

Ref. Enquiry No.: PE/PG/RTC/E-6545/2020

Dated: 24/10/20

**TENDER ENQUIRY THROUGH E-PROCUREMENT
(CONDITIONAL ENQUIRY)**

SUBJECT: TENDER ENQUIRY FOR FRAMEWORK AGREEMENT (RATE CONTRACT) OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS AS PER TECHNICAL SPECIFICATION NO. PE-TS-999-558-E006

OUR REF: TENDER ENQUIRY NO: PE/PG/RTC/E-6545/2020, DTD-24.10.2020

DUE DATE – 03.11.2020, BY 02.00PM

Dear Sir/ Ma'am,

We are pleased to invite your offer for subject package in two parts strictly as per Clause-2.0 of "Instructions to Bidders" of GCC Rev 07. Please upload your best quotation/ offer on <https://bhel.abcpurchase.com> for the requirement strictly as per schedule of price format before above mentioned due date & time. The details of the tender enquiry are as mentioned below:

Sl. No	Description for which (Framework Agreement) Rate Contract is desired	Tentative Quantity	Delivery required
1	<u>LIGHTING FIXTURES, LAMPS AND MISC. ITEMS –</u> Refer Technical specification no PE-TS-999-558-E006 for detailed description.	As per BOQ cum price schedule in Annexure-I) cumulative for the Prospective Projects as per Annexure-IV	<p>FOR LOT-I - Within 4 months from the approval of last applicable primary drawing/document for the released items in PO, subjected to drawing/document submission/re-submission schedule as stipulated, delay in initial submission (if any) of last submitted applicable primary drawing/document and/or delay in re-submissions of last applicable approved primary drawing/document (with reduction of overlapping period) shall be reduced from delivery period of four months. Delay in BHEL's comments/approval of last applicable approved primary drawing/document beyond 18 days shall also be considered for delay analysis. Please refer Annexure – B of Section-I and Cl.no.12 of Section-II of Technical Specification no. PE-TS-999-558-E006.</p> <p>Delivery of subsequent lots: within 4 months from approval of last applicable primary drawing/document (of items released first time in present lot only) or lot clearance by BHEL, whichever is later. This is subjected to drawing/document submission/re-submission schedule as stipulated, delay in initial submission (if any) of last submitted applicable primary drawing/document and/or delay in re-submissions of last applicable approved primary drawing/document (with reduction of overlapping period) shall be reduced from delivery period of four months. Delay in BHEL's comments/approval of last applicable approved primary drawing/document beyond 18 days shall also be considered for delay analysis. Please refer Annexure – B of Section-I and Cl.no.12 of Section-II of Technical Specification no. PE-TS-999-558-E006.</p> <p>Mandatory Spares: Within four (04) months from the date of BHEL manufacturing clearance. Separate dispatch/ manufacturing clearance will be issued for mandatory spares.</p> <p>Delivery for Supervision of E & C Job at site by vendor:</p>

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			<p>Vendor to depute its service engineer for respective site activity within 15 days from BHEL's intimation (for deputing service engineer) for such site activity.</p> <p>For delay in deputing service engineer, LD on site activities portion shall be applicable @ ½% of the total site activities portion contract value (excluding element of taxes) per week or part thereof, with applicable GST. However, total LD (supply + site activities) shall be limited to 10% of cumulative total contract value excluding taxes and freight (supply + site activities)</p>
<p>Your best quotation/offer for the above requirement, in line with our terms and conditions, should be submitted online via e-procurement system. It shall be the responsibility of the bidder to ensure that the Tender is submitted on or before the due date by 2.00PM. Part-I bids shall be opened at 3.00PM on due date through e-procurement Portal.</p> <p>Detailed Tender documents can be downloaded from the following websites: -</p> <p>a) www.eprocure.gov.in b) https://bhel.abcpocure.com c) www.bhel.com d) www.bhelpem.com</p>			
<p>Tender submission through e-procurement portal- Bidders may go through the Sellers' manual & Help documents provided on E-Procurement Portal website (https://bhel.abcpocure.com).</p> <p>E-procurement service Provider details: M/s E-Procurement Technologies Limited, Ahmedabad B705. Wall Street II, Opp. Orient Club, Near Gujrat college, Ellis Bridge, Ahmedabad, PIN 380 006. Please get in touch with our service provider at the earliest for required support. The contact details of the service provider are given at: https://bhel.abcpocure.com/EPROC/contactus</p>			
<p>Note: -</p> <ol style="list-style-type: none">1. Please note that Part Supplies offered for tender BOQ shall disqualify the bidder's offer.2. Documents and Credential as per Technical PQR, Techno Commercial Bids and Price Bids should be uploaded on the e-procurement portal.3. Bidders to ensure that Third party/customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/certificate issuing authority such as name & designation of Issuing Authority and its organisation contact number and email Id etc. In case the same found not available, Purchaser has right to reject such document from evaluation.4. "This item/Package/System falls under the list of items defined in Para 3 of Ministry of Finance guideline datedt.20-09-2016 (procurement of items related to public safety, health, critical security operations and equipment's, etc.) & hence criteria of prior experience/turnover shall be same for all the bidders including start up/MSME".			

Please refer GCC Rev-07 which is available on www.bhelpem.com. You are requested to kindly download the same.

TERMS AND CONDITIONS

1. Bidders to note that their bid shall be conditional, subject to qualify PQR (technical), Customer Approval & registration in PEM for subject package before price bid opening
2. Framework Agreement (Rate contract), will be done for 2 years from placement of Framework Agreement (Rate contract) PO with a provision for further extension after review on mutual consent.
3. Framework Agreement (Rate contract) is proposed to be done with 2 vendors in ratio of 70:30 value wise at L1 FOR site price (Ex-works + freight) for this package. Splitting of Framework Agreement (Rate contract) between 2 vendors may be changed during project ordering process if any vendor in Framework Agreement (Rate Contract) is not approved by customer (i.e. BHEL may place order on any of the vendor in Framework Agreement (Rate Contract) up to total applicable Framework Agreement (Rate Contract) value in case of non-availability of

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customer approval for other vendor in Framework Agreement (Rate Contract)). However, order for a project shall not be split and the same shall be informed to bidders through NIT.

4. Framework Agreement (Rate Contract) will be finalized on total lump sum basis instead of item wise evaluation so that the complete requirement against one project is not split amongst various vendors to minimize operational difficulty.

L1 Rates (Ex works + Freight) shall be counter offered to all bidders who participated in Price Bid Opening/RA for 30% value and in case acceptance of counter offer received from more than one vendor then acceptance shall be considered as per FINAL Price Bid Opening / Reverse Auction Ranking (as applicable). If none accepts L1 rates, Framework Agreement (Rate Contract) shall be done with L1 vendor for 100% value.

5. PVC is not applicable for this package. Prices shall remain firm throughout the contract period.
6. Following clause will be applicable in line with MII circular Public Procurement (preference to make in India), order 2017 Rev dated-04.06.2020-

"For this procurement, the local content to categorize a supplier as Class I local supplier/ Class II local supplier/ Non Local supplier and purchase preference to Class I local supplier is as defined in Public Procurement (Preference to Make India), Order 2017 dated 04.06.2020 issued by DPIT. In case of subsequent order issued by nodal ministry changing the definition of local content for item in NIT, the same shall be applicable even if issued after issue of this NIT but before opening of part-II bids against this NIT."

Since this package falls under the category of goods, services or works in respect of which nodal ministry/ department has communicated that there is a sufficient local capacity and competition, **only Class-I local suppliers as defined in the order are eligible to bid.**

7. Following point to be noted regarding verification of local content-

The supplier at the time of tender, bidding or solicitation shall be required to provide self-certification that the item offered meets the minimum local content, in accordance with para 9 (b) of PP-MII order revision dated-04.06.2020.

Point no 6 & 7 above will supersede point no 26 of ITB of GCC Rev 07.

8. Bidders to note the following: -
- Tender Evaluation - Evaluation will be done on overall L1 (Total Cost to BHEL excluding GST) basis with necessary loading as applicable i.e. **Evaluation will be on Ex Works + Freight basis** for this tender.
 - In case of PBO, the loading (technical/commercial), if any, shall be added by BHEL for evaluation.
 - In case of RA, the loading (technical/commercial), if any, shall be added by bidder while submitting the bid in reverse auction portal.
 - Ordering shall be done after de-loading the commercial/ technical loading from bidder's final price.
 - In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders. In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss / draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s). Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.
 - Bidder to give single % of freight charges considering anywhere in India in the freight column. Bidders have to give same % of freight for each line item.**

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- iv. Bidders to mention applicable GST rate on (total Ex. works + freight) in the specified cells of price schedule on price form at e-procurement portal. However, may please note that GST shall not be considered in evaluation.
- v. Though evaluation is on Ex Works + Freight, but there is % allocation weightage against BOQ quantity of each item which shall be used for arriving at price break up. Bidders need to give only their total ex works price for given BOQ at the specific cells that has been kept opened in the price schedule available in the e-procurement portal (Grand Total ex works price). **Price mentioned anywhere else in BOQ or price uploaded anywhere else in the e-procurement portal shall not be taken in cognizance.**
- vi. Rest of the prices shall be derived by BHEL in line with allocation fixed for each item. There is formula applied in price schedule form available in e-procurement portal. As soon as bidder fills the cells for Total Ex works, freight percentage and GST percentage, rest values for e.g. unit ex works – item wise, total ex works – item wise, FOR site price – item wise will filled automatically.
- vii. For better clarity to the bidders where value is to be filled is kept open in price form at e-procurement portal and for other columns it will be locked which shall be derived by BHEL as per allocation fixed against each item.
- viii. HSN Code has been mentioned in Price Schedule.
- ix. Incomplete offer shall be summarily rejected.
- x. **PRE-QUALIFICATION REQUIREMENT:-**
Bidders is requested to fill up the details in “TECHNICAL PRE-QUALIFYING REQUIREMENT” as per the conditions mentioned in the PQR (technical) and also to submit the credentials.
Bids of only those bidders shall be evaluated who meet the Technical pre-qualifying requirements (if applicable). **Bidders to ensure that Third party/customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document/certificate issuing authority such as name & designation of Issuing Authority and its organisation contact number and email Id etc. In case the same found not available, Purchaser has right to reject such document from evaluation.**
“This item/Package/System falls under the list of items defined in Para 3 of Ministry of Finance guideline datedt.20-09-2016 (procurement of items related to public safety, health, critical security operations and equipment’s, etc.) & hence criteria of prior experience/turnover shall be same for all the bidders including start up/MSME”.
- xi. Bidders to note that their bid shall be conditional subject to qualify PQR (technical) & Customer Approval by registered vendors & non-registered vendors have to qualify PQR (technical) & get registered with PEM as well as Customer Approval for the package **before price bid opening.**
For registration in PEM “Bidders needs to apply & get registered for subject package with PEM before P-2 (price bid opening) & hence you need to apply online for registration on PEM web portal & have to enclose acknowledgement with this effect with the bid documents else your bid may not be considered for evaluation”
- xii. This enquiry is subject to Conditions/ limits if any imposed in PMD / Vendor registration/ Customer Approval.
- xiii. Refer Annexure I for tentative quantity of LIGHTING FIXTURES, LAMPS AND MISC. ITEMS, required for prospective projects. Project list is indicative only, BHEL may ask for delivery anywhere in India for any of the project added in the prospective project/ existing projects during RC period. No minimum quantity is guaranteed by BHEL.
- xiv. Following terms are applicable for quantity variations-
- a) Overall Quantity variation shall be plus 30 percent of the contract value. Bidders to note that the quantities indicated in the tender are tentative quantities. No minimum quantity is guaranteed by BHEL.
- b) For the items " lighting Luminaries" and " lighting Lamps", the above quantity variation shall be calculated at the total order value against items "lighting Luminaires" (sum of order value

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of sub items i.e. all type of lighting luminaires) and " lighting lamps" (sum of order value of sub items i.e. all type of lighting lamps) respectively.

- c) Quantities released (In Lots) up to 100% of contract value shall be intimated within 03 years from date of original PO
d) Lots for supply subsequent to 03 years shall be limited to 30% of order value.

xv. Following terms are applicable -

- a) Project specific indent for each FGD projects shall be issued separately, Manufacturing clearance of quantities shall be derived & issued from customer approval on project lighting drawings which shall be informed during the course of execution of said project engineering by vendor.
b) Container as mentioned cl.no.07 of section-II of Technical Specification are to be supplied along with the first supply. The price of container is deemed to be included in package price. No separate charges shall be payable.
c) The material shall be supplied in LOTs. LOTs shall be released progressively based on approved conduit layout of different areas and project requirement.
d) Lighting system design charges are deemed to be included in the price of BOQ items. No separate charges for design activity will be payable.

xvi. CIF allocation is not applicable for this tender. Bidder to quote accordingly.

xvii. Tenderers must enclose the Quality Plan in the prescribed format, for approval. Equipment will be dispatched only after Purchaser's / Owner's inspection of the hold points specified in the approved Quality Plan and issue of Material Dispatch Clearance Certificate (MDCC).

xviii. In case of joint bidding, bidders to furnish scope matrix which should be clearly defined between them along with the offer for the complete scope.

xix. **Integrity pact is applicable for this tender**

IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

Sl No.	IEM	Phone & Email
1.	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
2.	Shri Virendra Bahadur Singh, IPS (Retd.)	ybsinghips@gmail.com

The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this pact would be a preliminary qualification. (Refer Annexure-6 for Integrity pact).

Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the any of the IEMs mentioned in the NIT. All correspondence with the IEMs shall be done through email only.

"No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department officials whose contact details are provided above in NIT".

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OTHER TERMS AND CONDITIONS

1. Procurement of the subject package shall be done through e-procurement
2. Offers should be uploaded in two parts online at <https://bhel.abcprocure.com> in as follows:
 - a) Part-I Bid: - Documents and Credential as per Technical PQR and Techno-Commercial offer (along with un-priced copy of un-priced bid and un-priced schedule of Technical-Commercial Deviation, Annexure I & II)
 - b) Part II Bid: - Price Bid and Priced schedule of Technical-Commercial Deviation
3. Terms and conditions: -
 - a) Part I bid will be opened on date & time mentioned in the NIT or subsequent corrigenda/amendments, if any.
 - b) **Techno-commercial offer of only those bidders shall be evaluated who will meet the Technical & Financial pre-qualifying requirement of the tender.**
All the above Tender Documents shall automatically become a part of the Order/Contract after its finalisation.
4. Vendors shall quote in accordance with the requirements mentioned in the tender documents. In case of deviations (Technical/ Commercial), the same shall be highlighted separately giving Clause references along with the Cost of withdrawal of Deviations in e-procurement portal, along with reasons for taking such deviations.
Bidder to note all the points mentioned in "Notes" of cost of withdrawal sheet in e-procurement portal.
5. **Please note the following:**
 - a. **Compliance to price form available at e-procurement portal.**
 - b. **SCC enclosed for compliance.**
GCC enclosed for compliance. GCC Rev-07 is available on www.bhelpem.com. You are requested to kindly download the same. Bidders are requested for furnishing compliance of these documents.
6. Tenders shall be submitted strictly in accordance with the requirements of the above tender documents.
7. Standard pre-printed terms & conditions of the tenderers shall not be considered valid.
8. Validity of offer shall be as per cl.no.7(instruction to bidders) of GCC Rev 07.
9. Unsolicited fresh/revised Price Bids shall not be entertained.
10. Purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any/all tender(s) in part or full without assigning any reason whatsoever.
11. Late tenders will be rejected.
12. Definition of Terms is also enclosed. These definitions will apply to all the tender documents including this Enquiry Letter.
13. Tenders and all correspondence thereof, shall be addressed to the undersigned by name & designation and sent at the following address:

Mr. AJAY JAIN, DGM, CMM M/s Bharat Heavy Electricals Ltd., Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 Kind Attn: AJAY JAIN/ CMM E-MAIL: ajayjain@bhel.in Ph. No. 0120- 4368986 , 9871002977	Mr. SUMEET SAHAY, DY MGR, CMM M/s Bharat Heavy Electricals Ltd., Project Engineering Management, Power Project Engineering Institute, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida-201301 Kind Attn: SUMEET SAHAY/ CMM E-MAIL: sumeetsahay@bhel.in Ph. No. 0120-4213532 ,09999498202
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14. **A) Payment terms applicable for Main Supply (inclusive of E & C Spares) for this tender will be :-**

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Payment of basic price of material supplied, along with freight & GST shall be paid against receipt of material at site on pro-rata basis. 15% of basic price of materials supplied will be retained as security deposit which will be released on pro - rata basis as per details below:

a) 10% will be released on pro-rata basis after submission of Material Receipt Certificate (MRC) from project site engineer of owner/purchaser. For obtaining MRC from project site/owner, vendor shall depute their representative to project site. Packages shall be opened at site in presence of vendor representative for verification of material supplied. If any material found damaged/ short supplied during verification, then Vendor shall be responsible for replenishment.

b) 5% payment shall be released on submission of soft and hard copies of final approved drg./docs. (Including O & M Manual) as per requirement of SCC of project.

B) Payment Terms for supervision of E & C Shall be : As per cl no 9.5 of GCTC of GCC Rev 07

C) Payment Terms for Mandatory Spares: As per clause no. 9.1 of GCC Rev 07

15. **Delivery: The following delivery term for project specific Purchase Orders which will be issued on the basis of subject Rate Contract will be: -**

Delivery Schedule for Main Supply (inclusive of E & C spares) and Mandatory Spares Supply:

FOR LOT-I - Within 4 months from the approval of last applicable primary drawing/document for the released items in PO, subjected to drawing/document submission/re-submission schedule as stipulated, delay in initial submission (if any) of last submitted applicable primary drawing/document and/or delay in re-submissions of last applicable approved primary drawing/document (with reduction of overlapping period) shall be reduced from delivery period of four months. Delay in BHEL's comments/approval of last applicable approved primary drawing/document beyond 18 days shall also be considered for delay analysis. Please refer Annexure – B of Section-I and Cl.no.12 of Section-II of Technical Specification no. PE-TS-999-558-E006.

Delivery of subsequent lots: within 4 months from approval of last applicable primary drawing/document (of items released first time in present lot only) or lot clearance by BHEL, whichever is later. This is subjected to drawing/document submission/re-submission schedule as stipulated, delay in initial submission (if any) of last submitted applicable primary drawing/document and/or delay in re-submissions of last applicable approved primary drawing/document (with reduction of overlapping period) shall be reduced from delivery period of four months. Delay in BHEL's comments/approval of last applicable approved primary drawing/document beyond 18 days shall also be considered for delay analysis. Please refer Annexure – B of Section-I and Cl.no.12 of Section-II of Technical Specification no. PE-TS-999-558-E006.

Mandatory Spares: Within four (04) months from the date of BHEL manufacturing clearance. Separate dispatch/ manufacturing clearance will be issued for mandatory spares.

Delivery for Supervision of E & C Job at site by vendor:

Vendor to depute its service engineer for respective site activity within 15 days from BHEL's intimation (for deputing service engineer) for such site activity.

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For delay in deputing service engineer, LD on site activities portion shall be applicable @ ½% of the total site activities portion contract value (excluding element of taxes) per week or part thereof, with applicable GST. However, total LD (supply + site activities) shall be limited to 10% of cumulative total contract value excluding taxes and freight (supply + site activities).

BHEL Drawing No	Drawing Title	Primary/Secondary	Drg Sch for Vendors
PE-V0-XXX-558-E101	OGA of equipments such as fixture, SBs, JBs, Receptacles, free standing ladder, Emergency exit sign, wheel mounted ladder, ceiling fans, ELU, etc.	Primary	R-0 within 28 days from lot clearance of released items & subsequent revisions within 15 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.
PE-V0-XXX-558-E102	Datasheet of lamps, CFL, Fluorescent tube, PVC coated conduit	Primary	
PE-V0-XXX-558-E901	MQP FOR LUMINARIES	Primary	
PE-V0-XXX-558-E905	MQP FOR MISCELLANEOUS ITEMS	Primary	
PE-V0-XXX-558-E201	Lighting design Calculation	Secondary	Within 3 weeks from the date of BHEL input drawing & re-submission within 15 days of BHEL comments. BHEL shall furnish comments / approval on each submission within 18 days from receipt.
PE-V0-XXX-558-E301	Lighting Layout	Secondary	
PE-V0-XXX-558-E401	Conduit Layout	Secondary	Within 15 days from the approval of respective LLOs
PE-V0-XXX-558-E103	MOUNTING ARRANGEMENT OF BULK HEAD FIXTURE	Secondary	Along with respective OGA
PE-V0-XXX-558-E104	TYPE TEST REPORTS FOR LIGHTING FIXTURES	Secondary	Within 2 months from lot clearance for applicable items
PE-V0-XXX-558-E105	FIELD QUALITY PLAN OF LIGHTING FIXTURES	Secondary	Within 3 months from PO
PE-V0-XXX-558-E106	MOUNTING ARRANGEMENT drgs.	Secondary	Along with respective OGA

NOTE :

- The above list of drawings and documents is indicative. Number of drawings may vary as per project requirement.
- The end period specified is for completion of the deliveries. Deliveries to start progressively so as to meet the completion schedule.
- The delivery conditions specified are for contractual LD purposes, however BHEL may ask for early deliveries without any compensation thereof.
- "Non-applicable drawings shall be decided during bid evaluation".
- Wherever schedule of drawings/documents submission / re-submission is stipulated in the Technical Specifications, same shall be superseded by delivery specified in NIT.

