



PROJECT ENGINEERING & SYSTEMS DIVISION
(Technical Specification For Illumination Items Package)

Std. / Doc. Number

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Rev. No. 00

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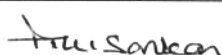
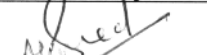
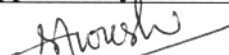
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TECHNICAL SPECIFICATION FOR ILLUMINATION ITEMS PACKAGE

PROJECT :	STEAM AND POWER GENERATION PACKAGE FOR REVIVAL OF RAMAGUNDAM FERTILIZER COMPLEX (1X32.5 MW GTG + 1X125 TPH HRSG + 1X85 TPH UB)
OWNER :	M/s RAMAGUNDAM FERTILIZERS AND CHEMICALS LIMITED
OWNER CONSULTANT:	M/s ENGINEERS INDIA LIMITED (EIL), NEW DELHI

Revisions:

Refer to record of revisions

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Date :**10.07.2017**



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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:

1.0 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-1248	Direct acting indicating analogue measuring instruments and their accessories.
IS/IEC 60898	Electrical Accessories - circuit breaker for over protection for house hold and similar
IS-12640	Residual current operated circuit breakers.
IS/IEC 60947	LV Switchgear and Control Gear
IS/IEC 60079-0	Electrical apparatus for explosive gas atmospheres (General requirement).
IS/IEC 60079-1	Electrical apparatus for explosive gas atmospheres (Equipment protection by flame proof encloser "d")
IS/IEC 60079-7	Electrical apparatus for explosive gas atmospheres (Equipment protection by increased safety "e")
IS/IEC 60529	Degree of protection provided by enclosures (IP Code).
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 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

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2.0 The code & standard to be followed for LED luminaires

Code	Standard Description
16101:2012	General lighting. LEDs and LED Modules Terms & definitions
16102(Part 1):2012	Self ballasted LED lamps for General Lighting Services. Part-1 Safety Requirements.
16102(Part 2):2012	Self ballasted LED lamps for General Lighting Services. Part-2 Performance Requirements.
16103(Part 1):2012	LED modules for General lighting Safety Requirements.
IEC 61347-2-13	Lamp Controlgear-Part2-13: Particular Requirement for DC and AC supplied electronic control gear for LED models.
16104:2012	DC or AC supplied Electronic Control Gear for LED Modules – Performance requirements.
16105:2012	Method of measurement of lumen maintenance of solid state Light (LED) sources.
16106:2012	Method of Electrical and photometric Measurement of solid state Lighting (LED) Products.
16107:2012	Luminaire Performance
16108:2012	Photobiological safety of lamps and lamp system.
IS 513	Cold rolled low carbon steel sheets and strips.
IS 12063	Classification of degree of protection provided by enclosure.
IS 14700(Part3/Sec.2)	Electromagnetic compatibility (EMC) – Limits for Harmonic current emission – THD < 15% (equipment input current < 16A per phase).
IS 9000(Part 6)	Environment testing: Test Z - AD: composite temperature/humidity cyclic test.
IS 4905, IEC 60598	Method of random sampling Ingress protection, luminaire performance and safety.
IEC 61000-3-2	Total Harmonic Distortion
IEC 61000-4-5	Surge protection
IES-LM 80 along with TM 21/IS16105	Lumen depreciation and rated life of LED Chip.
IES-LM 79/IS 16106	Luminaire optics and color parameter and electric parameter.

C. INSTRUCTIONS TO BIDDER

- 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.
- 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.
- Technical datasheet for major equipment is attached at Annexure-XI, vendor to comply the same.** Any technical features over & above BHEL enquiry specification requirements, proposed by Bidder will not be given preference for the purpose of evaluation.

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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) may vary to the extent of +/-10% as per various finalized illumination layouts based on Customer approval. Same shall be informed to bidder at the time of technical scrutiny. For addition/reduction of quantity, unit rate quoted in the present offer shall be considered.
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

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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 & Annexure-XI, 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 60947, IS 8828, IS 694 and IS 12640 and shall have IP-42 (min.) protection for indoor and IP55 (min.) for outdoor type panel as per IS2147.
- 1.2 Lighting panels shall be metal enclosed, double door type, fabricated from CRCA sheet steel or polycarbonate of minimum 16 SWG with dust and vermin proof. Outdoor type panels shall be provided with external 14SWG FRP to protect from heavy tropical rains from top and both sides. These shall be suitable for wall/column mounting with external fixing lugs. All hardware provided shall be stainless steel (SS304).
- 1.3 Three separate compartments shall be provided, one for incoming MCB/RCCB/RCBO, one for outgoing 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/RCCBs/RCBOs should be mounted on a bracket covered with Bakelite cover plate with only opening for dollies. Dollies of MCBs/RCCBs/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 MCBs/RCCBs/RCBOs/TBs/Cable glands etc. along with their internal wiring in orderly manner.
- 1.4 Two numbers 6mm external earthing studs complete with two plain, one spring/lock washer, and a nut on opposite side of the panels shall be provided. Earth Bus of 25x6 (min.) Al. shall be provided with terminal studs along the length at TB compartment for internal earthing & terminating all earth wires of outgoing circuits.
- 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 outer 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 incoming and outgoing cables. Sufficient Nos. of TBs shall be provided. Maximum two wires are permitted to terminate at one terminal. If required additional terminal with shorting link shall be provided.

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1.7 Sufficient space shall be provided (150 to 200mm) between gland plate and bottom of terminal block for easy termination of cables.

1.8 For AC lighting panels, High conductivity 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. 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 90°. Spacing between the bus bars shall be as per IS for the applied voltage to prevent flash over. Short circuit level of the MCBs shall be 9kA. 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.

1.9 For AC lighting panels, rating of MCBs/RCCBs/RCBOs for incomer and outgoing shall be as per Illumination BOM. However if not specified, incomer shall be provided with 63A, 415V, TPN MCB (4 pole) and TPN ELCB/RCCB (4 pole). Outgoing feeders shall be provided with 20A, SPN MCBs. 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 9kA (min.) at 240V AC and RCCBs shall be provided with tripping due to earth leakage with a sensitivity of 100mA.

1.10 For DC lighting panels, incomer shall be provided with 63A /32A, DP MCB (2 pole, 220V DC). Outgoing feeders shall be provided with 10A, DP MCBs.

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

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

1.13 All component installed in the panels shall have labels, also outgoing and incoming circuits at terminal blocks shall have labels. A Circuit diagram indicating incomer details and outgoing details viz. Circuit number, circuit rating etc. shall be pasted inside the panel. In addition, a laminated copy of diagram shall be provided inside the panel in a suitably designed pocket.

1.14 Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type 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 PVC gland hoods. Incoming and outgoing cable entries shall be from bottom by means of removable undrilled gland plates.

1.15 Crimp type heavy duty tinned Copper 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. Stainless steel (SS304) nuts & bolts of suitable size shall be supplied with each panel for mounting of panel.

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

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

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- 1.18 Lighting panels should be supplied complete with installed sub components and necessary internal wiring. All loose items like Cable Glands, Blanking plugs, Lugs for incoming/outgoing cables and mounting hardware etc. shall be supplied along with panels for fitting at site.
- 1.19 All metal surfaces shall undergo manufacturer's standard cleaning/painting cycle. After preparation of under surface, equipment shall be painted with two coats of epoxy based final paint. Colour shade of final paint shall be 631/632 as per IS:5 for Indoor/Outdoor type panel. All unpainted steel parts shall be suitably treated to prevent rust formation.
- 1.20 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: Elmax, Connectwell
- 1.21 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 CIMFR/ERTL/BASEEFA/LCIE/UL/FM or equivalent as applicable for the service and the area of installation and shall be approved by DGMS/PESO. 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 Lighting panel shall be suitable for installation and satisfactory operation in classified hazardous locations in tropical, humid and corrosive atmosphere as prevalent in refineries, petrochemical and fertilizer plants.
- 2.2 The lighting panel shall be designed to operate under site conditions as specified in the illumination BOM, if not specifically mentioned therein, a design ambient temperature of 40 Degree centigrade and an altitude not exceeding 1000m above mean sea level shall be considered.
- 2.3 Lighting panels shall have IP55 degree of protection (min.) and shall be suitable for area classification as mentioned in the illumination BOM (i.e. Zone – I & II, Gas Group IIA&IIB or IIC). The lighting panels shall be flameproof type Ex (d) with temperature class T3 (min.).
- 2.4 The enclosure shall be of Cast light Metal Alloy with modular construction. The enclosure shall be provided with gasket made of non-inflammable and self-extinguishing material.
- 2.5 Outdoor type panels shall be provided with external 14SWG FRP canopy to protect from heavy tropical rains from top and both sides. These shall be suitable for wall/column mounting with external fixing lugs. Hole provided in the lugs shall be oblong type. All hardware provided like nuts, bolts, washer etc. shall be stainless steel (SS304).
- 2.6 Two numbers 6mm external earthing studs complete with two plain and one spring/lock washer, lugs and a nut on opposite side of the panels shall be provided for termination of 10mm dia GI wire rope.
- 2.7 All non current carrying metallic parts of the panel shall be inherently bonded together.

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

2.9 Terminal blocks suitable for connection of incoming and outgoing circuit cables shall be provided. Terminal blocks shall be stud/clamp type suitable for incoming and outgoing cables. Sufficient Nos. of TBs shall be provided. Maximum two wires are permitted to terminate at one terminal. If required additional terminal with shorting link shall be provided.

2.10 Sufficient space shall be provided (100mm) between gland plate and bottom of terminal block for easy termination of cables.

2.11 For AC lighting panels, High conductivity 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. 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 90°. Spacing between the bus bars shall be as per IS for the applied voltage to prevent flash over. Short circuit level of the MCBs shall be 9kA. 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.

2.12 For AC lighting panels, rating of MCBs/RCCBs/RCBOs for incomer and outgoing shall be as per Illumination BOM. However if not specified, incomer shall be provided with 63A, 415V, TPN MCB (4 pole) and TPN ELCB/RCCB (4 pole). Outgoing feeders shall be provided with 20A, DP MCBs. All MCBs Shall be suitable for breaking capacity of 9kA(min.) at 240V AC and RCCBs shall be provided with tripping due to earth leakage with a sensitivity of 100mA.

2.13 For DC lighting panels, incomer shall be provided with 63A /32A, DP MCB (2 pole, 220V DC). Outgoing feeders shall be provided with 10A, DP MCBs.

2.14 The ELCB/RCCB shall be hand reset type, one no. door mounted reset push button shall be provided.

2.15 The operating knobs (ON/OFF/RESET) shall be provided with suitable rack and pinion arrangement or cam type operating mechanism for operating smoothly from outside.

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

2.17 All internal wiring shall be done with FR type, 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.

2.18 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.

2.19 All panels shall be provided with NPT cable entries suitable for approved type flame proof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands. Cable entry sizes shall be as per Illumination BOM (Annexure-II).

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- 2.20 Flame proof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands (NPT type) 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 should be supplied with PVC gland hoods.
- 2.21 Crimp type heavy duty tinned Copper lugs of appropriate sizes suitable for TBs shall be provided for all incoming and outgoing cables. Flame proof nickel plated Brass Blanking plug of suitable size shall be supplied for 20% (min) outgoing cable entries to seal the unused entries. Stainless steel (SS304) nuts & bolts of suitable size shall be supplied with each panel for mounting of panel.
- 2.22 Sizes of cable glands, Terminal blocks, Lugs & Blanking plugs are project specific, will be decided during detail engineering at drawing approval stage.
- 2.23 All electrical components shall be mounted on suitable brackets to match with inner door.
- 2.24 Lighting panels should be supplied complete with installed sub components and necessary internal wiring. All loose items like Cable Glands, Blanking plugs, Lugs for incoming/outgoing cables and mounting hardware etc, shall be supplied along with panels for fitting at site.
- 2.25 All metal surfaces shall undergo manufacturer's standard cleaning/painting cycle. After preparation of under surface, equipment shall be painted with two coats of epoxy based final paint. Colour shade of final paint shall be 632 of IS:5 or RAL7031 for Gas group IIA & IIB, Light Yellow 355 of IS:5 or RAL1012 for Gas group IIC. All unpainted steel parts shall be suitably treated to prevent rust formation.
- 2.26 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. Name plate shall be engraved type and permanently fixed on the equipment. Name plate /warning plate shall be of nickel plated brass or stainless steel.
- 2.27 Additionally following details are to be embossed on the nameplate:
- Details of testing agency (CMRI or equivalent)
 - Test certificate no. with date
 - Statutory approval no. with date and agency like PESO, DGMS etc.
 - BIS License no. and date
 - Applicable gas group etc.
- 2.28 Makes of major components shall be as follows if not otherwise specified in sub vendor list:-
- MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.
 - Fuses: L & T, GE, Indo-Asian, Seimens.
 - Cable glands (Flame proof type): Baliga, Flameproof equipment, Prompt, FCG
 - Terminal Block: Elmax, Connectwell

III. FLEXIBLE WIRES:

- 1.1 Flexible wires shall be single core, unsheathed, PVC insulated suitable for voltage grade 1.1kV as per IS:694.

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- 1.2 The conductor shall be stranded Copper 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 90m + 5%.
- 1.4 Internal resistance and insulation thickness of the wire should be as per IS694.
- 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 for its life under atmospheric conditions existing at site and without exceeding permissible temperature rise as specified in the applicable standards.
- 1.2 LED fixtures shall be manufactured and tested in conformity with code & standard as specified at clause-2.0 of 'B' above.
- 1.3 Unless specified otherwise, operating voltage is 240VAC $\pm$ 10% 1-phase 50Hz $\pm$ 5% for AC fixture and 220VDC $\pm$ 5% DC fixture. All fixtures shall be suitable for operation on available power supply.
- 1.4 All Lighting fixtures shall be complete with lamp(s), lamp holder(s), LED chip assembly, terminal blocks, clamps, locking arrangements, fixing brackets etc.
- 1.5 Driver circuit/Control gears shall be provided as applicable / specified. The fixtures shall be fully wired up to terminal block.
- 1.6 All fixing/locking screws, washers, nuts, brackets, studs etc. shall be stainless steel (SS304).
- 1.7 Fixtures should be provided with earthing terminals. All metal or metal enclosed parts of the housing and accessories shall be bonded and connected to earthing terminal.
- 1.8 The lighting fixtures shall be designed for minimum glare. The finish of the fixtures shall be such that no bright spot are produced either by direct source or by reflection.
- 1.9 All Well glass, street lighting & Flood lighting fixtures shall be weather proof with IP 55 (min) protection. Street lighting fixture shall be suitable for mounting with 50 diameter (outer) steel pipe.
- 1.10 LED luminaires body shall such designed that heat sink/ heat dissipating housing shall be mounted outside the overall luminaire fixture housing, and shall be suitably clearing the driver circuit. Outdoor type LED luminaires, the exposed heat sink shall be suitably designed to avoid dust/foreign particles accumulation on the same.
- 1.11 LED luminaires housing/body shall be pressure die cast aluminum or extruded aluminum or CRCA as specified along with finished powder coating. Design shall be such that there is no water stagnation anywhere.
- 1.12 LED type of fixtures shall meet the following technical requirements:-
 - a) The Luminaire efficacy shall not be less than 100Lm/W.
 - b) Heat Sink/Heat dissipation arrangement shall be provided in the luminaires.
 - c) The LED luminaires shall have minimum life of 50,000 burning hours at 40 degree ambient temperature.
 - d) The beam angle for LED chip shall be 120 degree or 90 degree.
 - e) The power factor of the luminaire shall not be less than 0.95.

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- f) LED fixtures shall be complete with internal reflectors. No external reflector is envisaged for LED.
- g) The LED light fixtures should be tested for luminous lux level as per IES-LM-79. Type test certificates shall be furnished in compliance to same.
- h) The LED's used in the lighting fixtures should be tested for the service life as per IES-LM-80. Type test certificates shall be furnished in compliance to same.
- i) The LED Driver shall comply with the requirement of IEC 61347-2-13.
- j) LED modules and drivers shall be compatible to each other. LED drivers may at least have following Control and protection
 - i) Surge protection.

- 1.13 Fixture catalogue details/name plate as per E-I of this spec. shall be provided for easy identification.
- 1.14 All DC fixtures (Bulkhead/Well glass/ Down light etc.) shall be compatible with the DC voltage specified in the project. Fixtures shall have in built suitable DC to AC convertor if required. Paint shade for DC fixture shall be Bright red shade 538 of IS5/RAL 3003.
- 1.15 Cable entries of fixtures shall be suitable for 3Cx2.5sq.mm Cu cable. For Well glass and High bay fixtures cable entry should be from side only. Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands suitable for specified area classification shall be provided for all cable entries.
- 1.16 Fixtures shall be supplied with all accessories like Crimp type heavy duty tinned Copper lugs, Stainless steel (SS304) mounting Nuts & Bolts, cable glands, Pole reducer & "C" bracket for well Glass fixture etc.
- 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. Following test reports to be submitted for LED Chip/ LED Luminaires:
 - a) LM 80/IS:16105 report
 - b) LM79/IS:16106 report
- 1.18 Makes of major components shall be as follows if not otherwise specified in sub vendor list:-
 - a) Cable gland: Baliga, Comet, Flexipro, FCG

V. HAZARDOUS AREA FIXTURES AND LAMPS:

- 1.0 Certification:** The equipment shall be certified by testing authorities like CIMFR/ERTL/BASEEFA/LCIE/UL/FM or equivalent as applicable for the service and the area of installation and shall be approved by DGMS/PESO. 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). The light fittings shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T3 (min.).
 - 2.2 The enclosures of fixtures shall be of Cast light metal alloy and free from frictional sparking hazard.

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2.3 The enclosure shall be provided with gasket made of non-inflammable and self-extinguishing material.

2.4 All fixtures shall be provided with NPT cable entries suitable for approved type flame proof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands.

2.5 All metal surfaces shall undergo manufacturer's standard cleaning/painting cycle. After preparation of under surface, equipment shall be painted with two coats of epoxy based final paint. Colour shade of final paint shall be 632 or RAL7031 for IIA&IIB, Light Yellow 355 or RAL1011 for IIC, Bright red shade 538 of IS5/RAL 3003 for DC Fixture. All unpainted steel parts shall be suitably treated to prevent rust formation.

2.6 Additionally following details are to be embossed on the nameplate of light fittings:

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

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

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) in case specified in sub vendor list.

VI. SAFE AREA WEATHER PROOF JUNCTION BOXES:

1.1 The junction boxes shall have IP65 (Min.) degree of protection.

1.2 Enclosure of rectangular JB's shall be of material (i.e. FRP/sheet steel/cast Iron/Die cast Aluminum/Thermoplastic) as per mentioned in the Illumination BOM (Annexure-II).

1.3 All metal surfaces shall undergo manufacturer's standard cleaning/painting cycle. After preparation of under surface, equipment shall be painted with two coats of epoxy based final paint with shade of 631/632 for indoor/outdoor JB as per IS:5 if not otherwise specified. All unpainted steel parts shall be suitably treated to prevent rust formation.

1.4 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 and hardware provided shall be of stainless steel (SS304).

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

1.6 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 Crimp type heavy duty tinned Copper lugs shall be supplied in loose for cable termination.

1.7 The no. of entries required and their sizes shall be project specific as indicated in the illumination BOM. Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands with PVC shroud of required sizes and nos. equal to cable entries shall be supplied in loose.

1.8 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.

