FOR STREET LIGHT

THIS DRAWING INDICATES TECHNICAL DETAIL OF 4.75 MTR. POLE. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE POLE.



4.75M POLE FOR STREET LIGHT

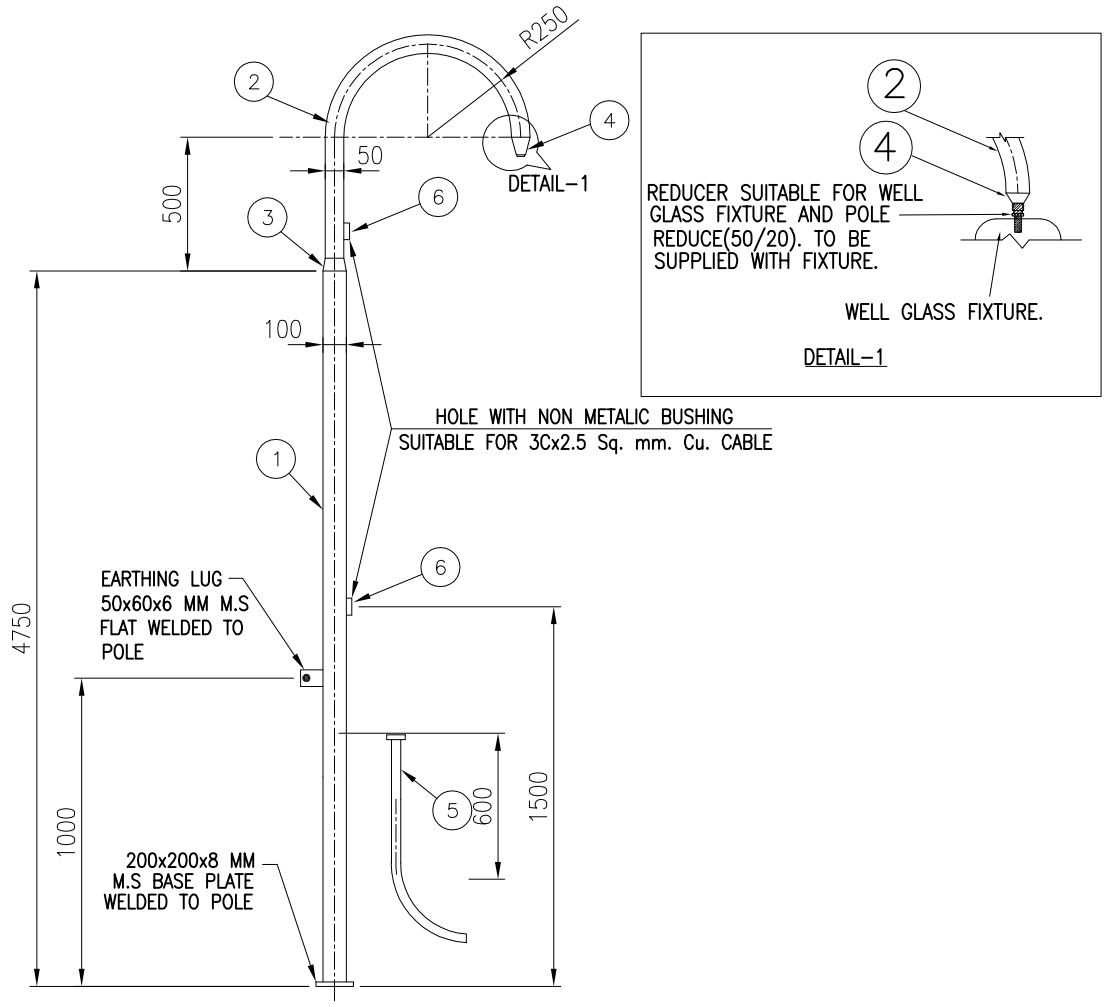
NOTE:-

1. ALL DIMENSIONS ARE IN MM ONLY.

SUPPLY OF B.O.Q AGAINST EACH POLE			
SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	ø100mm GI PIPE (CLASS HEAVY) WITH ONE SIDE THREADING, AND OTHER SIDE WELDED BASE PLATE, LENGTH 4.75 Mtrs.	NO.	01
02	50 OUTER DIA(MAX.) GI PIPE (CLASS HEAVY) WITH 300MM RADIUS 180 DEGREE BEND BOTH END THREADED.	NO.	01
03	G.I. REDUCER-100x50mm	NO.	01
04	100 DIA GI PIPE MAX. LENGTH. 1MTR WITH BEND OF 300 DEGREE RADIUS WITH NIPPLE.	NO.	01
05	NON METALIC BUSHING SUITABLE FOR 3CX2.5 SQMM CABLE AND HOLE AT POLE TO TAKE OUT CABLE FROM POLE	NO.	01

TITLE- 4.75M. POLE FOR WELL GLASS

THIS DRAWING INDICATES TECHNICAL DETAIL OF 4.75 MTR. POLE. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE POLE.