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16. All other terms and conditions shall be as per GCC Rev 07 and Special Conditions of (Framework Agreement) Rate Contract. In the event of any contradiction in the terms and conditions mentioned, the order of preference shall be as mentioned in clause no 36 of GCTC of GCC (Rev.07).
17. All the above Tender Documents shall automatically become a part of the Order/Contract after its finalization.
18. **All** corrigenda, addenda, amendments, time extensions, clarifications etc. to the tender will be hosted on BHEL websites only (www.bhelpem.com., www.bhel.com & <https://bhel.abcpocure.com> under subject tender reference. Bidders are requested to visit our websites from time to time to keep themselves updated. **Bidders may go through the Sellers' manual & Help documents provided on E-Procurement Portal website & obtain required Digital Signature Certificate for participating in the subject Tender.**
19. Bidders to submit their offers strictly in line with the form available at e-procurement portal.
20. Inspection shall be done by BHEL/ END CUSTOMER/Third party Agency (finalized by BHEL).
21. Foreign & indigenous bidders participating through open/limited tender will necessarily have to but class III DSCs issued by the certifying authorities in India. Basic procedure/ checklist is uploaded on www.bhel.com.
22. Non- registered bidder to submit the credentials required for Registration in BHEL PEM: -
"Online Registration Portal is operational in BHEL. Non-registered Vendors, who wish to apply for registration with BHEL-PEM, have to apply through Online Registration Portal available at www.bhelpem.com - vendor section - Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration has to be uploaded on the website and submit the application for registration. One set of hard copy of the filled-up SRF downloaded from Online Registration Portal duly signed and stamped has to be submitted."
23. Purchaser reserves the right to split up the scope of the tender enquiry and place the orders for different scope/ items with different bidders and also increase or decrease the quantity.
24. RA guideline 2020 shall be applicable for this tender and same is available at http://www.bhel.com/vender_registration/pdf/Guidelines%20for%20Reverse%20Auction-2020.pdf
Bidders to note following point before quoting-
"BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) for this tender. RA shall be conducted among all the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."
Note: - Vendors to note that above RA clause will supersede clause no 13 of " Instruction to bidders " of GCC Rev-07.
"The Bidders has to quote the Single Price (i.e. Total Cost to BHEL) (excl. GST) in Reverse Auction. Price are to be inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, Freight as applicable, including loading (if any) but excluding GST. De-loading (if any) shall be done in line with NIT terms.
25. If any bidder has mentioned the term Not Applicable / Not required / Not Quoted in bidding form. The bidder needs to substantiate the same. If the same item will be required in future for the system same will be supplied free of cost.
26. L1 bidder will have to submit Bank Guarantee for each POs (irrespective of value) which will be placed under the (Framework Agreement) Rate Contract finalised through this tender considering RC as original contract as per format mentioned in in GCC Rev 07.
27. *The evaluation currency for this tender shall be INR.*
28. Restrictions under Rule 144(xi) of the General Financial Rules (GFRs), 2017

MR SUMEET SAHAY
DY MANAGER/CMM
BHEL/PS-PEM
POWER PROJECT ENGINEERING INSTITUTE,
PLOT NO. 25, SECTOR - 16A, NOIDA (UP)
(OFF) 0120-4213532, 09999498202

Regd. Office:
BHEL House
Siri Fort
New Delhi-110049

Ref. Enquiry No.: PE/PG/RTC/E-6545/2020

Dated: 24/10/20

**TENDER ENQUIRY THROUGH E-PROCUREMENT
(CONDITIONAL ENQUIRY)**

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Order means

- a. An entity incorporated, established or registered in such a country; or
- b. A subsidiary of an entity Incorporated. established or registered in such a country; or
- c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
- d. An entity whose beneficial owner is situated in such a country: or
- e. An Indian (or other) agent of such an entity; or
- f. A natural person who is a Citizen of such a country; or
- g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

IV. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means,

Explanation-

a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;

b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions Including by virtue of their shareholding or management rights or shareholder's agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together. or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of Individuals;

4. Where no natural person is Identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

5. In case of a trust, the identification of beneficial owner(s) shall Include identification of the author of the trust. the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person

Ref. Enquiry No.: PE/PG/RTC/E-6545/2020

Dated: 24/10/20

**TENDER ENQUIRY THROUGH E-PROCUREMENT
(CONDITIONAL ENQUIRY)**

Note- The above clause shall not be applicable for the bidders from those countries (even if sharing a land order with India) to which the Government of India (Gol) has extended lines of credit or in which the Gol is engaged in development work.

Thanking you,

Yours faithfully,
For and on behalf of BHEL

(Signature of official with Name & Designation)

Enclosure:

1. Enquiry Terms & Conditions.
2. Price Schedule - Annexure-I to NIT (to be filled in e-procurement portal only)
3. Cost of withdrawal sheet -Annexure-II to NIT (to be filled in e-procurement portal only)
4. Technical Specifications.
5. Technical PQR
6. SCC – Annexure-III to NIT.
7. Prospective Project List – Annexure-IV to NIT
8. Bank Guarantee Format – Annexure-V to NIT.
9. Integrity Pact (IP) – Annexure-6 to NIT

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ANNEXURE- I TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020

PRICE SCHEDULE FOR MAIN SUPPLY , E & C SPARES , MANDATORY SPARES , & SUPERVISION OF E & C OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT

RATE CONTRACT													
SL. NO.	ITEM CODE	ITEM DESCRIPTION	UOM	QUANTITY	HSN CODE	FORMULA FOR UNIT EX- WORKS PRICE (DULY PACKED) (INR)	UNIT EX- WORKS PRICE (DULY PACKED) (INR)	FORMULA FOR TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL FOR SITE PRICE (INR)	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.0		MAIN SUPPLY OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT											
1.1		Lighting Luminaires (complete with accessories)											
1.1.01	558-12117-A	LED tube fixture with industrail box type base without any cover (Equivalent to FC02) for Stair Case	Nos.	250	9405	0.01572	Derived	3.92966	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.02	558-12118-A	Industrial type LED tube fixture suitable for conduit/surface/suspended mounting, with integral driver aesthetically designed for switchgear/ equipment room (Equivalent to FC06)	Nos.	3000	9405	0.00157	Derived	4.71246	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.03	558-12119-A	Panel (600X600) LED luminaire suitable for recess mounting in false ceiling with integral driver aesthetically designed for control room/oofice (Equivalent to FC26)	Nos.	1000	9405	0.01354	Derived	13.53906	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.04	558-12200-A	High bay, industrail type LED fixture with driver & module (Equivalent to SB03)	Nos.	550	9405	0.00871	Derived	4.79299	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.05	558-12199-A	Medium bay, industrail type LED fixture with driver & module (Equivalent to SB02)	Nos.	250	9405	0.00672	Derived	1.68079	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.06	558-12120-A	LED fixture corrosion proof, totally enclosed type for battery room (Equivalent to FC81)	Nos.	600	9405	0.00055	Derived	0.32747	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.07	558-12122-A	Street Light LED Fixture SS62	Nos.	450	9405	0.01152	Derived	5.18469	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.08	558-12201-A	LED Flood Light heavy duty type SF63	Nos.	200	9405	0.01556	Derived	3.11171	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.09	558-12202-A	LED Flood Light heavy duty type SF64	Nos.	250	9405	0.02722	Derived	6.80515	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	



ANNEXURE- I TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020

PRICE SCHEDULE FOR MAIN SUPPLY , E & C SPARES , MANDATORY SPARES , & SUPERVISION OF E & C OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT

RATE CONTRACT													
SL. NO.	ITEM CODE	ITEM DESCRIPTION	UOM	QUANTITY	HSN CODE	FORMULA FOR UNIT EX- WORKS PRICE (DULY PACKED) (INR)	UNIT EX- WORKS PRICE (DULY PACKED) (INR)	FORMULA FOR TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL FOR SITE PRICE (INR)	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.1.10	558-12205-A	Well glass type, Vapour proff LED ficture suitable for platforms SW41	Nos.	1500	9405	0.00403	Derived	6.03797	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.11	558-12206-A	Well glass type, vapour proff LED ficture suitable for platforms SW42	Nos.	500	9405	0.00709	Derived	3.54411	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.12	558-12195-A	Industrial type LED fixture suitable for conduit/ surface/ suspended/ column mounting, having integral driver. Fixture shall operate on 220V DC input supply.(Equivanet to FC07)	Nos.	220	9405	0.00201	Derived	0.44235	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.13	558-12196-A	Decorative, recessed type LED fixture having integral driver. Fixture shall operate on 220V DC input supply. (Equivanet to FC33)	Nos.	100	9405	0.00163	Derived	0.16339	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.14	558-12197-A	Well glass, dust proof type LED fixture having integral driver. Fixture shall operate on 220V DC input supply.(Equivanet to FC34)	Nos.	100	9405	0.00346	Derived	0.34631	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.1.15	558-12224-A	Downlighter LED (18 W = 6x3W)	Nos.	50	9405	0.00180	Derived	0.08999	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.2		24V supply module & lamp unit complete with all accessories (For tehcnical detail please refer specification)											
1.2.01	558-12002-A	Fixed type 24V supply modules	Nos.	20	8537	0.02587	Derived	0.51732	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.2.02	558-12078-A	Portable halogen lamp unit	Nos.	100	9405	0.00381	Derived	0.38067	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.2.03	558-12105-A	5A, 24V industrial type sockets	Nos.	300	8536	0.00363	Derived	1.08929	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	



ANNEXURE- I TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020

PRICE SCHEDULE FOR MAIN SUPPLY , E & C SPARES , MANDATORY SPARES , & SUPERVISION OF E & C OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT

RATE CONTRACT													
SL. NO.	ITEM CODE	ITEM DESCRIPTION	UOM	QUANTITY	HSN CODE	FORMULA FOR UNIT EX- WORKS PRICE (DULY PACKED) (INR)	UNIT EX- WORKS PRICE (DULY PACKED) (INR)	FORMULA FOR TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL FOR SITE PRICE (INR)	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.3		Switch boxes for individual control of circuits (Switchboards consisting of switch boxes, switches, switch plates and fixing accessories.)											
1.3.01	558-12087-A	Type SWB1	Nos.	300	8536	0.00061	Derived	0.18448	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.3.02	558-12088-A	Type SWB2	Nos.	100	8536	0.00195	Derived	0.19541	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.3.03	558-12089-A	Type SWB3	Nos.	100	8536	0.00437	Derived	0.43699	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.3.04	558-12099-A	Type SWB4	Nos.	100	8536	0.00499	Derived	0.49936	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.3.05	558-12100-A	Type SWB5	Nos.	100	8536	0.00606	Derived	0.60575	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.4		Junction boxes							Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.4.01	558-12026-A	Type JB-F	Nos.	8000	8536	0.00058	Derived	4.60705	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.4.02	558-12027-A	Type JB-FE	Nos.	520	8536	0.00061	Derived	0.31722	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.5		Receptacles											
1.5.01	558-12079-A	Type RA	Nos.	250	8536	0.00205	Derived	0.51195	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.5.02	558-12081-A	Type RB	Nos.	200	8536	0.00194	Derived	0.38750	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.5.03	558-12082-A	Type RC (welding receptacle)	Nos.	130	8536	0.01908	Derived	2.48068	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.6		Ceiling fans with electronic regulators											
1.6.01	558-12010-A	1200 mm sweep	Nos.	100	8414	0.00281	Derived	0.28111	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.7	558-12018-A	Emergency lighting Units (With Ni-Cd battery, Charger and 2 CFL lamp)	Nos.	100	8513	0.01779	Derived	1.77889	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	



ANNEXURE- I TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020

PRICE SCHEDULE FOR MAIN SUPPLY , E & C SPARES , MANDATORY SPARES , & SUPERVISION OF E & C OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT

RATE CONTRACT													
SL. NO.	ITEM CODE	ITEM DESCRIPTION	UOM	QUANTITY	HSN CODE	FORMULA FOR UNIT EX- WORKS PRICE (DULY PACKED) (INR)	UNIT EX- WORKS PRICE (DULY PACKED) (INR)	FORMULA FOR TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL FOR SITE PRICE (INR)	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.8		Flexible conduit											
1.8.01	558-12021-A	20 mm dia TERNE coated conduit	mtrs.	11000	8307	0.00138	Derived	15.13886	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.9		Ladder											
1.9.01	558-12022-A	Free standing ladder	Nos.	10	8307	0.21083	Derived	2.10832	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.9.02	558-12091-A	Wheel mounted ladder	Nos.	10	7616	0.20018	Derived	2.00176	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.9.03	558-12019-A	EXIT SIGN	Nos.	100	9405	0.01380	Derived	1.38016	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.9.04	558-12094-A	Pedestal Fan 400m sweep (50-65 watt approx)	Nos.	100	8414	0.00688	Derived	0.68813	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.9.05	558-12139-A	Occupancy Sensor	Nos.	50	9999	0.00719	Derived	0.35949	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
1.10	SUB TOTAL FOR MAIN SUPPLY ITEMS(from 1.1 to 1.9.05)							90.65849	Derived	Derived	Derived	Derived	
2.0		E&C SPARE ITEMS											
2.1		Lighting Luminaires DRIVER											
2.1.01	558-12017-A	Industrial type LED tube fixture suitable for conduit/surface/suspended mounting, with integral driver aesthetically designed for switchgear/ equipment room (Equivalent to FC06)	Nos.	90	9405	0.00131	Derived	0.11789	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.02	558-12017-A	Panel (600X600) LED luminaire suitable for recess mounting in false ceiling with integral driver aesthetically designed for control room/ooffice (Equivalent to FC26)	Nos.	30	9405	0.00471	Derived	0.14137	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.03	558-12017-A	High bay, industrail type LED fixture with driver & module (Equivalent to SB03)	Nos.	17	9405	0.02462	Derived	0.40617	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	



ANNEXURE- I TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020

PRICE SCHEDULE FOR MAIN SUPPLY , E & C SPARES , MANDATORY SPARES , & SUPERVISION OF E & C OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT

RATE CONTRACT													
SL. NO.	ITEM CODE	ITEM DESCRIPTION	UOM	QUANTITY	HSN CODE	FORMULA FOR UNIT EX- WORKS PRICE (DULY PACKED) (INR)	UNIT EX- WORKS PRICE (DULY PACKED) (INR)	FORMULA FOR TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL FOR SITE PRICE (INR)	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
2.1.04	558-12017-A	Medium bay, industrail type LED fixture with driver & module (Equivalent to SB02)	Nos.	8	9405	0.01917	Derived	0.14379	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.05	558-12017-A	LED fixture corrosion proof, totally enclosed type for battery room (Equivalent to FC81)	Nos.	18	9405	0.00280	Derived	0.05042	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.06	558-12017-A	LED tube fixture with industrail box type base without any cover (Equivalent to FC02) for Stair Case	Nos.	8	9405	0.00131	Derived	0.00983	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.07	558-12017-A	Street Light LED Fixture SS62	Nos.	14	9405	0.01152	Derived	0.15554	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.08	558-12017-A	LED Flood Light heavy duty type SF63	Nos.	6	9405	0.01556	Derived	0.09335	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.09	558-12017-A	LED Flood Light heavy duty type SF64	Nos.	8	9405	0.02722	Derived	0.20415	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.10	558-12017-A	Well glass type, Vapour proff LED ficture suitable for platforms SW41 (For Platform Lighting)	Nos.	45	9405	0.00403	Derived	0.18114	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.11	558-12017-A	Well glass type, vapour proff LED fixture suitable for platforms SW42 (For Platform Lighting 30% of SW41)	Nos.	15	9405	0.00709	Derived	0.10632	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.12	558-12017-A	Industrial type LED fixture suitable for conduit/ surface/ suspended/ column mounting, having integral driver. Fixture shall operate on 220V DC input supply.(Equivanet to FC07)	Nos.	7	8539	0.00201	Derived	0.01327	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.13	558-12017-A	Decorative, recessed type LED fixture having integral driver. Fixture shall operate on 220V DC input supply. (Equivanet to FC33)	Nos.	3	8539	0.00164	Derived	0.00491	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	



ANNEXURE- I TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020

PRICE SCHEDULE FOR MAIN SUPPLY , E & C SPARES , MANDATORY SPARES , & SUPERVISION OF E & C OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT

RATE CONTRACT													
SL. NO.	ITEM CODE	ITEM DESCRIPTION	UOM	QUANTITY	HSN CODE	FORMULA FOR UNIT EX- WORKS PRICE (DULY PACKED) (INR)	UNIT EX- WORKS PRICE (DULY PACKED) (INR)	FORMULA FOR TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL FOR SITE PRICE (INR)	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
2.1.14	558-12017-A	Well glass, dust proof type LED fixture having integral driver. Fixture shall operate on 220V DC input supply.(Equivalent to FC34)	Nos.	3	8539	0.00346	Derived	0.01039	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.1.15	558-12017-A	Downlighter LED (18 W = 6x3W)	Nos.	2	9405	0.00180	Derived	0.00270	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
2.2	SUB TOTAL FOR E & C SPARES (from 2.1.1 to 2.1.15)							1.64124	Derived	Derived	Derived	Derived	
3	MANDATORY SPARES OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT - For Break-up of items please refer Annexure- IA .							6.82181	Derived	Derived	Derived	Derived	
4	SUPERVISION OF E & C OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT - For Break-up of items please refer Annexure-IB							0.87846	Derived	-	Derived	Derived	
5	GRAND TOTAL FOR MAIN SUPPLY , E & C SPARES , MANDATORY SPARES , & SUPERVISION OF E & C (1.10+2.2+3+4)							100.00000	X= TO BE QUOTED (IN FIGURES)	Derived	Derived	Derived	
6	GRAND TOTAL IN WORDS FOR SL.NO.5								X= TO BE QUOTED (IN WORDS)				

NOTE :-

- Bidder has to quote only Total Value 'X' = i.e. Total lumpsum ex-works price for Main Supply+E& C Spares +Mandatory Spares + Supervision of E & C . Based on this price, unit price shall be derived for all items as per formula indicated above.
- Bidder to note that evaluation shall be on Total Ex works price + Freight. Bidder to quote grand total Ex works value of the complete package only as per the BOQ above. The item wise break up of Ex works prices (unit as well as total) for all the items in the BOQ shall be derived as per the formulae indicated above by BHEL. Bidder also need to indicate Freight and GST rate in percentage in the respective column. Freight percentage to be quoted in percentage of Ex works value considering delivery anywhere in India.
- Value is to be filled only where "to be quoted" is mentioned and for other columns where "derived" is mentioned same shall be derived by BHEL as per % allocation fixed against each item.
- Price mentioned anywhere else in BOQ shall not be taken in cognizance.
- For any clarification please refer Technical Specification no. PE-TS-999-558-E006, REV-0
- In case of Reverse Auction, vendor has to quote their Ex Works price+ Freight .
- Quantity variation shall be as per NIT.
- Container as mentioned cl.no.07 of section-II of Technical Specification are to be supplied along with the supplies. The price of container is deemed to be included in package price. No separate charges shall be payable.
- The material shall be supplied in LOTs. LOTs shall be released progressively based on approved conduit layout of different areas and project requirement.
- Lighting system design charges are deemed to be included in the price of above items. No separate charges for design activity will be payable.
- For item at Sl. No. 1 above "Lighting Luminaries (complete with accessories)", the quantity variation shall be calculated at the total order value against item at Sl. No. 5.

ANNEXURE IA TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020													
PRICE SCHEDULE FOR MANDATORY SPARES OF LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT													
RATE CONTRACT													
SL. NO.	ITEM CODE	ITEM DESCRIPTION	UOM	QUANTITY	HSN CODE	FORMULA FOR UNIT EX- WORKS PRICE (DULY PACKED)	UNIT EX- WORKS PRICE (DULY PACKED) (INR)	FORMULA FOR TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	TOTAL EX- WORKS PRICE (DULY PACKED) (INR)	FREIGHT CHARGES WITHOUT GST @ % OF TOTAL EX WORKS (INR)	APPLICABLE GST RATE % ON (TOTAL EX WORKS + FREIGHT) (INR)	TOTAL FOR SITE PRICE (INR)	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
3.1		Lighting Luminaires (complete with accessories)											
3.1.01	558-12000-B	Industrial type LED tube fixture suitable for conduit/surface/suspended mounting, with integral driver aesthetically designed for switchgear/ equipment room (Equivalent to FC06)	Nos.	52	9405	0.00131	Derived	0.06811	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.02	558-12000-B	Panel (600X600) LED luminaire suitable for recess mounting in false ceiling with integral driver aesthetically designed for control room/ooffice (Equivalent to FC26)	Nos.	52	9405	0.00471	Derived	0.24505	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.03	558-12000-B	High bay, industrail type LED fixture with driver & module (Equivalent to SB03)	Nos.	52	9405	0.02462	Derived	1.28006	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.04	558-12000-B	Medium bay, industrail type LED fixture with driver & module (Equivalent to SB02)	Nos.	52	9405	0.01917	Derived	0.99694	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.05	558-12000-B	LED fixture corrosion proof, totally enclosed type for battery room (Equivalent to FC81)	Nos.	52	9405	0.00280	Derived	0.14567	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.06	558-12000-B	LED tube fixture with industrail box type base without any cover (Equivalent to FC02) for Stair Case	Nos.	52	9405	0.00131	Derived	0.06811	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.07	558-12000-B	Street Light LED Fixture SS62	Nos.	52	9405	0.01152	Derived	0.59912	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.08	558-12000-B	LED Flood Light heavy duty type SF63	Nos.	52	9405	0.01556	Derived	0.80904	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.09	558-12000-B	LED Flood Light heavy duty type SF64	Nos.	52	9405	0.02722	Derived	1.41547	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.10	558-12000-B	Well glass type, Vapour proff LED ficture suitable for platforms SW41 (For Platform Lighting)	Nos.	52	9405	0.00403	Derived	0.20932	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.11	558-12000-B	Well glass type, vapour proff LED fixture suitable for platforms SW42 (For Platform Lighting 30% of SW41)	Nos.	52	9405	0.00709	Derived	0.36859	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.12	558-12000-B	Industrial type LED fixture suitable for conduit/ surface/ suspended/ column mounting, having integral driver. Fixture shall operate on 220V DC input supply.(Equivanet to FC07)	Nos.	52	8539	0.00201	Derived	0.10456	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.13	558-12000-B	Decorative, recessed type LED fixture having integral driver. Fixture shall operate on 220V DC input supply. (Equivanet to FC33)	Nos.	52	8539	0.00163	Derived	0.08497	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.14	558-12000-B	Well glass, dust proof type LED fixture having integral driver. Fixture shall operate on 220V DC input supply.(Equivanet to FC34)	Nos.	52	8539	0.00346	Derived	0.18008	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.1.15	558-12000-B	Downlighter LED (18 W = 6x3W)	Nos.	52	9405	0.00180	Derived	0.09359	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.2		Junction boxes											

3.2.01	558-12000-B	Type JB-TYPE F2 terminal strips	Nos.	75	8539	0.00068	Derived	0.05125	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.3		Receptacles								% TO BE QUOTED			
3.3.01	558-12000-B	Type RA receptcle with plug	Nos.	15	8536	0.00340	Derived	0.05094	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3.3.02	558-12000-B	20A ROTARY SWITCH	Nos.	15	8536	0.00340	Derived	0.05094	Derived	% TO BE QUOTED	% TO BE QUOTED	Derived	
3	TOTAL							6.82181	Derived	Derived	Derived	Derived	
NOTE : "X" to be quoted in Grand Total Table .													
Qty. against each item of Mandatory Spares in line with Customer contract requirement shall be finalized after completion of Engg. and final qty. on quoted unit rates shall be furnished to successful bidder along with PO for manufacturing.													

ANNEXURE-II: DEVIATION SHEET (COST OF WITHDRAWAL)

PACKAGE:- LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT (FRAMEWORK AGREEMENT)

TENDER ENQUIRY REF NO -NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020

NAME OF VENDOR:-

SL NO	VOLUME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASONS FOR QUOTING DEVIATION	
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TECHNICAL DEVIATIONS

[illegible]

COMMERCIAL DEVIATIONS

[illegible]

PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE

NAME	DESIGNATIONS	SIGN & DATE		

NOTES:

- | |
|---|
| 1. Cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only. |
| 2. All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format. |
| 3. Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of. |
| 4. Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable. In the absence of same, such deviation(s) shall not be considered and offer shall be considered in total compliance to NIT. |
| 5. Bidder shall furnish price copy of above format along with price bid. |
| 6. The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser. |
| 7. Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered. |
| 8. For deviations w.r.t. Credit Period, Liquidated damages, Firm prices if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VII, will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL. |
| 9. Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be considered. |
| 10. All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format. |
| 11. Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL. |
| 12. In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive. |
| 13. In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering. |



BHEL / PEM / CMM
SPECIAL CONDITIONS OF RATE CONTRACT

ANNEXURE III TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020

SPECIAL CONDITION OF RATE CONTRACT FOR LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT

1. BHEL/PEM intends to enter into Rate Contract for supply of the tendered items for a period of two years. The Rate Contract shall come into force from the date of issue of Purchase order for Rate Contract. Validity for ordering shall be two years from the purchase order for Rate Contract.
2. Details of consignee and project site information for dispatch of material shall be intimated at the time of placement of PO for specific project after finalization of RC
3. Transit Insurance is in BHEL scope
4. The items will be required against respective projects. Exact quantities and Project information shall be intimated while placing order for a specific project based on the Rate Contract.
5. The prices shall be firm during the period of rate contract (i.e. Two years) with a provision for further extension after review on mutual consent.
6. Inspection of materials shall be carried out by BHEL/CQA and or by Customer or by an authorized agency at manufacture's works before dispatch, if required. Dispatch of material to be done, only after receipt of BHEL/Customer MDCC. It is responsibility of vendor to for obtain Material Dispatch Clearance Certificate (MDCC) from BHEL or Customer as required before dispatch of material.