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- 1.9 Doors shall be hinged at one side and provided with anti falling screw knob at the other side. JB enclosure shall have neoprene gasket.
- 1.10 JB should be suitable for Wall/Column mounting and mounting lugs shall be provided in the enclosure. Necessary mounting nuts and bolts of stainless steel (SS304) shall be provided in loose.
- 1.11 JBs shall be provided with earthing studs (2 nos. internal and 2 nos. external) with washers.
- 1.12 Inscription plate / nameplate as per E.II of this spec. with caution note shall be provided on front cover.
- 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.
- 1.14 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: Elmax, Wago, phonix, Connectwell

VII. HAZARDOUS AREA JUNCTION BOXES:

- 1.0 Certification:** The equipment shall be certified by testing authorities like CIMFR/ERTL/BASEEFA/LCIE/UL/FM or equivalent as applicable for the service and the area of installation and shall be approved by DGMS/PESO. 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). The JB shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T3 (min.).
 - 2.2 Enclosure of JBs shall be of cast light alloy with adequate thickness and free from frictional sparking hazard.
 - 2.3 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 (SS304).
 - 2.4 Gasket made of non-inflammable and self-extinguishing material shall be provided.
 - 2.5 Size of the JB shall be project specific as indicated in annexure-II (Illumination BOM).
 - 2.6 JB shall have cable entries from bottom only to protect from heavy tropical rains.
 - 2.7 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 Crimp type heavy duty tinned Copper lugs shall be supplied in loose for cable termination.
 - 2.8 All JBs shall be provided with NPT cable entries suitable for approved type flameproof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands. The no. of entries required and their sizes shall be project specific as indicated in the illumination BOM. Flame proof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands with PVC shroud of required sizes and nos. equal to cable entries shall be supplied in loose.

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- 2.9 One FLP Brass blanking plug for each type of cable entry shall be provided. In addition, Mounting nuts & bolts of stainless steel (SS304) shall be supplied with each JB.
- 2.10 All metal surfaces shall undergo manufacturer's standard cleaning/painting cycle. After preparation of under surface, equipment shall be painted with two coats of epoxy based final paint. Colour shade of final paint shall be 632 of IS:5 or RAL7031 for IIA&IIB, Light Yellow 355 of IS:5 or RAL1011 for IIC. All unpainted steel parts shall be suitably treated to prevent rust formation.
- 2.11 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.
- 2.12 Additionally following details are to be embossed on the nameplate:
- Details of testing agency (CMRI or equivalent)
 - Test certificate no. with date
 - Statutory approval no. with date and agency like PESO, DGMS etc.
 - BIS License no. and date
 - Applicable gas group etc.
- 2.13 Makes of major components shall be as follows if not otherwise specified in sub vendor list:-
- MCBs: MDS, Havell's, Indo-Asian, Legrand, ABB, Schneider.
 - Fuses: L & T, GE, Indo-Asian, Siemens.
 - Cable glands (Flame proof type): Baliga, Flameproof equipment, Prompt, FCG
 - Terminal Block: Elemax, Connectwell
- 2.14 Make of cable glands suitable for the specified area classification shall be as per the makes given under "Hazardous Area Lighting Panels" (II above).

X. CONDUIT BRANCHING ROUND JB.

- Round JB should be made of Galvanized steel/PVC and shall have smooth finish, completely free from dents, defects and blow holes. JB should have internal diameter of 60mm for dummy JB and 88mm for JB which have terminal block within it.
- JB should have conduit entries in all the four sides suitable for 25mm GI/PVC conduit.
- JB should be supplied with flat cover screwed to the JB and shall have PVC blanking in all the entries before dispatch. Round JB of 88mm with TB, should have 3 nos. terminal block suitable for 6 sq.mm (min) wire within it.
- GI 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.
- Make of JB shall be from reputed vendor with proven track record unless otherwise specified in Sub-vendor list.
- 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:

- Flexible conduits shall be made with bright, cold rolled annealed and electro-galvanized mild steel strips & coated with PVC.
- Internal diameter of conduit is specified in annexure-II (Illumination BOM).

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- 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 SS304.

XIII. FLUSH/SURFACE MOUNTED SWITCHBOARD (FSB/SSB):

- 1.1 All switchboards shall be of modular construction with piano type switches mounted on it. Switches shall be mounted on front cover made of Polypropylene sheet. Color of the front cover and switches shall be milky white.
- 1.2 For flush mounted switchboard, Front cover is arranged such that only cover with switch will be visible after installation of switchboard.
- 1.3 Modular boxes for flush mounted switchboard shall be made of M.S sheet having minimum thickness of 1.6 mm and shall be minimum 65mm deep. The box shall be galvanized /nickel plated after fabrication. Switch boxes shall be provided with earthing screw and washer for body earthing. Material for surface boxes shall be plastic or other improved material as per reputed vendors manufacturing standard.
- 1.4 Front cover plate shall be fixed by cadmium plated brass screws & cup washers.
- 1.5 Conduit knockouts shall be provided on each switchboard suitable for 25mm diameter conduit entry.
- 1.6 No. of switches on the switchboard shall be as specified in the Illumination BOM.
- 1.7 Switch boxes shall be provided with earthing screw and washer for body earthing.
- 1.8 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.
- 1.9 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. 6/16A, 240V, 2-POLE, 3-PIN COMMERCIAL TYPE SWITCH SOCKET:

- 1.1 Receptacles box shall be heavy duty, complete with individual 6/16A Socket & piano type switch.
- 1.2 All socket boxes shall be of modular construction with socket & the controlling ON/OFF switch mounted on front cover made of Polypropylene sheet of the same enclosure box. But these shall be separate units to facilitate replacement by part. Color of the front cover and switches shall be milky white.

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- 1.3 For flush mounted socket box, Front cover is arranged such that only cover with switch will be visible after installation of switchboard.
- 1.4 Modular boxes for flush mounted socket box shall be made of M.S sheet having minimum thickness of 1.6 mm and shall be minimum 65mm deep. The box shall be galvanized /nickel plated after fabrication. Socket boxes shall be provided with earthing screw and washer for body earthing. Material for surface mounted socket boxes shall be plastic or other improved material as per reputed vendors manufacturing standard.
- 1.5 Front cover plate shall be fixed by cadmium plated brass screws & cup washers.
- 1.6 Conduit knockouts shall be provided on each switchboard suitable for 25mm diameter conduit entry.
- 1.7 Switch boxes shall be provided with earthing screw and washer for body earthing.
- 1.8 Makes of socket box & switches shall be of reputed make like Anchor, Cona Electrical Solutions, ABB, Schneider etc if not otherwise specified in the sub vendor list.
- 1.9 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 of metal clad gasketed construction conform to IS 1293. Receptacles shall be heavy duty, complete with individual socket (3pin, 240V 1ph) & 20A MCB. The Isolating MCB shall be industrial type conforming to IS:8828.
- 1.2 Receptacles enclosure shall be CRCA sheet steel with epoxy powder coating and paint shade of RAL 7032 /631/632 as per IS:5 (shall be finalized during detail engineering) if not otherwise specified.
- 1.3 Outdoor type of receptacle shall have IP 55 (Min.) degree of protection and shall be provided with external FRP (2mm thick) to protect from heavy tropical rain from Top and Both sides.
- 1.4 Receptacles shall be suitable for wall / column mounting. Stainless steel (SS304) mounting nuts & bolts shall be supplied along with receptacles. Hardware used in the receptacle box shall be of stainless steel (SS304).
- 1.5 Front cover shall be provided with neoprene gasket and shall be screwed to the fabricated box by Stainless steel screws (SS304) & cup washers. This box shall have outlets at the bottom for incoming and outgoing cables.
- 1.6 Receptacle box shall be provided with internal and external earthing screws with washer and nuts for grounding.
- 1.7 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.
- 1.8 Terminal block suitable for 6 sq. mm wire or rated for 30A shall be supplied with Crimp type heavy duty tinned Copper lugs for 4 sq.mm Cu cable for all outgoing and incoming cables with loop in and loop out facility.
- 1.9 All internal power wiring shall be done with 660V grade PVC insulated Cu wires of 4 sqmm cu. wire.

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- 1.10 Each outlet shall be provided with either a spring loaded hinged cover or a cap connected with chain to close the outlet when not in service.
- 1.11 Each socket shall have two cable entries for looping facility and supplied with two numbers of suitable weather proof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands with PVC shroud and one number sealing plug to seal the unused cable entry. Necessary suitable Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands & blanking plug/Rubber grommet 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.
- 1.12 Inscription plate/Name plate shall be provided indicating voltage rating of the socket as per clause E-V. of this spec.
- 1.13 Receptacle box shall be of reputed make with proven track records and make 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 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 CIMFR/ERTL/BASEEFA/LCIE/UL/FM or equivalent as applicable for the service and the area of installation and shall be approved by DGMS/PESO. 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 T3 (min.).
- 2.2 The socket enclosure shall be of Cast light Metal Alloy with modular construction. The enclosure shall be provided with gasket made of non-inflammable and self-extinguishing material.
- 2.3 Outdoor type socket shall be provided with external FRP (2mm thick) canopy to protect from heavy tropical rains from Top and Both sides. These shall be suitable for wall/column mounting with external fixing lugs. Hole provided in the lugs shall be oblong type. All hardware provided like nuts, bolts, washer etc. shall be stainless steel (SS304).
- 2.4 Two numbers external earthing studs complete with two plain and one spring/lock washer and a nut on opposite side of the socket enclosure shall be provided. There shall also be 2nos. internal earthing screw to terminate earth wire of circuit cable.
- 2.5 All non-current carrying metallic parts of the panel shall be inherently bonded together.
- 2.6 All the accessories and loose items supplied with panel shall be suitable for applicable classified area.

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- 2.7 Terminal blocks suitable for connection of incoming and outgoing circuit cables shall be provided. Terminal blocks shall be stud/clamp type suitable for incoming and outgoing cables. Sufficient Nos. of TBs shall be provided. Maximum two wires are permitted to terminate at one terminal. If required additional terminal with shorting link shall be provided.
- 2.8 Sufficient space shall be provided (100 to 150mm) between gland plate and bottom of terminal block for easy termination of cables.
- 2.9 Receptacles shall be heavy duty complete with individual 20A, 3 pin, socket & interlocking rotary switch such that it cannot be switched ON unless plug is fully inserted & locked and Plug cannot be withdrawn unless switch is put OFF.
- 2.10 To avoid accidental removal of plug from socket, the engagement & disengagement shall be by two separate and distinct movement and position.
- 2.11 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
- 2.12 Sockets shall be provided with 2nos. NPT cable entries suitable for approved type flame proof light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type 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.
- 2.13 Flame proof light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands with PVC shroud of required sizes and nos. equal to cable entries shall be supplied in loose. One FLP Brass blanking plug shall be provided. In addition, Mounting nuts & bolts of stainless steel (SS304) and Crimp type heavy duty tinned Copper lugs shall be supplied with each Socket.
- 2.14 All metal surfaces shall undergo manufacturer's standard cleaning/painting cycle. After preparation of under surface, equipment shall be painted with two coats of epoxy based final paint. Colour shade of final paint shall be 632or RAL7031 for IIA&IIB, Light Yellow 355 or RAL1011 for IIC. All unpainted steel parts shall be suitably treated to prevent rust formation.
- 2.15 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.
- 2.16 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 PESO, DGMS etc.
 - (iv) BIS License no. and date
 - (v) Applicable gas group etc.
- 2.17 Make of cable glands suitable for the specified area classification shall be as per the makes given under "Hazardous Area Lighting Panels" (II above).

XVII. 240/24V, TRANSFORMER MODULE WITH SOCKET

- 1.1 The Transformer; module will be of sheet steel enclosure, epoxy painted stand alone type. Module shall have handle for carrying the unit.
- 1.2 Each module shall have one air cooled two-winding 100VA, 1-phase, 50Hz, 240/24V transformer with 5A HRC fuse on primary and secondary side.
- 1.3 Earthing screen shall be provided between primary and secondary winding of transformer.

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- 1.4 One 24V, 3-pin receptacle with 10A SPN MCB shall be provided on the front cover of the enclosure.
- 1.5 Module shall have 5mtrs, 3 core 1.5 sq mm cu. PVC insulated Flexible cable, metal braided duly terminated at Transformer primary at one end and 3 pin, 240V plug suitable 20A metal clad socket unit supplied in the package, at the other end for connecting the unit to the power socket. Unit shall have provision for keeping the cable in rolled condition.
- 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 Equipment, 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. 24V FLAME PROOF HAND LAMP:

1.0 Certification: The equipment shall be certified by testing authorities like CIMFR/ERTL/BASEEFA/LCIE/UL/FM or equivalent as applicable for the service and the area of installation and shall be approved by DGMS/PESO. 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 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). The hand lamp shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T3 (min.).
- 2.2 The enclosures of hand lamp shall be of Cast light Metal Alloy with modular construction. The enclosure shall be provided with gasket made of non-inflammable and self-extinguishing material.
- 2.3 All hardware provided shall be stainless steel (SS304).
- 2.4 All non current carrying metallic parts of the panel shall be inherently bonded together.
- 2.5 Suitable handle for carrying hand lamp and stand type guard suspension hook shall be provided.
- 2.6 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).
- 2.7 Hand lamp shall be provided with a galvanized steel wire protective cage having dimension not exceeding 50mm.
- 2.8 The lamp shall be of 60W GLS suitable for 24V, 50Hz supply and lamp holder shall be with ES cap.
- 2.9 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.

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- 2.10 All metal surfaces shall undergo manufacturer's standard cleaning/painting cycle. After preparation of under surface, equipment shall be painted with two coats of epoxy based final paint. Colour shade of final paint shall be 632 or RAL7031 for IIA&IIB, Light Yellow 355 or RAL1011 for IIC. All unpainted steel parts shall be suitably treated to prevent rust formation.
- 2.11 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.
- 2.12 Additionally following details are to be embossed on the nameplate:
- Details of testing agency (CMRI or equivalent)
 - Test certificate no. with date
 - Statutory approval no. with date and agency like PESO, DGMS etc.
 - BIS License no. and date
 - Applicable gas group etc.

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

- Receptacles shall be dust proof / vermin proof metal clad gasketed construction.. Outdoor type socket shall have IP 55 degree of protection and shall be provided with external FRP canopy (2mm thick) to protect from tropical rain from Top and Both sides.
- Receptacles enclosure shall be CRCA sheet steel and painted with epoxy powder coating of shade 631/632 as per IS 5 for Indoor/Outdoor type receptacle. Front cover shall be provided with neoprene gasket and shall be screwed to the fabricated box by Stainless steel screws (SS304) & cup washers. This box shall have outlets at the bottom for incoming and outgoing cables.
- Sufficient space shall be provided (100 to 150mm) between gland plate and bottom of terminal block for easy termination of cables.
- Receptacle shall be provided with 5-pin (3P+1N+1E) socket & Plug non-reversible type.
- The socket outlet shall be provided with interlocking switch such that it cannot be switched ON unless plug is fully inserted & locked and Plug cannot be withdrawn when switch is ON.
- Receptacles shall be suitable for wall / column mounting. All mounting hardware shall be supplied along with receptacles.
- Receptacle box shall be provided with internal & external earthing stud with washer & nuts welded on the surface for grounding.
- The plug assembly shall be mechanically rugged, light and shall not unduly stress the socket or its own pins when fitted on the socket.
- Terminal blocks rated for 100A/suitable for incoming/Outgoing cable along with Crimp type heavy duty tinned Copper lugs shall be provided. Sufficient Nos. of TBs shall be provided. Maximum two wires are permitted to terminate at one terminal. If required additional terminal with shorting link shall be provided.
- All internal power wiring shall be done with 16sqmm Cu. wire of 660V grade PVC insulated.
- 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.
- Each socket shall have two cable entries of 4C x 35 sq mm Al. FRLS with looping facility. Two numbers of weather proof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands with PVC hood and one number sealing plug to seal the unused cable entry shall be supplied with each receptacle.

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1.13 The sizes of cable entries, Cable glands, lugs shall be project specific as indicated in the illumination BOM or will be decided during drawing approval stage.

1.14 All hardware like Nuts & Bolts, screw, washer etc. used in the receptacle shall be of stainless steel (SS304).

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

1.16 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

1.17 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, Lugs, Al. blanking plug shall be supplied in loose.

1.18 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 CIMFR/ERTL/BASEEFA/LCIE/UL/FM or equivalent as applicable for the service and the area of installation and shall be approved by DGMS/PESO. 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). The socket shall be flameproof type Ex (d) with temperature rise limited to applicable classified area or T3(min.).

2.2 The enclosures of plug sockets shall be of Cast light alloy material. External FRP canopy (2mm thick) shall be provided for outdoor type socket.to protect from tropical rain from Top and Both side.

2.3 These shall be suitable for wall/column mounting with external fixing lugs. Hole provided in the lugs shall be oblong type. All hardware provided like nuts, bolts, washer etc. shall be stainless steel (SS304).

2.4 Two numbers external earthing studs complete with two plain and one spring/lock washer and a nut on opposite side of the socket enclouser shall be provided.

2.5 All non current carrying metallic parts of the panel shall be inherently bonded together.

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

2.7 Terminal blocks suitable for connection of incoming and outgoing cables shall be provided. Sufficient Nos. of TBs shall be provided. Maximum two wires are permitted to terminate at one terminal. If required additional terminal with shorting link shall be provided.

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- 2.8 Sufficient space shall be provided (100 to 150mm) between gland plate and bottom of terminal block for easy termination of cables.
- 2.9 Receptacle shall be provided with 5-pin(3P+1N+1E) socket & Plug non reversible type.
- 2.10 The socket outlet shall be provided with interlocking switch such that it cannot be switched ON unless plug is fully inserted & Locked and Plug cannot be withdrawn when switch is ON.
- 2.11 To avoid accidental removal of plug from socket, the engagement & disengagement shall be by two separate and distinct movement and position.
- 2.12 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.
- 2.13 Receptacle shall be provided with 2nos. NPT cable entries suitable for approved type flame proof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands. 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.
- 2.14 Flame proof Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands with PVC shroud of required sizes and nos. equal to cable entries shall be supplied in loose. One FLP Brass blanking plug shall be provided. In addition, Mounting nuts & bolts of stainless steel (SS304) and Crimp type heavy duty tinned Copper lugs shall be supplied with each Socket.
- 2.15 All metal surfaces shall undergo manufacturer's standard cleaning/painting cycle. After preparation of under surface, equipment shall be painted with two coats of epoxy based final paint. Colour shade of final paint shall be 632or RAL7031 for IIA&IIB, Light Yellow 355 or RAL1011 for IIC. All unpainted steel parts shall be suitably treated to prevent rust formation.
- 2.16 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.
- 2.17 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 PESO, DGMS etc.
 - (iv) BIS License no. and date
 - (v) Applicable gas group etc.

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 poles from ERW steel 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

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- 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, 50/100NB 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 300x210x150mm (min.) size and contain cable entries with cable gland, fuses, neutral links, terminal blocks, ground studs, etc. Marshalling box shall be epoxy painted of shade 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 300x210x150mm. Junction box should have cable entries 2 nos. suitable for feeder cable and 2 nos. suitable for 3Cx2.5 sqmm cu. armoured Cable with required terminal block, Crimp type heavy duty tinned Copper lugs and cable glands. Necessary glands & blanking plug shall be supplied with JB. Junction box shall be epoxy painted of shade 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.
 - (iii) 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 (2.0m, 3.0m, 3.75m & 4.75m):

- 1.1 Lighting pole shall be of medium grade GI pipe with 100NB for 3.0 meter and above height pole and 50NB for 2.0 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).

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- 1.4 The marshalling box to be supplied with 3.0 mtr. and above height pole. Marshalling box shall have IP 55 degree of protection, provided with hinged door & suitable locking arrangements. This box shall be of 300x210x150mm (min.) size and contain cable entries with cable gland, fuses, neutral links, terminal blocks, ground studs, etc. Marshalling box shall be epoxy painted of shade 632 as per IS 5 (shall be finalized during detail engineering) if not otherwise specified.
- 1.5 The poles shall have swan neck made of medium grade 50NB GI pipe with radius of 250mm as shown in the drawings (Annexure-I).
- 1.6 All poles should have required size holes at indicated location as shown in the drawing (Annexure-I) for routing of cable to the fixture.
- 1.7 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 all conduits (GI/PVC) shall be 16 SWG.
- 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 of stainless steel (SS304).
- 3.4 PVC Rawl Plug suitable for saddle bar mounting screw shall be provided along with each set of saddle and saddle bar.