4.75M POLE FOR WELL GLASS

NOTE:-

1. ALL DIMENSIONS ARE IN MM ONLY.

SUPPLY OF B.O.Q AGAINST EACH POLE			
SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	ø100mm GI PIPE (CLASS HEAVY) WITH ONE SIDE THREADING, AND OTHER SIDE WELDED BASE PLATE, LENGTH 4.75 Mtrs.	NO.	01
02	50mm ø G.I. PIPE (CLASS HEAVY.) WITH ONE END SWAN NECK 250mm RADIUS 180° BEND & BOTH END THREADED.MAXIMUM LENGTH 1.3 Mtrs.	NO.	01
03	G.I. REDUCER-100x50mm	NO.	01
04	G.I. REDUCER 50/20 SUITABLE FOR SWAN NECK.	NO.	01
05	100 DIA GI PIPE MAX. LENGTH. 1MTR WITH BEND OF 300 DEGREE RADIUS WITH NIPPLE.	NO.	01
06	NON METALIC BUSHING SUITABLE FOR 3CX2.5 SQMM CABLE AND HOLE AT POLE TO TAKE OUT CABLE FROM POLE	NO.	02

HYDERABAD

PRODUCT STANDARD

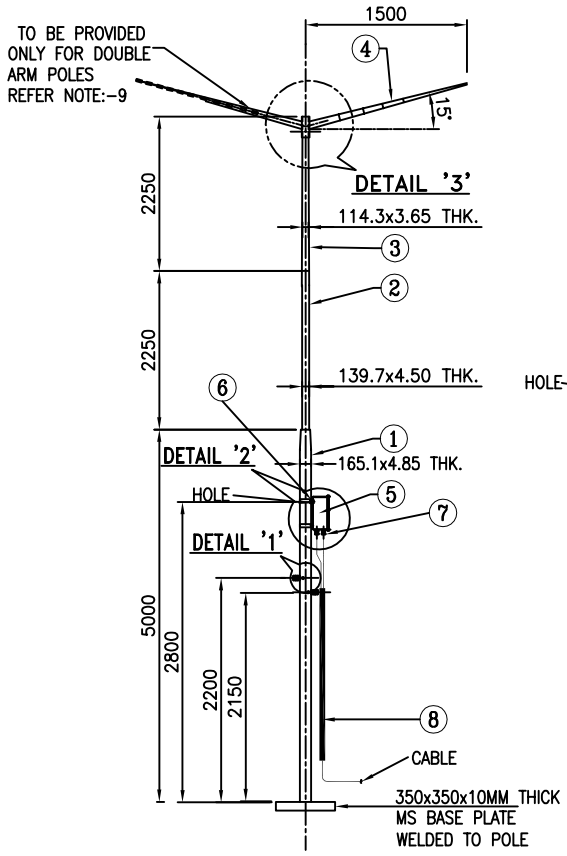
PROJECT ENGINEERING & SYSTEM DIVISION
HYDERABAD

ANNEXURE-1 TO PY55158

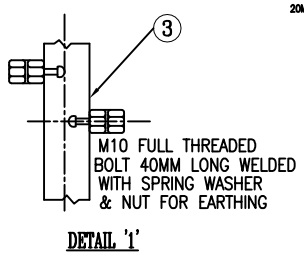
Rev. No. 00

TITLE: 10M STREET LIGHTING POLE

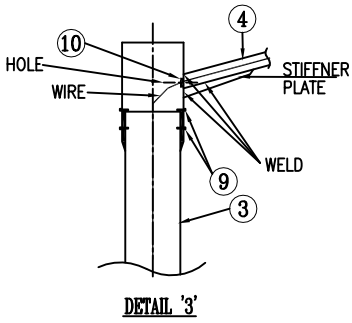
THIS DRAWING INDICATES TECHNICAL DETAILS OF POLE. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE POLE



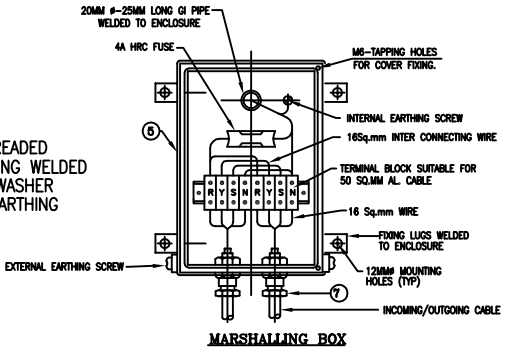
10M STREET LIGHTING POLE (TYPE 410 SP-38)