Vendor shall give inspection call on BHEL-CQS web site to applicable inspection agency with a copy of inspection call to BHEL-PEM for arranging Customer participation (if applicable) in inspection / Joint inspection on the proposed date with an advance notice of 15 working days. Inspection charges shall be paid by BHEL-PEM.

Items have to be manufactured as per specification and supplied strictly in accordance with the approved BHEL / Customer's Drawings & Quality Plan. The items/ test certificate of items, which for any reason are not acceptable to BHEL / Customer, shall be required to be retested. No extra charge shall be payable on those account by BHEL.

7. Mode of dispatch shall be by road through Schedule Bank/BHEL (PEM) approved transporters.
8. Other terms and conditions shall be as per Standard Technical specification no, GCC Rev 07 & Enquiry letter.
9. This enquiry is subject to Conditions/ limits if any imposed in PMD/ Vendor registration.
10. Tentative quantity is given in enquiry.
11. Bidders to submit offer for RC of said items ONLINE via e-Procurement System only. Bidder to upload tender documents complete in all respects duly signed & stamped on each and every page by the authorized signatory of the bidder as a token of acceptance of all the terms and conditions of tender.
12. The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendor/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL web site <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud as soon as it comes to their notice.

ANNX 4 TO NIT NO. PE/PG/RTC/E-6545/2020, DTD-24.10.2020
PROSPECTIVE PROJECT LIST FOR LIGHTING FIXTURES, LAMPS AND MISC. ITEMS RATE CONTRACT
(RATE CONTRACT)

Sl.no	TITLE
1	3X660 MW NTPC BARH STPP STAGE I-FGD
2	2X660 MW NTPC BARH STAGE II FGD
3	3 X 660 MW NTPC NORTH KARANPURA- FGD
4	3X200 + 3X500 MW NTPC RAMAGUNDAM TPP FGD
5	2 X 250 MW NSPCL Bhilai TPP- FGD
6	3X200+3X500+1x500 MW NTPC KORBA TPP-FGD
7	3x660 MW NPGCPL NABINAGAR STPP (FGD PKG)
8	4X250 MW BRBCL NABINAGAR FGD
9	2X500 MW NTPC MAUDA STAGE I-FGD

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No: _____

Date: _____

To,

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the Bharat Heavy Electricals Limited 1 (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at1 through its Unit at..... (name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at2 hereinafter referred to as the 'Vendor/Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No.....dated3 valued at Rs 4 (Rupees)/ FC (in words) for..... 5 (hereinafter called the 'Contract') and the Vendor/Contractor/Seller having agreed to provide a Contract Performance Guarantee, equivalent to % (.... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we, , (hereinafter referred to as the Bank), having registered/Head office at and inter alia a branch at being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer a maximum amount Rs 6 (Rupees) without any demur, immediately on first demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor/Contractor/ Supplier in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Vendor/Contractors/Supplier shall have no claim against us for making such payment.

We the bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract/satisfactory completion of the performance guarantee period as per the terms of the Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

We BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Vendor/Contractor/Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Vendor/Contractor/Supplier and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Vendor/Contractor/Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Vendor/Contractor/Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Vendor/Contractor/Supplier and notwithstanding any security or other guarantee that the Employer may have in relation to the Vendor/Contractor/Supplier 's liabilities.

This Guarantee shall remain in force up to and including..... 7 and shall be extended from time to time for such period as may be desired by Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Vendor/Contractor/Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the8 we shall be discharged from all liabilities under this guarantee thereafter.

We, BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent

of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a. The liability of the Bank under this Guarantee shall not exceed6
- b. This Guarantee shall be valid up to7
- c. Unless the Bank is served a written claim or demand on or before..... 8 all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We,Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

Dated..... ..

For and on behalf of

Place of Issue..... ..

(Name of the Bank)

1 NAME AND ADDRESS OF EMPLOYER i.e. Bharat Heavy Electricals Limited

2 NAME AND ADDRESS OF THE VENDOR / CONTRACTOR / SUPPLIER.

3 DETAILS ABOUT THE NOTICE OF AWARD/ CONTRACT REFERENCE

4 CONTRACT VALUE

5 PROJECT/SUPPLY DETAILS

6 BG AMOUNT IN FIGURES AND WORDS

7 VALIDITY DATE

8 DATE OF EXPIRY OF CLAIM PERIOD

Note:

1. Units are advised that expiry of claim period may be kept 3-6 months after validity date. It may be ensured that the same is in line with the agreement/ contract entered with the vendor.
2. The BG should be on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier/Bank issuing the guarantee.
3. In line with the GCC, SCC and contractual terms, Unit may carry out minor modifications in the Standard BG Formats. If required, such modifications may be carried out after taking up appropriately with the Unit/Region's Law Deptt.
4. In Case of Bank Guarantees submitted by Foreign Vendors-
 - a) From Nationalized Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/ city or at nearest branch where the Unit (New Delhi for POs issued from PEM Noida/ PO issuing agency) is located i.e. Demand can be presented at the Branch located in the town/ city or at nearest branch where the Unit is located.
 - b) From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)
 - b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks** only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It is advisable that all charges for issuance of Bank Guarantee/ Counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.
 - b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 will required to be followed.
 - b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). The BG Format provided to them should clearly specify the same.

or & On behalf of Guarantee issuing bank

(Office Seal)

Name:

E-mail ID:

Contact number:

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi – 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles: -

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.


1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.



2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 – Disqualification from tender process & exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors". framed by the Principal.

Section 4 – Compensation for Damages

4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.

6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 – Criminal Charges against violating Bidders / Contractors / Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.



Section 8 –Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non-disclosure agreement.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.

8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organization.

8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.12 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty/ guarantee etc. should be outside the purview of IEMs.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.



10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

SUMIT SAHAY
सुमीत साहय (सी.एम.एम.) / Dy. Manager (CMM)
शरत भार्गव (सी.एम.एम.) / Sheral Heavy Electricals Ltd.
भारत केवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Ltd.
पावर सेक्टर - प्रोजेक्ट एंजिनियरिंग मैनेजमेंट
Power Sector - Project Engineering Management
एन.पी.ई. बिल्डिंग्स एंड एल.सी.पी. कॉम्प्लेक्स
NPE Bldgs HRD & LCP Complex
प्लॉट नं. 16 & 17, नोडा - 201301
Plot No. 16 & 17, Noida - 201301
For & On behalf of the Principal
(Office Seal)

For & On behalf of the Bidder/ Contractor
(Office Seal)

Place _____

Date _____

Witness: _____

(Name & Address) AJAY JAIN

BHEL-PEM, NOIDA

Witness: _____

(Name & Address) _____



**PRE-QUALIFYING REQUIREMENTS FOR
LIGHTING FIXTURES, LAMPS & MISC. ITEMS**

PE-PQ-999-558-E006

REV. 03

DATE: 11/10/2019

SHEET 1 OF 1

ITEMS: Lighting fixtures, lamps, receptacles, Junction boxes and Miscellaneous Items.

SCOPE:

Supply(Including Design) : YES

Erection & Commissioning: No

Services : YES (Supervision of E&C)

1 Manufacturing Capability

- i) Manufacturer of applicable type of lighting fixtures as per BHEL-PEM sub-vendor list (Refer Note 4 below)
OR
- ii) Manufacturer of Applicable type of lighting fixtures other than those mentioned in BHEL-PEM sub-vendor list (Refer Note 4 below). In this case, complete credentials for proposed make of lighting fixtures is to be submitted along with the offer. Bidder shall be evaluated as per sub-vendor pre-qualifying criteria attached as Annexure-I however the manufacturer should mandatorily tie up with Lighting designer as per BHEL-PEM sub-vendor list (Refer Note 4 below)

2 Lighting System Design Capability

Lighting designer as per BHEL-PEM sub-vendor list (Refer Note 4 below)

Notes:

1. In case vendor is able to meet criteria at Sl. No: 1 only and not Sl. No: 2 above, vendor to furnish undertaking that in case vendor comes out as successful bidder, vendor will submit MOU on non-judicial stamp paper of Rs. 100 /- with any one of the lighting designer as per BHEL-PEM sub-vendor list prior to the placement of order.
2. In case vendor is able to meet criteria at Sl. No: 2 only and not Sl. No: 1 above, vendor to furnish undertaking that in case vendor comes out as successful bidder, vendor will submit MOU on non-judicial stamp paper of Rs. 100 /- with any one of the Manufacturer of applicable type of lighting fixtures as per BHEL-PEM sub-vendor list prior to the placement of order.
3. Bidder to note that MOU on non-judicial stamp paper once offered to BHEL cannot be changed till the execution of the project.
4.
 - a) For Cases of registration, BHEL-PEM sub-vendor list of applicable type of lighting fixtures may be obtained from BHEL-PEM.
 - b) For cases of bidding, sub-vendor list is included in the technical specification.

General Points of PQR:

1. Consideration of offer shall be subject to customer's approval of bidders, if applicable.
2. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
3. Any other project specific requirement shall be as per Annexure – II and bidder shall submit relevant supporting documents.
4. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/ collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
5. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender.

PREPARED BY

MEET SAGAR SINGH RAJPAL
(DY.MANAGER)

REVIEWED BY

PRAVEEN DUTTA
(SR. DGM)

APPROVED BY

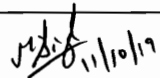
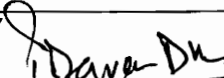

DEBASISA RATH
(AGM & DH ELECTRICAL)

**PRE-QUALIFYING REQUIREMENTS FOR LIGHTING FIXTURES, LAMPS &
MISC. ITEMS**

DOC NO. PE-PQ-999-558-E006, REV 03

**DOCUMENTS/CREDENTIALS REQUIRED FROM SUB-VENDOR
(MANUFACTURER OF APPLICABLE TYPE OF LIGHTING FIXTURES) FOR
APPLICATION/BIDDING PROCESS:**

1. List of Items normally manufactured by the vendor.
2. Annual turnover for last 3 years
3. Organization & deployment of competent people to various disciplines including quality.
4. Organizations by whom the vendor has been already approved.
5. BHEL units by whom vendor has been already approved
6. Adequacy of past performance.
7. Performance certificate from power utilities
8. Performance certificate from other utilities.
9. Adequacy of technical know-how & design capability.
10. Adequacy of mfg. & shop facilities.
11. Adequacy of testing and inspection facilities.
12. Adequacy of type reports.
13. Adequacy of Quality system, Quality Control, QC record & Quality Plan.
14. ISO certificate
15. MSME certificate

PREPARED BY  MEET SAGAR SINGH RAJPAL (DY. MANAGER)	REVIEWED BY  PRAVEEN DUTTA (SR. DGM)	APPROVED BY  DEBASISA RATH (AGM & DH ELECTRICAL)
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NATIONAL THERMAL POWER CORPORATION LIMITED

RATE CONTRACT

VOLUME – II

**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS AND MISCELLANEOUS ITEMS**

SPECIFICATION NO : PE-TS-999-558-E006, REV-0



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UTTAR PRADESH, INDIA – 201301**



**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS AND
MISCELLANEOUS ITEMS**

SPECIFICATION NO. PE-TS-999-558-E006

VOLUME II

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RATE CONTRACT

REV. 0

DATE:

SHEET 1 OF 1

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S NO. DESCRIPTION

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**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS AND
MISCELLANEOUS ITEMS**

RATE CONTRACT

SPECIFICATION NO. PE-TS-999-558-E006

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REV. 0

DATE: 3.04.2020

SHEET 1 OF 1

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.
2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'.
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in BOQ-Cum-Price schedule of the specification shall not be considered (i.e. technical description & quantities as per specification shall prevail).



**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS AND
MISCELLANEOUS ITEMS**

RATE CONTRACT

SPECIFICATION NO. PE-TS-999-558-E006

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REV. 0

DATE: 3.04.2020

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SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS



**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS AND
MISCELLANEOUS ITEMS**

RATE CONTRACT

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VOLUME II

SECTION - I

REV. 0

DATE:

1.0 SCOPE OF SUPPLY AND SERVICES

1.1 SUPPLY:

Design, manufacture, assembly, inspection & testing at vendor's/ sub-vendor's works, proper packing and delivery to site of **LIGHTING FIXTURES, LAMPS & MISCELLANEOUS ITEMS** as mentioned in different sections of this specification, complete with all accessories for efficient and trouble-free operation.

1.2 SYSTEM DESIGN ENGINEERING:

System Design Engineering is included in vendor's scope, which includes design of complete lighting system for indoor and outdoor areas of the power plant. Please refer the list of LLO/LDC/CLO/PDS drawings as per Annexure-B for the tentative areas to be covered by the lighting system. The aspect of engineering covers preparation of electrical distribution and control schemes, quantity estimation, luminaire layout drawings, conduit layout drawings, wiring schemes upto luminaires, cable schedules and all associated design work not specifically mentioned in the specification. The quantity estimation to include all items required for the complete lighting system viz. lighting fixtures, lamps, Lighting DBs, Welding DBs, lighting panels, conduits, PVC wires etc.

1.3 Supervision of Erection & Commissioning (as required by site) of lighting system is included in vendor's scope.

1.4 Although Erection and Commissioning is not included in vendor's scope, the vendor shall still not be absolved of his responsibility of establishing the correctness of engineering and equipment at site.

1.5 Standard technical requirements of the lighting fixtures, lamps & miscellaneous items and lighting system design requirements are indicated in Section-II. Project specific requirements/changes are listed in Section-I.

1.6 The stipulations of Section-I, followed by those of Data Sheet-A shall prevail and govern in case of conflict between the corresponding requirements of Section-I and Section-II.

1.7 Review of sub-vendor's documents by the purchaser shall not relieve the vendor from the responsibility of design & supply.

1.8 The documents shall be in English language and MKS system of units.

1.9 Make of all equipment and components shall be as per attached Sub-Vendor List enclosed as per Annexure-A to section- I.

2.0 BILL OF QUANTITIES:

2.1 Quantity requirements shall be as per BOQ-cum-price schedule as part of NIT.

3.0 STATUTORY AND REGULATORY REGULATION

3.1 Statutory and regulatory regulation shall be applicable as per Indian Electricity Rule, 1956 with amendment-3 Rule no. 35, 48, 49, 50, 61 & 64 for illumination & low voltage power services.

4.0 DOCUMENTATION

4.1 Documents required along with the technical offer: -

a) Signed & Stamped copy of Compliance certificate



**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS AND
MISCELLANEOUS ITEMS**

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DATE:

- b) Duly filled in signed & stamped copy of scope matrix for broad activities
- c) Signed & stamped copy of unpriced price schedule with “quoted” word indicated against all items.
- d) Duly filled in signed & stamped copy of Datasheet-B.

4.2 Documents required after award of LOI/PO shall be as per Annexure -B (to be submitted by successful bidder).

5.0 SPECIFIC TECHNICAL REQUIREMENTS

5.1

S.No.	Reference clause No. of Section-II	Specific requirement/Change
1	5.2.1(n), Page-17	“The LED chip efficacy shall be min 120 Lm/W. The luminaire efficacy shall be not less than 80Lm/W” shall be read as “The LED chip efficacy shall be min 120 Lm/W”
2	Additional Clause no.6 to be added under annexure-I of section-II as below:-	

6.0

SL. No.	Type of Luminaire	Description	Total Luminous flux (Lumen) of luminaire- Minimum value	Measured Electrical Input Power(Watt)- Maximum value
1	FC02(LED)	Industrial type LED fixture suitable for conduit /surface/ suspended mounting, with integral driver aesthetically designed for stair case/toilets	3780	42
2	FC06(LED)	Industrial type LED fixture suitable for conduit /surface/ suspended mounting, with integral driver aesthetically designed for Switchgear / Equipment room	3780	42
3	FC07(LED)	Industrial type LED fixture suitable for conduit/ surface/ suspended/ column mounting, having integral driver. Fixture shall operate on 220V DC input supply.	1260	14
4	FC26 (LED)	Panel 600 mm X 600 mm LED luminaire suitable for recess mounting in false ceiling with integral driver aesthetically designed for Control Room/ Office	3780	42



**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS AND
MISCELLANEOUS ITEMS**

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5	FC33 (LED)	Decorative, recessed type LED fixture having integral driver. Fixture shall operate on 220V DC input supply.	1260	14
6	FC34 (LED)	Well glass, dust proof type LED fixture having integral driver. Fixture shall operate on 220V DC input supply.	1260	14
7	FC81(LED)	Corrosion proof, totally enclosed type LED fixture having integral driver.	3780	42
8	SB02 (LED)	High Bay Industrial type LED fixture	16920	188
9	SB03 (LED)	High Bay Industrial type LED fixture suitable for turbine hall operating floor (mounting height >10 m)	24750	275
10	SF63 (LED)	Flood light, heavy duty type LED fixture	16920	188
11	SF64 (LED)	Flood light, heavy duty type LED fixture	27000	300
12	SS62 (LED)	Street light LED fixture	10080	112
13	SW41(LED)	Well glass type, vapour proof LED fixture suitable for Boiler / ESP platforms	4680	52
14	SW42(LED)	Well glass type, vapour proof LED fixture suitable for Boiler / ESP platforms	7380	82

Notes:

- 1) LED must comply all the parameters of IS 16105 or IESNA LM-80-08.
- 2) The Luminaire must comply all the parameters of IS 16106 or IESNA LM-79-08.
- 3) The LED driver should comply to IEC 61347-2-13, IS 15885: Part 2: Sec 13, IEC 62384, IS 16104 and CISPR 15.
- 4) The luminaire complete with all accessories shall comply to relevant specified standards.
- 5) The values of minimum luminous flux & maximum measured electrical input power are specified above for the luminaire (including any accessories like driver module etc). These values shall be measured as per IS 16106 & shall not be subject to any further tolerance.
- 6) All parameters mentioned in Section-II, Clause 5.2.1 are to be complied in totality.

	RATE CONTRACT		Document Number: PE-DC-999-558-E006	
	Typical Design Memorandum for Lighting System		Revision:	00
			Date:	

1.0 SCOPE:

The purpose of this design document is to cover basic approach for designing lighting system for FGD system area under PEM scope. The document covers various types of lighting system, lighting system design, illumination levels for various areas, luminaries type and low voltage power services for various areas of the FGD system package.

Lighting system for following area shall be designed by BHEL-PEM.

S.no	Building/ area description	No of Buildings	Remarks
1	FGD Control Room Building (FGDCR)	1	
2	Ball Mill Building [BMB] (Limes tone grinding house)	1	
3	Gypsum Dewatering building [GDWB]	1	
4	RC pump + Oxidation Blower house (RCPH)	2	
5	SO2 Analyzer room	2	
6	ACW/DMCW Pump House	1	
7	Road lighting (PEM scope)	-----	Road length shall be considered as per layout.
8	FGD Compressor House + Electrical Annex	1	

Lighting system of buildings/areas not listed in above table shall be designed by BHEL- ISG.

Reference documents:

1. Contract specification.
2. IS 3646-1992 Code of practice for interior illumination.
3. Indian building code.

2.0 LIGHTING SYSTEM DESIGN:

2.1 The illumination system shall be designed to ensure uniform, reliable, aesthetically pleasing and glare free illumination. The lighting fixtures shall be designed for minimum glare. The design shall prevent glare/luminous patch seen on VDU/ Large video screens, when viewed from an angle. The finish of the fixtures shall be such that no bright spots are produced either by direct light source or by reflection. The diffusers/ louvers used in fixtures shall be made of impact resistant polystyrene sheet and shall have no yellowing property over a prolonged period. The Lux levels to be adopted for various area are indicated at Annexure - A.

2.2 All fixtures shall be of a proven design for applications in power plant environment.

2.3 The lighting fixtures in the plant area shall be group controlled from lighting panel. The lighting fixtures in office areas, control rooms etc. shall be controlled by switches.

2.4 Lighting panel (LP) for controlling lights with additional provision for manual/bypass control shall be provided:

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Indoor lighting panel: With Timer

Outdoor lighting panel: With Timer or photocell

2.5 Outdoor areas shall have flood light fixtures mounted on flood light poles.

2.6 Degree of protection:

(i) All outdoor fixtures shall be weather proof and of min. IP65 class of protection.

(ii) For Indoor type of fixtures:

(a) Surface/Pendent mounting: - IP 54 class of protection.

(b) Recess Mounting (False ceiling): - IP 20 class of protection

2.7 Junction box for indoor lighting shall be made of fire retardant material. Material of JB shall be thermoplastic or thermosetting or FRP type.

Junction boxes for street lighting poles and lighting mast shall be deep drawn or fabricated type made of min 1.6mm thick CRCA sheet, hot dip galvanized min 50micron thick. The degree of protection shall be IP 55.

3.0 ILLUMINATION DESIGN CALCULATION:

3.1 Lighting design for indoor areas shall be done by computer programme as per standard norms for lighting design to meet the specified lux level.


The Reflection factor (RF) will be considered as given below:

	Ceiling (rc)	Wall (rw)	Floor (rf)
White and very light colours	70	70	10
Light colours	50	50	10
Middle tints	30	30	10
Dark colours	10	10	10

Values of Maintenance Factor (MF), which includes the luminaire depreciation factor, will be considered as given below:

Dust prone indoor/outdoor area	0.6
Control room & air conditioned area	0.8
Indoor area non-AC (except fluorescent fixture)	0.7
Conveyor / Transfer point	0.5

3.2 Lighting design for outdoor area, open area shall be done by computer programme as per standard norms for lighting design to meet the specified lux level.

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4.0 LIGHTING SYSTEM DESCRIPTION

Lighting system will be provided with AC normal, AC emergency and DC emergency as listed against various areas as per Annexure-B enclosed.

The sources of power lighting are as below:

- (i) 415V AC Normal (ACN) Supply from lighting distribution boards / switchboard MCCs
- (ii) 415V AC Emergency (ACE) Supply from Emergency Board
- (iii) 220V DC Emergency Supply from DC Distribution Board

For FGD control room:

For FGD control room area normally all AC luminaries (ACN & ACE) will be in service on normal AC supply. Approximately distribution of AC Luminaries on AC normal and AC emergency shall be as follows: ACE luminaire shall be ON with normal AC supply. However, these lights shall go off for a few seconds in case of normal AC supply failure but shall be automatically restored when emergency AC supply is energised by diesel generator set.

Emergency DC lighting will be provided by emergency DC lighting fixtures located strategically in critical operating area & emergency exits. These shall be switched ON when both the normal AC & emergency AC lighting system fail. The DC supply shall be automatically switched off after about 3 min following the restoration of supply to normal AC or emergency AC lighting system.