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XXIV. MISCELLANEOUS ITEMS:

1.0 S- Hooks:

- 1.1 Hooks shall be of SS304 with 6mm thickness. Overall length and width of hook shall be minimum 75mm and 40mm and shall be suitable for fixture mounting eyebolt 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 LED fixture.

5.0 CHECK NUTS

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

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):

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- 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

I. 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.
- 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.

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- 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 NOXXXXXX /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.

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- 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.

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- f) Some item may require functional test, Inspector is advised to witness the test at manufacturer's work before clearing the material.
- g) Inspector shall inspect the packing of material w.r.t. method mentioned in approved datasheet and Packing instruction indicated in this specification.
- h) Inspector is advised to check that correct quantity of material along with its associate accessories is packed with correct packing material.
- i) 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) **During Technical offer submission: Two copies of following**

- (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, LM79 & 80 for LED Fixture.

b) **During Drawing approval after PO Placement: Three copies of following**

- (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) **Alongwith material, final documentation:**

- (i) Packing slip: Along with material 2 copies, BHEL project site – 3 copies, BHEL design office- 3 copies.
- (ii) Inspection report - BHEL project site – 3 copies, BHEL design office- 3 copies.
- (iii) Test certificates- BHEL project site – 3 copies, BHEL design office- 3 copies.
- (iv) Warrantee certificates of equipment if any- BHEL project site – 3 copies, BHEL design office- 3 copies.

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- (v) Operation & Maintenance manual of equipment, if any- BHEL project site – 3 copies, BHEL design office- 3 copies.
- (vi) 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. PRICE SCHEDULE:

- 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 given in Illumination BOM (Annexure-II) may vary to the extent of +/-10% as per various finalized illumination layouts based on Customer approval. Same shall be informed to bidder at the time of technical scrutiny. For addition/reduction of quantity, unit rate quoted in the present offer shall be considered.
- 1.4 BHEL reserves the right to cancel an item if not required for the project.

K. BHEL MATERIAL CODES:

Variant No.	Description	Material Code
01	Illumination Items Package of RFCL Ramagundam	PY9755257012



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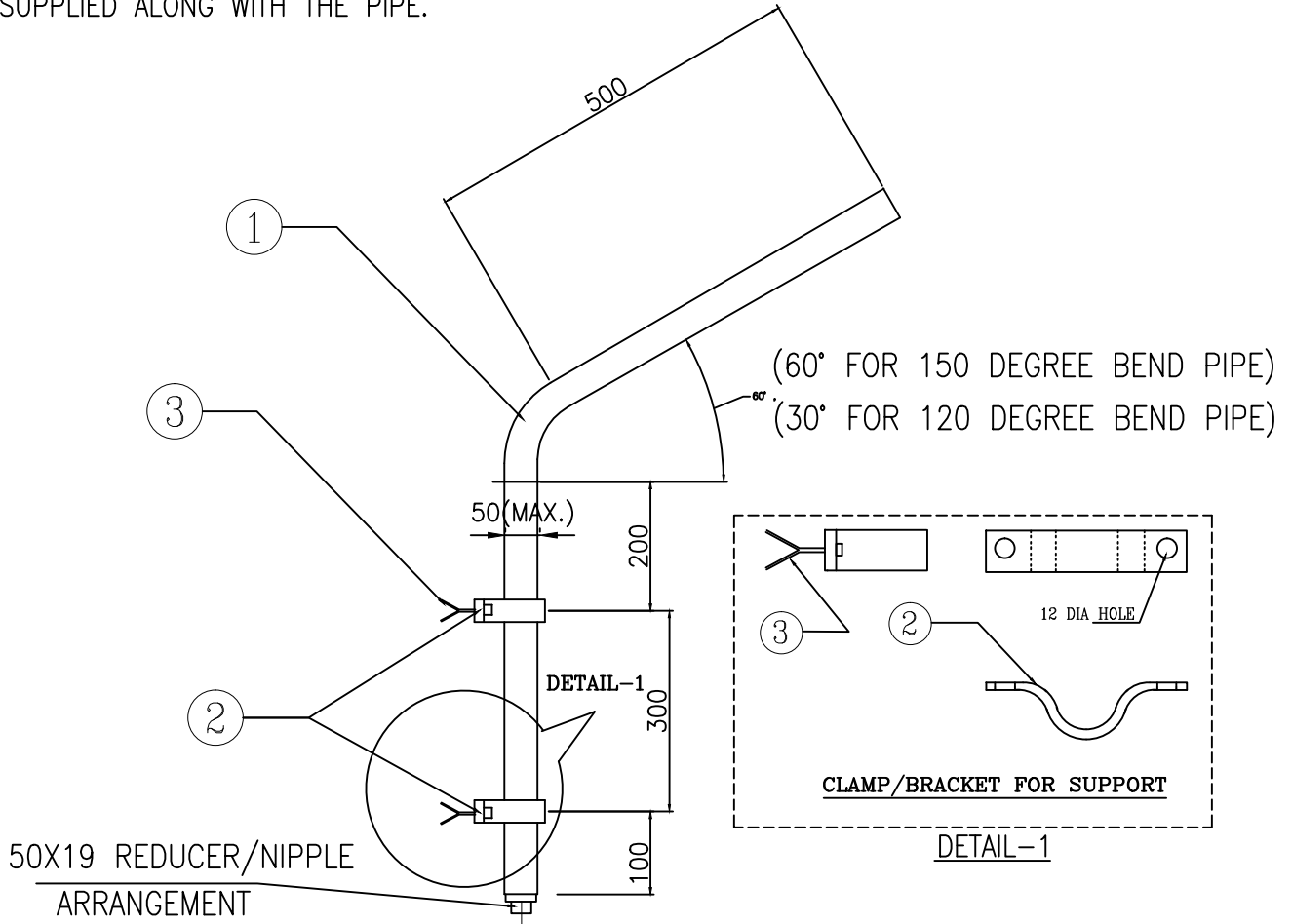
RECORD OF REVISIONS

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		Form No భారత్ హెవీ ఎలక్ట్రికల్స్ HYDERABAD PRODUCT STANDARD HYDERABAD Annexure-I to PY55257 Rev No. 00 Page 1 of 09
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.



NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. OUTER DIA OF PIPE BEND SHALL BE SUT TO LED STREET LIGHTING FIXTURE.

SUPPLY BOQ.

SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	GI ANGLE BEND PIPE OF 50MM MAX. OUTER DIA SUIT TO LED STREET LIGHTING FIXTURE (CLASS MEDIUM) WITH NIPPLE ARRANGEMENT AT ONE END AS PER DETAILS.	NO.	01
02	GI MS CLAMP WITH BASE.	NO.	2
03	M10X68MM LONG ANCHORING STUD	NO.	04



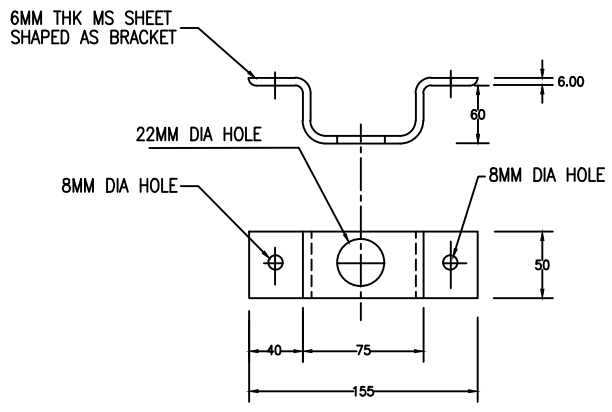
PRODUCT STANDARD
PROJECT ENGINEERING
HYDERABAD

ANNEXURE-1 TO
PY55257
Rev. No. 00

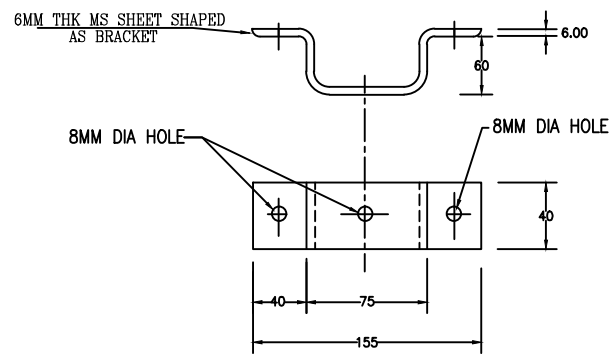
TITLE: GI CLAMP

Page 03 OF 09

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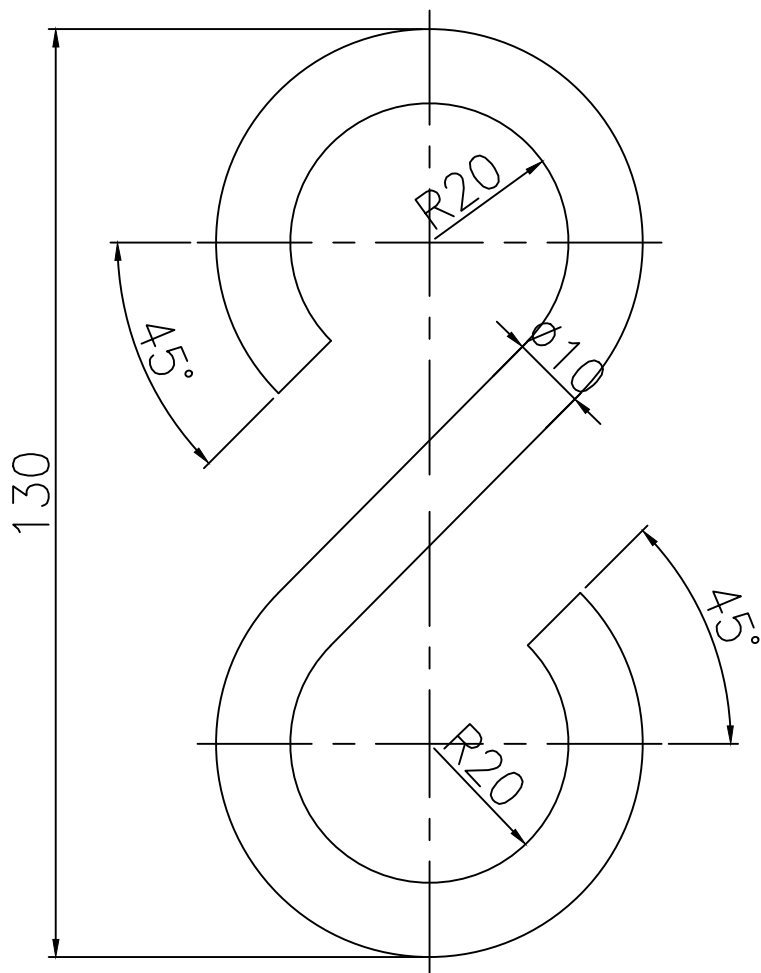


GI CLAMP FOR METSEC/FTL(TYPE CL-I)



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

TD-201 Rev. No. 00	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEM DIVISION HYDERABAD	ANNEXURE-1 TO PY55257
			TITLE: S-HOOK	Rev. No. 00 Page 04 OF 09
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S-HOOK

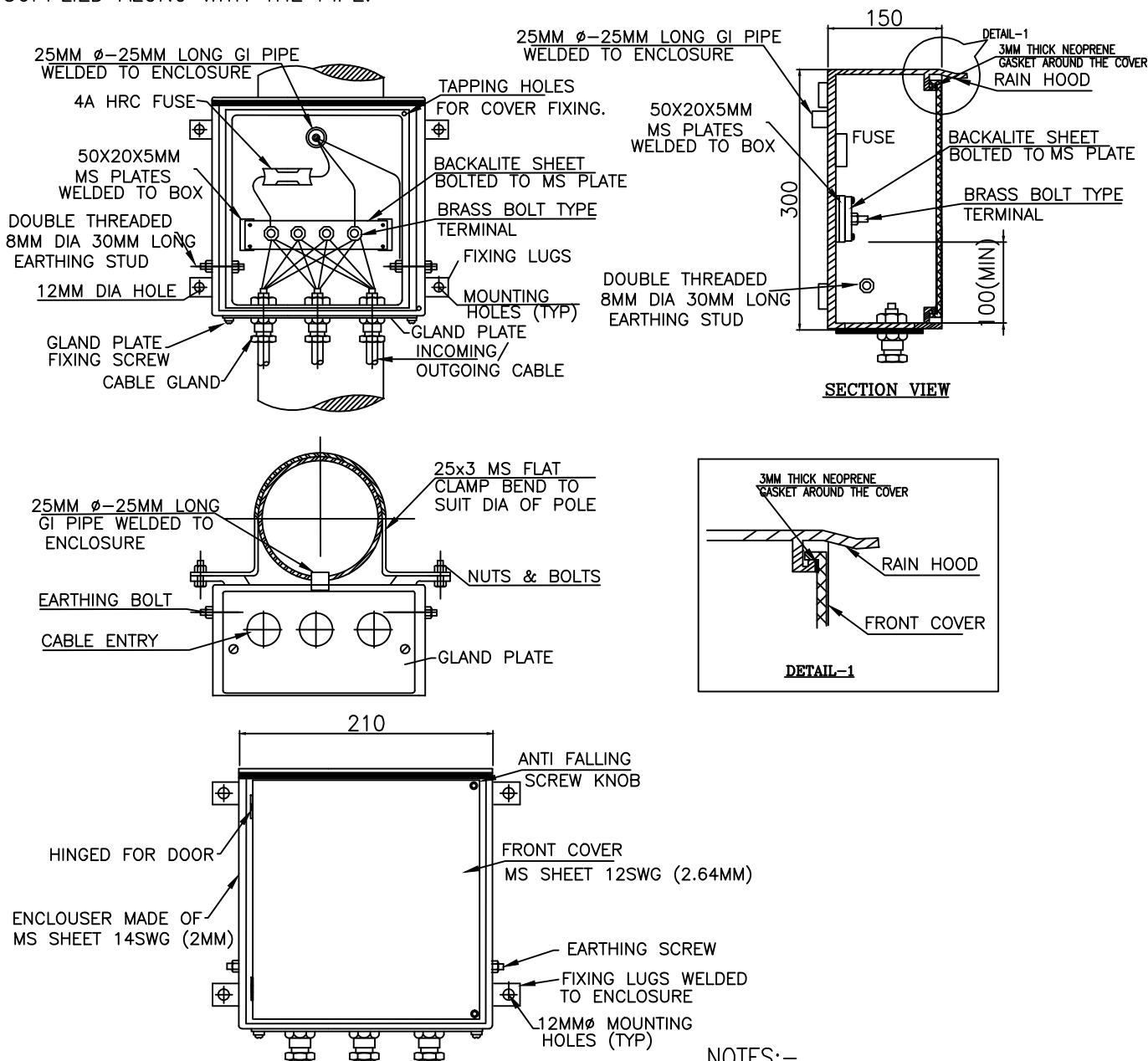
NOTE—

1. ALL DIMENSIONS ARE IN MM.
2. HOOK SHALL BE OF STAINLESS STEEL (SS-304)

TITLE: MARSHALLING BOX

Page 05 OF 09

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



SUPPLY BOQ.

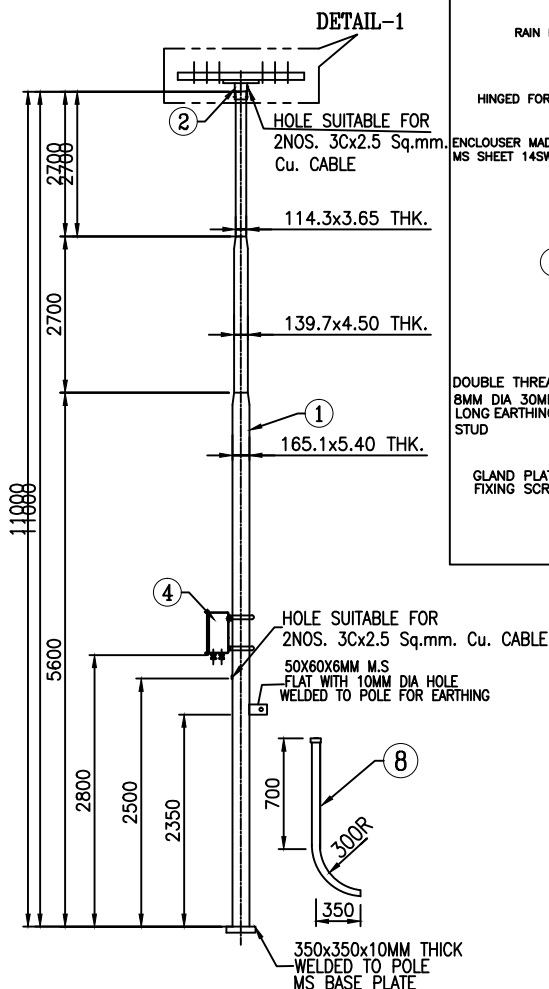
MARSHALLING BOX

SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	MARSHALLING BOX (300X210X150MM) OF 2MM MS SHEET WITH IP55 PROTECTION & CONSTRUCTION AS PER DETAIL GIVEN IN THE DRAWING	NO.	01
02	BRACKET/CLAMP MADE OF 25 X 3MM FLAT WITH 2nos. M10 X 40MM LONG BOLTS WITH NUT & PLAIN WASHERS FOR MB FIXING	NO.	2
03	ALUMINIUM ALLOY WITH ELECTROLYTIC CADMIUM PLATED/STAINLESS STEEL DC CABLE GLAND WITH PVC GLAND HOOD SUITABLE FOR FEEDER CABLE	NO.	03

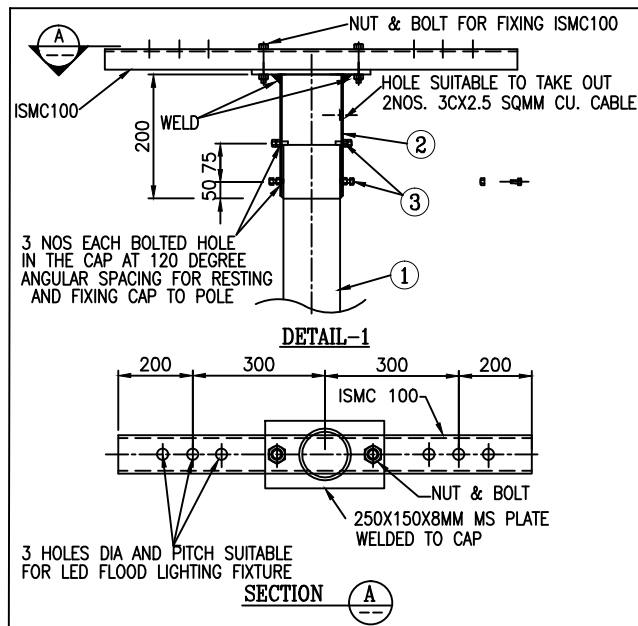
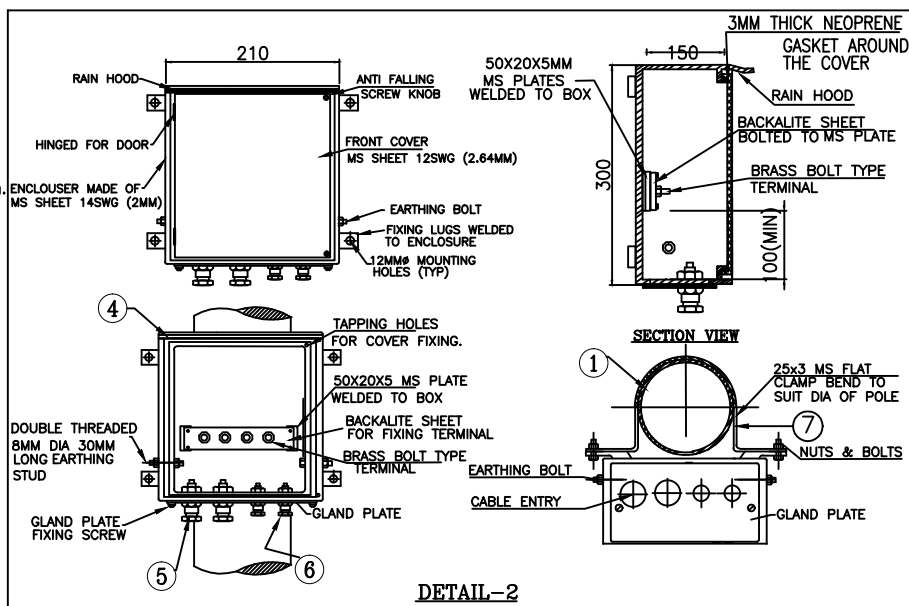
NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. ENCLOSURE MADE OF 2MM (14SWG) THICK MS SHEET.
3. FRONT COVER MADE OF 12 SWG (2.64MM) MS SHEET.
4. MARSHALLING BOX SHALL BE EPOXY PAINTED OF SHADE 632 AS PER IS5.
5. MARSHALLING BOX SHALL HAVE IP55 PROTECTION.
6. ALL MOUNTING HARDWARE SHALL BE OF STAINLESS STEEL (SS 302)