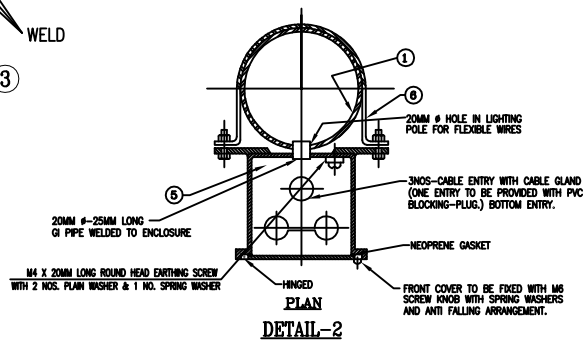
DETAIL '1'



DETAIL '3'



MARSHALLING BOX



PLAN

DETAIL-2

NOTE:-

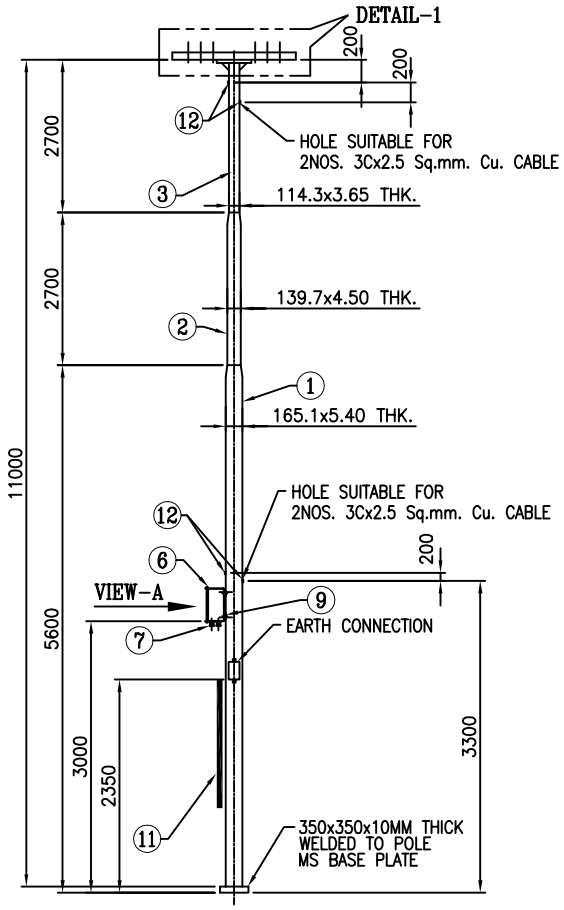
1. ALL DIMENSIONS ARE IN MM ONLY.
2. ENCLOUSER OF MARSHALLING BOX SHOULD BE 14SWG/2MM THICK AND IPW55 PROTECTION WITH NEOPRENE GASKET.
3. DOOR COVER OF MB SHOULD BE 12 SWG/2.64MM THICK AND FIXTED TO ENCLOUSER WITH HINGED ARRANGEMENT AND ANTI FALLING SCREW KNOB.