All other auxiliary area:

For other auxiliary areas AC Normal lighting will provide 100% illumination level and normally all AC lighting fixture shall remain "ON" as long as normal AC supply is available.

In off-site areas/odd locations, for safe movement of personal during emergency, self-contained 4 hours duration battery operated emergency lighting units (ELUs) is envisaged.

4.1 AC Normal Lighting Systems:

AC Normal lighting fixtures are fed through a number of conveniently located AC Lighting panel (ACLP) which are fed from Lighting Distribution Board (LDB).

LDBs consisting of dry type isolation transformer housed in LDB with proper separation from distribution panels as per details indicated below is envisaged:

Transformer rating:	50 / 100 kVA
Transformer voltage ratio:	415 / 433 Volt, taps of +5% to -5% in steps of 2.5%.
Transformer type:	cast resin Non Encapsulated
Distribution Panel type:	Single front fixed type
LDB Configuration:	Two incomer & bus coupler
Incomer & Bus coupler type:	TPN SFU

	RATE CONTRACT		Document Number: PE-DC-999-558-E006	
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			Date:	

Incomer & Bus coupler rating: As per lighting transformer rating

Outgoing feeder type: TPN SFU

Outgoing feeder rating: 63A

AC normal lighting panel as per details given below is envisaged:

Incomer type: TPN MCB

Incomer rating: 63A

Outgoing feeder type: SPN MCB

Outgoing feeder rating: 20A

Short circuit rating: 10kA

ELCB in Incomer: Yes

The normal LPs shall be provided with contactor & timer for switching the incomer supply.

Street lighting panel as per details given below is envisaged:

Incomer type: TPN MCB

Incomer rating: 63A

Outgoing feeder type: TPN MCB

Outgoing feeder rating: 20A

Short circuit rating: 10kA

ON/ OFF control With Timer or photocell

AC LDB shall be 3Ph, 4Wire, 50Hz effectively grounded System.

Voltage drop at the fixture from the LDB bus shall not exceed 3%.

Circuit loading of each Lighting panel shall be done in such a way that almost balance loading in all the phases will be achieved.

Minimum two phases will be used for Illumination of a particular area.

Sub circuit loading of each lighting panel shall be restricted to 2000W or 20 Nos. fixtures whichever is lower.

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4.2 AC Emergency Lighting Systems (Only for FGD control room):

AC Emergency lighting fixtures are fed through a number of conveniently located AC Lighting panel (ACLP) which are fed from AC Emergency Lighting Distribution Board (ELDB).

ELDBs consisting of dry type isolation transformer housed in ELDB with proper separation from distribution panels as per details indicated below is envisaged:


Transformer rating:	50 kVA
Transformer voltage ratio:	415 / 433 Volt, taps of +5% to -5% in steps of 2.5%.
Transformer type:	cast resin Non Encapsulated
Distribution Panel type:	Single front fixed type
LDB Configuration:	Two incomer & bus coupler
Incomer & Bus coupler type:	TPN SFU
Incomer & Bus coupler rating:	As per lighting transformer rating
Outgoing feeder type:	TPN SFU
Outgoing feeder rating:	63A

AC emergency lighting panel as per details given below is envisaged:

Incomer type:	TPN MCB
Incomer rating:	63A
Outgoing feeder type:	TPN MCB
Outgoing feeder rating:	20A
Short circuit rating:	10kA
ELCB in Incomer:	Yes

AC ELDB shall be 3Ph, 4Wire, 50Hz effectively grounded System.

DC Emergency lighting fixtures fed through suitable numbers of conveniently located DC Emergency Lighting panel (DCELP) which are fed through DC emergency Lighting Distribution Board (DCELDB).

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	Typical Design Memorandum for Lighting System		Revision:	00
			Date:	

4.3 DC Emergency Lighting Systems:

DCELDBs as per details given below is envisaged:

Distribution Panel type:	Single front fixed type
DC Incomer type:	DP Switch fuse unit with contactor
DC Incomer rating:	63A
Outgoing feeder type:	DP Switch fuse unit
Outgoing feeder rating:	32A

DCELPs as per details given below is envisaged:

Incomer type:	DP Switch fuse unit
Incomer rating:	32A
Outgoing feeder type:	DP MCB
Outgoing feeder rating:	20A

DC lighting fixtures shall be provided at strategic locations in the FGD Control Room to enable safe movement of operating personnel and access to important control points during an emergency, when both the normal AC & Emergency lighting system fail.

Lighting fixtures shall be fed from DC lighting panels which in turn shall be fed from DC LDB.

4.4 The LDBs shall be made of CRCA sheet steel of 2 mm and shall be provided with voltmeter and ammeter along with selector switch, supply ON indicating lamps etc. All indicating lamps will be cluster LED type. The DOP for LDB will be IP-54 for indoor and for transformer cubicle IP-42. Whereas the DOP for LP will be IP-55 for indoor and IP-55 with canopy for outdoor. Lighting distribution boards & panels shall be powder coated with colour shade RAL9002.

4.5 Emergency EXIT lamps:

Emergency exit lamps backed up by battery shall be provided at strategic locations of the building for safe exit of personnel. These exit lamps will remain ON all the time and normally received power supply from ACELP.

Exit lamp unit shall contain maintenance free Ni-Cd battery with 0.5 hours backup capacity.

5.0 STREET LIGHTING / OUTDOOR LIGHTING

5.1 The roads within BHEL scope as per contract will be considered for lighting.

5.2 Street lights / outdoor lighting will be fed from separate panel located at suitable places. Automatic switching ON/OFF of these circuits shall be done from street light panel.

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5.3 For street lighting, street light pole will be used. For outdoor area lighting if required flood light pole will be used. Pole type shall be as below:

Pole height (Above Ground): 9 meter (Minimum)

Pole type: hot dip galvanized (Tubular/Octagonal in shape).

Coating thickness of galvanizing shall be min 70 micron.

The pole shall be mounted above ground using base plate and minimum height of pole shall be 8 meters.

6.0 LOW VOLTAGE POWER SERVICES

6.1 Receptacles shall be controlled through MCB. Mechanical interlock shall be provided for receptacles such that it can be switched "ON" only when the plug is in finally engaged condition and the plug can be withdrawn only when switch is in "OFF" position.

Different type of receptacles as per details below will be provided:

(i) Decorative receptacle:

At least 01 number 6/16A, 5-Pin, 240V AC universal socket with switch will be provided in control room, office area, store room, cabin etc.

(ii) Industrial receptacle:

Suitable number 20A, 3-Pin, 240V AC industrial type receptacles with switch will be provided at suitable location in industrial area. All receptacles will be controlled with a switch.


(iii) Welding receptacle:

63A, 3-phase, 415V AC welding receptacles with isolating switch and RCCB/RCD of 30mA sensitivity having facility for manual testing/checking of operation of RCCB/RCD will be provided at specific points near all major equipment and at an average distance of 50m (location will be decided during detailed engineering). Maximum 03 nos. receptacles will be fed through one feeder.

6.2 Based on room size, suitable nos. of ceiling fans (1200mm sweep) with Stepped electronic regulator finished in stove enamelled white or with electro static powder coating shall be provided in office rooms/control room which are not covered by air-conditioned system. Power factor of fans shall not be less than 0.9.

7.0 WIRING / CONDUITS

7.1 Wiring of lighting system will be done as follows:

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			Date:	

(i) Wiring in FGD areas Cable Vaults, transformer yard, outdoor area (like Absorber etc.) will be done using Cu/Al, PVC insulated, FRLS PVC sheathed unarmoured cable which shall be laid in cable tray running in these areas.

For FGD Control room, Switchgear room etc. Wiring installation will be done by multi-stranded, PVC insulated, unsheathed, copper, colour coded wires laid in GI conduits of 20 mm dia size (minimum) conforming to IS-9537. The thickness of conduits up to & including 25 mm dia will be 1.6 mm and conduits above 25 mm will be 2.0 mm. Colour of the PVC insulation of wires shall be Red, Yellow, Blue, black for R, Y, and B phases & neutral respectively and white & grey for DC positive & DC negative circuits respectively.

(ii) Conduits will be heavy-duty type hot dip galvanised steel conforming to IS-9537. Conduit accessories will be hot dip galvanised. In corrosive area, conduits will have suitable epoxy coating additionally.

(iii) Flexible conduits shall be water proof and rust proof made of heat resistant TERNE coated steel.

(iv) Conduits in office rooms, control room, service building, laboratory building and other air-conditioned areas will be surface mounted on the roof above false ceiling. However vertical drops of conduits will be concealed along walls and finally plastered for better aesthetics. Vertical drops along RCC column shall be exposed.


(v) Filling area of wires in conduit shall not exceed 40% of the conduit area.

(vi) Wiring for AC Normal, AC Emergency, and DC Emergency services will run in separate conduits

(vii) Lighting and receptacles will be fed from separate circuits. No two different phase circuits will be run in the same conduit. However, different circuits of same phase may be laid in the same conduit.

7.2 Following sizes of 1100 V grade, PVC insulated single core stranded copper conductor wires/ PVC insulated Standard 2 Core copper/aluminium conductor cable will be used:

	WIRE	CABLE
Lighting Panel to Fixtures:	1.5 sq. mm (Cu)	1.5 sq. mm (Cu)
Lighting Panel to JB's/ Switches:	1.5 sq. mm (Cu)	1.5 sq. mm (Cu)
JB's/ switches to Fixtures:	1.5 sq. mm (Cu)	1.5 sq. mm (Cu)
Panel to First receptacles:	4 sq. mm (Cu)	10 sq. mm (Al)
First receptacles to looping other receptacles (240V, 1 phase receptacles):	4 sq. mm (Cu)	10 sq. mm (Al)
In case of only one receptacles in ckt., Panel to receptacles (240V, 1 phase receptacles):	4 sq. mm (Cu)	10 sq. mm (Al)

	RATE CONTRACT		Document Number: PE-DC-999-558-E006	
	Typical Design Memorandum for Lighting System		Revision:	00
			Date:	

Panel/ JBs to flood light fixtures:

2-1C-1.5 sq. mm (Cu)

8.0 EARTHING

Earthing of lighting system will be done by using of following sizes of wire / flat:

Lighting Distribution Board:

GS Flat 50x6 mm

Lighting Panels:

GS Flat 25x6 mm

Lighting fixtures, receptacles, conduits, junction boxes & switch boxes, power sockets:

14 SWG GI wire

Welding receptacles:

GS Flat 25x6 mm

Street light pole/ flood light pole:

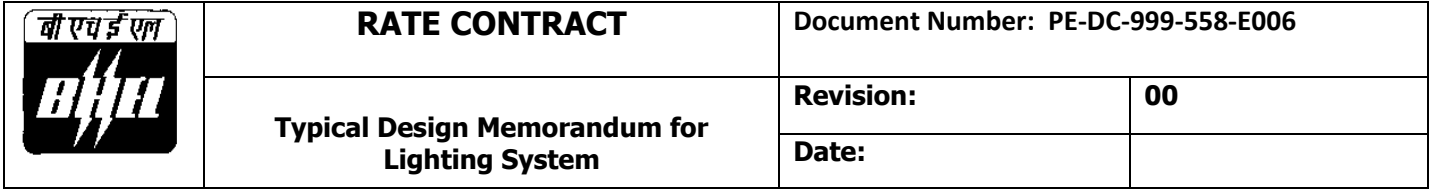
GS Flat 50x6 mm

Electrode for Pole earthing:

2 nos, 40 mm dia MS rod, 3 mtr long

	RATE CONTRACT		Document Number: PE-DC-999-558-E006	
	Typical Design Memorandum for Lighting System		Revision:	00
			Date:	

ANNEXURE-A			
<u>AVERAGE LUX LEVEL & TYPE OF FIXTURES</u>			
S. No.	LOCATION	AVERAGE LUX LEVEL	TYPE OF FIXTURE
1	Switchgear rooms, charger, rectifier room	200	Industrial type LED Luminaire
2	Control room, computer room, control equipment room	350	LED Luminaire equivalent to Mirror optics with anti-glare features or down lighter.
3	Offices, conference room etc.	300	Decorative mirror optics Type LED luminaire or LED down lighter
4	Battery rooms	100	Totally enclosed corrosion proof LED luminaire
5	Transformer area	20 (general) 50 (on equipment)	LED luminaire
6	Diesel generating room/enclosure, compressor room, pump house etc.	150	LED medium bay/Industrial type LED Luminaire
7	Cable galleries/vault	50	Industrial type LED Luminaire
8	Street lighting- Primary roads Secondary roads	20 10	LED street lights
9	Outdoor storage handling and unloading area	20	LED Luminaire



ANNEXURE-B

LIGHTING & LV POWER SERVICES IN DIFFERENT AREAS

S. No.	AREA	ACN	ACE	DCE	6/16A Socket	20A Socket	63A Socket	ELU \$
1	FGD control room	Y (70%)	Y (30%)	Y	Y	-	-	
2	Cable spreader room/vault	Y (80%)	Y (20%)	Y	-	Y	Y	
3.	BALL MILL BUILDING (BMB) LIME STONE GRINDING ILDING HOUSE	Y (100%)	-	-	-	Y	Y	Y
4	RC pump + OXIDATION BLOWER House (RCPH)	Y (100%)	-	-	-	Y	Y	Y
5	GYPSUM DEWATERING BUILDING (GDWB)	Y (100%)	-	-	-	Y	Y	Y
6	SO2 ANALYZER ROOM	Y (100%)	-	-	-	Y	Y	Y
7	ACW/DMCW PUMP HOUSE	Y (100%)	-	-	-	Y	Y	Y
8	Area lighting	Y (100%)	-	-	-	-	-	-
9	Street lighting	Y (100%)	-	-	-	-	-	

<u>LEGEND:</u>	ACN:	AC Normal Lighting
	ACE:	AC Emergency Lighting
	DCE:	DC Emergency Lighting
	Y:	YES
	\$:	Emergency Lighting Unit (ELU) & 6/16A Switch socket for ELU

AC Normal Lighting

AC Emergency Lighting


DC Emergency Lighting


YES

Emergency Lighting Unit (ELU) & 6/16A Switch socket for ELU


SUB-SECTION-II-E15

LIGHTING

CLAUSE NO.	<div data-bbox="1284 100 1425 176" style="float: right;">  </div> TECHNICAL REQUIREMENTS		
1.00.00	GENERAL		
1.01.00	This specification covers the general description of design, manufacture and construction features, testing, supply, installation and commissioning of the Lighting system equipment.		
2.00.00	CODES AND STANDARDS		
2.01.00	All standards and codes of practice referred to herein shall be the latest edition including all applicable official amendments & revisions as on date of bid opening. In case of conflict between this specification and those (IS codes, standards etc.) referred to herein, the former shall prevail. All work shall be carried out as per the following standards & codes.		
2.02.00	Lighting Fixtures and Accessories		
	IS:1913	General and safety requirements for luminaires.	
	IS:2148	Flame proof enclosures of electrical apparatus.	
	IS:418	Tungsten filament general service electric lamps.	
	IS:1258	Bayonet lamp holders.	
	IS:1534	Ballast for fluorescent lamps.	
	IS:1569	Capacitors for use in tubular fluorescent, high pressure mercury vapour and low pressure sodium vapour discharge lamp circuit.	
	IS:1777	Industrial luminaire with metal reflectors.	
	IS:2215	Starters for fluorescent lamps.	
	IS:2418	Tubular fluorescent lamps for general lighting services.	
	IS:3323	Bi-pin lamp holders for tubular fluorescent lamps.	
	IS:3324	Holders for starters for tubular fluorescent lamps.	
	IS:4013	Dust-tight electric lighting fittings.	
	IS:8224	Electric Lighting fittings for Division 2 areas.	
	IS:10276	Edison screw lamp holders.	
	IS:10322	Luminaires.	
	IS:13021	AC Supplied Electronic Ballasts for tubular fluorescent lamps.	
	2.03.00	Lighting Panels, Switch-boxes, Receptacles and Junction Boxes	
	IS:2147	Degree of protection provided by enclosures for low-voltage switchgear and control gear.	
	IS:1293	Plugs & socket outlets of rated voltage upto and Including 250volts & rated current upto and including 16 Amps.	
LOT-1A PROJECTS FLUE GAS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-0011-109(1A)-2	SUBSECTION-II-E15 STATION LIGHTING Page 1 of 16

CLAUSE NO.	<div style="text-align: right;">  </div> TECHNICAL REQUIREMENTS			
	IS:2551 Danger notice plates. IS:13947 Low voltage switchgear and controlgear IS:3854 Switches for domestic and similar purposes. IS:6875 Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V AC and 1200 V DC. IS:13703 Low voltage fuses for voltages not exceeding 1000V AC or 1500 V DC.			
2.04.00	Conduits, Pipes and Accessories IS:2667 Fittings for rigid steel conduit for electrical wiring. IS:3837 Accessories for rigid steel conduits for electrical wiring. IS:9537 Conduits for electrical installations.			
2.05.00	Lighting Wires/Cables IS:694 PVC insulated cables for working voltages upto and including 1100 V IS:3961 Recommended current ratings for cables.(PVC Insulated and PVC sheathed heavy duty cables and light duty cables). IS:8130 Conductors for insulated electric cables and flexible cords. IS:10810 Methods of tests for cables.			
2.06.00	LED Luminaries 16101:2012 General Lighting. LEDs and LED modules Terms and 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 I):2012 LED modules for General lighting Safety Requirements. 15885(Part 2/Sec. 13) :2012 Lamp control gear Part 2 particular Requirements Section 13 d.c. or a.c. Supplied Electronic control gear for LED modules 16104:2012 d.c. or a.c. Supplied Electronic control gear for LED modules - Performance Requirements. 16105:2012 Method of Measurement of Lumen maintenance of Solid-state Light (LED) Sources.			
LOT-IA PROJECTS FLUE GAS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-0011-109(1A)-2	SUBSECTION-II-E15 STATION LIGHTING	Page 2 of 16

CLAUSE NO.	<div data-bbox="1284 100 1425 176" style="float: right;">एनटीपीसी NTPC</div> TECHNICAL REQUIREMENTS			
	<div data-bbox="402 205 1398 1035"> <div>16106:2012</div><div>Method of Electrical and photometric Measurements of Solid State Lighting (LED) Products</div> <div>16107:2012</div><div>Luminaires Performance</div> <div>16108:2012</div><div>Photobiological safety of Lamps and Lamp Systems</div> <div>IS 513</div><div>Cold rolled low carbon steel sheets and strips</div> <div>IS 12063</div><div>Classification of degree of protection provided by enclosures.</div> <div>IS 14700</div><div>Electro magnetic compatibility (EMC) – Limits (Part 3/Sec. 2) for Harmonic current emission – THD < 15% (equipment, input current < 16 Amps. per phase.</div> <div>IS 9000 (Part 6)</div><div>Environment testing: Test Z – AD: composite temperature/humidity cyclic test.</div> <div>IS 15885</div><div>Lamp control gear: particular requirements for (Part 2/Sec. 13) DC or AC supplied electronic control gear IS 16004 – 1 and 2) for LED modules.</div> <div>IS 4905</div><div>Method for random sampling</div> </div>			
	<div data-bbox="224 1094 305 1119">2.07.00</div> <div data-bbox="402 1094 971 1119">Electrical Installation Practices & Miscellaneous</div>			
	IS:1944	Code of practice for lighting of public thorough fare		
	IS:3646	Code of practice for interior illumination.		
	IS:5572	Classification of Hazardous areas (other than Mines) having flammable gases and Vapours for electrical installation		
	S:6665	Code of practice for industrial lighting.		
	.	National Electrical Code		
	-	Indian Electricity Rules.		
	IS:5	Indian Electricity Act Colour for ready mixed paints & enamels.		
	IS:280	Mild steel wires for general engineering purposes.		
	IS:374	Electric ceiling type fans & regulators.		
	IS:732	Code of practice for electrical wiring installations.		
LOT-1A PROJECTS FLUE GAS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-0011-109(1A)-2	SUBSECTION-II-E15 STATION LIGHTING	Page 3 of 16