TD-201 Rev. No. 00 Form No.	बीएसईएल BHEL HYDERABAD	PRODUCT STANDARD	ANNEXURE-1 TO PY55257																																				
		PROJECT ENGINEERING & SYSTEM DIVISION HYDERABAD	Rev. No. 00																																				
TITLE- 2.0M POLE		Page 06 OF 09																																					
THIS DRAWING INDICATES TECHNICAL DETAIL OF 2.0 MTR. POLE. IT ALSO COVERS THE BOQ TO BE SUPPLIED ALONG WITH THE POLE.																																							
COPYRIGHT AND CONFIDENTIAL The Information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.	400 2000 60.3MM 60.3MM R250 DETAIL-1 HOLE WITH NON METALIC BUSHING SUITABLE FOR 3Cx2.5 Sq. mm. Cu. CABLE 2.0M POLE																																						
	REDUCER SUITABLE FOR WELL GLASS FIXTURE AND POLE REDUCE(60.3/19). TO BE SUPPLIED WITH FIXTURE. WELL GLASS FIXTURE. DETAIL-1 120MM 75MM 40MM THREADING DETAIL OF U-BOLT																																						
NOTE:- 1. ALL DIMENSIONS ARE IN MM. SUPPLY OF B.O.Q <table><thead><tr><th>SL. NO.</th><th>ITEM DESCRIPTION</th><th>UNIT</th><th>QTY.</th></tr></thead><tbody><tr><td>01</td><td>50NB GI PIPE (CLASS MEDIUM) WITH BOTH SIDE THREADING, LENGTH 2.0 Mtrs.</td><td>NO.</td><td>01</td></tr><tr><td>02</td><td>50NB G.I. PIPE (CLASS MEDIUM) WITH ONE END SWAN NECK 250mm RADIUS 180° BEND & BOTH END THREADED.MAXIMUM LENGTH 1.2 Mtrs.</td><td>NO.</td><td>01</td></tr><tr><td>03</td><td>G.I. COUPLER SUITABLE FOR 50NB PIPE (60.3x60.3mm)</td><td>NO.</td><td>01</td></tr><tr><td>04</td><td>G.I. REDUCER 60.3X19MM SUITABLE FOR SWAN NECK</td><td>NO.</td><td>01</td></tr><tr><td>05</td><td>G.I. REDUCER 60.3X19MM SUITABLE FOR 50NB PIPE</td><td>NO.</td><td>01</td></tr><tr><td>06</td><td>Ø10mm 'U' BOLT WITH BOTH ENDS THREADED, SUITABLE NUTS, 2 NOS. PLAIN AND 1 No. SPRING WASHER</td><td>SET</td><td>02</td></tr><tr><td>07</td><td>50x6x150mm LONG G.I. FLAT WITH 2Nos. Ø12mm HOLES</td><td>NO.</td><td>02</td></tr><tr><td>08</td><td>NON METALLIC BUSHING</td><td>NO.</td><td>02</td></tr></tbody></table>				SL. NO.	ITEM DESCRIPTION	UNIT	QTY.	01	50NB GI PIPE (CLASS MEDIUM) WITH BOTH SIDE THREADING, LENGTH 2.0 Mtrs.	NO.	01	02	50NB G.I. PIPE (CLASS MEDIUM) WITH ONE END SWAN NECK 250mm RADIUS 180° BEND & BOTH END THREADED.MAXIMUM LENGTH 1.2 Mtrs.	NO.	01	03	G.I. COUPLER SUITABLE FOR 50NB PIPE (60.3x60.3mm)	NO.	01	04	G.I. REDUCER 60.3X19MM SUITABLE FOR SWAN NECK	NO.	01	05	G.I. REDUCER 60.3X19MM SUITABLE FOR 50NB 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	08	NON METALLIC BUSHING	NO.	02
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08	NON METALLIC BUSHING	NO.	02																																				
Ref. Doc.																																							



11M FLOOD LIGHTING POLE (TYPE 410 SP-54)



SUPPLY OF B.O.Q

SL. NO.	ITEM DESCRIPTION	UNIT	QTY.
01	ERW FLOOD LIGHTING POLE 11M LONG, TUBULAR CONSTRUCTION WITH WELDED SECTIONS AND BASE PLATE AS PER DETAILS GIVEN IN THE DRAWING. ALL SECTION TO BE JOINT TOGETHER AND BEVELLED.	NO.	01
02	CAP WITH BOLTED HOLE AND MOUNTED ISMC 100 AS PER DETAIL-1	NO.	01
03	M10X30MM LONG FULL THREADED BOLT & NUT FOR FIXING CAP	NO.	06
04	4WAY WEATHER PROOF JUNCTION BOX (300X210X150MM) AS PER DETAIL-2	NO.	01
05	ALUMINIUM ALLOY WITH ELECTROLYTIC CADMIUM PLATED/STAINLESS STEEL DC CABLE GLAND WITH PVC GLAND HOOD SUITABLE FOR FEEDER CABLE	NO.	02
06	ALUMINIUM ALLOY WITH ELECTROLYTIC CADMIUM PLATED/STAINLESS STEEL DC CABLE GLAND WITH PVC GLAND HOOD SUITABLE FOR 3CX2.5 SQMM CU. CABLE	NO.	02
07	25X3MM MS FLAT CLAMP WITH NUTS & BOLTS, BEND AS PER POLE DIA.	NO.	02
08	50NB G.I PIPES FOR INCOMING AND OUTGOING CABLES, 1.2MTR. LENGTH WITH BEND OF RADIUS 300MM AT 700MM AS PER DETAIL.	NO.	02
09	M10, 30mm LONG NUT & BOLT FOR EARTHING	NO.	01
10	CU. LUGS SUITABLE FOR FEEDER CABLE AND TB OF JUNCTION BOX	NO.	14
11	NON METALIC BUSHING SUITABLE FOR 2NOS. 3CX2.5 Sq.mm. Cu. CABLE	NO.	02

NOTE:-

1. ALL DIMENSIONS ARE IN MM ONLY.
2. LIGHTING POLE SHALL BE FABRICATED FROM ERW STEEL TUBULAR PIPES OF INDICATED SECTIONS WITH JOINTS, SWAGED TOGETHER WHEN HOT AND BEVELED ON OUTSIDE EDGES.
3. THE POLE SHALL BE COATED WITH BITUMINOUS PRESERVATIVE SOLUTION INTERNALLY AND EXTERNALLY UPTO 1800MM FROM BOTTOM. REMAINING EXTERNAL PORTION SHALL BE GIVEN ONE COAT OF RED OXIDE PRIMER AND FINISHING WITH TWO COATS OF ALUMINIUM PAINT.
4. THE MARSHALLING BOX SHALL HAVE IP 55 PROTECTION AND PAINTED WITH EPOXY BASED PAINT SHADE 632 AS PER IS5.
5. ALL HARDWARE SHALL BE STAINLESS STEEL(SS302).

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		Form No HYDERABAD PRODUCT STANDARD HYDERABAD Annexure-II to PY55257 Rev No. 00 Page 1 of 5
ANNEXURE –II (ILLUMINATION BOM)		

Project:-RFCL-RAMAGUNDAM		ILLUMINATION BOQ	REV00
		Annexure-II to PY55257	Date:- 10.07.2017
SITE CONDITION			
1. Maximum ambient temperature :- 47.5 Degree Celsius			
2. Minimum ambient temperature :- 9 Degree Celsius			
3. Design ambient temperature:- 45 Degree Celsius			
4. Relative humidity :- 97.4%			
5. Altitude above MSL :- Less than 1000m above Mean Sea level			
6.Site Location:- Ramagundam - Telangana			
LIST OF ITEMS FOR ILLUMINATION PACKAGE (MATERIAL CODE - PY9755257012)			
SL NO.	DESCRIPTION (FIXTURES / LAMPS / ACCESSORIES)	UNIT	QTY.
1	Industrial DC LED Well Glass fixture (35-45W approx) suitable for 220V DC Supply with minimum 3300 lumen output. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be complete with integrated driver/convertor, heatsink, 2nos. cable entries & TBs suitable for loop-in & loop-out circuit cable (3Cx2.5sqmm cu. cable) and shall be supplied with suitable DC cable gland, Bracket, Pole reducer, Mounting hardware, Cu. lugs.	Nos	45
2	Flame proof DC LED Well Glass fixture (35-45W approx) suitable for 220V DC Supply with minimum 3300 lumen output. Fixture shall also be suitable for hazardous area Gas Group IIC and Zone 1 & 2. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be complete with integrated driver/convertor, heatsink, 2nos. cable entries & TBs suitable for loop-in & loop-out circuit cable (3Cx2.5sqmm cu. cable) and shall be supplied with suitable FLP DC cable gland, Bracket, Pole reducer, Mounting hardware, Cu. lugs.	Nos	25
3	Industrial type general purpose LED Batten type fixture of either batten with 2 nos. 16-22W (approx) LED tube lamp or linear batten of 40W (Approx). Fixture shall be complete with integrated driver/convertor, heatsink and shall be supplied with suitable Mounting hardware, Cu. lugs. Fixture shall have minimum 3200 system lumen output (i.e. 1600 lumen/lamp) with lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be suitable for surface / suspension mounting through 20mm down conduit and necessary hardware shall be provided for mounting..	Nos	8
4	600x 600mm Recess mounted decorative 30-36W(Approx) LED fixture with high efficiency low glare optics. Fixture shall have integrated driver, heatsink and shall be supplied with all accessories, Cu. lugs etc.. Fixture shall have minimum 3100lumen output with lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature.	Nos	6
5	Flame proof LED Well Glass fixture (35-45WApprox) with minimum 3300 lumen output, suitable for hazardous area Gas Group IIC and Zone 1 & 2. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be complete with integrated driver/convertor, heatsink, 2nos. cable entries & TBs suitable for loop-in & loop-out circuit cable (3Cx2.5sqmm cu. cable) and shall be supplied with suitable FLP DC cable gland, Bracket, Pole reducer, Mounting hardware, Cu. lugs.	Nos	185
6	Industrial LED Well Glass fixture (35-45W aprpx) with minimum 3300 lumen output. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be complete with integrated driver/convertor, heatsink, 2nos. cable entries & TBs suitable for loop-in & loop-out circuit cable (3Cx2.5sqmm cu. cable) and shall be supplied with suitable DC cable gland, Bracket, Pole reducer, Mounting hardware, Cu. lugs.	Nos	250
7	Industrial LED high bay Fixture (170-180 watt approx) with minimum 17000 lumen output. Fixture shall have integrated driver, heatsink and shall be supplied with suitable DC cable gland, Eye bolt, Mounting hardware, Cu. lugs. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature.	Nos	25

8	LED street lighting fixture (60W approx) with minimum 6000 lumen output. Fixture shall have integrated driver, heatsink and shall be supplied with Mounting hardware, Cu. lugs. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature.	Nos	25
9	LED Flood lighting Fixture (170-180 watt approx) with minimum 17000 lumen output. Fixture shall have integrated driver, heatsink and shall be supplied with suitable DC cable gland, Eye bolt, Mounting hardware, Cu. lugs. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature.	Nos	15
10	11meter ERW Steel tubular Floodlight pole (410 SP-54) with marshalling box. Pole shall be supplied with 2nos. GI pipe sleeve, Cable gland for Marshalling box and other accessories as shown in the annexure-I	Nos	5
11	7.5M ERW steel tubular Street light pole (410 SP-8) with marshalling box. Pole shall be supplied with 2nos. GI pipe sleeve, Cable gland for Marshalling box and other accessories as shown in the annexure-I	Nos	8
12	4.75m GI pole with marshalling box. Pole shall be supplied with 2nos. GI pipe sleeve, Cable gland for Marshalling box and other accessories as shown in the annexure-I.	Nos	30
13	2 meter GI pole as per drawing at annexure-I.	Nos	200
14	1200mm long 150 deg bend (50NB) pipe with 2 nos suitable clamp with base and anchoring bolts as indicated in the drawing at annexure-I. Outer dia of bend pipe shall be suitable for Street lighting fixture supplied with the package.	Nos	16
15	3000mm long 25mm GI conduit	Nos	100
16	GI Conduit bend suitable for 25mm GI Conduit	Nos	125
17	GI Conduit inspection bend suitable for 25mm GI Conduit	Nos	75
18	GI Conduit coupler suitable for 25mm GI Conduit	Nos	250
19	Saddle with saddle bar suitable for 25mm dia conduit with 2nos of 1.5"deep screws along with rawl plug for saddle and 1 No of 1.5" deep screw along with rawl plug for saddle bar	Nos	750
20	GI Conduit branching JB for 25mm GI conduit	Nos	50
21	GS stripped Flexible PVC conduit (20mm dia)	Nos	50
22	GS stripped Flexible PVC conduit (25mm dia)	Nos	100
23	PVC reducer 25mm/20mm for Flexible conduit	Nos	25
24	3000mm long 25mm PVC conduit	Nos	10
25	PVC Conduit bend suitable for 25mm PVC Conduit	Nos	30
26	PVC Conduit coupler suitable for 25mm PVC Conduit	Nos	20
27	PVC Conduit branching JB for 25mm PVC conduit	Nos	10
28	3000mm long 50NB GI conduit	Nos	15
29	3000mm long 50NB PVC conduit	Nos	5
30	3000mm long 20mm GI conduit	Nos	5
31	Check nuts suitable for 20mm GI conduit	Nos	50
32	Galvanised steel chain	Mtr	75
33	Spring loaded ball socket suitable for GI conduit branching round JB	Nos	30
34	Rubber grommet 25mm	Nos	100
35	Rubber grommet 19mm	Nos	750
36	S Hook (Stainless steel, SS304)	Nos	600

37	Rawl Plug 1.5"	Nos	500
38	6mm dia x 35mm long bolt type anchoring fastener (Stainless steel, SS304)	Nos	50
39	6mm dia x 35mm long Hook type anchoring fastener (Stainless steel, SS304)	Nos	50
40	10mm dia 68mm long bolt type anchoring fastener (Stainless steel, SS304)	Nos	150
41	Cable clamps suitable for 3Cx2.5sqmm Cu. Armoured Cable with base and hardware (Stainless steel, SS304)	Nos	15000
42	Cable clamps suitable for 4Cx25 sqmm Al. Armoured Cable with base and hardware (Stainless steel, SS304)	Nos	1500
43	GI conduit Branching Round JB with 3nos.terminal block suitable for 4sqmm.	Nos	20
44	4 way 250x200x120mm rectangular sheet steel weather proof JB (IP65) with two nos. Cable entry suitable for 4Cx25sqmm Al. armoured Cable and two nos suitable for 3Cx2.5 sqmm. Cu. armoured cable along with DC Cable glands, PVC gland hood. JB shall have Terminal block 4 nos. suitable for 35sq.mm Al cable & 4 nos. 6 sq.mm Cu cable and shall be supplied with mounting hardware, suitable cu. lugs blanking plug/rubber grommet.	Nos	25
45	4 way 200x150x100mm rectangular sheet steel weather proof JB (IP65) with four nos. Cable entry suitable for 3Cx2.5 sqmm. Cu. armoured cable along with DC Cable glands, PVC gland hood. JB shall have Terminal block 4 nos. suitable for 6 sq.mm cu cable and shall be supplied with mounting hardware, suitable cu. lugs blanking plug/rubber grommet.	Nos	175
46	Flame proof Cast light alloy JB (250x200x120mm) suitable for Gas group IIC and Zone-1 &2. JB Shall have Cable entries 2nos. suitable for 4Cx25sqmm Al. armoured Cable and 2nos. nos suitable for 3Cx2.5 sqmm. Cu. armoured cable along with FLP DC Cable glands, PVC gland hood. JB shall have Terminal block, 4 nos. suitable for 35sq.mm Al cable & 4 nos. 6 sq.mm Cu cable and shall be supplied with mounting hardware, suitable cu. lugs, Brass blanking plug.	Nos	2
47	Flame proof Cast light alloy JB (200x150x100mm) suitable for Gas group IIC and Zone-1 &2. JB Shall have Cable entries 4nos. suitable for 3Cx2.5 sqmm. Cu. armoured cable along with FLP DC Cable glands, PVC gland hood. JB shall also have Terminal block, 4 nos. suitable for 6 sq.mm Cu cable and shall be supplied with mounting hardware, suitable cu. lugs, Brass blanking plug.	Nos	80
48	FSB2- Flush mounted swbd with 2nos 6A piano type switch (modular type)	Nos	2
49	SSB2- Surface mounted swbd with 2nos 6A piano type switch (modular type)	Nos	2
50	Domestic type 6/16A receptacle with 16A switch (Flush mounted modular)	Nos	2
51	Domestic type 6/16A receptacle with 16A switch (Surface mounted type, modular)	Nos	2
52	Industrial metal clad type 1Ph, 20A Socket with 20A MCB switch & Plug (Indoor type). Socket unit shall be supplied with suitable DC Cable gland, mounting hardware, cu. lugs, blanking plug/Rubber grommet.	Nos	6
53	Industrial metal clad type 1Ph, 20A Socket with 20A MCB switch & Plug, weather proof (IP55) Outdoor type with external canopy. Socket unit shall be supplied with suitable DC Cable gland & Gland hood, mounting hardware, cu. lugs, blanking plug/Rubber grommet.	Nos	24
54	Flameproof 1ph, 20A Socket with interlocked rotary switch & Plug suitable for Gas group IIC and Zone 1 &2. Socket unit shall be suitable to use at Outdoor location and supplied with external canopy. Socket unit shall also be supplied with suitable FLP DC Cable gland & Gland hood, mounting hardware, cu. lugs, Brass blanking plug.	Nos	21
55	Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug (Indoor type). Receptacle unit shall be supplied with suitable DC Cable gland, mounting hardware, cu. lugs, blanking plug/Rubber grommet.	Nos	2
56	Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug, weather proof (IP55) outdoor type with external canopy. Receptacle unit shall be supplied with suitable DC Cable gland & Gland hood, mounting hardware, cu. lugs, blanking plug/Rubber grommet.	Nos	13

57	Flameproof 3ph, 63A (5pin) Receptacle with interlocked rotary switch & Plug suitable for Gas group IIC and Zone 1 & 2. Receptacle unit shall be suitable to use at outdoor location and supplied with external canopy. Receptacle unit shall also be supplied with suitable FLP DC Cable gland & Gland hood, mounting hardware, cu. lugs, Brass blanking plug.	Nos	10
58	240V to 24V Portable Transformer module with inbuilt Transformer and 24V socket and supplied with Flame proof hand lamp. Hand lamp shall be suitable Gas group IIC and Zone 1&2.	Nos	4
59	6 way AC Indoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing.	Nos	3
60	12 way AC Indoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing.	Nos	1
61	6 way DC Indoor Lighting Panel with 32A DP MCB at incomer and 10A DP MCB at outgoing.	Nos	1
62	6 way AC outdoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	2
63	12 way AC outdoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	6
64	18 way AC outdoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	2
65	6 way DC outdoor Lighting Panel with 32A DP MCB at incomer and 10A DP MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	3
66	6 way AC outdoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 32A TPN MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	1
67	1Cx 2.5 Sqmm Cu. Multi strand PVC Flexible wire (Red)	Mtr	270
68	1Cx 2.5 Sqmm Cu. Multi strand PVC Flexible wire (Yellow)	Mtr	90
69	1Cx 2.5 Sqmm Cu. Multi strand PVC Flexible wire (Blue)	Mtr	90
70	1Cx 2.5 Sqmm Cu. Multi strand PVC Flexible wire (Black)	Mtr	450
71	1Cx 2.5 Sqmm Cu. Multi strand PVC Flexible wire (Green)	Mtr	450
72	1Cx 4 Sqmm Cu. Multi strand PVC Flexible wire (Red)	Mtr	90
73	1Cx 4 Sqmm Cu. Multi strand PVC Flexible wire (Yellow)	Mtr	90
74	1Cx 4 Sqmm Cu. Multi strand PVC Flexible wire (Blue)	Mtr	90
75	1Cx 4 Sqmm Cu. Multi strand PVC Flexible wire (Black)	Mtr	270
76	1Cx 4 Sqmm Cu. Multi strand PVC Flexible wire (Green)	Mtr	270

NOTE:

1.) For bid evaluation, items against Sl. No. 1 to 76 above shall be considered on overall package basis.