SUPPLY OF B.O.Q

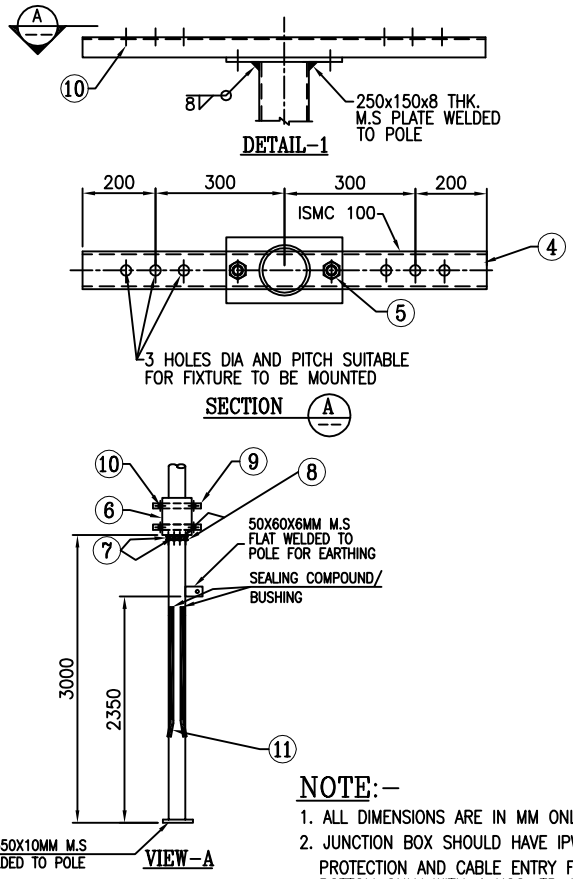
SL. NO.	ITEM DESCRIPTION	UNIT	QTY.	REMARKS
01	STREET LIGHTING POLE WITH OD 165.1x4.85mm THK. & 5.0M LONG, TUBLAR SHAPED ONE END AND WELDED BASE PLATE AT OTHER END AND DRILLED HOLE AND EARTHING BOLT AS PER DETAIL.	NO.	01	SHALL BE SUPPLIED IN ASSEMBLED CONDITION
02	STREET LIGHTING POLE WITH OD 139.7x4.5mm THK. & 2.25M LONG AND ONE SIDE TUBULAR SHAPE AS PER DETAIL	NO.	01	
03	STREET LIGHTING POLE WITH OD 114.3x3.65mm THK. & 2.25M LONG	NO.	01	
04	40mm DIA PIPE MEDIUM 1.5M LONG MAX. WITH WELDED TO CAP BY STIFFNER PLATE AS PER DETAIL.	MTR	01	
05	MARSHALLING BOX SUITABLE TO LOOP IN/OUT FEEDER CABLE	NO.	01	SHALL BE SUPPLIED IN LOOSE
06	BRACKET/CLAMP MADE OF 25 X 6MM FLAT WITH M10 X 40MM LONG BOLTS WITH NUT, LOCK NUT & PLAIN WASHERS FOR MB FIXING	NO.	02	
07	DC BRASS CABLE GLAND SUITABLE FOR FEEDER CABLE 4CX35 SQ AL.	NO.	03	
08	G.I PIPES FOR INCOMING AND OUTGOING CABLES ø50mm&1.5MTR. LENGTH WITH BEND AT 1 MTR LENGTH	NO.	02	
09	M10, 30mm LONG FULL THREADED BOLT	NO.	06	
10	NON METALIC BUSHING SUITABLE FOR ø25mm HOLE	NO.	01	

*ANY OTHER ACCESSORIES THOUGH NOT INDICATED IN THE ABOVE BOQ,BUT REQUIRED FOR SUCCESSFUL INSTALLATION & OPERATION OF FIXTURE SHALL FORM A PART OF SUPPLY BOQ.

THIS DRAWING INDICATES TECHNICAL DETAILS OF POLE. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE POLE



12M FLOOD LIGHTING POLE (TYPE 410 SP-54)



NOTE:-

1. ALL DIMENSIONS ARE IN MM ONLY.
2. JUNCTION BOX SHOULD HAVE IPW55 PROTECTION AND CABLE ENTRY FROM BOTTOM ONLY WITH 4 NOS. TB & 2 CABLE ENTRIES SUITABLE FOR 4C X 16 SQMM AND 4 NOS. TB & 2 CABLE ENTRIES SUITABLE FOR 3Cx x2.5 SQMM CABLE.

SUPPLY OF B.O.Q

SL. NO.	ITEM DESCRIPTION	UNIT	QTY.	REMARKS
01	FLOOD LIGHTING POLE WITH OD 165.1x5.40mm THK. & 5.6M LONG, TUBULAR ONE SIDE AND AND OYHER SIDE WELDED BASE PLATE, EARTHING BOLT AND DRILLED HOLES AS PER DETAIL	NO.	01	SHALL BE SUPPLIED IN ASSEMBLED CONDITION
02	FLOOD LIGHTING POLE WITH OD 139.7x4.50mm THK. & 2.7M LONG TUBULAR END AS PER DETAIL	NO.	01	
03	FLOOD LIGHTING POLE WITH OD 114.3x3.65mm THK. & 2.7M LONG, DRILLED HOLE AND WELDED MS PLATE 250X150X8MM AS PER DETAIL	NO.	01	
04	ISMC 100 LENGTH IM WITH DRILLED HOLE AS PER DETAIL	NO.	01	
05	BOLT & NUT TO FIX ISMC 100 WITH MS PLATE	NO.	02	
06	4WAY WEATHER PROOF JUNCTION BOX (250X200X100MM OUT DOOR TYPE)	NO.	01	SHALL BE SUPPLIED IN LOOSE
07	DC BRASS CABLE GLAND SUITABLE FOR FEEDER CABLE	NO.	02	
08	CABLE GLAND SUITABLE FOR 3Cx2.5 Sq.mm. Cu. CABLE	NO.	02	
09	50x6mm MS FLAT LENGTH AS REQD. SUITABLE TO FIX JB	NO.	02	
10	BOLT M10x25 LONG WITH NUT & WASHERS	NO.	10	
11	G.I PIPES FOR INCOMING AND OUTGOING CABLES ø50mm&1.5MTR. LENGTH WITH BEND AT 1 MTR LENGTH	NO.	02	
12	NON METALIC BUSHING SUITABLE FOR 2NOS. 3Cx2.5 Sq.mm. Cu. CABLE	NO.	04	