CLAUSE NO.	<div style="text-align: right;">  </div> TECHNICAL REQUIREMENTS			
	<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:1255</div> <div style="width: 85%;">Code of practice for installation and maintenance of power cables Upto and including 33KV rating.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2062</div> <div style="width: 85%;">Steel for general structural purposes</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2629</div> <div style="width: 85%;">Recommended practice for hot-dip galvanizing of iron and steel.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2633</div> <div style="width: 85%;">Methods for testing uniformity of coating of zinc coated articles.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:2713</div> <div style="width: 85%;">Tubular steel poles for overhead power lines.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:3043</div> <div style="width: 85%;">Code of practice for earthing</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:5216</div> <div style="width: 85%;">Guide for safety procedures and practices in electrical work.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">IS:5571</div> <div style="width: 85%;">Guide for selection of electrical equipments for hazardous areas.</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 15%;">BS:6121</div> <div style="width: 85%;">Mechanical cable glands</div> </div>			
3.00.00	LIGHTING SYSTEM DESCRIPTION			
3.01.00	<p>The illumination of various indoor and outdoor areas in the main plant & offsite area shall be provided as described here. The lighting system of various areas shall comprise of the following systems as identified in Annexure-B:</p> <div style="margin-left: 20px;"> <p>(a) Normal AC Lighting System</p> <p>(b) Emergency AC Lighting System</p> <p>(c) DC Lighting System</p> </div>			
3.02.01	<p>Normal AC Lighting System</p> <p>Normal AC lighting system 415V, 3Phase, 4wire, will be fed from lighting panels (LPs) which in turn will be fed from the lighting distribution boards (LDBs)/Switch board MCC.</p>			
3.02.02	<p>Emergency AC Lighting System</p> <p>This system shall be provided for certain important areas in the main plant. The lighting fixtures connected to this system shall be normally "ON" along with the normal AC system. These will be fed from emergency lighting panels (ELPs) which in turn will be fed 3-phase, 4-wire supply from the emergency lighting distribution boards (ELDB'S). These lights will go off for a few seconds in case of AC supply failure at Emergency Switchgear, but shall be automatically restored when Emergency Switchgear is energised by Diesel generator set.</p>			
3.03.00	DC Lighting System			
3.03.01	<p>At strategic locations in the main plant, a few lighting fixtures fed from 220V, DC supply, shall be provided to enable safe movement of operating personnel and access to important control points during an emergency, when both the normal AC and Emergency Lighting system fail. These lighting fixtures will be fed from 220V DC LDBs which in turn will be fed from DC lighting panels.</p>			
3.03.02	<p>The supply to the DC lighting panels shall be automatically switched ON in case of loss of AC supply at station service switchgear as well as Emergency switch-gear. The DC</p>			
LOT-IA PROJECTS FLUE GAS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-0011-109(1A)-2	SUBSECTION-II-E15 STATION LIGHTING	Page 4 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
	supply will be automatically switched OFF after about 3 minutes following the restoration of supply to normal AC or emergency AC lighting system.			
3.03.03	Emergency DC lighting is to be provided, through self-contained DC emergency fixtures with four hours back-up duration, at strategic locations, in auxiliary/offsite buildings wherever DC supply system is not available. The fixtures shall be switched 'ON' automatically in case of failure of AC supply.			
3.03.04	For Coal Handling plant./FGD Plant Area 100W, 220V DC Lighting fixture shall be provided in underground portion of conveyor, each switchgear room, control room, office room, pump house, each drive floor of TPs, staircases of various TPs and buildings and each local control area. DC lighting fixtures shall be fed from 220V DC LDB which in turn will be fed from CHP DC system. The supply to the DC lighting panels shall be automatically switched ON in case of loss of normal AC supply.			
4.00.00	DESIGN PHILOSOPHY <div><div>1.</div><div>A comprehensive illumination system shall be provided in the entire areas.</div></div> <div><div>2.</div><div>All outdoor lighting system shall be automatically controlled by synchronous timer. Provision to bypass the timer shall be provided in the panel.</div></div> <div><div>3.</div><div>The system shall include distribution boards, normal/ emergency lighting panels, lighting fixtures, junction boxes, receptacles, switch boards, lighting pole/masts, conduits, cables and wires, etc. The system shall cover all interior and exterior lighting such as area lighting etc. The constructional features of lighting distribution boards shall be similar to AC/DC distribution boards described in chapter of LT Switchgear. Outgoing circuits in LPs shall be provided with MCBs of adequate ratings.</div></div> <div><div>4.</div><div>The illumination system shall be designed on the basis of best engineering practice and shall ensure uniform, reliable, aesthetically pleasing and glare free illumination. The lighting fixtures shall be designed for minimum glare. The design shall prevent glare/luminous patch seen on VDU/ Large video screens, when viewed from an angle. The finish of the fixtures shall be such that no bright spots are produced either by direct light source or by reflection. The diffusers/ louvers used in fixtures shall be made of impact resistant polystyrene sheet and shall have no yellowing property over a prolonged period. The Lux levels to be adopted for various area are indicated at Annexure - A. (placed at the end of this Chapter).</div></div> <div><div>5.</div><div>While finalizing the detailed layout of lighting fixtures, the position/location and layout of equipments should be taken into account to have adequate illumination at desired locations.</div></div> <div><div>6.</div><div>LED Luminaires: LED Luminaires shall be used for the lighting of all the indoor & outdoor areas in bidder's scope. However for DC lighting, hazardous areas lighting etc. conventional type luminaires shall be used. In false ceiling area LED luminaires shall be recessed mounting type & in non-false ceiling area the LED luminaires shall be surface mounting type. The individual lamp wattage for LED shall be upto 3 watt. Fractional wattage LEDs are also acceptable. The LED chip efficacy shall be min 120 Lm/W. The</div></div>			
LOT-IA PROJECTS FLUE GAS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-0011-109(1A)-2	SUBSECTION-II-E15 STATION LIGHTING	Page 5 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>																
	<p>luminaire efficacy shall be not less than 80 Lm/W. Suitable heat sink shall be designed & provided in the luminaire. The LED used in the luminaires shall have colour rendering index (CRI) of Min 80. Colour designation of LED shall be "cool day light" (min 5700K) type for indoor areas. However for outdoor areas, the colour temperature of LED shall be min. 4000K, including rough & dust prone areas. LED shall conform to the LM 80 requirements.</p> <p>The max. junction temperature of LED shall be 85 deg C. Further the lumen maintenance at this temperature shall be min 90%. The THD of LED Luminaires shall be less than 10%. Further the EMC shall be as per IS 14700. The power factor of the luminaire shall not be less than 0.9. The marking on luminaire & safety requirements of luminaire shall be as per IS standards. Suitable heat sink with proper thermal management shall be designed & provided in the luminaire.</p> <p>The connecting wires used inside the system, shall be low smoke halogen free, fire retardant type and fuse protection shall be provided in input side specifically for LED luminaires.</p> <p>Care shall be taken in the design that there is no water stagnation anywhere in the housing of luminaire. The entire housing shall be dust and water proof protection as per IS 12063.</p>																			
7.	<p>Driver Circuit</p> <p>LED modules and drivers shall be compatible to each other. The LED module driver's ratings and makes shall be as recommended by corresponding LED chip manufacturer.</p> <p>LED Drivers shall have following control & protections:-</p> <ul style="list-style-type: none">• Suitable precision current control of LED.• Open Circuit Protection• Short Circuit Protection• Over Temperature Protection• Overload Protection																			
8.	<p>Apart from maintenance factor as given below, Temperature correction factor shall be considered in the lighting design for fixtures located in non air conditioned area.</p> <table><tr><td>(a.)</td><td>Office area (air conditioned)</td><td>:</td><td>0.8</td></tr><tr><td>(b.)</td><td>Office area (non air conditioned) and other indoor area</td><td>:</td><td>0.7</td></tr><tr><td>(c.)</td><td>Dust prone indoor and outdoor area</td><td>:</td><td>0.6</td></tr><tr><td>(d.)</td><td>Coal Handling area, Ash Handling Conveyor /Transfer Points etc.</td><td>:</td><td>0.5</td></tr></table>				(a.)	Office area (air conditioned)	:	0.8	(b.)	Office area (non air conditioned) and other indoor area	:	0.7	(c.)	Dust prone indoor and outdoor area	:	0.6	(d.)	Coal Handling area, Ash Handling Conveyor /Transfer Points etc.	:	0.5
(a.)	Office area (air conditioned)	:	0.8																	
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(c.)	Dust prone indoor and outdoor area	:	0.6																	
(d.)	Coal Handling area, Ash Handling Conveyor /Transfer Points etc.	:	0.5																	
9.	<p>(i) All outdoor fixtures shall be weather proof and of min. IP65 degree of protection.</p> <p>(ii) For Indoor type of fixtures:-</p> <p>(a) Surface/Pendent mounting: - IP 54 class of protection.</p> <p>(b) Recess Mounting (False ceiling):- IP 20 class of protection</p>																			
10.	<p>(a) Lighting panels shall be constructed out of 2 mm thick CRCA sheet steel. The door shall be hinged and the panel shall be gasketed to achieve specified degree of protection. Lighting panels shall be powder coated with color shade RAL9002. Lighting panels shall have min. IP55 degree of protection.</p>																			
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CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
	<div><div><div>(b) All MCBs/Isolators/Switches/Contactors etc. shall be mounted inside the panel and a fibre glass sheet shall be provided inside the main door such that the operating knobs of MCBs etc., shall project out of it for safe operation against accidental contact.</div><div>(c) Terminal blocks shall be 1100 V grade, clip-on stud type, made up of polymide 6.6 or better suitable for terminating multicore 35 or 70 Sq. mm. stranded aluminium conductor incoming cable and 10 Sq. mm. stranded aluminium conductor for each outgoing circuits voltage. All terminals shall be shrouded, numbered and provided with identification strip for the feeders.</div><div>(d) MCB's shall be current limiting type with magnetic and thermal release suitable for manual closing and automatic tripping under fault condition. MCB's shall have short circuit interrupting capacity of 9 KA rms. MCB knob shall be marked with ON/OFF indication. A trip free release shall be provided to ensure tripping on fault even if the knob is held in ON position. MCB terminal shall be shrouded to avoid accidental contact.</div><div>(e) Contactors of AC lighting panels shall be 3 no's, 32 A, 3 pole continuous duty MCB, load make-break type suitable for 415 V, 3 phase 4 wire system. HRC fuses with suitable mounting base of 125A shall be provided in the incomer of Contactors in the LP.</div><div>(f) DC switches shall be rotary type, 2 pole, continuous duty, load break type, quick make quick break, suitable for 220 V DC, 2 wire system. Switch knob shall be provided with ON/OFF indication.</div><div>(g) Programmable Digital Timer shall be Electronic Astronomical Almanac Time switch with battery back up of min. TEN years, 4 Digit LED display, 24 hours range, manual override facility, 10 Amp 3 relay output, with NO/NC Contacts suitable for operation on 240V single phase AC supply.</div><div>(h) Each lighting panel (LP-3) shall be fed from a 415V/42V, 3 phase-4 wire, 3 KVA transformer. The transformer shall be located inside the lighting panel itself. Transformers shall be dry type, natural air cooled with class F insulation or better. Impedance of transformer shall be 5%. Transformers shall be tested as per IS:11171. Off-circuit tap changer with +/- 5% in steps of +/- 1.25% tapping shall be provided. One minute power frequency withstands voltage for lighting transformer shall be 2.5 KV.</div></div></div>			
LOT-IA PROJECTS FLUE GAS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-0011-109(1A)-2	SUBSECTION-II-E15 STATION LIGHTING	Page 7 of 16


TECHNICAL REQUIREMENTS


(i) Lighting Panels shall be of following types:


TYPE	INCOMER FEEDER	OUTGOING FEEDERS	DETAIL OF CONTENTS
LP-1	3No. 415V, 32 A, TP MCB (31/2Cx70sq.mm cable)	18Nos.,20A, 240V MCB	415V, 63A(min.), AC2 duty contactor and Programmable Digital Timer of 24 hour range 10A, 240V selector switch, fuse, etc. outdoor type and IP:55 degree of protection
LP-2	3No. 415V, 32 A, TP MCB (31/2Cx35sq.mm cable)	9 Nos.,20A, 240V MCB	415V, 63A(min.), AC2 duty contactor and Programmable Digital Timer of 24 hour range 10A, 240V selector switch, fuse, etc. outdoor type and IP:55 degree of protection
LP-3	1 No., 4A fuse 3 KVA transformer,40A TPN MCB	24 Nos., 16A, 45V MCB	IP 55 degree of protection. Incomer shall be suitable for receiving 4Cx16 sq. mm cable and outgoing circuit shall be suitable for 2Cx16 sq. mm cable.
LP-D1	1No. 220V,32 A, DP Isolator (2Cx35sq.mm cable)	6Nos.,16A, 220V DP Switch & Fuse	220V,32A DC Fuse, etc. outdoor type IP:55 degree of protection.

11. Wires of different phase shall normally run in separate conduit.

12. Power supply shall be fed from 415 / 240 V normal AC supply, emergency AC supply and 220V DC supply through suitable number of conveniently located lighting distribution boards (LDB) and lighting panels (LP). AC lighting supply shall be isolated from main supply by 2x100% isolation transformers of max. rating of 100KVA for 10/15 nos. outgoing feeder with changeover switch facility.


CLAUSE NO.	<div style="text-align: right;">  </div> TECHNICAL REQUIREMENTS																							
	<p>The isolation transformer shall be fed from two different bus sections of MCC and fault level restricted to 3 KA at Lighting Panels.</p> <p>13. Atleast one 6/16A, 240V AC universal socket outlet with switch shall be provided in offices, cabins, etc. Further 20A, 240V AC industrial receptacle with switch shall be provided strategically in all industrial areas. Suitable number of 63A, 3ph, 415V AC industrial receptacles shall be provided for entire plant for welding purposes, particularly near all major equipment and at an average distance of 50m. Atleast one 63A, 3ph, 415V AC receptacle shall be provided in each floor of off-site buildings/ structures.</p> <p>Receptacles boxes shall be fabricated out of 2 mm thick MS steel hot dip galvanized or of not less than 2.5 mm thick die-cast aluminium alloy or fabricated out of 2 mm thick CRCA sheet with electro static powder coating. IP-degree of protection shall be applicable to receptacles Type 'RA &' RF only</p> <p>Receptacles shall be of following types :</p> <table border="1" data-bbox="375 743 1430 1262"> <thead> <tr> <th>Type</th><th>Switch rating</th><th>Socket & plug rating</th><th>Type & make of plug & Socket</th><th>Terminal Block size</th></tr> </thead> <tbody> <tr> <td>RA</td><td>20 A, SP240V AC(Industrial)</td><td>20A, 3 pin240 V AC</td><td>NTPC appd. make</td><td>1-4 way, suitable for loop-in loop- out of 10 sq.mm. Al. Conductor</td></tr> <tr> <td>RB</td><td>16A, S.P240V AC</td><td>6A+16A6 Pin decorative Piano-key Type Switch</td><td>NTPC appd.make</td><td>1-4 way, suitable for loop-in loop- out of upto 10 sq.mm. Al. Conductor</td></tr> <tr> <td>RF</td><td>20 A, SP24 V AC(Industrial)</td><td>20A, 3 pin24 V AC</td><td>NTPC appd. make</td><td>1-4 way, suitable for loop-in loop- out of 2 core -16 sq.mm. Al. Cable.</td></tr> </tbody> </table> <p>14. In the hazardous areas like Hydrogen generation plant, fuel oil handling areas or any other gas/ liquid fuel storage/ handling areas in bidder's scope, lighting shall be flame proof.</p> <p>15. The type of fixtures, LP, JB, and receptacle used in Hydrogen generation plant building shall be suitable for group II C as per IS: 2148 or class I, Division II as per NEC 70-428.</p> <p>16. All flouresent lamps shall be have "Cool day light" colour designation. The mirror optics type flouresent fixtures shall have no irridescence effect. Fixtures with better efficiency and upgraded proven system may also be considered In candescent lamps may be used only with DC Lighting.</p> <p>17. Aviation warning lights shall be provided as per the recommendations of ICAO and Director general of civil aviation, India. The arrangement of light should be marked such that the object is indicated from every angle in azimuth. The</p>				Type	Switch rating	Socket & plug rating	Type & make of plug & Socket	Terminal Block size	RA	20 A, SP240V AC(Industrial)	20A, 3 pin240 V AC	NTPC appd. make	1-4 way, suitable for loop-in loop- out of 10 sq.mm. Al. Conductor	RB	16A, S.P240V AC	6A+16A6 Pin decorative Piano-key Type Switch	NTPC appd.make	1-4 way, suitable for loop-in loop- out of upto 10 sq.mm. Al. Conductor	RF	20 A, SP24 V AC(Industrial)	20A, 3 pin24 V AC	NTPC appd. make	1-4 way, suitable for loop-in loop- out of 2 core -16 sq.mm. Al. Cable.
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LOT-IA PROJECTS FLUE GAS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-0011-109(1A)-2		SUBSECTION-II-E15 STATION LIGHTING	Page 9 of 16																				

CLAUSE NO.	TECHNICAL REQUIREMENTS			
	<p>aviation warning lighting system shall also conform to the latest Indian standard IS 4998.</p> <p>18. Contractor shall demonstrate the average lux level achieved for different areas as per specification requirements, after completion of the lighting work, at site to the satisfaction of engineer-in-charge.</p> <p>19. In the Offsite area / buildings DC lighting shall be provided by self-contained 90 minutes duration Emergency lighting fixtures. Each shall be provided with Ni-cd battery, battery Charger & 2x10 W fluorescent lamps</p>			
4.01.00	Ballasts			
4.01.01	All fluorescent fixtures except for Class-I, Div-II fittings/ increased safety fittings (Div-II/Hazardous Area) shall be provided with electronic ballasts.			
4.02.00	All luminaires and their accessories and components shall be of type readily replaceable by available Indian makes.			
4.03.00	Fans & Regulator			
4.03.01	Ceiling Fans, to be provided in non air-conditioned office/control room area. Further tentatively one (1) no. ceiling fan shall be provided for 10 sq.m area, at suitable mounting height. The ceiling fans shall be suitable for operation on 240 V +/-10%, 50 Hz, AC supply comprising of class 'E' or better insulated copper wound single phase motor, 1200mm sweep, aerodynamically designed well balanced AL blades (3 Nos.), down rod, die cast aluminium housing, capacitor, suspension hook, canopies etc. finished in stove enameled white or with electro static powder coating. Power factor of fans shall not be less than 0.9. Fan regulators shall be stepped electronic type suitable for operation on 240V +/-10% AC supply.			
4.04.00	Junction Boxes, Conduits, Fitting & Accessories, Pull Out Boxes:			
	Junction box for indoor lighting shall be made of fire retardant material. Material of JB shall be Thermoplastic or thermosetting or FRP type.			
	Junction boxes for street lighting poles and lighting mast if applicable , shall be deep drawn or fabricated type made of min. 1.6 mm thick CRCA Sheet. The box shall be hot dip galvanized. The degree of protection shall be IP55.			
	All switches and receptacles upto 16A shall be modular type. These shall be provided with pre-galvanized/galvanized modular switchbox & plate.			
	Conduits, Pipes and Accessories Galvanised heavy duty steel conduits for normal area and galvanised heavy duty steel conduits with an additional epoxy coating for corrosive area shall be offered. Alternatively glass reinforced epoxy conduits with comparable compressive and impact strength with that of heavy duty steel conduits may be offered.			
	Rigid steel conduits shall be heavy duty type,hot dip galvanised conforming to IS : 9537 Part-I & II shall be suitable for heavy mechanical stresses, threaded on both sides and threaded length shall be protected by zinc rich paint. Conduits shall be smooth from inside and outside.			
	Flexible conduit shall be water proof and rust proof made of heat resistant TERNE coated steel.			
LOT-IA PROJECTS FLUE GAS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-B BID DOC NO : CS-0011-109(1A)-2		SUBSECTION-II-E15 STATION LIGHTING
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CLAUSE NO.	<div style="text-align: right;">  </div> TECHNICAL REQUIREMENTS		
	<p>Pull out boxes shall be provided at suitable interval in a conduit run .Boxes shall be suitable for mounting on Walls, Columns, Structures, etc.. Pull-out boxes shall have cover with screw and shall be provided with good quality gasket lining. Pull out boxes used outdoor shall be weather proof type suitable for IP: 55 degree of protection and those used indoor shall be suitable for IP: 52 degree of protection. Pull out box & its cover shall be hot dip galvanized.</p>		
4.05.00	Lighting Wires		
4.05.01	<p>Lighting wires shall be 1100 V grade, light duty PVC insulated unsheathed, stranded copper/aluminium wire for fixed wiring installation. Colour of the PVC insulation of wires shall be Red, Yellow, Blue and Black for R, Y, B phases & neutral, respectively and white & grey for DC positive & DC negative circuits, respectively. Minimum size of wire shall not be less than 1.5.sq.mm. for copper and 4 sq.mm. for aluminium.</p>		
4.06.00	Lighting Poles		
4.06.01	<p>The Street Light system and peripheral lighting shall be designed generally in line with design guidelines. The Poles shall be mounted above ground using base plate and minimum height of pole shall be 8 mtrs The poles shall be hot-dip galvanized as per IS2629/ IS2633/ IS4759. The average coating thickness of galvanizing shall be min. 70 micron. The System shall be capable of withstanding the appropriate wind load etc as per IS 875 considering prevailing soil/ site condition considering all accessories mounting on pole.</p> <p>The street light poles shall have loop in loop out arrangement for cable entry and light fixture / wiring protected with suitably rated MCB.</p>		
4.07.00	<p>Occupancy based Passive Infra-red sensors</p> <p>The sensors shall be recess mounted, programmable type suitable for lighting load of 6A with variable off delay settings. The detection area shall be minimum 5 metres for standard room height of 3mt. All the calibrated settings shall be stored in non-volatile memory of PIR sensor which shall be unaffected by power supply fluctuations. Necessary 16A contactor shall be supplied alongwith each sensor & shall be located inside the switch box</p>		
5.00.00	TESTS		
5.01.00	<p>For LED Fixture</p> <p>a) All equipments to be supplied shall be of type tested design. During detailed engineering, the contractor shall submit for Employer's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.</p> <p>b) However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client /Employers representative and submit the reports for approval.</p>		
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CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
	<div><div>c)</div><div>All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.</div></div> <div><div>d)</div><div>The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.</div></div> <div><div>LED fixtures</div><div>Type test reports to be submitted for one rating each of following type of LED fixtures.</div><div><div>a)</div><div>High bay fixture.</div></div><div><div>b)</div><div>Well glass fixture.</div></div><div><div>c)</div><div>Street light fixture</div></div><div><div>d)</div><div>Surface mounted type fixture.</div></div><div><div>e)</div><div>Recessed mounted type fixture.</div></div></div>			
5.02.00	<div>For all other lighting equipment:</div> <div><div>a)</div><div>All equipment to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.</div></div> <div><div>b)</div><div>However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.</div></div>			
5.03.00	<div>All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.</div>			
5.04.00	<div>Selection of samples for type test, acceptance test & routine test and acceptance criteria for all the items shall be as per relevant IS</div>			
5.05.00	<div>Type test reports of the following items as per technical specification requirements/ standards shall be submitted for approval.</div> <div><div>SL NO.</div><div>DESCRIPTION</div></div> <div><div>i.</div><div>Lighting fixtures of each type</div></div> <div><div>ii.</div><div>Lighting panel of each type (Degree of Protection)</div></div> <div><div>iii.</div><div>Junction Box of each type.</div></div> <div><div>Type test reports for LED as per standards for following shall be submitted for approval.</div><div><div>1. Visual and Dimension check</div></div><div><div>2. Proof of procurement of LEDs</div></div><div><div>3. Safety tests</div></div><div><div>a) Marking</div></div><div><div>b) Construction</div></div><div><div>c) Provision for Earthing</div></div></div>			
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CLAUSE NO.		TECHNICAL REQUIREMENTS		<div>एनटीपीसी NTPC</div>																								
		<div><div><div>d) External and Internal wiring</div><div>e) Protection against electrical shock</div><div>f) Endurance and Thermal</div><div>g) Insulation resistance & electrical strength</div><div>h) Resistance to heat fire & tracking</div><div>i) Resistance to Humidity</div><div>4. Fire Retardant test</div><div>5. Performance tests (electrical, Photometric color and Life)</div><div>6. Burn-in Test</div><div>7. Power Cycling</div><div>8. Temperature rise test</div><div>9. Emission Tests</div><div>a) Radiated & conducted emission</div><div>b) Harmonics & flickers</div><div>10. Immunity tests</div></div></div> <div>In addition, following test reports to be submitted for LED chip/LED luminaire: a) LED parameters like Lumen per watt, CRI, Beam angle from manufacturer. b) LM 80/IS: 16105 report. c) LM 79/IS: 16106 report.</div>																										
5.06.00	Acceptance Test and Routine Test																											
5.06.01	All lighting fixtures, lamps and other items shall be subjected to acceptance and routine test, as per relevant specified standards.																											
5.06.02	<div>Junction boxes, switch boxes, receptacle enclosure etc. shall be subjected to physical and dimensional checks also. Switch boxes shall be made of 1.6 mm thick MS sheet with 3 mm thick decorative, Perspex cover. Switch box shall be hot dip galvanized.</div> <div>Switch boxes shall be of following types :</div> <table><tr><th>TYPE No.</th><th>Switch</th><th>Fan Regulator*</th><th>Socket</th></tr><tr><td>SWB 1</td><td>5 A - 2 Nos.</td><td>-</td><td>-</td></tr><tr><td>SWB 2</td><td>5 A - 3 Nos.</td><td>-</td><td>5A - 1.No.</td></tr><tr><td>SWB 3*</td><td>5 A - 5 Nos.</td><td>1</td><td>5A - 1.No</td></tr><tr><td>SWB 4*</td><td>5 A - 7 Nos</td><td>3</td><td>5A - 1.No.</td></tr><tr><td>SWB 5**</td><td>5 A - 5 Nos</td><td>-</td><td>5A - 1.No.</td></tr></table> <div>* Space provision shall be kept for fan regulator in switch boxes. ** Shall have the provision for mounting the 16 A contactor.</div>				TYPE No.	Switch	Fan Regulator*	Socket	SWB 1	5 A - 2 Nos.	-	-	SWB 2	5 A - 3 Nos.	-	5A - 1.No.	SWB 3*	5 A - 5 Nos.	1	5A - 1.No	SWB 4*	5 A - 7 Nos	3	5A - 1.No.	SWB 5**	5 A - 5 Nos	-	5A - 1.No.
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SWB 5**	5 A - 5 Nos	-	5A - 1.No.																									
5.07.00	Galvanizing Tests																											
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CLAUSE NO.	TECHNICAL REQUIREMENTS			
5.07.01	The quality of galvanizing shall be smooth, continuous, free from flux stains and shall be inspected visually.			
5.07.02	In addition following tests shall be conducted as acceptance tests.			
	(a)	Uniformity of coating - The coating of any article shall withstand for one (1) minute dips in standard copper sulphate solution without the formation of an adherent red spot of metallic copper upon the basic metal.		
	(b)	The quality of cadmium/zinc plating on items with screw threads shall be free from visible defects such as unplated areas, blisters and modules and shall be inspected visually.		
	(c)	In addition, the plating thickness shall be determined microscopically/ chemically or electronically.		
6.00.00	COMMISSIONING CHECKS			
	1.	On completion of installation work, the Contractor shall request the Project manager for inspection and test with minimum of fourteen (14) days advance notice.		
	2.	The Project manager shall arrange for joint inspection of the installation for completeness and correctness of the work. Any defect pointed out during such inspection shall be promptly rectified by the Contractor.		
	3.	The installation shall be then tested and commissioned in presence of the Project manager.		
	4.	The contractor shall provide all, men material and equipment required to carry out the tests.		
	5.	All rectifications, repair or adjustment work found necessary during inspection, testing and commissioning shall be carried out by the Contractor without any extra cost. The handing over the lighting installation shall be effected only after the receipt of written instruction from the Employer/his authorized representative.		
	6.	The testing shall be done in accordance with the applicable Indian Standards and codes of practices. The following tests shall be specifically carried out for all lighting installation.		
	(a)	Insulation Resistance.		
	(b)	Testing of earth continuity path.		
	(c)	Polarity test of single phase switches.		
	(d)	Functional checks.		
	7.	The lighting circuits shall be tested in the following manner:		
	(a)	All switches ON and consuming devices in circuit, both poles connected together to obtain resistance to earth.		
	(b)	Insulation resistance between poles with lamps and other consuming devices removed and switches ON.		
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CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
	ANNEXURE-A			
	SI No.	Location**	Average Illumination Level (Lux)	Type of Fixture
	(a)	Switchgear rooms, Charger, Rectifier room	200	Industrial type LED Luminaire
	(b)	Control room, computer room, control equipment room	350	LED luminaire equivalent to Mirror optics with anti-glare features or downlighter.
	(c)	Offices, conference rooms, etc.	300	Decorative mirror optics Type LED luminaire or LED downlighter
	(d)	Battery rooms	100	totally enclosed corrosion Proof LED Luminaire
	(e)	Transformer Area	20 (general) 50 (on equipment)	LED Luminaire
	(f)	Diesel generating room /enclosure, Compressor room, pump house etc.	150	LED medium bay/ Industrial type LED Luminaire
	(g)	Cable galleries/vault	50	Industrial type LED Luminaire
	(h)	Street lighting- primary roads secondary roads	20 10	LED street lights
	(i)	Outdoor storage handling and unloading area	20	LED Luminaire
	(j)	Cement stores	150	Industrial dust proof type LED Luminaire
	(k)	Chemical stores/House	150	Corrosion proof LED Luminaire
	(l)	Permanent stores	150	LED high/medium bay / Industrial trough LED Luminaire
	(m)	Workshop. Building	150	LED high/medium bay / Industrial trough LED Luminaire
	(n)	Laboratory General Analysis area	150 300	Corrosion proof LED Luminaire
	(o)	Garage/Car Parking	50	Industrial type LED Luminaire
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CLAUSE NO.	TECHNICAL REQUIREMENTS			<div>एनटीपीसी NTPC</div>
	(p)	Transfer points, Sheds, tunnels, bunker house, Conveyor Gallery etc. in bidders scope	100	LED Dust tight/Well glass type Luminaire
	(q)	Facility building, canteen etc.	150	Industrial type LED Luminaire
	(r)	Corridors, Walkways	50	LED Luminaire
	(s)	Building Periphery Lighting	10	LED Street Light fixture
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**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS &
MISCELLANEOUS ITEMS**