2.) The quantities given in Illumination BOM (Annexure-II) may vary to the extent of +/-10% as per various finalized illumination layouts based on Customer approval. Same shall be informed to bidder at the time of technical scrutiny. For addition/reduction of quantity, unit rate quoted in the present offer shall be considered.

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ANNEXURE – III (UNPRICED PRICE SCHEDULE)		భారత్ హిందూ HYDERABAD	
		PRODUCT STANDARD HYDERABAD	
		Annexure-III to PY55257	
		Rev No. 00	
		Page 1 of 05	

Project:-RFCL-RAMAGUNDAM		PRICE SCHEDULE		REV00		
		Annexure-III to PY55257		Date:- 10.07.2017		
Enq. NO.:-						
Name of the Bidder:-						
Offer Ref. No.:-						
A. NOTE:-						
1. This format details the price schedule for the enquiry. Bidder shall fill up this format only. No other format will be entertained. No cognizance will be taken of any change made by bidder with respect to this format issued by BHEL and contents of this format shall prevail.						
2. Bidder to filled in writing “Quoted” against each item of the package mentined in the format and submit 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.						
3. 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.						
4. For bid evaluation, items mentioned at C- Sl. No. 1 to 76 below shall be considered on overall package basis.						
B. SUPPLY						
SL NO.	DESCRIPTION OF ITEM	UNIT	QTY.	UNIT PRICE (RS.)	TOTAL PRICE (RS.)	QUOTED (YES/NO)
1	ILLUMINATION ITEMS PACKAGE (MATERIAL CODE - PY9755257012)	Set	1	NA		
C. UNIT PRICES OF ILLUMINATION PACKAGE ITEMS						
SL NO.	DESCRIPTION (FIXTURES / LAMPS / ACCESSORIES)	UNIT	QTY.	UNIT PRICE (RS.)	TOTAL PRICE (RS.)	QUOTED (YES/NO)
1	Industrial DC LED Well Glass fixture (35-45W approx) suitable for 220V DC Supply with minimum 3300 lumen output. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be complete with integrated driver/convertor, heatsink, 2nos. cable entries & TBs suitable for loop-in & loop-out circuit cable (3Cx2.5sqmm cu. cable) and shall be supplied with suitable DC cable gland, Bracket, Pole reducer, Mounting hardware, Cu. lugs.	Nos	45			
2	Flame proof DC LED Well Glass fixture (35-45W approx) suitable for 220V DC Supply with minimum 3300 lumen output. Fixture shall also be suitable for hazardous area Gas Group IIC and Zone 1 & 2. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be complete with integrated driver/convertor, heatsink, 2nos. cable entries & TBs suitable for loop-in & loop-out circuit cable (3Cx2.5sqmm cu. cable) and shall be supplied with suitable FLP DC cable gland, Bracket, Pole reducer, Mounting hardware, Cu. lugs.	Nos	25			
3	Industrial type general purpose LED Batten type fixture of either batten with 2 nos. 16-22W (approx) LED tube lamp or linear batten of 40W (Approx). Fixture shall be complete with integrated driver/convertor, heatsink and shall be supplied with suitable Mounting hardware, Cu. lugs. Fixture shall have minimum 3200 system lumen output (i.e. 1600 lumen/lamp) with lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be suitable for surface / suspension mounting through 20mm down conduit and necessary hardware shall be provided for mounting..	Nos	8			
4	600x 600mm Recess mounted decorative 30-36W(Approx) LED fixture with high efficiency low glare optics. Fixture shall have integrated driver, heatsink and shall be supplied with all accessories, Cu. lugs etc.. Fixture shall have minimum 3100lumen output with lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature.	Nos	6			
5	Flame proof LED Well Glass fixture (35-45WApprox) with minimum 3300 lumen output, suitable for hazardous area Gas Group IIC and Zone 1 & 2. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be complete with integrated driver/convertor, heatsink, 2nos. cable entries & TBs suitable for loop-in & loop-out circuit cable (3Cx2.5sqmm cu. cable) and shall be supplied with suitable FLP DC cable gland, Bracket, Pole reducer, Mounting hardware, Cu. lugs.	Nos	185			
6	Industrial LED Well Glass fixture (35-45W apprx) with minimum 3300 lumen output. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature. Fixture shall be complete with integrated driver/convertor, heatsink, 2nos. cable entries & TBs suitable for loop-in & loop-out circuit cable (3Cx2.5sqmm cu. cable) and shall be supplied with suitable DC cable gland, Bracket, Pole reducer, Mounting hardware, Cu. lugs.	Nos	250			

7	Industrial LED high bay Fixture (170-180 watt approx) with minimum 17000 lumen output. Fixture shall have integrated driver, heatsink and shall be supplied with suitable DC cable gland, Eye bolt, Mounting hardware, Cu. lugs. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature.	Nos	25			
8	LED street lighting fixture (60W approx) with minimum 6000 lumen output. Fixture shall have integrated driver, heatsink and shall be supplied with Mounting hardware, Cu. lugs. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature.	Nos	25			
9	LED Flood lighting Fixture (170-180 watt approx) with minimum 17000 lumen output. Fixture shall have integrated driver, heatsink and shall be supplied with suitable DC cable gland, Eye bolt, Mounting hardware, Cu. lugs. Fixture shall have lumen efficacy 100lumen/watt, 0.95 PF and 50000 burning life at 40degree centrigade ambient temprature.	Nos	15			
10	1 meter ERW Steel tubular Floodlight pole (410 SP-54) with marshalling box. Pole shall be supplied with 2nos. GI pipe sleeve, Cable gland for Marshalling box and other accessories as shown in the annexure-I	Nos	5			
11	7.5M ERW steel tubular Street light pole (410 SP-8) with marshalling box. Pole shall be supplied with 2nos. GI pipe sleeve, Cable gland for Marshalling box and other accessories as shown in the annexure-I	Nos	8			
12	4.75m GI pole with marshalling box. Pole shall be supplied with 2nos. GI pipe sleeve, Cable gland for Marshalling box and other accessories as shown in the annexure-I.	Nos	30			
13	2 meter GI pole as per drawing at annexure-I.	Nos	200			
14	1200mm long 150 deg bend (50NB) pipe with 2 nos suitable clamp with base and anchoring bolts as indicated in the drawing at annexure-I. Outer dia of bend pipe shall be suitable for Street lighting fixture supplied with the package.	Nos	16			
15	3000mm long 25mm GI conduit	Nos	100			
16	GI Conduit bend suitable for 25mm GI Conduit	Nos	125			
17	GI Conduit inspection bend suitable for 25mm GI Conduit	Nos	75			
18	GI Conduit coupler suitable for 25mm GI Conduit	Nos	250			
19	Saddle with saddle bar suitable for 25mm dia conduit with 2nos of 1.5" deep screws along with rawl plug for saddle and 1 No of 1.5" deep screw along with rawl plug for saddle bar	Nos	750			
20	GI Conduit branching JB for 25mm GI conduit	Nos	50			
21	GS stripped Flexible PVC conduit (20mm dia)	Nos	50			
22	GS stripped Flexible PVC conduit (25mm dia)	Nos	100			
23	PVC reducer 25mm/20mm for Flexible conduit	Nos	25			
24	3000mm long 25mm PVC conduit	Nos	10			
25	PVC Conduit bend suitable for 25mm PVC Conduit	Nos	30			
26	PVC Conduit coupler suitable for 25mm PVC Conduit	Nos	20			
27	PVC Conduit branching JB for 25mm PVC conduit	Nos	10			
28	3000mm long 50NB GI conduit	Nos	15			
29	3000mm long 50NB PVC conduit	Nos	5			
30	3000mm long 20mm GI conduit	Nos	5			
31	Check nuts suitable for 20mm GI conduit	Nos	50			
32	Galvanised steel chain	Mtr	75			
33	Spring loaded ball socket suitable for GI conduit branching round JB	Nos	30			

34	Rubber grommet 25mm	Nos	100			
35	Rubber grommet 19mm	Nos	750			
36	S Hook (Stainless steel, SS304)	Nos	600			
37	Rawl Plug 1.5"	Nos	500			
38	6mm dia x 35mm long bolt type anchoring fastener (Stainless steel, SS304)	Nos	50			
39	6mm dia x 35mm long Hook type anchoring fastener (Stainless steel, SS304)	Nos	50			
40	10mm dia 68mm long bolt type anchoring fastener (Stainless steel, SS304)	Nos	150			
41	Cable clamps suitable for 3Cx2.5sqmm Cu. Armoured Cable with base and hardware (Stainless steel, SS304)	Nos	15000			
42	Cable clamps suitable for 4Cx25 sqmm Al. Armoured Cable with base and hardware (Stainless steel, SS304)	Nos	1500			
43	GI conduit Branching Round JB with 3nos.terminal block suitable for 4sqmm.	Nos	20			
44	4 way 250x200x120mm rectangular sheet steel weather proof JB (IP65) with two nos. Cable entry suitable for 4Cx25sqmm Al. armoured Cable and two nos suitable for 3Cx2.5 sqmm. Cu. armoured cable along with DC Cable glands, PVC gland hood. JB shall have Terminal block 4 nos. suitable for 35sq.mm Al cable & 4 nos. 6 sq.mm Cu cable and shall be supplied with mounting hardware, suitable cu. lugs blanking plug/rubber grommet.	Nos	25			
45	4 way 200x150x100mm rectangular sheet steel weather proof JB (IP65) with four nos. Cable entry suitable for 3Cx2.5 sqmm. Cu. armoured cable along with DC Cable glands, PVC gland hood. JB shall have Terminal block 4 nos. suitable for 6 sq.mm cu cable and shall be supplied with mounting hardware, suitable cu. lugs blanking plug/rubber grommet.	Nos	175			
46	Flame proof Cast light alloy JB (250x200x120mm) suitable for Gas group IIC and Zone-1 &2. JB Shall have Cable entries 2nos. suitable for 4Cx25sqmm Al. armoured Cable and 2nos. nos suitable for 3Cx2.5 sqmm. Cu. armoured cable along with FLP DC Cable glands, PVC gland hood. JB shall have Terminal block, 4 nos. suitable for 35sq.mm Al cable & 4 nos. 6 sq.mm Cu cable and shall be supplied with mounting hardware, suitable cu. lugs, Brass blanking plug.	Nos	2			
47	Flame proof Cast light alloy JB (200x150x100mm) suitable for Gas group IIC and Zone-1 &2. JB Shall have Cable entries 4nos. suitable for 3Cx2.5 sqmm. Cu. armoured cable along with FLP DC Cable glands, PVC gland hood. JB shall also have Terminal block, 4 nos. suitable for 6 sq.mm Cu cable and shall be supplied with mounting hardware, suitable cu. lugs, Brass blanking plug.	Nos	80			
48	FSB2- Flush mounted swbd with 2nos 6A piano type switch (modular type)	Nos	2			
49	SSB2- Surface mounted swbd with 2nos 6A piano type switch (modular type)	Nos	2			
50	Domestic type 6/16A receptacle with 16A switch (Flush mounted modular)	Nos	2			
51	Domestic type 6/16A receptacle with 16A switch (Surface mounted type, modular)	Nos	2			
52	Industrial metal clad type 1Ph, 20A Socket with 20A MCB switch & Plug (Indoor type). Socket unit shall be supplied with suitable DC Cable gland, mounting hardware, cu. lugs, blanking plug/Rubber grommet.	Nos	6			
53	Industrial metal clad type 1Ph, 20A Socket with 20A MCB switch & Plug, weather proof (IP55) Outdoor type with external canopy. Socket unit shall be supplied with suitable DC Cable gland & Gland hood, mounting hardware, cu. lugs, blanking plug/Rubber grommet.	Nos	24			
54	Flameproof 1ph, 20A Socket with interlocked rotary switch & Plug suitable for Gas group IIC and Zone 1 &2. Socket unit shall be suitable to use at Outdoor location and supplied with external canopy. Socket unit shall also be supplied with suitable FLP DC Cable gland & Gland hood, mounting hardware, cu. lugs, Brass blanking plug.	Nos	21			

55	Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug (Indoor type). Receptacle unit shall be supplied with suitable DC Cable gland, mounting hardware, cu. lugs, blanking plug/Rubber grommet.	Nos	2			
56	Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug, weather proof (IP55) outdoor type with external canopy. Receptacle unit shall be supplied with suitable DC Cable gland & Gland hood, mounting hardware, cu. lugs, blanking plug/Rubber grommet.	Nos	13			
57	Flameproof 3ph, 63A (5pin) Receptacle with interlocked rotary switch & Plug suitable for Gas group IIC and Zone 1 & 2. Receptacle unit shall be suitable to use at outdoor location and supplied with external canopy. Receptacle unit shall also be supplied with suitable FLP DC Cable gland & Gland hood, mounting hardware, cu. lugs, Brass blanking plug.	Nos	10			
58	240V to 24V Portable Transformer module with inbuilt Transformer and 24V socket and supplied with Flame proof hand lamp. Hand lamp shall be suitable Gas group IIC and Zone 1&2.	Nos	4			
59	6 way AC Indoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing.	Nos	3			
60	12 way AC Indoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing.	Nos	1			
61	6 way DC Indoor Lighting Panel with 32A DP MCB at incomer and 10A DP MCB at outgoing.	Nos	1			
62	6 way AC outdoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	2			
63	12 way AC outdoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	6			
64	18 way AC outdoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 20A SPN MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	2			
65	6 way DC outdoor Lighting Panel with 32A DP MCB at incomer and 10A DP MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	3			
66	6 way AC outdoor Lighting Panel with 63A TPN MCB & ELCB at incomer and 32A TPN MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos	1			
67	1Cx 2.5 Sqmm Cu. Multi starnd PVC Flexible wire (Red)	Mtr	270			
68	1Cx 2.5 Sqmm Cu. Multi starnd PVC Flexible wire (Yellow)	Mtr	90			
69	1Cx 2.5 Sqmm Cu. Multi starnd PVC Flexible wire (Blue)	Mtr	90			
70	1Cx 2.5 Sqmm Cu. Multi starnd PVC Flexible wire (Black)	Mtr	450			
71	1Cx 2.5 Sqmm Cu. Multi starnd PVC Flexible wire (Green)	Mtr	450			
72	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Red)	Mtr	90			
73	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Yellow)	Mtr	90			
74	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Blue)	Mtr	90			
75	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Black)	Mtr	270			
76	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Green)	Mtr	270			
			Signature along with Company Seal			

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		Form No
ANNEXURE -IV (SUB VENDOR LIST)		HYDERABAD PRODUCT STANDARD HYDERABAD
		Annexure-IV to
		PY55257
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SUB VENDOR LIST FOR ILLUMINATION PACKAGE		
PROJECT : RFCL Ramagundam		
S.NO	ITEM DESCRIPTION	VENDOR
1	LIGHTING FIXTURES, LUMINIAIRS (FOR SAFE AREA APPLICATIONS)	Bajaj Electricals Limited
		Crompton Greaves Ltd
		Wipro
		Spaceage switchgear Limited
		Philips
2	LIGHTING FIXTURES & LUMINIAIRS (EXPLOSION PROOF AREA APPLICATIONS)	Bajaj Electricals Limited
		Philips
		Wipro
		Spaceage switchgear Limited
		FCG FlameProof Control Gears Pvt Ltd
		Safex Flameproof control limited
		FlameProofEquipments Pvt Ltd
		Prompt Engineering Works
3	Cable glands (Weather Proof/Explosion Proof)	Crompton Greaves Limited
		United Agro Engineering Pvt. Ltd.
		Flexipro Electricals Pvt. Ltd.
		Electromac Industries
		FCG Power Industries Pvt. Ltd.
		FCG FlameProof Control Gears Pvt Ltd
		Prompt Engineers
4	Junction Boxes (Weatehr Proof & Flame Proof)	Flame proof Equipments Pvt. Ltd.
		FlameProof Equipments Pvt Ltd
		Flexipro Electricals Pvt. Ltd.
		Electromac Industries
		FCG FlameProof Control Gears Pvt Ltd
5	Junction Boxes (Flame Proof)	Prompt Engineering Works
		FCG FLAMEPROOF CONTROL GEARS
		FLAMEPROOF EQUIPMENTS PVT.LTD.
6	FLEXIBLE WIRE FOR LIGHTING	SAFEX FLAMEPROOF CONTROLS (P) LTD
		PAGODA CABLES PVT. LTD.
		FINOLEX CABLES LTD.
		APAR INDUSTRIES LIMITED
		TECHNO CABLES PVT. LTD.
		RADIANT CABLES PVT. LTD HYD
7	Cable Lugs	THERMO CABLES LIMITED
		Automatic Electric
		Chetna engineering
		Electromac
		Forward engineering Industries

Note: Vendors should not be part of EIL holiday List. Package vendors will not source the items from sub-vendors who are part of EIL's holiday list.

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ANNEXURE -V (DEVIATION FORMAT)		HYDERABAD PRODUCT STANDARD HYDERABAD
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DEVIATION FORMAT

(TO BE FILLED BY BIDDER AND FURNISH ALONGWITH OFFER)

Project Name:-

Enquiry No.:-

Name of Bidder:-

Offer Reference No.:-

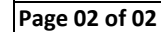
Sl.No	Item	Clause No. & Spec. No	Description as per specification	Deviation taken	Nature of Deviation	REMARKS

NOTES

1. Technical offer of the bidder will be evaluated only on the basis of Deviation Schedule
2. Deviation Schedule constitutes this Sheet(with these Notes) duly signed & stamped.
3. Deviations, if any, shall be clearly brought out only in this format. Deviations mentioned / taken elsewhere or in any other format will be ignored.
4. Additional sheets in the same format can be enclosed by the vendor, if necessary.
5. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market.
6. No price implications shall be entertained for deviations withdrawn during the technical scrutiny. If any deviations are accepted by BHEL during technical scrutiny then also there will be no price implication. Hence, in no case there will be consideration of Price implications.
7. Reasons for the deviations shall be specified in the Remarks column.
8. If there are no deviations from the specifications, bidder still has to submit the Deviation Schedule by writing "NO Deviations" in this format.
9. If the "Deviation Schedule" is not submitted along with the offer, the bidder's offer is likely to be rejected without any further interaction with the bidder.

SIGNATURE OF BIDDER WITH SEAL & STAMP

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ANNEXURE -VI (CHECK LIST OF BIDDER)		

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	భారత్ హిందూ HYDERABAD PRODUCT STANDARD HYDERABAD Annexure-VII to PY55257 Rev No. 00 Page 1 of 11	
ANNEXURE -VII (QUALITY SYSTEM, TESTING & INSPECTION REQUIREMENT)		

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company. <u>QUALITY SYSTEM, INSPECTION & TESTING OF EQUIPMENT AT MANUFACTURER'S PREMISES</u> 1. GENERAL:- a) Inspection & testing of equipment shall be carried out by BHEL / CUSTOMER / BHEL appointed third party at the works of Vendor/Sub vendor during manufacturing and/or on final product to ensure conformity of the same with acceptable criteria of technical specifications, approve drawings, manufacturing drawing and acceptable national / international standards. b) Inspection & test carried out by BHEL or BHEL appointed third party shall not absolve the responsibility of the vendor to provide acceptable product as per terms of contract nor shall it preclude subsequent rejection. c) BHEL reserve the right to inspect any product at any stage of manufacturing beyond pre – identified stages & hold points of approve QAP. 2. QUALITY SYSTEM REQUIREMENTS a) The vendor must recognize the importance of quality and follow defined quality program in all stages of manufacturing and quality control activities of the product. Vendor must define and implement the tasks and control that will provide needed assurance for the procured components / items. All the brought out equipment or component shall be procured from vendors which are listed in the sub- vendor list. b) BHEL reserve the right to verify the quality programme of vendor & its sub vendors to ensure effectiveness of program to meet the intended and specified quality of the product. 3. QUALITY ASSURANCE PLAN a) The vendor shall furnish Quality assurance plan (QAP) for respective equipment after completion of detail engineering for BHEL approval. b) QAP shall be prepared & furnish by vendor as per guide lines mentioned at Annexure-XI. c) The vendor shall indicate procurement source and furnish following document to BHEL, during the submission of QAP for scrutiny & final approval by BHEL. i. Copies of PO ii. Technical specification iii. BHEL approved GA drawings/ datasheets iv. Detail manufacturer drawing v. Back up reference materials d) The submission & subsequent approval of QAPs shall be ensured to be restricted to one round only. e) Inspection and test requirements shall be decided with due consideration of factors like safety, duty cycle, operating conditions, equipment life, environmental condition, place of installation and statutory regulation as applicable, for a particular equipment. Any additional type or special tests or routine tests if found necessary to establish the intended quality after detailed engineering then same shall have to be incorporated in the QAPs without any commercial implication.				
Ref. Doc				

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.						f) The vendor shall submit documents to demonstrate that the vendor and his sub-vendors follow, QA/QC program meeting the requirements set forth in this section. Typical inspection requirements for some of the critical equipment are appended in this section of the specifications. These indicated requirements are minimum and from the BHEL’s perspective. Vendor can review the same and supplement based on their experience and practice for all items. g) Detailed QAP shall be prepared by Vendor in consultation with their sub vendor/manufacturers to avoid any complicity later. 4. CALIBRATION OF MEASURING EQUIPMENT a) All the measuring equipment used for inspection & testing shall be calibrate and appropriate accuracy class of measuring equipment shall be used. Calibration standards used for calibration of measuring instrument shall be traceable to national standards of National Physical Laboratory (NP) with unbroken chains of comparison. b) Valid calibration certificates for all measuring instrument used during inspection and testing at manufacturer’s works, with traceability to National standards of NPL/NABL accredited laboratories shall be furnished prior to undertaking inspection by BHEL. c) Calibration certificate shall also indicate reference no. of calibration standards calibrated by NPL/NABL accredited laboratories and copies of such calibration certificates of calibration standards shall be included in the complied dossiers of inspection/test result. 5. TEST CERTIFICATE AND DOCUMENT a) For each items being manufactured as per approved QAP, following test certificates and documents as applicable for each equipment/item, in the requisite copies including original, duly endorsed by the manufacturer/vendor with appropriate linkage to project, purchase order and acceptance criteria etc. shall be submitted to BHEL. i. Raw material identification & physical and chemical test certificates for all material used in manufacture of the equipment/item. ii. WPS, PQR & WPQ documents as per applicable code. iii. Details of stage wise inspection & rectification records of fabricated items, casting, forging and machined items. iv. Control dimension chart with records of alignment, squareness etc. v. Manufacturer’s material and performance/ relevant test certificate for all brought out items. vi. Details of heat treatment and stress relieving charts as per specification. vii. Non destructive test reports as per respective code. viii. Hardness test certificates. ix. Pressure/leakage test certificates. x. Weather proof test certificates as per applicable codes. xi. Performance test certificates for all characteristics. xii. Routine/ type /calibration/acceptance/special test (Type test etc.) certificates. xiii. Surface preparation and painting certificates. xiv. Certificates from competent authority for the items coming under statutory regulations.(i.e. CIMFR, PESO, DGMS etc. xv. BIS license certificate. b) Where physical and chemical test certificates of material are not available, the vendor shall arrange to have specimens and test samples of the materials, tested in his own
						Ref. Doc

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laboratory at his cost and submit copies of test results in requisite numbers to BHEL for review. Number of test samples against each batch of materials as applicable shall be as per relevant Indian or International standards.

c) Where facilities for testing do not exist in the vendor or sub vendor’s laboratories or in case of any dispute, samples and test pieces shall be drawn by the vendor in presence of BHEL or BHEL nominated third party and sealed sample shall be sent to any Govt. approve / NABL accredited laboratory for necessary tests at vendor’s own cost.

d) The BHEL shall have right to be present and witness all tests being carried out by the vendor/sub vendor/manufacturer at their own laboratory or approved laboratories. Also, the inspection team of BHEL shall reserve the right to call for confirmatory test on samples, at his discretion.

e) Only latest edition of codes / standards and specification shall be used for materials and testing. The latest revision means the revision whose date of revision is closest to the contract date.

6. INTERNAL INSPECTION BY VENDOR/MANUFACTURER

a) Inspection and tests shall be carried out by Vendor/manufacturer in accordance with BHEL approve drawings, Technical specification, PO and approve QAP. They shall maintain records of each inspection and test carried out and signed documents shall be submitted to BHEL for verification.

b) The vendor shall carry out internal inspection & obtain clearance from statutory bodies e.g. IBR, CCE, TAC, weight & measures, safety, IE rules etc. prior to offering any equipment for BHEL inspection in accordance with approve QAP.

c) The vendor shall identify all inspected equipment/items/raw material and shall maintain the record of status of inspection viz. inspected & found acceptable, require rectification/rework, rejected etc.

d) The vendor shall establish and maintain procedures to ensure that the product that does not conform to specified requirements is prevented from inadvertent dispatch. The description of non-conformity that has been accepted subsequently by BHEL by concession and/or repair shall be recorded.

e) Repaired and reworked product shall be offered for re-inspection to BHEL along with records of corrective action taken.

7. METHOD OF UNDERTAKING INSPECTION & TESTING BY BHEL

a) Inspection call shall be given only on readiness of the equipment/assembly and after approval of all relevant drawings and QAP.

b) All documents like test certificates, internal inspection reports, PO, Technical specification, approve QAP, approve GA drawing/ datasheets, Manufacturing drawings, Inspection check list shall be arranged and handed over to inspector before inspection.

Inspection without above document shall be treated as incomplete.

c) The hard copy of such documents must also accompany a CD (comprising computer readable files) containing the identical documents.

d) On receipt of inspection call pertaining to package equipment, QA & inspection group of BHEL shall organize inspection visit or will issue inspection assignment to BHEL approved third party (Based on the nearness to the manufacturer’s works). For further inspecting pertaining to the same equipment, vendor may forward the subsequent inspection call to the concern inspection agency with a copy to QA & Inspection section of BHEL Hyderabad.

Ref. Doc

TD-201 Rev No. 00		बी एच ई एल  HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING HYDERABAD	Annexure-VII to PY55257
Form No.				Rev No. 00
				Page 5 of 11
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company. 8. OBLIGATION OF VENDOR a) The vendor shall provide all facilities and ensure full and free access of the inspection Engineer of BHEL to their own or sub vendor’s premises to facilitate him carry out inspection and testing of the product during manufacturing of the same. b) The vendor shall provide all instruments, tools, necessary testing & other inspection facilities to BHEL inspector free of cost for carrying out inspection. c) The vendor shall comply with instructions of BHEL fully and with promptitude. d) The cost of testing welds, radiographic and dye penetration tests etc. if applicable, in the fabrication workshop shall be borne by the vendor. e) The vendor shall ensure that the equipment/assembly/component require to be inspected, are not dispatched before inspection. f) Vendor shall submit Engineering design datasheet with necessary technical details and manufacturer design sketches of all offered items for review by BHEL and obtain approval for the same. It will be vendor’s responsibility to revise the design as per the BHEL’s observation made on the design datasheet in line with specification requirement till final approval is obtained. Vendor shall not proceed with manufacturing of item unless submitted design is approved by BHEL in all respect. g) Vendor may categorize some items for stage inspection with manufacturing of few sample item, if agreed by BHEL for clearance of mass production. After the mass production, vendor shall call BHEL for re- inspecting the lot. It will be vendor’s responsibility to manufacture the item in line with inspected sample, BHEL will not be held responsible by anyway if the item is rejected due to deviation from sample item. h) For equipment not covered by any other approved standards, the tests to be carried out shall be in accordance with the Vendor’s quality assurance program which to be agreed between the Vendor and the BHEL. Vendor shall furnish a comprehensive list of the tests for such items and include the same in the quality plan during offer. i) If vendor fails to furnish list of test to be carried out at vendor’s works for items not covered by any approved standards, BHEL at his discretion may called for any test to be performed at vendor’s works. j) Vendor is responsible for providing inspection check list as per attached format at annexure-VIII for each item to be inspected and get it endorsed by the inspector. Vendor shall submit signed copy of inspection check list along with other QAP documents as listed elsewhere to BHEL for their perusal. k) Dispatch clearance of any item will not be issued if vendor fails to provide satisfactory inspection checklist & test certificates and other quality related documents.				
Ref. Doc				

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32		Annexure-VII to PY55257 Rev 00 Page 06 of 11	
MINIMUM INSPECTION REQUIREMENT					
FIXTURE					Action by BHEL
1. DOCUMENT		Purchase order, Technical specification of BHEL, BHEL approved drawings/documents/Datasheet,QAP, Consumables certificates and any special requirements			R
2. Materials	Enclosure, reflector, PVC Cables/wires, wire guard, gasket, bracket and brought out items	Material test certificates, Inspection authority stamp correlation with material & TPI stamp verification, manufacturer guarantee certificate and routine test report			R
		If any specific / additional test requirements			R
3. In process inspection	Fabrication of enclosure, reflector, wire guard, bracket	Dimension, Drilling and weld quality			R
	Assembly of fixture	Dimension, cable opening, mounting arrangement			R
	Painting of fixture and finishing	Surface treatment, paint quality, finish colour, shade and thickness			R
	Wiring	Arrangement of terminal blocks, wiring continuity, clamping, Tag provision			R
5. Final inspection	Physical check	Fixture, internal & external reflector, Gasket, wire guard, Glass/acrylic cover, mounting arrangement , cable entries, IP class, Lamp holder type and voltage rating vs approved datasheet.			W
		Name plate for correct entries of Model No. Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc.			W
		Cable entry and terminal block size and type of cable gland used			W
		Make of fixture and accessories			W
		Paint quality, finish colour, shade and thickness			W
	Assembly check	lamp, reflector, cable gland, wire guard for proper fitment to the fixture.			W
	Functional check	Lamp with ballast & Control gear. For Non Integral type Fixture CG box shall be kept 30M away from lamp compartment.			W
		DC fixture with Convertor			W
	Document check	Material test certificate for all type of materials used, Painting quality test certificate, IP class test certificate, Routine test certificate, BIS License copy if applicable, Test certificates from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS for flame proof item, Guarantee/Warranty certificate.			R
6. Packing & dispatch	Packing	Soundness of packing, preservation & documentation as per specification.			V
		Marking of packing for easy identification			V
	Dispatch	Format of Packing slip & quantity as per scope of supply			V
Abbreviations used : R- Review, W- Witness, V- Verify					

	BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32		Annexure-VII to PY55257		
			Rev 00		
			Page 07 of 11		
MINIMUM INSPECTION REQUIREMENT					
PANEL					Action By BHEL
1. DOCUMENT		Purchase order, Technical specification of BHEL, BHEL approved drawings/documents/Datasheet,QAP, Consumables certificates and any special requirements			R
2. Materials	Sheet, PVC cables/ wire, Channels & Frame, Brought out items etc.	Material test certificates, Inspection authority stamp correlation with material & TPI stamp verification, manufacturer guarantee certificate and routine test report			R
		If any specific / additional test requirements			R
3. In process inspection	Fabrication of Panel	Dimension, Straightness, Drilling and weld quality			R
	Assembly of Panel	Dimension, Straightness, opening, Door clearance , mounting arrangement			R
	Painting of Panel and finishing	Surface treatment, paint quality, finish colour, shade and thickness			R
	Wiring	Arrangement of terminal blocks, wiring continuity, clamping, Ferrules terminals and Tag provision			R
5. Final inspection	Physical check	Panel dimension, rating, internal arrangement of components & wiring, mounting arrangement , cable entries, IP class and voltage rating vs approved datasheet, sheet gauge .			W
		Name plate for correct entries of Model No. Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc., Component leveling , circuit diagram, warning label.			W
		Cable entry and terminal block size and type of cable gland used			W
		Make of Panel, sub component and accessories			W
		Paint quality, finish colour, shade and thickness			W
	Functional check	Circuit functional check, Routine test, continuity check.			W
		ELCB/RCCB functional check			W
	Document check	Material test certificate for all type of materials used, Painting quality test certificate, gasket material certificate, IP class test certificate, BIS License copy if applicable, Test certificates from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS for flame proof item, Guarantee/Warranty certificate.			R
		Routine test certificates like HV Test, Insulation measurement before & after HV test, Continuty test, Functional test.			W
6. Packing & dispatch	Packing	Soundness of packing, preservation & documentation as per specification.			V
		Marking of packing for easy identification			V
	Dispatch	Format of Packing slip & quantity as per scope of supply			V
Abbreviations used : R- Review, W- Witness, V- Verify					

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32		Annexure-VII to PY55257 Rev 00 Page 08 of 11	
MINIMUM INSPECTION REQUIREMENT					
JUNCTION BOXES					Action By BHEL
1. DOCUMENT		Purchase order, Technical specification of BHEL, BHEL approved drawings/documents/Datasheet,QAP, Consumables certificates and any special requirements			R
2. Materials	Sheet, Channels & Frame, Brought out items etc.	Material test certificates, Inspection authority stamp correlation with material & TPI stamp verification, manufacturer guarantee certificate and routine test report			R
		If any specific / additional test requirements			R
3. In process inspection	Fabrication of JB	Dimension, Straightness, Drilling and weld quality			R
	Assembly of JB	Dimension, Straightness, opening, Door clearance , mounting arrangement			R
	Painting of JB and finishing	Surface treatment, paint quality, finish colour, shade and thickness			R
	Wiring	Arrangement of terminal blocks			R
5. Final inspection	Physical check	JB dimension, rating, mounting arrangement , cable entries, IP class and voltage rating vs approved datasheet, Sheet Gauge.			W
		Name plate for correct entries of Model No. Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc.			W
		Cable entry and terminal block size and type of cable gland used			W
		Make of JB, sub component and accessories			W
		Paint quality , finish colour, shade and thickness			W
	Document check	Material test certificate for all type of materials used, Painting quality test certificate, IP class test certificate, gasket certificate, BIS License copy if applicable, Test certificates from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS for flame proof item, Guarantee/Warranty certificate.			R
		Routine test certificates like HV Test, Insulation measurement before & after HV test, Secondary current injection test if applicable.			W
6. Packing & despatch	Packing	Soundness of packing, preservation & documentation as per specification.			V
		Marking of packing for easy identification			V
	Dispatch	Format of Packing slip & quantity as per scope of supply			V
Abbreviations used : R- Review, W- Witness, V- Verify					

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32		Annexure-VII to PY55257 Rev 00 Page 09 of 11	
MINIMUM INSPECTION REQUIREMENT					
POWER SOCKET					Action By BHEL
1. DOCUMENT		Purchase order, Technical specification of BHEL, BHEL approved drawings/documents/Datasheet,QAP, Consumables certificates and any special requirements			R
2. Materials	Sheet, PVC cables/ wire, Channels & Frame, Brought out items etc.	Material test certificates, Inspection authority stamp correlation with material & TPI stamp verification, manufacturer guarantee certificate and routine test report			R
		If any specific / additional test requirements			R
3. In process inspection	Fabrication of socket	Dimension, Straightness, Drilling and weld quality			R
	Assembly of Socket	Dimension, Straightness, opening, Door clearance , mounting arrangement			R
	Painting of Socket and finishing	Surface treatment, paint quality, finish colour, shade and thickness			R
	Wiring	Arrangement of terminal blocks, wiring continuity, clamping, Ferrules terminals and Tag provision			R
5. Final inspection	Physical check	Socket rating, internal arrangement of components & wiring, mounting arrangement , cable entries, IP class and voltage rating vs approved datasheet.			W
		Name plate for correct entries of Model No. Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc.			W
		Cable entry and terminal block size and type of cable gland used			W
		Make of Socket, sub component and accessories			W
		Paint quality, finish colour, shade and thickness			W
	Functional check	Circuit functional check, continuity check.			W
		Plug & Socket interlocking check			W
	Document check	Material test certificate for all type of materials used, Painting quality test certificate, IP class test certificate, BIS License copy if applicable, Test certificates from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS for flame proof item, Guarantee/Warranty certificate.			R
		Routine test certificates like HV Test, Insulation measurement before & after HV test, Secondary current injection test if applicable.			W
6. Packing & dispatch	Packing	Soundness of packing, preservation & documentation as per specification.			V
		Marking of packing for easy identification			V
	Dispatch	Format of Packing slip & quantity as per scope of supply			V
Abbreviations used : R- Review, W- Witness, V- Verify					

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32		Annexure-VII to PY55257 Rev 00 Page 10 of 11	
MINIMUM INSPECTION REQUIREMENT					
POLES					Action By BHEL
1. DOCUMENT		Purchase order, Technical specification of BHEL, BHEL approved drawings/documents/Datasheet,QAP, Consumables certificates and any special requirements			R
2. Materials	Pipe	Material test certificates, Inspection authority stamp correlation with material & TPI stamp verification, manufacturer guarantee certificate and routine test report			R
		If any specific / additional test requirements			R
3. In process inspection	Fabrication of Pole	Dimension, Straightness, Drilling and weld quality			R
	Assembly of Pole	Dimension, Straightness, Rigidity of different section joint			R
	Painting of Pole and finishing	Surface treatment, paint quality, finish colour, shade and thickness			R
5. Final inspection	Physical check	Dimension, assemble Check of different components, finishing			W
		Sub component like JB/Marshalling box Classification details (i.e. FLP/WP etc.) IP class and voltage range etc.			W
		Marshalling Box/JB Cable entry and terminal block size and type of cable gland used			W
		Make of JB/Marshalling box, sub component and accessories			W
		Paint quality, finish colour, shade and thickness			W
	Document check	Material test certificate for all type of materials used, routine test certificate, Painting quality test certificate. For JB/ Marshalling Box - IP class test certificate, BIS License copy if applicable, Test certificates from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS for flame proof item, Guarantee/Warranty certificate.			R
		For JB/Marshalling box:- Routine test certificates like HV Test, Insulation measurement before & after HV test, Secondary current injection test, if applicable			R
6. Packing & dispatch	Packing	Soundness of packing, preservation & documentation as per specification.			V
		Marking of packing for easy identification			V
	Dispatch	Format of Packing slip & quantity as per scope of supply			V
Abbreviations used : R- Review, W- Witness, V- Verify					