RATE CONTRACT

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DATA SHEET –A

S. No.	Description	Unit	Value
1.0	SYSTEM DESIGN DATA		
1.1	Design ambient	⁰ C	50
1.2	AC Supply		
a)	Rated voltage	V	415
b)	Rated frequency	Hz	50
c)	Voltage variation (permissible)	%	+10% to -10%
d)	Frequency variation (permissible)	%	+3% to -5%
e)	Combined voltage & frequency variation (sum of absolutes permissible)	%	10%
f)	System fault level & duration	kA, sec.	50kA for 1 sec.
1.3	DC Supply		
a)	Rated voltage	V	220
b)	Voltage variation (permissible)	%	+10% to -15%
c)	System fault level & duration	kA, sec.	20kA for 1 sec.
2.0	SCOPE OF SYSTEM DESIGN ENGINEERING		Included in vendor's scope
3.0	Lighting Concept		
3.1	Types of supplies considered (other than AC Normal)		
a)	AC emergency		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
b)	DC emergency		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
c)	DC Normal		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
3.2	Diversity Factor for Sockets	%	25%
4.0	LUMINAIRES, LAMPS & ACCESSORIES		
4.1	Type of false ceiling for recessed fluorescent luminaire		Grid False ceiling (600mm X 600mm) / Aluminium false ceiling (for Control Room).
4.2	Degree of protection for drip proof luminaires		Outdoor : Min IP65 and weather proof



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			Indoor : Surface / pendant mounting : IP54 Recess mounting (false ceiling) : IP20.
4.3	Flame proof luminaires		
a)	Hazardous area classification		IS-2148 Zone II Group-IIA & IIB ; Group –II C as per IS 2148 or class-I Division-II as per NEC 70- 428
b)	Degree of protection		IP55
c)	Mounting type for well glass		[] Eye-bolt [] MS Galvanised Strap [√] Screw neck
4.4	Non-integral controlgear box for HPMV/HPSV lamps		
a)	Material		[] CRCA sheet steel [√] Cast Aluminium LM6
b)	Sheet thickness	mm	[] 2 for CRCA sheet [√] 3 for Cast Aluminium LM6
c)	Degree of protection		IP55
d)	Surface treatment		[√] Powder co [] Galvanized
e)	If galvanized		NOT APPLICABLE
	Process		-
	Weight of zinc	g/m ² ma	-
f)	If painted		
	Paint shade		RAL 7032
	Minimum paint thickness (DFT)	micron	50
4.5	Lamps		
a)	Type of Fluorescent Lamps		[√] Cool Daylight [√] White Light
4.6	Emergency Lighting Unit		
a)	Lamp type		[] FLT [√] CFL [] LED
b)	Nos. of Lamp		2
c)	Lamp wattage	W	10
d)	Lumen output of lamp at rated voltage	Lumen	To furnished by Vendor.



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e)	Type of battery (Rechargeable type)		<input checked="" type="checkbox"/> Ni-Cd <input type="checkbox"/> Lead-Acid <input type="checkbox"/> Li-Ion
f)	AH capacity of battery	AH	To furnished by Vendor.
g)	Battery voltage	V	9
h)	Battery backup time	Hr	4
i)	In built charger		Yes
4.7	Exit Sign		
a)	Lamp type		FLT/ CFL/ LED
b)	Nos. of Lamp		1
c)	Lamp wattage	W	20
d)	Lumen output of lamp at rated voltage	Lumen	To furnished by Vendor.
e)	Type of battery		<input checked="" type="checkbox"/> Ni-Cd <input type="checkbox"/> Lead-Acid <input type="checkbox"/> Li-Ion
f)	AH capacity of battery	AH	To furnished by Vendor.
g)	Battery voltage	V	To furnished by Vendor.
h)	Battery backup time	Hr	4
4.8	24V AC Supply Module (Fixed type & portable type)		
a)	Enclosure		
	Enclosure material		<input type="checkbox"/> Cast aluminium alloy <input checked="" type="checkbox"/> CRCA sheet steel
	Enclosure thickness	mm	<input type="checkbox"/> 3 for Cast aluminium alloy <input checked="" type="checkbox"/> 2 for CRCA sheet steel
	Louvers provided		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
b)	Surface treatment		<input type="checkbox"/> Painted <input checked="" type="checkbox"/> Galvanized
c)	If galvanized		
	Process		Hot dip
	Weight of zinc	g/m ²	460 gm / mm ² (65 microns)
d)	If painted		
	Paint shade		
	Minimum paint thickness (DFT)	micron	
e)	Transformer		
	Rating	VA	500



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	Voltage ratio & Current Rating	V	240 V/24V [6A/16A]
	Class of insulation		Class F, temperature rise limited to Class-B
f)	24V Hand lamp unit		
	Lamp type		<input checked="" type="checkbox"/> Halogen <input type="checkbox"/> LED
	Lamp wattage	W	40
g)	No. of outgoing sockets		4
h)	Whether cord coiling arrangement provided		<input checked="" type="checkbox"/> Yes air cooled <input type="checkbox"/> No
5.0	Junction Box		
a)	Enclosure material		JB for street lighting: CRCA sheet Indoor : Thermoplastic / thermosetting / FRP type.
b)	Enclosure thickness	mm	1.6 (min) thick CRCA sheet.
c)	Galvanized (applicable for CRCA sheet)		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
d)	Degree of protection		IP-55(indoor) / FRP Weather proof IPW-66 for outdoor area & Flameproof for hazardous area)
6.0	Industrial/ Welding Receptacle		
a)	Enclosure material		<input checked="" type="checkbox"/> MS sheet & hot dip galvanised / Die cast aluminium alloy / CRCA sheet steel with electrostatic powder coating
b)	Enclosure thickness	mm	<input checked="" type="checkbox"/> 2mm (min) / 2.5mm (min) / <input checked="" type="checkbox"/> 2mm (min) respectively.
c)	Surface treatment		<input type="checkbox"/> Painted <input checked="" type="checkbox"/> Galvanized
d)	If galvanized		
	Process		Hot dip
	Weight of zinc	g/m ²	460 gm / mm ² (65 microns)
e)	If painted		NOT APPLICABLE
	Paint shade		
	Minimum paint thickness (DFT)	micron	
f)	Degree of protection		IP-55
7.0	Decorative Receptacle		
a)	Enclosure material		<input type="checkbox"/> Cast aluminium alloy <input checked="" type="checkbox"/> MS Sheet



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b)	Enclosure thickness	mm	[] 2 for cast aluminium alloy [√] 2 for MS sheet
c)	Surface treatment		[] Painted [√] Galvanized/ Electro-plated
d)	If galvanized		
	Process		Hot dip
	Weight of zinc	g/m ²	460 gm / mm ² (65 microns)
e)	If painted		NOT APPLICABLE
	Paint shade		
	Minimum paint thickness	micron	
f)	Degree of protection		IP-55
9.0	Switch Box		
a)	Enclosure material		[] FRP [√] MS Sheet.
b)	Enclosure thickness	mm	1.6mm MS sheet with 3mm thick decorative, Perspex cover.
c)	Galvanized		[√] Yes [] No
d)	Painted		[] Yes [√] No
d)	Degree of protection		IP-55
10.0	Conduit (Flexible)		
a)	Type		[√] TERNE coated conduit [] Lead coated
b)	Size	mm	20
c)	Standard length	m	25 to 50
d)	Thickness of Galvanization	microns	
5.13	Cable Glands		By vendor for all incoming and outgoing cables
a)	Type		[√] Double compression [] Single compression
b)	Material		Brass
c)	Nickel Plating provided		[√] Yes [] No
d)	Flameproof glands with flameproof equipment		[√] Yes [] No
5.14	Cable Lugs		By vendor for all incoming and outgoing cables



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a)	Type		Crimping type/ ring type
b)	Material		Tinned copper
12.0	LADDERS		
a)	Type		<input type="checkbox"/> Free standing <input type="checkbox"/> wheel mounted <input checked="" type="checkbox"/> both
b)	Material		<input type="checkbox"/> Steel <input checked="" type="checkbox"/> Aluminium
c)	Duty		<input type="checkbox"/> Heavy <input checked="" type="checkbox"/> Medium
d)	Surface treatment		<input checked="" type="checkbox"/> Galvanised <input type="checkbox"/> Painted
e)	Reference Standard		IS: 4571, 3696

Note:

1. Detailed luminaire and lamp data shall be placed by vendor after award of contract.
2. Galvanization wherever applicable shall be hot dip galvanized with weight of Zinc as 460g/m² (65micron).



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LIST OF APPLICABLE STANDARDS

ILLUMINATION

Code of practice for interior illumination	IS 3646
Code of practice for industrial lighting	IS 6665
Code of practice for lighting of public thoroughfare	IS 1944

LUMINAIRES

Luminaires	IS 10322
Industrial luminaires with metal reflector	IS 1777
Industrial lighting fittings with plastic reflectors	IS 3287
Decorative lighting outfits	IS 5077
Waterproof electric lighting fittings	IS 3528
Watertight electric lighting fittings	IS 3553
Dust-proof electric lighting fittings	IS 4012
Dust-tight electric lighting fittings	IS 4013
Flameproof electric lighting fittings - well glass & bulk head types	IS 2206
Electric lighting fittings for division 2 areas	IS 8224
General & Safety requirement of Luminaire	IS 1913
General Lighting. LEDs and LED modules Terms and definitions	IS 16101
Self Ballasted LED Lamps for General Lighting Services.	IS 16102
LED modules for General lighting Safety Requirements.	IS 16103
Lamp control gear Part 2 particular	IS 15885(Part 2)
Requirements d.c. or a.c. Supplied Electronic control gear for LED modules	IS 16104

LAMPS

Tungsten filament lamps for domestic and similar general lighting purpose	IS 418
Tubular fluorescent lamps for general lighting service	IS 2418
High pressure mercury vapour lamps	IS 9900
High pressure sodium vapour lamps	IS 9974

LUMINAIRE COMPONENTS



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Ballast for fluorescent lamps for switch start circuits	IS 1534
Ballast for high pressure mercury vapour lamps	IS 15882
Capacitors for use in tubular fluorescent high pressure mercury and low pressure sodium vapour discharge lamp circuits	IS 1569
Bi-pin lamp holders for tubular fluorescent lamps	IS 3323
Methods of measurement of lamp cap temperature rise	IS 8913
Starters for fluorescent lamps	IS 2215
Holders for starters for tubular fluorescent lamps	IS 3324
Cast acrylic sheets for use in luminaires	IS 7569

ASSEMBLED EQUIPMENT AND COMPONENTS

Low voltage switchgear and controlgear.	IS 60947
Code of practice for selection, installation & maintenance of switchgear & control gear	IS 10118
Explosive atmospheres	IS 60079
Classification of hazardous areas for electrical installations	IS 5572
Dry type transformers	IS 11171
Electrical Accessories - circuit breakers for over protection for household and similar installations	IS 60898
Low voltage Fuses for voltages not exceeding 1000 V ac or 1500 V dc	IS 13703
Indicator lamps (visual)	IS 1901

POLES, SOCKETS AND OTHER MISCELLANEOUS

Plugs and socket outlets of rated voltage upto and including 250 volts and rated current upto and including 16 amperes	IS 1293
Interlocking switch socket outlet	IS 4160
Electric ceiling type fans and regulators	IS 374
Structural steel (Standard quality)	IS 2062
Danger notice plates	IS 2551
Enclosures for accessories for household and similar fixed electrical installations	IS 14772
General construction in steel - Code of practice	IS 800
Wrought aluminium and aluminium alloy bars, rods, tubes and sections for electrical purposes	IS 5082
Code of practice for phosphating of iron and steel	IS 6005



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Colour for ready mixed paints & enamels	IS 5
Recommended practice for hot dip galvanising of iron & steel	IS 2629
Method of testing uniformity of coating on zinc coated articles	IS 2603
Flexible steel conduits for electrical wiring	IS 3480
Conduits for electrical installations	IS: 9537
Scaffolds & ladders - Code of safety	IS: 3696
Aluminium extension ladders	IS: 4571
General Requirement for enclosures for accessories for household & similar fixed electrical installations	IS: 5133

RATE CONTRACT

DATA SHEET - B

SL. NO.	DESCRIPTION	MEASURED ELECTRICAL INPUT POWER (W) MAX. VALUE	TOTAL LUMINOUS FLUX (LUMEN) OF LUMINAIRE - MIN. VALUE	MAKE OF LUMINAIRE
	MAIN SUPPLY ITEMS			
1.0	Lighting Luminaires (complete with accessories)			REFER BELOW NOTE 2&3
1.1	Luminaire Type FC02 (LED)			
1.2	Luminaire Type FC06 (LED)			
1.3	Luminaire Type FC07 (LED)			
1.4	Luminaire Type FC26 (LED)			
1.5	Luminaire Type FC33 (LED)			
1.6	Luminaire Type FC34 (LED)			
1.7	Luminaire Type FC81 (LED)			
1.8	Luminaire Type SB02 (LED)			
1.9	Luminaire Type SB03 (LED)			
1.10	Luminaire Type SF63 (LED)			
1.11	Luminaire Type SF64 (LED)			
1.12	Luminaire Type SS62 (LED)			
1.13	Luminaire Type SW41 (LED)			
1.14	Luminaire Type SW42 (LED)			
1.15	Luminaire Type Downlighter (LED)			

NOTE :

- 1 Bidder to fill details of luminaires as per parameters mentioned above and furnish Data Sheet - B along with technical offer. .
- 2 Lighting designer shall furnish the make of above mentioned luminaires along with the MOU as per technical PQR prior to the placement of order.
- 3 Luminaire manufacturer shall furnish the make of above mentioned luminaires prior to the placement of order.

SUB VENDOR LIST FOR LIGHTING DESIGNER

SL NO.	ITEM/SERVICE	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
1	LIGHTING DESIGNER	AT13	AVAIDS TECHNOVATORS PVT. LTD.	4A/58, SHANKAR ROAD, NEW DELHI-110060	Mr. Rajendra Panda M: 9910481854 (email: rajendra@avaids.com)	
2	LIGHTING DESIGNER	BE13	BAJAJ ELECTRICALS LTD.	801 (8th floor), Rustomjee Aspire, Bhanu Shankar Yagnik Marg, Off Eastern Express Highway Sion (E), Mumbai 400022	Mr. S. SREEMANY. SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705. (email: srabans@bajajelectricals.com)	
3	LIGHTING DESIGNER	KS13	KELSATEK SOLUTIONS PVT. LTD.	50/1 4TH FLOOR, CHURCH STREET, BANGALORE-560001	Mr. S S Mudaliar Sr. VP M: 6380471362 (email: mudaliar@kelsatek.com)	
4	LIGHTING DESIGNER	SE13	M/s SUMANAM ENGINEERING SERVICES CONSULTANT	1, ADITHYA, KOWDIAR, TRIVANDRUM 695003	Mr. Anshad S Phone: 471-2437588, (email: shaw@sumanam.org)	
5	LIGHTING DESIGNER	SM13	SPAN MANUFACTURING COMPANY LTD	27 First Floor, Bhiku Building, Murari Ghag Marg, Prabhadevi, Mumbai-400025	Ms Surbhi Jindal M: 9811026321 (email: spanmanufacturing@gmail.com, info@dalighthub.com)	Lighting System designer only for FGD, R&M and Hydro projects
6	LIGHTING DESIGNER	CL13	CITELUM INDIA PVT. LTD	Y-14A, GREEN PARK MAIN, NEW DELHI-110016	Mr. Satyabrata Meher M: 8155001095, (email: smeher@citelum.in)	Lighting System designer only for FGD, R&M and Hydro projects
7	LIGHTING DESIGNER	SR13	M/s SURYA ROSHNI LTD	Padma Tower 1, Rajendra Place, New Delhi-110008	Mr. Saurabh Gupta 9999433167, (email: saurabh.gupta@surya.in), AKHILESH AGRAWAL (aagrawal@surya.in)	

ANNEXURE-A
LIST OF MAKES (SUB-VENDOR ITEMS)

ITEM/SERVICE DESCRIPTION	SL NO.	VENDOR NAME	REMARKS
AC CONTACTORS	1	SIEMENS	
AC CONTACTORS	2	GE-POWER	
AC CONTACTORS	3	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	TAKEN OVER BY SCHNEIDER
AC CONTACTORS	4	L&T	
AC CONTACTORS	5	BCH	
AC MCCB	1	C&S ELECTRIC LTD.	
AC MCCB	2	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
AC MCCB	3	SIEMENS	
AC MCCB	4	GE-POWER	
AC MCCB	5	L&T	
AC MCCB	6	CROMPTON GREAVES	
CABLE GLANDS	1	ALLIED TRADERS & EXPORTERS	
CABLE GLANDS	2	ARUP ENGG & FOUNDARY WORKS	
CABLE GLANDS	3	BALIGA LIGHTING EQPT.PVT.LTD.	
CABLE GLANDS	4	COMMET BRASS PRODUCTS	
CABLE GLANDS	5	DOWELLS	
CABLE GLANDS	6	ELECTROMAC INDUSTRIES	
CABLE GLANDS	7	INCAB	
CABLE LUGS	1	DOWELLS	
CABLE LUGS	2	UNIVERSAL MACHINES LTD.	
GI CONDUITS	BIS APPROVED MAKE		
GI CONDUIT (EPOXY PAINTED)	BIS APPROVED MAKE		
FLEXIBLE CONDUITS (LEAD COATED)	1	PLICA INDIA PVT. LTD.	
FLEXIBLE CONDUIT (PVC COATED)	REPUTED MAKE		
CONTROL SWITCHES/ SELECTOR SWITCH	1	KAYCEE	
CONTROL SWITCHES/ SELECTOR SWITCH	2	GE-POWER	
CONTROL SWITCHES/ SELECTOR SWITCH	3	ALSTOM LTD	
CONTROL SWITCHES/ SELECTOR SWITCH	4	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
CONTROL SWITCHES/ SELECTOR SWITCH	5	M/s Shrenik & Co.	
CONTROL SWITCHES/ SELECTOR SWITCH	6	RECOM PVT. LTD.	
EMER. PORTABLE LTG. SET	1	BAJAJ ELECTRICALS	
EMER. PORTABLE LTG. SET	2	BAJAJ ELECTRICALS	
FUSE BASE	1	INDO ASIAN	
FUSE BASE	2	GE-POWER	
FUSE BASE	3	L&T	
FUSE BASE	4	C&S ELECTRIC LTD.	
FUSE BASE	5	SIEMENS	
FUSE BASE	6	ABB	
FUSE BASE	7	SPACEAGE SWITCHGEARS LTD.	
FUSE BASE	8	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
FUSE BASE	9	ALSTOM LTD	
FUSE BASE	10	ESSEN DEINKI	
HRC FUSES	1	INDO ASIAN	
HRC FUSES	2	GE-POWER	
HRC FUSES	3	L&T	
HRC FUSES	4	C&S ELECTRIC LTD.	


ITEM/SERVICE DESCRIPTION	SL NO.	VENDOR NAME	REMARKS
HRC FUSES	5	SIEMENS	
HRC FUSES	6	ABB	
HRC FUSES	7	SPACEAGE SWITCHGEARS LTD.	
HRC FUSES	8	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
HRC FUSES	9	ALSTOM LTD	
HRC FUSES	10	ESSEN DEINKI	
IND.POWER & WLDG SOCKETS	1	CROMPTON GREAVES	
IND.POWER & WLDG SOCKETS	2	CYCLO ELECTRIC DEVICE & SERV.CO.	
IND.POWER & WLDG SOCKETS	3	BCH	
IND.POWER & WLDG SOCKETS	4	BEST & CROMPTON	
IND.POWER & WLDG SOCKETS	5	AJMERA INDUSTRIES & ENGG. WORKS	
INDICATING LAMPS	1	BCH	
INDICATING LAMPS	2	C&S ELECTRIC LTD.	
INDICATING LAMPS	3	ESSEN DEINKI	
INDICATING LAMPS	4	VAISHNO(HOTLINE SWGR.& CONTROL)	
INDICATING LAMPS	5	GE-POWER	
INDICATING LAMPS	6	SIEMENS	
INDICATING LAMPS	7	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
JUNCTION BOXES (NON FLAME PROOF)	1	JASPER ENGINREES PVT. LTD.	
JUNCTION BOXES (NON FLAME PROOF)	2	Electro Controls & Devices	
JUNCTION BOXES (NON FLAME PROOF)	3	M/s Shrenik & Co.	
JUNCTION BOXES (NON FLAME PROOF)	4	M/s PHOENIX MECANO LTD.,	
JUNCTION BOXES (NON FLAME PROOF)	5	Adroit Control Engineers Pvt.Ltd.	
JUNCTION BOXES (NON FLAME PROOF)	6	M/s PHOENIX MECANO LTD.,	
JUNCTION BOXES (NON FLAME PROOF)	7	MIKA ENGINEERS	TYPE-S ONLY
JUNCTION BOXES (NON FLAME PROOF)	8	M/s PHOENIX MECANO LTD.,	
JUNCTION BOXES (NON FLAME PROOF)	9	BAJAJ ELECTRICALS	
JUNCTION BOXES (NON FLAME PROOF)	10	AJMERA INDUSTRIES & ENGG. WORKS	
JUNCTION BOXES (NON FLAME PROOF)	11	S.B. ELECTRICAL ENGINEERING	
JUNCTION BOXES (NON FLAME PROOF)	12	RITTAL INDIA PVT. LTD.	
JUNCTION BOXES (FLAME PROOF)	1	SUDHIR SWITCHGEAR	
LIGHTING FIXTURES (NON LED)	2	BALIGA LIGHTING EQPT PVT LTD	
LIGHTING FIXTURES (NON LED)	3	ELEXPRO ELECTRICALS PVT/ LTD.	
LIGHTING FIXTURES (NON LED)	4	BAJAJ ELECTRICALS	
LIGHTING FIXTURES (NON LED)	5	CROMPTON GREAVES	
LIGHTING FIXTURES (NON LED)	6	EVERGREEN ENGG. CO.	
LIGHTING FIXTURES (NON LED)	7	PHILIPS	
LIGHTING FIXTURES (NON LED)	8	WIPRO LTD.	
LIGHTING FIXTURES (NON LED)	9	M/S HPL ELECTRIC & POWER PVT. LTD	
LIGHTING FIXTURES (NON LED)	10	SURYA ROSHNI LIMITED	
LIGHTING FIXTURES (NON LED)	11	HAVELLS INDIA LIMITED	
LIGHTING FIXTURES (NON LED)	12	M/s Halonix Technologies Limited	

ITEM/SERVICE DESCRIPTION	SL NO.	VENDOR NAME	REMARKS
LIGHTING FIXTURES (LED)	1	Neev Luminaries	
LIGHTING FIXTURES (LED)	2	HAVELLS INDIA LIMITED	
LIGHTING FIXTURES (LED)	3	BAJAJ ELECTRICALS	
LIGHTING FIXTURES (LED)	4	SURYA ROSHNI LIMITED	
LIGHTING FIXTURES (LED)	5	PHILIPS	
LIGHTING FIXTURES (LED)	6	M/S HPL ELECTRIC & POWER PVT. LTD	
LIGHTING FIXTURES (LED)	7	INSTA POWER	
LIGHTING FIXTURES (LED)	8	Pyrotech Electronics Pvt. Ltd.	
LIGHTING FIXTURES (LED)	9	M/s Halonix Technologies Limited	
LIGHTING FIXTURES (LED)	10	M/s JAQUAR & COMPANY PVT. LTD.	
LIGHTING FIXTURES (LED)	11	M/s CROMPTON GREAVES CONSUMER	
LIGHTING FIXTURES (LED)	12	M/s WIPRO ENTERPRISES PRIVATE LTD.	
LIGHTING FIXTURES (FLAME PROOF)	1	HAVELLS INDIA LIMITED	
LIGHTING FIXTURES (FLAME PROOF)	2	BAJAJ ELECTRICALS	
LIGHTING FIXTURES (FLAME PROOF)	3	BALIGA ELECTRICALS	
LIGHTING LAMP (NON LED)	1	WIPRO LTD.	
LIGHTING LAMP (NON LED)	2	ESSEN DEINKI	
LIGHTING LAMP (NON LED)	3	BAJAJ ELECTRICALS	
LIGHTING LAMP (NON LED)	4	INSTA POWER	
LIGHTING LAMP (NON LED)	5	PHILIPS	
LIGHTING LAMP (NON LED)	6	HAVELLS INDIA LIMITED	
LIGHTING LAMP (NON LED)	7	HPL	
LIGHTING LAMP (NON LED)	8	SURYA ROSHNI LIMITED	
LIGHTING LAMP (NON LED)	9	M/s Halonix Technologies Limited	
LIGHTING LAMP (LED)	1	Neev Luminaries	
LIGHTING LAMP (LED)	2	HAVELLS INDIA LIMITED	
LIGHTING LAMP (LED)	3	BAJAJ ELECTRICALS	
LIGHTING LAMP (LED)	4	SURYA ROSHNI LIMITED	
LIGHTING LAMP (LED)	5	PHILIPS	
LIGHTING LAMP (LED)	6	M/S HPL ELECTRIC & POWER PVT. LTD	
LIGHTING LAMP (LED)	7	INSTA POWER	
LIGHTING LAMP (LED)	8	Pyrotech Electronics Pvt. Ltd.	
LIGHTING LAMP (LED)	9	M/s Halonix Technologies Limited	
LIGHTING SWITCH , SOCKET & S/F UNIT	1	ELEXPLO ELECTRICALS PVT/ LTD.	
LIGHTING SWITCH , SOCKET & S/F UNIT	2	ANCHOR	
LIGHTING SWITCH , SOCKET & S/F UNIT	3	KAYCEE	
LIGHTING SWITCH , SOCKET & S/F UNIT	4	L&T	
LIGHTING SWITCH , SOCKET & S/F UNIT	5	SIEMENS	
LIGHTING SWITCH , SOCKET & S/F UNIT	6	INDO ASIAN	

ITEM/SERVICE DESCRIPTION	SL NO.	VENDOR NAME	REMARKS
MCB	1	MDS SWITCHGEAR LTD	
MCB	2	INDO ASIAN	
MCB	3	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
MCB	4	S&S POWER SWITCHGEAR LTD,	
MODULAR SWITCH BOARD	1	ANCHOR	
MODULAR SWITCH BOARD	2	ELEXPRO ELECTRICALS PVT/ LTD.	
MODULAR SWITCH BOARD	3	HAVELLS INDIA LIMITED	
RECEPTACLES - DECORATIVE	1	ANCHOR	
RECEPTACLES - DECORATIVE	2	ELEXPRO ELECTRICALS PVT/ LTD.	
RECEPTACLES - DECORATIVE	3	BAJAJ ELECTRICALS	
RECEPTACLES - DECORATIVE	4	AJMERA INDUSTRIES & ENGG. WORKS	
SWITCH BOX	1	ANCHOR	
SWITCH BOX	2	ELEXPRO ELECTRICALS PVT/ LTD.	
SWITCH BOX	3	BAJAJ ELECTRICALS	
SWITCH BOX	4	AJMERA INDUSTRIES & ENGG. WORKS	
SWITCH BOX	5	S.B. ELECTRICAL ENGINEERING	
TERMINAL BLOCKS	1	WAGO-CONTROLS	
TERMINAL BLOCKS	2	CONNECT WELL	
TERMINAL BLOCKS	3	ELMEX CONTROLS PVT. LTD.	
TERMINAL BLOCKS	4	ESSEN DEINKI	
TERMINAL BLOCKS	5	TECHNOPLAST	
TERMINAL BLOCKS	6	M/s PHOENIX MECANO LTD.,	
TERMINAL BLOCKS	7	ESSEN DEINKI	
TIMERS - PNEUMATIC	1	BCH	
TIMERS - PNEUMATIC	2	ALSTOM LTD	
TIMERS - PNEUMATIC	3	L&T	
TIMERS - PNEUMATIC	4	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	TAKEN OVER BY SCHNEIDER
TIMERS - PNEUMATIC	5	SCHNEIDER ELECTRIC INDIA PVT. LTD.	
TIMERS - PNEUMATIC	6	ELECTRONIC AUTOMATION PVT. LTD.	
TIMERS - ELECTRONIC	1	ESSEN DEINKI	
RECEPTACLE (FLAME PROOF)	1	BALIGA ELECTRICALS	
RECEPTACLE (FLAME PROOF)	2	SUDHIR SWITCHGEAR	
RECEPTACLE (FLAME PROOF)	3	FCG FLAME PROOF CONTROL GEAR	
RECEPTACLE (NON FLAME PROOF)	1	AJMERA INDUSTRIES & ENGG. WORKS	
RECEPTACLE (NON FLAME PROOF)	2	CROMPTON GREAVES	
RECEPTACLE (NON FLAME PROOF)	3	CYCLO ELECTRIC DEVICE & SERV.CO.	
RECEPTACLE (NON FLAME PROOF)	4	BCH	
RECEPTACLE (NON FLAME PROOF)	5	BEST & CROMPTON	
EMERGENCY LIGHTING UNIT (FIXED & PORTABLE TYPE)- NON FLAME PROOF	1	BAJAJ ELECTRICALS	
EMERGENCY LIGHTING UNIT (FIXED & PORTABLE TYPE)- NON FLAME PROOF	2	PROLITE AUTOGLO LIMITED,	
24V SUPPLY MODULE WITH COMPLETE ACCESSORIES	1	POWER PACK ENTERPRISES	
24V SUPPLY MODULE WITH COMPLETE ACCESSORIES	2	INDCOIL	

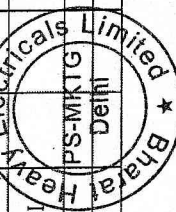
ITEM/SERVICE DESCRIPTION	SL NO.	VENDOR NAME	REMARKS
24V SUPPLY MODULE WITH COMPLETE ACCESSORIES	3	Ames Impex Electricals Pvt. Ltd	
AMMETER	1	AUTOMATIC ELECTRIC LTD.	
AMMETER	2	RISHABH INST.PVT LTD	
AMMETER	3	M/s Newtek Electricals	
VOLTMETER	1	AUTOMATIC ELECTRIC LTD.	
VOLTMETER	3	M/s Newtek Electricals	
PVC WIRES	BIS APPROVED MAKE		
PEDESTAL FAN & CEILING FAN	REPUTED MAKE		
EXIT SIGN (FLAME PROOF)	REPUTED MAKE		
EXIT SIGN (NON FLAME PROOF)	REPUTED MAKE		
LADDER	REPUTED MAKE		
PHOTOELECTRIC SWITCH	REPUTED MAKE		
DICHORIC SPOT LIGHTING FIXTURE	REPUTED MAKE		
HAND LAMP UNIT	REPUTED MAKE		

NOTE: Make of all the equipment / instrument under this specification shall be subjected to owner's approval in the event of order. Owner reserves the right to accept/ reject any make or sub-vendor and to add new sub-vendors for the project after award of contract. Approval, rejection or addition of makes shall not have any price implication to the owner after award of contract.

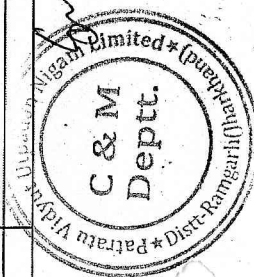
		PROJECT : Patratu STPP (2X660 MW) PACAKAGE : EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2				LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL				REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017	
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						Engineers	Hoogly (Kolkata)			
						Patny System	Hyderabad	A		Galvanisation at Gurpreet galvaniser - Hyderabad
						Rabi Engg	Kolkata	A		Galvanizing from NTPC approved sources
						Advance Power Products	Howrah	A		
						Maheswari Electricals	Noida	DR		
						Saral Industries	Raibareilly	DR		
						Parmar Metal	Rajkot	DR		
						Pentax	Mumbai	DR		
						Eros metal	Nagpur	DR		
						Vinfab	Thane	DR		
						Nandhari	Ludhiana	DR		
						Indimark Formtech	PUNE	DR		
						Valco	Mumbai	A		Galvanising at Sigma Mumbai
						Inar profiles	Enkapalli	A		
						Industrial perforations	Kolkata	A		
						Premier power products	Kolkata	A		Galvanising at Neha Galvaniser
						Steelite engg.	Mumbai	A		
						Indiana gratings	Pune	A		Galvanising at Poona Galvaniser
						Amtech	Pune	A		Galvanising at B.G. Shirke
						Ratan Projects	Kolkata	A		Galvanization at NTPC approved sources
						Indimark Formtech	PUNE	DR		
						M/s PLICA	Ghaziabad	A		
						M/s Lapp	Germany	DR		
						M/s Bansal Labs	Bhopal	A		

11. Cable tray flexible support system (GI)

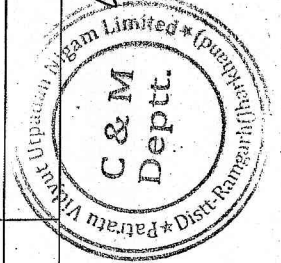


12. Lead coated steel flexible conduits

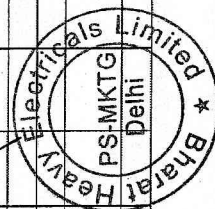
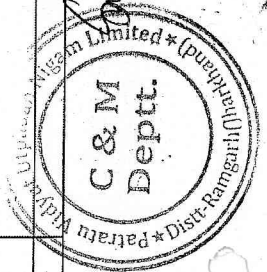



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13.	Junction boxes / Link Boxes/ Test Link Box/ Adaptor box, Switch Boxes, Pull Boxes (Hot Dip Galvanized)	III				Main contractor approved sources with galvanization from NTPC approved sources (Note-2)		Noted		
14.	FRP Junction boxes	II	10			Main Contractor approved sources		Noted		
15.	Cable termination kits & straight through jointing kit upto 33KV	I	11			M/s 3M Electro & Communication	Pune	A		up to 33 KV
						Raychem	Mumbai	A		Heat shrinkable type up to 33 KV
						Yamuna Cable Accessories	Yamunanagar	DR		
						Hari Consolidated Pvt Ltd	Delhi	A		Heat shrinkable type Upto 11 KV with conditions, above rating DR
16.	Cable glands	III				Main contractor approved sources		Noted		
17.	Cable lugs	III				M/s Dowell	Mumbai	A		
						M/s Bilets Elektro Werke Ltd.	Umbergaon	A		



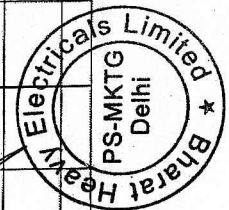
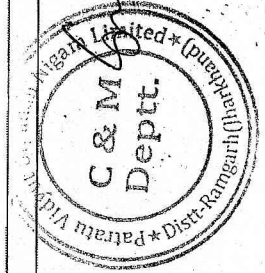
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						(3 D) M/s Chelna Additionally Any make's model with VDE or CE or UL or CSA marking or BIS approved with CML no. Refer Note-3	Nasik	A		
18.	Lighting fixtures with accessories	I	12			M/s Crompton	Mumbai	A#		#- "A"- for filament type and "DR" for LED Type
						M/s Bajaj Electricals	Mumbai	A		
						M/s Philips	Noida	A#		
						M/s Wipro	Mumbai	A		
						M/s Surya Rosini	Kashipur	A		
						M/s Goldwyn	Noida	A		
19.	Lamps	III				M/s Crompton	Mumbai	A#		#- "A"- for filament type and "DR" for LED Type
						M/s Bajaj Electricals	Mumbai	A		
						M/s Philips	Noida	A#		
						M/s Wipro	Mumbai	A		
						M/s Surya Rosini	Kashipur	A		
						Goldwyn	Noida	A		
20.	Lighting Panels	I				Please refer serial no- 3 as identified in LT Switchgear & LT Busduct sub package list				



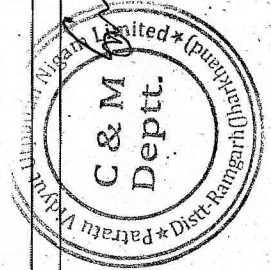
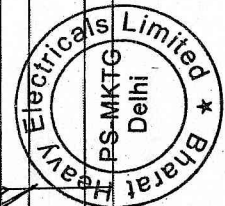



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						M/s Ajmera	Mumbai	A		
						M/s. Sakthi & Crown	Chennai	A		
						Additionally Any make's model with VDE or CE or UL or CSA marking or BIS approved with CML no		Refer Note-3		
23.	Lighting mast with raise & lower type lantern carriage	I	15			M/s Bajaj	Pune	A		
						M/s Skipper	Howrah	A		
						M/s. B.P. Project,	Hoogly	A		
24.	Lighting pole / steel tubular pole	I	16			BIS licensee as per IS 2713 with valid CML number		A		
25.	Lighting poles polygonal type	I				M/s Bajaj	Pune	A		
						M/s B.P. Projects	Hoogly	A		
26.	PVC conduit/hume pipe/lighting wire/GI pipes/HDPPE pipe/Structural Steel	III				BIS licensee / ISI marked with valid CML number		A		
27.	GI steel rigid conduit/ epoxy conduit	III				BIS licensee with valid CML number		A		



PROJECT : Patratu STPP (2X660 MW) PACAKGE :EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2										LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL			REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24 th April 2017		
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28.	Trefoil clamps/Earthing & Lighting Protection Material/Sheet Steel/ FRP cable trench cover/drum lifting jack/Earth wire/ FRP/Aluminum Ladder/Dimmer & Passive Infrared Sensors	III					Main Contractor Approved Sources	Noted							
29.	FAN with regulators & Exhaust Fan	III				M/s Crompton									
						M/s Orient									
						M/s Khaitan									
						M/s Polar									
						M/s GEC									
						M/s Havells									
						M/s Bajaj									
30.	FQP of DG Set Installation.	I	G-01												
31.	FQP of Cables & Accessories	I	G-02												



		PROJECT : Patratu STPP (2X660 MW) PACAKGE :EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2				LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL			REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017		
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32.	FQP of Earthing	I	G-03								
33.	FQP of Station Lighting	I	G-04								

NB:

Under Sub Supplier approval status as per NTPC column:

A: mean that vendor for this item is acceptable to NTPC.

Under QP / INSPN CATEGORY column:

CAT-I : For these items the Quality Plans approved by NTPC & final acceptance will be on physical inspection & witness by NTPC

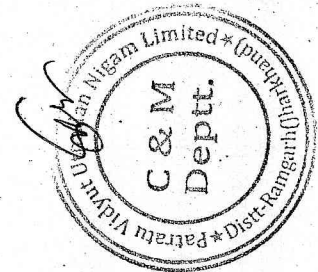
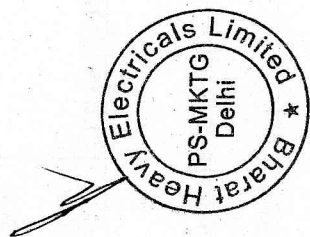
CAT-II : For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on basis of verification of documents as per approved QP


CAT-III : For these items Main supplier approves the Quality Plans. The final acceptance by NTPC shall be on basis of certificate of conformance by the main supplier.

@ : Vendors acceptance is subject to sub-QR clearance.

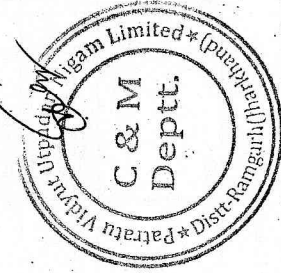
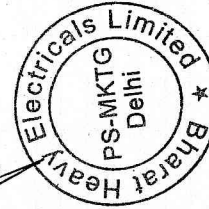
Note-1- Approval conditions attached to above identified vendors, as applicable shall be adhered to.

Note-2 – List of NTPC acceptable galvanizers



				PROJECT : Patratu STPP (2X660 MW) PACAKGE : EPC Sub Package: Electrical Equipment Supply & Erection CONTRACTOR : M/S BHEL CONT. NO. CS-9585-001-2				LIST OF ITEMS REQUIRING QP APPROVAL & ACCEPTABLE VENDOR Contractor-M/S BHEL				REF NO : 9585-001-QOE-R-01 REVISION NO. 00 DATE 24th April 2017			
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1.	M/s M J Engg, Delhi														
2.	M/s Jamna Metal, Delhi														
3.	M/s A. V. Engg, Kolkata														
4.	M/s Inar Profiles, Vishakapatnam														
5.	M/s Anand Udyog, Mumbai														
6.	M/s Techno Engg, Chandigarh														
7.	M/S Steelite Engg, Mumbai														
8.	M/s National Galvanizer, Kolkata														
9.	M/s Unistar Galvanizer, Kolkata														
10.	M/s B.P. Project, Kolkata														
11.	M/s Bajaj Pune														
12.	M/s Electrocare Industries, Mumbai														
13.	M/s B.G. Shirke, Pune														
14.	M/s Gurpreet Galvanizer, Hyderabad														
15.	M/s Sigma, Mumbai														
16.	M/s Radhakrishnan Shetty, Chennai														
17.	Karamlara Mumbai														
18.	Poona Galvanizers Pune														
19.	Neha Galvanizer- Kolkata														
20.	Unitech galvanizers- Hoogly														
21.	Gurpreet galvanizers- Hyderabad														
22.	DMP Projects- Kolkata														

Note-3 : VDE / CE / UL / CSA MARKING FOR PRODUCT QUALITY: SELF CERTIFICATION/VALID CERTIFICATION FROM THIRD PARTY AGENCY OR BIS APPROVAL LETTER WITH CML NO. FOR PRODUCT QUALITY SHALL BE SUBMITTED FOR NTPC'S INFORMATION





**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS AND
MISCELLANEOUS ITEMS**

RATE CONTRACT

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**ANNEXURE – B
DOCUMENTS REQUIRED AFTER AWARD OF LOI**

PE-V0-XXX-558-E101	OGA of equipments such as fixture, SBs, JBs, Receptacles, free standing ladder, Emergency exit sign, wheel mounted ladder, ceiling fans, ELU, etc.	Primary	R-0 within 28 days from lot clearance of released items & subsequent revisions within 15 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.
PE-V0-XXX-558-E102	Datasheet of lamps, CFL, Fluorescent tube, PVC coated conduit	Primary	
PE-V0-XXX-558-E901	MQP FOR LUMINARIES	Primary	
PE-V0-XXX-558-E905	MQP FOR MISCELLANEOUS ITEMS	Primary	
PE-V0-XXX-558-E201	Lighting design Calculation	Secondary	Within 3 weeks from the date of BHEL input drawing & re- submission within 15 days of BHEL comments. BHEL shall furnish comments / approval on each submission within 18 days from receipt.
PE-V0-XXX-558-E301	Lighting Layout	Secondary	
PE-V0-XXX-558-E401	Conduit Layout	Secondary	Within 15 days from the approval of respective LLOs/ BHEL comments.
PE-V0-XXX-558-E103	MOUNTING ARRANGEMENT OF BULK HEAD FIXTURE	Secondary	Along with respective OGA
PE-V0-XXX-558-E104	TYPE TEST REPORTS FOR LIGHTING FIXTURES	Secondary	Within 2 months from lot clearance for applicable items
PE-V0-XXX-558-E105	FIELD QUALITY PLAN OF LIGHTING FIXTURES	Secondary	Within 3 months from PO
PE-V0-XXX-558-E106	MOUNTING ARRANGEMENT drgs.	Secondary	Along with respective OGA

Note: The above list of drawings and documents is indicative. Number of drawings may vary as per project requirements.