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32		Annexure-VII to PY55257 Rev 00 Page 11 of 11	
MINIMUM INSPECTION REQUIREMENT					
MISC. ITEM					Action By BHEL
1. DOCUMENT		Purchase order, Technical specification of BHEL, BHEL approved drawings/documents/Datasheet,QAP, Consumables certificates and any special requirements			R
2. Materials		Material test certificates, Inspection authority stamp correlation with material & TPI stamp verification, manufacturer guarantee certificate and routine test report			R
		If any specific / additional test requirements			R
3. In process inspection	Fabrication	Dimension, Straightness, Drilling and weld quality			R
	Assembly	Dimension, Straightness, opening, Door clearance , mounting arrangement			R
	Painting and finishing	Surface treatment, paint quality, finish colour, shade and thickness			R
	Wiring	Arrangement of terminal blocks, wiring continuity, clamping, Ferrules terminals and Tag provision			R
5. Final inspection	Physical check	Rating, internal arrangement of components & wiring, mounting arrangement , cable entries, IP class and voltage rating vs approved datasheet.			W
		Name plate for correct entries of Model No. Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc.			W
		Cable entry and terminal block size and type of cable gland used			W
		Make of main item, sub component and accessories			W
		Paint quality, finish colour, shade and thickness			W
	Functional check	Circuit functional check, continuity check.			W
	Document check	Material test certificate for all type of materials used, Painting quality test certificate, IP class test certificate, BIS License copy if applicable, Test certificates from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS for flame proof item, Guarantee/Warranty certificate.			R
		Routine test certificates like HV Test, Insulation measurement before & after HV test, Secondary current injection test if applicable.			W
6. Packing & dispatch	Packing	Soundness of packing, preservation & documentation as per specification.			V
		Marking of packing for easy identification			V
	Dispatch	Format of Packing slip & quantity as per scope of supply			V
Abbreviations used : R- Review, W- Witness, V- Verify					

Ref. Doc	COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	Rev No. 00
		Form No HYDERABAD PRODUCT STANDARD HYDERABAD Annexure-VIII to PY55257 Rev No. 00 Page 01 of 07
ANNEXURE – VIII (INSPECTION CHECK LIST FORMAT)		

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32								Annexure-VIII to PY55257 Rev 00 Page 02 of 07	
INSPECTION CHECK LIST FOR LIGHTING FIXTURE											
BHEL PO NO :											
Item PO SL.No.											
PROJECT											
Description of Item											
Qty											
Referred BHEL Spec. NO.											
Referred Approved datasheet No.											
Name of the inspector											
Date of Inspection											
Points to check during Inspection in addition to applicable QAP/ IS requirements :										Inspector remarks	
I Physical Checks :										Inspector signature/date	
1	Check availability of applicable spec. & approved datasheet (Approved as Code 1 or Code-2 by BHEL). Please note that item not to be inspected without stamped and signed approved datasheet from BHEL.										
2	Physical check of Fixture along with all components like internal & external reflector, Gasket, wire guard, Glass/acrylic cover, mounting arrangement , cable entries, IP class, and voltage range etc. as per approved datasheet. Check the lamp holder type(i.e. Bi pin or screw type) is as per approved datasheet and suitable for lamp.										
3	Check the paint shed of fixture including accessories and quality of painting as per approved datasheet.										
4	Physical check of Material composition, dimension and thickness of enclosure, reflector etc. as mentioned in the datasheet. Also check finishing of end product.										
5	Physical check that accessories like cable glands are of approved make as per sub vendor list or BHEL. Spec.										
6	Physical verification of name plate for correct entries of Model No. Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc.										
7	Suitability check of lamp for proper fitment to the fixture.										
8	Quantity check for loose accessories to be supplied along with fixture as per supply BOQ listed in datasheet.										
9	Check the size and type of Cable gland as per approved datasheet if applicable (i.e. FLP or safe area DC Brass suitable for 3Cx2.5 sqmm cu. Armoured cable)										
10	Suitability check of Cable gland with fixture cable entry if applicable										
11	Physical Check of DC to AC convertor along with it's enclosure for proper fitment and internal wiring(Applicable for DC Fixture with CFL Lamp)										
12	Suitability check of cable gland with Converter enclosure cable entry (Applicable for DC Fixture with CFL Lamp)										
13	Physical Check of Control gear box for proper type suitable for fixture (Applicable for Non integral type fixture)										
14	Suitability check of cable gland with CG box cable entry (Applicable for Non integral type fixture)										
15	Physical check of blanking plug (Aluminum) for proper fitment with Fixture enclosure, CG box cable entry if applicable.										
16	Physical check of terminal block for proper size suitable for terminating of two nos. 2.5 sqmm cu. Wire.										
17	Review of test certificate from CIMFR or equivalent laboratory, certified by NABL & approved from PESO/DGMS(details as mentioned in approved data sheet), for fixture, CG box and enclosure of converter as applicable(Applicable for Flame proof items only).										
18	Review of test certification for weather proof fixture, CG box and enclosure of converter as applicable(Applicable for weather proof items only with minimum IP52 protection).										
19	Physical verification of packing slip (For all line items including accessories to be supplied in loose.).										
20	Physical check of packing of all items including accessories are as per packing method mentioned in the illumination spec.										
II Functional checks :											
1	Functional check on suitability of fixture and lamp for rated Supply voltage along with accessories like ballast CG box etc. .										
2	Functional check on suitability of DC convertor for rated DC voltage of project and lamp .(Applicable for DC Fixture with CFL Lamp)										

	BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32										Annexure-VIII to PY55257 Rev 00 Page 03 of 07
	INSPECTION CHECK LIST FOR LIGHTING PANEL										
	BHEL PO NO : Item PO.SL.No. PROJECT Description of Item Qty Referred BHEL Spec. NO. Referred Approved datasheet No. Name of the inspector Date of Inspection										
	Points to check during inspection in addition to applicable QAP/ IS requirements :					Inspector remarks				Inspector signature/date	
1	Physical Checks :										
1	Check availability of applicable spec. & approved datasheet (Approved as Code 1 or Code-2 by BHEL). Please note that item not to be inspected without stamped and signed approved datasheet from BHEL.										
2	Physical check of lighting panels alongwith all components like MCB, RCCB, Bus bars, external canopy(if applicable), Gasket etc. as per approved datasheet.										
3	Physical check of mounting arrangement , cable entries, IP class, and voltage range, etc. as per approved datasheet.										
4	Physical check of Material composition, dimension and thickness of enclosure, canopy(if applicable) etc. as mentioned in the datasheet. Also check finishing of end product.										
5	Check that all components are leveled and outgoing and incoming circuits are numbered at terminal blocks.										
6	Check the paint shed of Lighting panel including accessories and quality of painting as per approved datasheet.										
7	Physical verification of availability of name plate for correct entries of Model No. manufacturer name, Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc.										
8	Physical verification of availability of circuit diagram inside the front cover as per internal wiring of lighting panel. Also check that caution plate is available on front cover.										
9	Physical verification of availability of external canopy for outdoor type panel and its assembly check with lighting panel.(Applicable for outdoor type panel only).										
10	Quantity check for loose accessories to be supplied along with lighting panel as per supply BOQ listed in datasheet.										
11	Check the make, size and type of Cable gland (i.e. FLP, Double compression brass) as per approved datasheet. Please note Cable gland shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.										
12	Suitability check of Cable gland with lighting panel cable entry										
13	Physical check of Make, type & rating of MCB/MCCB/RCCB etc. as per approved datasheet. Please note MCB/RCCB/MCCB etc. shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.										
14	Physical check of blanking plug (Aluminum) for proper fitment with lighting panel cable entry.										
15	Physical check of Make, type & size of terminal block as per approved datasheet. Please note terminal block shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.										
16	Review of test certificate from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS(details as mentioned in approved data sheet) (Applicable for Flame proof items only).										
17	Review of IP class test certification (Applicable for item with minimum IP42 and higher protection).										
18	Physical verification of packing slip (For all line items including accessories to be supplied in loose.).										
19	Physical check of packing of all items including accessories as per packing method mentioned in the illumination spec.										

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32								Annexure-VIII to PY55257 Rev 00 Page 04 of 07	
INSPECTION CHECK LIST FOR POWER SOCKET AND RECEPTACLE											
BHEL PO NO :											
Item PO.SL.No.											
PROJECT											
Description of Item											
Qty											
Referred BHEL Spec. NO.											
Referred Approved datasheet No.											
Name of the inspector											
Date of Inspection											
	Points to check during Inspection in addition to applicable QAP/IS requirements :						Inspector remarks			Inspector signature/date	
I	Physical Checks :										
1	Check availability of applicable spec. & approved datasheet (Approved as Code 1 or Code-2 by BHEL). Please note that item not to be inspected without stamped and signed approved datasheet from BHEL.										
2	Physical check of Power sockets along with all components like MCB, Plug assembly, external canopy(if applicable), Gasket etc. as per approved datasheet.										
3	Physical check of mounting arrangement , cable entries, IP class, and voltage range, etc. as per approved datasheet.										
4	Physical check of Material composition, dimension and thickness of enclosure, canopy(if applicable) etc. as mentioned in the datasheet. Also check finishing of end product.										
5	Check the paint shed of Socket/Receptacle including accessories and quality of painting as per approved datasheet.										
6	Physical verification of availability of name plate for correct entries of Model No. manufacturer name, Type, Classification details (i.e. FLP/WP etc.) IP class and voltage /Current rating etc. as per spec.										
7	Physical verification of availability of external canopy for outdoor type Socket/Receptacle (If asked in Datasheet) and its assembly check with Socket enclosure.(Applicable for outdoor type Socket/Receptacle only).										
8	Quantity check for loose accessories to be supplied along with Socket/Receptacle as per supply BOQ listed in datasheet.										
9	Check the make, size and type of Cable gland (i.e. FLP, Double compression brass)as per approved datasheet. Please note that Cable gland shall be of approved make as per sub vendor list or as mentioned in the vendor list/Illumination spec.										
10	Suitability check of Cable gland with Socket/Receptacle cable entry for proper fitment.										
11	Check interlocking arrangement of plug & socket (If asked in the data sheet).										
12	Physical check of blanking plug (Aluminum) for proper fitment with Socket/receptacle cable entry.										
13	Physical check of size of terminal block as per approved datasheet.										
14	Review of test certificate from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS (details as mentioned in approved data sheet) (Applicable for Flame proof items only).										
15	Review of IP class test certification for weather proof outdoor type Socket/Receptacle(Applicable for weather proof items only with minimum IP52 protection).										
16	Physical verification of packing slip (For all line items including accessories to be supplied in loose.).										
17	Physical check of packing of all items including accessories are as per packing method mentioned in the illumination spec.										

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32								Annexure-VIII to PY55257 Rev 00 Page 05 of 07	
INSPECTION CHECK LIST FOR LIGHTING POLE											
BHEL PO NO :											
Item PO.SL.No.											
PROJECT											
Description of Item											
Qty											
Referred BHEL Spec. NO.											
Referred Approved datasheet No.											
Name of the inspector											
Date of Inspection											
Points to check during Inspection in addition to applicable QAP/ IS requirements :						Inspector remarks			Inspector signature/date		
I		Physical Checks :									
1		Check availability of applicable spec. & approved datasheet (Approved as Code 1 or Code-2 by BHEL). Please note that item not to be inspected without stamped and signed approved datasheet from BHEL.									
2		Physical check of Poles along with all components like GI Pipe, Marshalling/Junction Box, arm, Swan neck, reducer, coupler etc. as per approved datasheet.									
3		Physical check of mounting arrangement , cable entries, IP class of marshalling /Junction box (for Street/Flood lighting pole) as per approved datasheet.									
4		Physical check of Material composition, dimension and thickness of different section of poles, accessories (as applicable) etc. as mentioned in the datasheet. Also check finishing of end product.									
5		Physical check of availability of cable entry holes at different locations in the poles as per approved data sheet. Also check the size of holes for their suitability of required usage.									
6		Check the painting of poles and Marshalling box/ junction box including canopy(if applicable) and quality of painting as per approved datasheet or Illumination spec.									
7		Physical verification of availability of name plate in the Marshalling box/Junction box for correct entries of Model No. manufacturer name, Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc (Applicable for street & Flood lighting poles)									
8		Physical verification of availability of external canopy for marshalling box/ JB (if asked in data sheet)(Applicable for street & Flood lighting poles).									
9		Quantity check for loose accessories to be supplied along with Poles as per supply BOQ listed in datasheet.									
10		Check the make, size and type of Cable gland (i.e. FLP, Double compression brass) to be supplied along with marshalling box/Junction box as per approved datasheet(Applicable for street & Flood lighting poles). Please note Cable gland shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.									
11		Suitability check of Cable gland with cable entries at Marshalling/Junction box (Applicable for street & Flood lighting poles).									
12		Physical check of blanking plug (Aluminum) for proper fitment with Marshalling/Junction box cable entry (Applicable for street & Flood lighting poles).									
13		Physical check of Make, type & size of terminal block in the marshalling/Junction box as per approved datasheet (Applicable for street & Flood lighting poles).Please note terminal block shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.									
14		Review of test certificate from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS (details as mentioned in approved data sheet) (Applicable for Flame proof items only).									
15		Review of test certification for weather proof Marshalling/ Junction box (Applicable for street & Flood lighting poles).									
16		Physical verification of packing slip (For all line items including accessories to be supplied in loose.).									
17		Physical check of packing of all items including accessories are as per packing method mentioned in the illumination spec.									
II		Assembly checks :									
1		Assemble the different part of poles and check for alignment and suitability of each parts of pole as per approved datasheet.									
2		Check for suitability of fitment different type of reducer (to be supplied against different type of fixture) to lighting pole Swan neck end (reducer 50/20). (Applicable for 2M, 3.75 & 4.75M pole with swan neck).									

		BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32							Annexure-VIII to PY55257 Rev 00 Page 06 of 07	
INSPECTION CHECK LIST FOR MISC. ITEMS										
BHEL PO NO :										
Item PO.SL.No.										
PROJECT										
Description of Item										
Qty										
Referred BHEL Spec. NO.										
Referred Approved datasheet No.										
Name of the inspector										
Date of Inspection										
	Points to check during Inspection in addition to applicable QAP/ IS requirements :					Inspector remarks			Inspector signature/date	
I	Physical Checks :									
1	Check availability of applicable spec. & approved datasheet (Approved as Code 1 or Code-2 by BHEL).									
2	Physical check the items along with all components for technical compatibility as per approved datasheet and Illumination spec.									
3	Physical check of Material composition, thickness, dimension, shape etc. as mentioned in the datasheet. Also check finishing of end product.									
4	Check the paint shed of items (if applicable) and quality of painting as per approved datasheet.									
5	Physical verification of availability of name plate for correct entries of Model No. manufacturer name, Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc (If applicable).									
6	Suitability check of all sub component of the item (If applicable).									
7	Quantity check for loose accessories to be supplied along with the item as per supply BOQ listed in datasheet.									
8	Check the make, size and type of Cable gland (i.e. FLP, Double compression brass) if supplied as per approved datasheet. Please note Cable gland shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.									
9	Suitability check of Cable gland with cable entries of equipment (If applicable).									
10	Physical check of Make, type & size of terminal block as per approved datasheet. Please note terminal block shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.									
11	Review of test certificate from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS(details as mentioned in approved data sheet) (Applicable for Flame proof items only).									
12	Review of test certification for weather proof (Applicable for weather proof items only with minimum IP52 protection).									
13	Physical verification of packing slip (For all line items including accessories to be supplied in loose).									
14	Physical check of packing of all items including accessories are as per packing method mentioned in the illumination spec.									
II	Functional checks :									
1	Functional check to be carried out on items like 24V Module & Hand lamp, Remote Emergency light etc. to ascertain their suitability of intend use.									
II	Assembly checks :									
1	Assembly check to be carried out on items like METSEC channel to ascertain the alignment and suitability of different component/accessories for intend use.									

	BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32										Annexure-VIII to PY55257 Rev 00 Page 07 of 07
	INSPECTION CHECK LIST FOR JUNCTION BOX										
	BHEL PO NO : Item PO.SL.No. PROJECT Description of Item Qty Referred BHEL Spec. NO. Referred Approved datasheet No. Name of the inspector Date of Inspection										
	Points to check during inspection in addition to applicable QAP/ IS requirements :					Inspector remarks				Inspector signature/date	
I	Physical Checks :										
1	Check availability of applicable spec. & approved datasheet (Approved as Code 1 or Code-2 by BHEL). Please note that item not to be inspected without stamped and signed approved datasheet from BHEL.										
2	Physical check of Junction box along with all components like terminal blocks, external canopy(if applicable), Gasket etc. as per approved datasheet.										
3	Physical check of mounting arrangement , cable entries, IP class, and voltage range, etc. as per approved datasheet.										
4	Physical check of Material composition, dimension and thickness of enclosure, canopy(if applicable) etc. as mentioned in the datasheet. Also check finishing of end product.										
5	Check the paint shed of junction box including canopy(if applicable) and quality of painting as per approved datasheet.										
6	Physical verification of availability of name plate for correct entries of Model No. manufacturer name, Type, Classification details (i.e. FLP/WP etc.) IP class and voltage range etc as per approved datasheet.										
7	Physical verification of availability of external canopy for outdoor type JB and its assemble check with JB(Applicable for outdoor type JB only).										
8	Quantity check for loose accessories to be supplied along with lighting JB as per supply BOQ listed in datasheet.										
9	Check the make, size and type of Cable gland (i.e. FLP, Double compression brass) as per approved datasheet. Please note Cable gland shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.										
10	Suitability check of Cable gland with cable entries at Junction box.										
11	Physical check of blanking plug (Aluminum) for proper fitment with Junction box cable entry.										
12	Physical check of Make, type & size of terminal block as per approved datasheet. Please note terminal block shall be of approved make as per sub vendor list or as mentioned in the Illumination spec.										
13	Review of test certificate from CIMFR or equivalent laboratory certified by NABL & approved from PESO/DGMS(details as mentioned in approved data sheet) (Applicable for Flame proof items only).										
14	Review of test certification for weather proof outdoor type JB (Applicable for weather proof items only with minimum IP52 protection).										
15	Physical verification of packing slip (For all line items including accessories to be supplied in loose.).										
16	Physical check of packing of all items including accessories as per packing method mentioned in the illumination spec.										

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		Form No HYDERABAD PRODUCT STANDARD HYDERABAD Annexure-IX to PY55257 Rev No. 00 Page 1 of 2
ANNEXURE -IX (TYPICAL PACKING SLIP FORMAT)		



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HYDERABAD -32

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PACKING SLIP FORMAT

Project Name

PO No. & Date :-

Consignment No. & Date :-

1	2	3	4	5	6	7	8
PO SL NO	ITEM DESCRIPTION	TYPE OF PACKING	Identification No. Of the Packing	Qty/pack	Total Qty supplied	NO Of Packet	Remarks

SUMMARY

NO. OF CARTOON BOX

NO. OF GUNNY BAG

NO. OF BUNDLE OF POLES/CONDUIT

NOTE:

1. In packing detail at column 3 write type of the Packing used (i.e.Cartoon box, Gunney Bag, Bundle.etc.).

2. In packing detail at column 4 write identification nos. of the Packing (i.e. PO NO/1,2,3....etc.).

3. If item supplied as loose write only Identification no. assign to whole lot at column - 4 and write "loose supplied " in remarks column.

4. Write qty of item packed in a Packet at column 5.

5. Write total qty. of item supplied at column 6.

6. Write total no. of packet used for packing the supplied item at column 7.

7. Write any special remarks in the remarks column at 8 (i.e. Aecessories of item etc.)

Vendor's sign with stamp

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		Form No	
ANNEXURE -X (GUIDE LINES FOR PREPARATION OF QUALITY ASSURANCE PLAN)		భారత్ హెవీ ఎలక్ట్రికల్స్ BHEL HYDERABAD	PRODUCT STANDARD HYDERABAD
		Annexure-X to	
		PY55257	
		Rev No. 00	
		Page 1 of 4	

TD-201 Rev No. 00 Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE-X to PY 55257
			Rev No. 00
			Page 2 of 4
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.	QAP GUIDELINES & FORMAT (ANNEXURE-X TO SPECIFICATION PY 55257) The QAP format and Guidelines for filling up the format shall be used by vendor for preparation and submission of QAP after order placement.		

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE-XI to PY 55144
			Rev No. 00
			Page 3 of 4
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<u>GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN</u> 1. QAP shall be made in landscape mode on A4 size paper as per the format enclosed. Font size shall be minimum 10. 2. Each page of QAP shall contain the following information. a) Vendor's name & address. b) Customer: BHEL, Hyderabad. c) Project. d) BHEL Product Standard Number/revision number as referred in P.O. e) BHEL Purchase Order Number & Date. f) Product as per P.O. description. g) QAP Number (unique and shall not repeat)/revision number/date. h) Page number and number of pages 3. QAP shall contain four parts / stages as follows. a) Raw materials and bought out items. b) In process Control / Inspection. c) Final assembly, Inspection & Testing. d) Painting, preservation & packing. 4. Under 'Component', indicate name of the component (say casing, rotor, pressure gauge, etc). 5. Under 'Characteristics', indicate appropriately (say chemical analysis, mechanical properties, NDT (UT,DP etc.), hydrostatic test, calibration check etc.) 6. Under 'Class', indicate minor, major or critical depending on the importance of characteristic. 7. Under 'Type of check', indicate appropriately (say chemical, mechanical, UT, DP etc.) 8. Under 'Quantum of check', indicate appropriately (say 100%, 10%, sample, per melt, per heat, all pieces etc.) 9. Under 'Reference document' and 'Acceptance norms', appropriate National & International standards, BHEL standards, approved drawing references etc. should be indicated. It is not correct to mention as "Vendor's internal standards or Vendor's standard practice etc.". If vendors' internal standards are referred, same shall be in line with BHEL Spec. indicated in the P.O. These may require review & approval by our Engineering dept. 10. Under 'Format of record', indicate appropriately supplier's test certificate, calibration certificate, lab report, inspection report etc.		
	Ref. Doc		

	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE-XI to PY 55144 Rev No. 00 Page 4 of 4
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		11. Please refer 'Agency' in QAP format. Under P: Perform, W: Witness, V: Verify Indicate against each characteristic 1: (BHEL CQS/Nominated inspection agency), OR 2: (Vendor / Sub vendor) Note: Performing agency is normally vendor or his sub vendor (Legend 2). Where witness points are indicated in specification, P.O., Drawing etc., for such operations, under Witness (W) column use 1. Under 'Verify' column, use code1. 12. Under 'D' please put (☐ Tick) against each characteristic where vendor proposes to submit test certificate/report etc. OR as required as per BHEL Specification. 13. Vendor's signature & stamp should be available on each page of QAP. 14. Vendor should read the BHEL Product Standard thoroughly and QAP should be made only inline and relevant to the Specification & Approved Drawings. 15. The following operations/characteristics/check points may be included (AS APPROPRIATE) a) Visual check b) Dimensional check c) Mechanical and Chemical properties. d) Surface preparation before painting (by chemical cleaning, sand blasting, shot blasting etc. as the case may be.) e) Painting check for shade, Dry Film Thickness (DFT), Adhesion/ peel off test etc. f) Check for correctness for all components mounted as per General arrangement Drawing, Bill Of Materials (BOM), etc. for range, rating, make, color, size, location as per GA, quantity, label description including tag nos., annunciator facia, loose components, accessories, spares etc. g) Verification of test certificate for protection class for the enclosures. h) Mechanical functioning of switches. i) Continuity of earthing and provision of earth points. j) Colour coding of wiring, size, tightness & dressing of wiring. k) Review of test certificates of assembled items, raw materials, internal test reports etc. l) Witness of functional checks, which may include mechanical run & electrical run, H.V.test, IR measurement, Electrical and Mechanical tests etc. m) PQR, WPS, Welder Qualification Record, welding records (fit up, DP) etc. n) Material identification (for punch marks of serial numbers, Heat No, Melt No, Inspector's stamp etc.) o) Hydraulic Pressure Test, Pneumatic Pressure Test, Liquid Penetration Examination and other Non Destructive Tests. p) Tests on Galvanised items (Visual, Hammer Test, Knife Test, Thickness, Pierce Test (Copper sulphate test), Hydrogen evaluation test, Stripping test (for Mass of Zinc coating) q) All tests as per BHEL Product Standard & approved drawings including Type tests and Routine tests on individual items and on System as a whole. r) Packing and Preservation.		
	Ref. Doc	16. <u>QAP Format enclosed.</u>		

VENDOR'S NAME & ADDRESS:			MANUFACTURING QUALITY PLAN						QP. NO.:				
									REV NO:		DATE:		
			CUSTOMER: BHEL, HYDERABAD – 32. PROJECT: PRODUCT:			BHEL P.O.NO.: P.O.DATE: BHEL SPEC:			REV:			PAGE 1 OF 1	
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
2.0	INPROCESS INSPECTION												
3.0	FINAL INSPECTION & TESTING												
4.0	PRESERVATION & PACKING												

VENDOR TO NOTE: THIS FORMAT IS IN MICROSOFT WORD. HEADER & FOOTER SHALL BE AVAILABLE IN EACH PAGE OF QP. QP SHALL BE IN LANDSCAPE & A4 SIZE ONLY. FONT SIZE SHALL BE MIN 10. VENDOR SHALL SIGN & STAMP IN EACH PAGE OF QP. LOI REF. & DATE ARE NOT ACCEPTABLE. P.O.NO. & DATE SHALL BE INDICATED. QP NO. SHOULD BE UNIQUE AND SHALL NOT REPEAT. ALL THE TESTS / CHECKS INDICATED IN THE BHEL SPEC. SHALL BE INDICATED IN THE QP.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL CQS (OR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY	APPROVED BY	APPROVED BY
	VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP

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		Form No.	
ANNEXURE -XI DATASHEET OF MAJOR ILLUMINATION ITEM		భారత్ హిల్స్ HYDERABAD	PRODUCT STANDARD HYDERABAD
		Annexure-XI to PY55257	
		Rev No. 00	
		Page 1 of 7	



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HYDERABAD -32**

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DATASHEET OF MAJOR ILLUMINATION ITEM

FIXTURE

a) TYPE	LED	
b) STANDARD	For FLP Fixture IEC60079-1 and 0, driver of LED IEC61347-2-13	
c) LUMEN EFFACACY	100 Lumen/Watt	
d) BURNING HOURS	>50000hrs at 40degree ambient temp	
e) PF	>= 0.95	
f) IP CLASS	IP55 (Min.) For Outdoor fixture (i.e. WG, Street, Flood Light)	
g) GAS GROUP FOR FLP FIXTURE	As per BOQ	
h) FLAME PROOF TYPE	(Ex-d for Zone-1 and Exnr for Zone-2)	
i) TEMPARATURE CLASS FOR FLP FIXTURE	T3	
j) EXTERNAL REFLECTOR	Not required	
k) TEST CERTIFICATE	LM79, LM80, IPClass	
l) TEST CERTIFICATE FOR FLP	CIMFR/ERTL/BASEEFA/LCIE/UL/FM OR EQUIVALENT , PESO/DGMS & BIS Certificate	
m) PAINT SHADE	Dark admiralty grey 632or RAL7031 for IIA&IIB, Light Yellow 355 or RAL1011 for IIC, Bright Red 538 or RAL3003 for DC	
n) WARRANTY	5 YEARS	
o) ACCESSORIES TO BE SUPPLIED	Mounting Hardware (Stainless steel SS304),Cable gland, Cu. Lugs, Pole reducer with Well glass fixture suitable for fixture and pole.	
p) Type of Gland	Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands. Flameproof type gland for flame proof fixture	
q) Special requirement	Well glass fixture (AC or DC) shall have 2nos. Cable entries and TBs suitable for Loop in/out of circuit cable.	



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DATASHEET OF MAJOR ILLUMINATION ITEMS

SAFE AREA PANEL

a) MATERIAL OF CONSTRUCTION	1.6mm thick sheet steel or polycarbonate,Dust proof vermi proof with Hinged Door, Surface mounted (Wall/column)	
b) SEPARATE COMPARTMENT REQUIRED	Yes, three compartment (one for incomer MCB & Busbar, one for outgoing MCB and one for Terminal block/Cable termination)	
c) SHEET BARRIER	Required, bakelite cover plate	
d) IP CLASS	IP42 for Indoor, IP55 for Outdoor	
e) GASKET	Neoprene	
f) EXTERNAL CANOPY REQUIRED	Required for Outdoor, 2mm thick FRP sheet to cover top and two side	
g) INCOMER	63A TPN MCB & ELCB FOR ACLP & 32A DP MCB FOR DCLP (MCB M9 catagory as per IS8828)	
h) OUTGOING	20A SPN MCB for 1ph & 32A TPN MCB for 3ph, for AC and 10A DP MCB for DC (MCB M9 catagory as per IS8828)	
i) PHASE BUSBAR REQUIRED	Yes, Color coded High Conductivity copper supported by non-hygroscopic insulator, Min size 25x6	
j) EARTHING BUS SIZE & MATERIAL	Al, Min 25x6	
k) SHORT CKT RATING OF MCB	9kA	
l) TERMINAL BLOCK TYPE	Stud for incomer, Clip on Rail mounted type for outgoing	
m) CABLE ENTRY LOCATION & TYPE	Bottom, through Gland Plate	
n) INTERNAL WIRING WIRE SIZE	16sqmm cu. upto Busbar and 6 sqmm cu. for 1ph & 16sqmm for 3ph circuit from Busbar to individual MCB	
o) PAINT TYPE AND SHADE	Epoxy, 631 for Indoor & 632 for Outdoor as per IS5	
p) CERTIFICATION	IP Class	
q) ACCESSORIES TO BE SUPPLIED	Mounting Hardware (Stainless steel SS304),DC Cable gland with PVC Hood, Cu. Lugs	
r) Type of Gland	Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands.	

	BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32	Annexure-XI to PY55257 Rev 00 Page 04 of 07
DATASHEET OF MAJOR ILLUMINATION ITEMS		
FLAME PROOF PANEL		
a) MATERIAL OF CONSTRUCTION	Cast light metal alloy, Gas tight Explosion proof, Surface mounted (Wall/column)	
b) TYPE OF HOLE AT MOUNTING LUGS	Oblong type	
c) IP CLASS	IP55(min)	
d) GASKET	Non inflammable and self extinguising material	
e) EXTERNAL CANOPY REQUIRED	Required for outdoor type, as integral or externally with atleast 2mm thick FRP sheet to cover top and two side	
f) INCOMER	63A TPN MCB & ELCB FOR ACLP & 32A DP MCB FOR DCLP (MCB M9 catagory as per IS8828)	
g) OUTGOING	DP MCB (20A for AC & 10A for DC)(MCB M9 catagory as per IS8828)	
h) SPECIAL REQUIREMENT	Operating knob with rack & pinion for MCB and Hand reset push button for ELCB at the door to be provided.	
h) PHASE BUSBAR REQUIRED	Yes, Color coded High Conductivity copper supported by non-hygroscopic insulator, Min size 25x6	
i) EARTHING BUS SIZE & MATERIAL	Al, Min 25x6	
j) SHORT CKT RATING OF MCB	9kA	
k) TERMINAL BLOCK TYPE	Stud for incommer, Clip on Rail mounted type for outgoing	
l) CABLE ENTRY LOCATION & TYPE	Bottom	
m) GLAND TO TERMINAL DISTANCE	100mm (Min)	
n) INTERNAL WIRING WIRE SIZE	FR type Color coded 16sqmm cu. upto Busbar and 2.5 sqmm cu. for Busbar to individual MCB	
o) GAS GROUP	As per BOQ	
p) FLAME PROOF TYPE	Ex-d	
q) TEMPARATURE CLASS FOR FLP TYPE	T3(Min)	
r) PAINT TYPE AND SHADE	Epoxy, Dark admiralty grey 632or RAL7031 for IIA&IIB, Light Yellow 355 or RAL1011 for IIC	
s)CERTIFICATION	PESO/DGMS, BIS	
t) TEST REPORT	CIMFR/ERTL/BASEEFA/LCIE/UL/FM OR EQUIVALENT	
u) ACCESSORIES TO BE SUPPLIED	Mounting Hardware (Stainless steel SS304),FLP DC Cable gland with PVC Hood, Brass Blanking Plug, Cu. Lugs	
v) Type of Gland	Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands. Suitable for glas group and flame proof zone.	



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HYDERABAD -32**

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DATASHEET OF MAJOR ILLUMINATION ITEMS

SAFE AREA SOCKET & RECEPTACLE (INDUSTRIAL TYPE, 1Ph & 3Ph)

a) MATERIAL OF CONSTRUCTION	Sheet steel, Weather proof for Outdoor type	
b) IP CLASS	IP55 for Outdoor	
c) GASKET	Neoprene	
d) EXTERNAL CANOPY REQUIRED	Required for Outdoor, 2mm thick FRP sheet to cover top and two side	
e) RATING OF SOCKET	5 pin 63A , 415V for 3 Phase & 3 Pin 20A, 230V for 1Ph	
f) PLUG REQUIRED	Yes	
g) TYPE OF CONTROLLING SWITCH	Rotary type with interlocking facility for 3 Phase socket and MCB for 1Ph socket.	
h) SPECIAL REQUIREMENT FOR 3 PHASE SOCKET	Interlocking arrangement between plug & Switch such that Plug cannot be withdrawn unless switch is put OFF and switch can put ON only when Plug is fully inserted and latched.	
i)CAP FOR SOCKET	Required, either spring loaded Cap or Cap fastened with mettalic chain.	
j) NO OF TERMINAL BLOCK	Sufficient Qty required for loop in and loop out	
k)EARTHING BOLT	Yes, 1no. Internal & 2nos. external	
l) CABLE ENTRY LOCATION & TYPE	Bottom, through Gland Plate or Knock out	
m) GLAND TO TERMINAL DISTANCE	100mm (min)	
n) INTERNAL WIRING WIRE SIZE	16sqmm cu for 3 Ph, 4sqmm for 1 Ph socket	
o) PAINT TYPE AND SHADE	Epoxy, Shade 631 for Indoor & 632 for Outdoor as per IS5	
p) CERTIFICATION	IP Class	
q) ACCESSORIES TO BE SUPPLIED	Mounting Hardware (Stainless steel SS304),DC Cable gland with PVC Hood, Cu. Lugs, Rubber grommet as blanking plug	
r) Type of Gland	Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands.	

	BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32	Annexure-XI to PY55257 Rev 00 Page 06 of 07
DATASHEET OF MAJOR ILLUMINATION ITEMS		
FLAME PROOF SOCKET & RECEPTACLE (1Ph & 3 Ph)		
a) MATERIAL OF CONSTRUCTION	Cast light metal alloy, Gas tight Explosion proof	
b) IP CLASS	IP55(Min)	
c) GASKET	Non inflammable and self extinguising material	
d) EXTERNAL CANOPY REQUIRED	Required for Outdoor, 2mm thick FRP sheet to cover top and two side	
e) RATING OF SOCKET	5 pin 63A , 415V for 3 Phase & 3 Pin 20A, 230V for 1Ph	
f) PLUG REQUIRED	Yes	
g) TYPE OF CONTROLLING SWITCH (FOR 1PH & 3PH)	Rotary type with interlocking facility	
h) SPECIAL REQUIREMENT (FOR 1PH & 3PH)	Interlocking arrangement between plug & Switch such that Plug cannot be withdrawn unless switch is put OFF and switch can put ON only when Plug is fully inserted and latched.	
i)CAP FOR SOCKET	Required, either spring loaded Cap or Cap fastened with mettalic chain.	
j) NO OF TERMINAL BLOCK	Sufficient Qty required for loop in and loop out	
k)EARTHING BOLT	Yes, 1no. Internal & 2nos. external	
k) CABLE ENTRY LOCATION & TYPE	Bottom	
l) GLAND TO TERMINAL DISTANCE	100mm (min)	
m) INTERNAL WIRING WIRE SIZE	FR type 16sqmm cu. for 3 Ph, 4sqmm for 1 Ph socket	
n) GAS GROUP	As per BOQ	
o) PAINT TYPE AND SHADE	Epoxy, Shade 632or RAL7031 for IIA&IIB, Light Yellow 355 or RAL1011 for IIC	
p) CERTIFICATION	PESO/DGMS & BIS Certificate	
q) TEST REPORT	CIMFR/ERTL/BASEEFA/LCIE/UL/FM OR EQUIVALENT	
r) ACCESSORIES TO BE SUPPLIED	Mounting Hardware (Stainless steel SS304),FLP DC Cable gland with PVC Hood, Brass Blanking Plug, Cu. Lugs	
s) Type of Gland	Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands. Suitable for glas group and flame proof zone.	

	BHARAT HEAVY ELECTRICALS LIMITED HYDERABAD -32	Annexure-XI to PY55257
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DATASHEET OF MAJOR ILLUMINATION ITEMS		
1.SAFE AREA JUNCTION BOX		
a) MATERIAL OF CONSTRUCTION	Sheet steel, Dust & Weather proof, Hinged Door with anti falling screw knob, Wall/Column Mounted	
b) IP CLASS	IP65	
c) GASKET	Neoprene	
d)TYPE OF TERMINAL BLOCK	Brass Bolted type	
e)EARTHING BOLT	Yes, 2no. Internal & 2nos. external	
f) CABLE ENTRY LOCATION & TYPE	Bottom, through Knock out/Gland Plate	
g)GLAND TO TERMINAL DISTANCE	100mm (min)	
h) PAINT TYPE AND SHADE	Epoxy, Shade 631 for Indoor & 632 for Outdoor as per IS5	
i) CERTIFICATION	IP Class	
j) ACCESSORIES TO BE SUPPLIED	Mounting Hardware (Stainless steel SS304),DC Cable gland (IP65) with PVC Hood, Cu. Lugs, Rubber grommet as blanking plug	
k) Type of Gland	Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands.	
2. FLAME PROOF JUNCTION BOX		
a) MATERIAL OF CONSTRUCTION	Light Cast metal alloy, Gas tight explosion proof, Wall/Column Mounted	
b) IP CLASS	IP65	
c) GASKET	Non inflammable and self extinguising material	
d) GAS GROUP	As per BOQ	
e)TYPE OF TERMINAL e)BLOCK	Brass Bolted type	
f)EARTHING BOLT	Yes, 2no. Internal & 2nos. external	
g) CABLE ENTRY LOCATION & TYPE	Bottom	
h)GLAND TO TERMINAL DISTANCE	100mm (min)	
i) PAINT TYPE AND SHADE	Epoxy, Shade 632or RAL7031 for IIA&IIB, Light Yellow 355 or RAL1011 for IIC	
j) CERTIFICATION	PESO/DGMS & BIS Certificate	
k) TEST REPORT	CIMFR/ERTL/BASEEFA/LCIE/UL/FM OR EQUIVALENT	
l) ACCESSORIES TO BE SUPPLIED	Mounting Hardware (Stainless steel SS304),FLP Cable gland (NPT) with PVC Hood, Brass Blanking Plug, Cu. Lugs	
m) Type of Gland	Light alloy copper free aluminum alloy with electrolytic cadmium plating/ Stainless Steel double compression type cable glands. Suitable for gas group and flame proof zone.	