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**ANNEXURE – C
SCOPE MATRIX FOR BROAD ACTIVITIES**

SCOPE MATRIX FOR BROAD ACTIVITIES				
Sl. No.	Activities	Contractor	Associate	Remark (if any)
1	System Design			
2	Supply: - (a) Fixtures & Lamps (b) Other Items (as required for System completion)			
3	Supervision of Erection & commissioning			
4	Design review & changes based on site feedback for establishing correctness of the system at site			

Notes: -

1. Bidder to indicate Division of work (DOW)/ scope matrix between contractor & associate by indicating "Yes"/ "No" against each activity in the appropriate column, same to be furnished duly signed & stamped along with technical offer.

PACKING SPECIFICATIONS- LIGHTING FIXTURES, LAMPS & MISC. ITEMS

PACKING

1. The material shall be packed to ensure protection against damage during transit, storage for prolonged periods and handling.
2. Lighting Fixtures, Lamps, Receptacles, Switchboards, 24V Supply modules, 24V sockets, Junction Boxes, Exit signs shall be clean and dry prior to packaging.
3. All items specified at sl. No.2 above shall be supplied in packed cartons. The tapes used for packing shall not bleed, leave residue, or damage the item when removed.
4. Fixtures & other lighting material shall be wrapped in weather proof material such as polythene sheets, air bubble sheets/ thermocol etc. The lighting fixtures shall be placed in a corrugated paperboard/ fibreboard container/ mono carton.
5. The mono cartons shall be wrapped or bagged or tied in place in master cartons. The master carton shall be taped and then wrapped with cushioning material.
6. The dimensions of cartons shall be as per manufacturer's recommendations.
7. For items like step ladder, wheel mounted ladder and flexible conduits, packing shall be as per manufacturer standard.

Note: In case Manufacturer has a different packing standard which is **equivalent or better** same to be submitted for approval during contract stage.



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STANDARD TECHNICAL REQUIREMENTS



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**TECHNICAL SPECIFICATION FOR
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CLAUSE DESCRIPTION

1.0	INTENT OF SPECIFICATION
2.0	CODES & STANDARDS
3.0	LIGHTING SYSTEM DESCRIPTION (CONCEPTUAL VIEW)
4.0	SYSTEM DESIGN ENGINEERING
4.1	ENGINEERING INPUTS
4.2	DESIGN CRITERIA
4.3	ENGINEERING OUTPUTS
5.0	LUMINAIRES, ACCESSORIES AND LAMPS
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5.2	LUMINAIRE & OTHER ITEMS
5.3	CONTROLGEAR BOX (NON-INTEGRAL TYPE)
5.4	REFLECTORS
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5.6	STARTER HOLDERS
5.7	BALLASTS
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5.16	CABLE LUGS
5.17	FLEXIBLE METALLIC CONDUITS AND FITTINGS
5.18	PVC CONDUITS
6.0	SURFACE TREATMENT
7.0	PACKING
8.0	GUARANTEED PERFORMANCE REQUIREMENTS
9.0	INSPECTION & TESTING
10.0	SPARES
11.0	TOOLS & TACKLES
12.0	DOCUMENTATION
	ANNEXURE-I: LUMINAIRE DETAILS



**TECHNICAL SPECIFICATION FOR
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1.0 INTENT OF SPECIFICATION

- 1.1 The requirements given in specification for supply of equipment and system design engineering shall be fully complied with.
- 1.2 For the equipment of supply in vendor's scope, the "design" shall broadly cover the selection of components, materials, sizes etc. and complete responsibility of establishing the correctness of equipment design rests with the vendor.
- 1.3 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship, and shall be capable of performing required function in a manner acceptable to Purchaser, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgement is not in full accordance herewith.
- 1.4 Make of all equipment and components shall be to the approval of Purchaser. Bidder to comply to Sub-vendor list enclosed as Annexure to Section I, however same shall be subjected to end client approval without any commercial implication.

2.0 CODES & STANDARDS

- 2.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.
- 2.2 The material, construction, manufacture, inspection and testing shall conform to the latest revisions of standards as specified in Data Sheet-A.
- 2.3 In case of conflict between the applicable reference standard and this specification, stringent requirement shall govern.

3.0 LIGHTING SYSTEM DESCRIPTION (CONCEPTUAL VIEW)

- 3.1 All areas of plant (indoor and outdoor) shall be provided with suitable lighting arrangement to meet the functional requirements by use of various types of luminaires so as to achieve the desired quality and level of illumination.
- 3.2 Lighting system shall also cover the low voltage power services such as power receptacles and single phase feeders.
- 3.3 Lighting system shall be fed through various power sources such as AC Normal, AC Emergency and DC Emergency supply to achieve the desired reliability.
- 3.4 Power tapped from various sources shall be distributed through lighting distribution boards and lighting panels upto the various luminaires and power outlet sockets / feeders.



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4.0 SYSTEM DESIGN ENGINEERING

Engineering shall be done by the vendor only during the contract engineering stage as the same is covered in his scope. During tender stage, bidder shall make his quotation on the basis of BOQ furnished by the purchaser with the tender document.

4.1 ENGINEERING INPUTS : Complete engineering shall be done by the vendor on the basis of documents listed below. The engineering inputs shall be furnished by purchaser. However, furnishing of these inputs shall not absolve the vendor of responsibility to visit site and get acquainted with actual site conditions.

4.1.1 Indoor Areas

- a) Room dimensions (details as covered in various layout drawings)
- b) Lighting System Design Data (LSDD) covering typical values for various types of indoor areas, indicating :
 - i. Required average illumination level
 - ii. Reflection factors for walls, ceiling and floor
 - iii. Maintenance factor
 - iv. Type of luminaire
 - v. Mounting height of luminaire
 - vi. Height of working plane
- c) AC Emergency lighting requirements
- d) DC lighting requirements
- e) Requirement of sockets
- f) Requirement of exhaust fans and fan points

4.1.2 Outdoor Areas

- a) Area geometry (details as covered in various layout drawings)
- b) Lighting System Design Data (LSDD) covering typical values for various types of outdoor areas, indicating:
 - i. Average illumination level
 - ii. Type of luminaire
 - iii. Pole heights / mounting height
 - iv. AC Emergency lighting requirement



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- v. DC lighting requirements
- vi. Maintenance factor
- c) Requirement of sockets

4.1.3 Other inputs

- a) Plot plan, Main equipment plan and TG hall floor plans (to assess quantum of area lighting drawings)
- b) Suggestive location of LDBs
- c) Suggestive power distribution scheme (SLDs)
- d) Control schemes
- e) Single phase feeder details
- f) No. of sockets / criteria for computation of no. of sockets / location of sockets etc.
- g) LDB/WDB details
- h) LP details
- i) Poles & Masts details
- j) Conduit sizes
- k) Wire sizes
- l) Earthing material sizes

4.2 DESIGN CRITERIA:

4.2.1 General Requirements of Design

- a) Lighting system shall be provided to ensure adequate visual performance, safety and reliability and shall be free from excessive glare and flicker from discharge lamps. Particular attention shall be paid to ensure that level of illumination is satisfactory in all respects including viewing of all instruments, alarms, annunciations and indicating lamps.
- b) Complete system design shall be done on the basis of inputs provided by the purchaser and in line with the laid down criteria.
- c) Requirements of sockets shall be as per the criteria / number of sockets given by the purchaser during detailed engineering stage.



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- d) Complete power distribution system shall be designed keeping following criteria in view :
- Simplicity
 - Controlled voltage drop
 - Cost effectiveness

4.2.2 Sources of Power Supply

- a) The illumination of various indoor and outdoor areas in the main plant and off site areas shall comprise of one or more of the following systems:
- Normal AC Lighting System
 - Emergency AC Lighting System
 - DC Lighting System
- b) Arrangement and distribution of power shall depend upon the functional requirements of areas and therefore supply from all types of power sources shall not be made available to all areas. Lighting & LV power services in different areas shall be provided as per Annexure-B enclosed.
- c) 24V AC lighting for maintenance purposes (for hand lamps and/or hand operated tools) shall be supplied from 240/24V fixed/ portable lighting module.

4.2.3 Lighting philosophy

a) Normal AC Lighting System

Normal AC lighting system 415V, 3 phase, 4 wire, will be fed from lighting panels (LPs) which in turn will be fed from the lighting distribution boards (LDBs). Street lights/ flood lights shall be fed from Street Lighting Panel (SLP), Welding receptacles shall be fed from Welding DB/ MCC in offsite areas.

b) Emergency AC Lighting System

This system shall be provided for certain important areas in the main plant. The lighting fixtures connected to this system shall be normally "ON" along with the normal AC system. These will be fed from emergency lighting panels (ELPs) which in turn will be fed from 3-phase, 4-wire supply from the emergency lighting distribution boards (ELDB'S). These lights will go off for a few seconds in case of AC supply failure at Emergency Switchgear, but shall be automatically restored when Emergency Switchgear is energized by Diesel generator set.

c) DC Lighting System

At strategic locations in the main plant, a few lighting fixtures fed from 220V DC supply, shall be provided to enable safe movement of operating personnel and access to important control points during an emergency, when both the normal AC and Emergency Lighting system fail. These lighting fixtures will be fed from 220V DC LPs which in turn will be fed from DC LDBs.



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The supply to the DC lighting panels shall be automatically switched ON in case of loss of AC supply at station service switchgear as well as Emergency switchgear. The DC supply will be automatically switched OFF after about 3 minutes following the restoration of supply to normal AC or emergency AC lighting system.

In auxiliary /off site buildings, emergency DC lighting is to be provided through self contained DC emergency fixture at strategic locations. The fixtures shall be switched 'ON' automatically in case of failure of AC supply.

d) Street Lighting/ Flood Lighting

Street lights / flood lights will be fed from Street Lighting Panel (SLP). The number of street lights / flood lights shall be grouped in such a way that they will be fed from the nearest SLP available. Street lights shall have provision of automatic switching ON and OFF in any one of the following modes and as per the purchaser's scheme:

- i. Manual
- ii. Automatic through 00 - 24 hrs time switch
- iii. Automatic through combination of 00 - 24 hrs time switch and a remote sensing device for monitoring external illumination level. Each SLP shall be provided with a time switch and a remote light sensing device.

4.2.4 Number of Luminaires

- a) All calculations shall be done as per the input data covered under "Engineering Inputs".
- b) Total AC luminaires

Total number of AC luminaires for indoor and outdoor areas shall be calculated on the basis of point to point method by an established computer program. Optimisation criteria shall form part of street lighting calculations.

For AC emergency lighting, a specified percentage of total AC luminaires shall be considered as AC emergency luminaires. The percentage shall be informed during detail engineering.

4.2.5 Layout Considerations

a) General Layout Considerations

- i. Layout of equipment such as LDBs and LPs shall be on the basis of following criteria :
 - Ease of operation
 - Maintainability
 - Aesthetics
- ii. Luminaires shall be located to meet the functional requirements of the area. Aesthetics shall form part of layout considerations.
- iii. Due considerations shall be given to the mounting arrangement depending upon location and type of area.



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- iv. While preparing lighting system layout drawings for air conditioned control rooms/areas having false ceilings, the vendor shall be required to interface with the Air Conditioning / Ventilation Duct layout and false ceiling layout drawings to avoid fouling / interference.
- v. The poles shall be located 1.5m away from the road edge. The buried cable shall run in hume pipe / duct bank wherever it is crossing the roads.
- vi. 240V AC, 5/15A universal socket (at least two number) shall be provided in office, store, cabin etc. The receptacles shall be provided at interval of 20m or part thereof for hand tools etc. One no. 20A, 240V AC industrial type receptacle shall be provided at suitable location in all other area as required. The receptacles shall be controlled through switch/MCBs. In hazardous area, receptacles shall be flame proof.
- vii. Suitable nos. of 63A/125A, 3 phase, 415V industrial receptacle with switch shall be provided at specific points in power plant area for welding purposes. At least one 63A/125A receptacle shall be provided in each off-site building.
- viii. 1200mm/ 1400mm sweep ceiling fans with stepped electronic regulator shall be provided for office room, store rooms and social buildings which are not covered by air-conditioned and ventilation system.
- ix. All fans including pedestal fans shall comply to relevant IS.

b) Conduit System

- i. Unless indicated otherwise, conduits shall originate from respective lighting panels and shall continue upto the luminaires for all indoor areas.
- ii. Conduits shall run in straight runs, parallel to building columns, walls etc. as far as practicable.
- iii. Unnecessary bends and crossings shall be avoided.
- iv. In the corrosive environment, conduit installations shall be made with corrosion proof conduits. Such requirements shall be clearly indicated while preparing BOQ.
- v. Conduits in control room and other air-conditioned areas shall be surface mounted on the roof above false ceiling. However vertical drops of conduits shall be through column flanges or grooved to the wall, finally covered for better aesthetics.

c) Wiring

- i. Each circuit from LP shall be taken in a separate conduit.
- ii. Wiring of AC normal, AC emergency & DC emergency lighting system shall be carried out in separate conduits.



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- iii. Receptacle wiring shall be distinct from lighting conduits. No two phase circuits shall be run in the same conduit. However different circuits of same phase may be laid in the same conduit.
- iv. Maximum three nos. of receptacles shall be loop-in & loop-out in a circuit.
- v. Filling area of wires in conduit shall not exceed 40% of the conduit area.
- vi. Wiring shall be done with following conductor sizes:
 - Luminaires – 2.5 sq. mm
 - 5A plug & socket – 2.5 sq. mm
 - 5/15A and 20A plug & socket – 4 sq.mm
- vii. Wiring shall be designed for the uniformly distributed spread of luminaires on each phase i.e. R,Y,B. Distribution of luminaires on these phases shall be such so that there is generally uniform light intensity in the event of failure of one or two phases.
- viii. Luminaires located in offices, stores, laboratories, toilets etc. shall be individually or group controlled.

d) Cabling

- i. Cables shall be considered wherever it is not desirable to run the insulated wires due to long runs or for any other valid reason.
- ii. Cable Schedule shall be prepared for all cable connections.

4.3 ENGINEERING OUTPUTS:

Vendor shall prepare and submit following documents and drawings for purchaser's approval :

- a) Lighting calculations for indoor areas covering details such as room dimensions (length, width, height), illumination level, reflection factors (walls, ceiling, floor), maintenance factor, type of luminaire, mounting height of luminaire, room index, coefficient of utilisation, no. of luminaires (AC Normal & AC Emergency), lumen output of each luminaire, reference drawings and remarks.
- b) Lighting calculations for outdoor areas covering average illumination level, type of luminaire, chart for illumination level at various points in the area; location (coordinates), number and height of poles; type, number (normal + emergency) and orientation of luminaires etc. Calculated values of average and minimum illumination level as obtained through computer package shall also be furnished. Dot density plots for lux level shall be furnished if available in the computer package.
- c) Single line diagrams of power distribution upto Lighting Panels. Separate drawing for complete lighting distribution shall also be prepared by vendor.



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- d) Loads on each phase of LP and LDB with consideration of diversity factor for sockets.
- e) Layout drawings for each indoor area indicating location of luminaires, sockets, fan points, exhaust fans, LDBs and LPs. Details of type of luminaires, source of power supply (AC Normal, AC Emergency, DC Normal and DC Emergency). Bill of Material shall also be covered which shall include unit wise requirements of luminaires and other items.
- f) Layout drawings for each outdoor area indicating location of poles / towers, orientation of luminaires, sockets and LPs. Details of pole height / mounting height, type of luminaires, source of power supply (AC Normal, AC Emergency, DC Emergency). Bill of Material shall also be covered for various types of luminaires.
- g) Conduit layout drawings with wiring and load distribution details as superimposed on the area layout drawings indicated above. Drawings shall include Bill of Material for conduits, wires etc.
- h) Wiring and load distribution details for outdoor areas.
- i) Master Bill of Material (to be submitted at regular intervals of engineering progress) including all items required for the complete lighting system viz. lighting fixtures, lamps, Lighting DBs, Welding DBs, lighting panels, conduits, PVC wires etc.
- j) In case of revised inputs or site feedback, preparation and submission of revised engineering outputs shall also be in the scope of vendor.
- k) Calculation for selection of number and size of containers
- l) Packing procedures and drawings.

5.0 LUMINAIRES, ACCESSORIES AND LAMPS

5.1 GENERAL REQUIREMENTS OF LUMINAIRES

- a) All luminaires and accessories shall be designed for continuous operation and shall be suitable for the system design data given in Data Sheet A.
- b) Luminaires shall be complete with accessories mounted inside the luminaire assembly. Lamps shall be supplied separately as per BOQ.
- c) All luminaires and accessories shall be suitable for operation in the atmospheric conditions prevailing at site.
- d) Power factor for fluorescent lamp luminaires shall be 0.9 or more and that for HPMV/ HPSV luminaires shall be 0.85 or more. Power factor correction capacitors shall be provided for this purpose.



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- e) Luminaires shall be designed for minimum glare. No bright spots should appear from the lamp or from the reflectors.
- f) All accessories shall be wired upto a terminal block or a separate weather proof metallic terminal box suitable for 2.5 sq. mm. copper wire termination.
- g) All internal wiring shall be of PVC or silicon rubber insulation, capable of withstanding the maximum temperature to which it will be subjected under specified service conditions without deterioration.
- h) All luminaires and accessories including the breathing holes shall be vermin proof.
- i) Surface Treatment:
 - All surfaces after manufacture shall be thoroughly cleaned and degreased. Pre-treatment of surfaces shall be as per the applicable standard. Pretreated surfaces shall be free from rust, sharp edges, scales and burrs.
 - Finish of surfaces shall be non-porous, smooth and unfaded.
- j) All metal parts of the luminaires shall be bonded and connected to the earthing terminal. Earthing terminal shall be suitable for connecting 14 SWG GI wire.
- k) Flood lights shall be provided with base frame / base plate for mounting on structural steel members / wall.
- l) All weather proof luminaires shall have the control gear housed in a weather proof enclosure with necessary gaskets, mounting bracket, locking screws etc.

5.2 LUMINAIRE TYPES & OTHER ITEMS

5.2.1 General requirements depending upon type of luminaire are listed below. Specific requirements of each luminaire are indicated in "Luminaire Details" enclosed as Annexure-I.

a) Channel Mounted Luminaires (Fluorescent Luminaires)

- Channel mounted luminaires, except the special purpose luminaires, shall have CRCA sheet steel base plate / rail / channel / box / side panels / housing as per "Luminaire Details". Sheet shall be completely stove enameled unless mentioned vitreous enameled in "Luminaire Details". Colour of enamel shall be grey on all non-reflecting surfaces and white on reflecting surfaces.
- Twin fluorescent luminaires shall be wired in lead-lag circuit to minimise stroboscopic effect.
- Luminaires suitable for surface mounting shall also be suitable for pendant mounting. Knockouts of 20mm ET conduit fixation shall be provided for this purpose.



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b) Decorative Fluorescent Luminaires

- Decorative luminaires shall be provided with one of the following as per “Luminaire Details” :
 - i. Perspex acrylic diffuser.
 - ii. High purity, anodised aluminium, mirror optic reflectors with anodised aluminium matt finish transverse fins to control glare.
 - iii. Opal polystyrene louvers and sheet steel side panels.
 - iv. Vertical metallic louvers finished in stove enamelled white and with sheet steel side panels.
- End plates of decorative luminaires shall be of high impact polystyrene or sheet metal finished in black colour.
- Diffusers and louvers for the fluorescent lamps shall be made of high impact polystyrene sheet and shall have no yellowing property over a prolonged period of use.
- Recessed type decorative luminaires shall be suitable for mounting with gypsum boards / luxalon / plaster of Paris/aluminium frame false ceiling of standard size as per Data Sheet A and “Luminaire details”.

c) Industrial Fluorescent Luminaires (General Purpose)

- Additional reflectors, wherever provided, shall be easily removable type.

d) Industrial Fluorescent Luminaires (Special Purpose)

- Luminaires for chemical vapour (acidic / alkaline) laden environment shall be of cast aluminium controlgear box and end boxes. Controlgear housing shall have detachable, one piece neoprene gasket cover to make it weather proof. Design shall be suitable for chemically charged environment.
- Luminaires for corrosive and dust laden environment shall be made of tray type sheet steel housing and transparent acrylic visor supported by a galvanised sheet steel frame, fitted to the housing with gasket all around. Cable entry shall be from the side of luminaire. Luminaire shall be totally dust and vapour proof.
- Luminaires for highly corrosive environment shall have with sheet aluminium/ polycarbonate housing. controlgear housing, CRCA sheet steel controlgear tray with a stove enamelled white reflector. A clear acrylic cover of dish shape, secured to canopy by stainless steel toggle and neoprene gasket lining, shall be provided at the bottom.



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- Luminaires for drip proof environment such as street lighting fluorescent luminaire shall have sheet aluminium canopy, a detachable reflector-cum-controlgear housing, clear ribbed acrylic cover held in aluminium frame. Luminaire shall have the degree of protection IP:55 unless mentioned otherwise in Data Sheet A. Luminaire shall be suitable for side entry mounting with the pole bracket arm.

e) Bay Type Luminaires

- Luminaires shall be designed for following indoor applications:
 - i) High bay
 - ii) Medium bay
 - iii) Low bay
- Luminaires shall have top mounted, cast aluminium controlgear housing. Housing shall have cooling fins and canopy for easy access to the components. Canopy shall be hinged at one end and wing screw bolted at the other end.
- Controlgear shall be connected to the detachable lamp housing at the bottom such that heat dissipation is proper and distributed.
- Lamp housing-cum-reflector shall be made from spun aluminium, electrochemically brightened and anodised.
- Lamp housing for the dust laden environment shall be totally enclosed type. A clear toughened glass cover shall be attached to the lamp housing with an aluminium frame and neoprene gasket. Luminaire shall be provided with a safety chain for toughened glass.
- Mounting arrangement shall consist of MS brackets with an anti-vibration eye-bolt.
- Side mounted controlgear box shall be provided for low bay luminaires, if mentioned in "Luminaire Details".

f) Well Glass Luminaires

- Well glass luminaires shall be suitable for dust and vapour laden environment.
- Luminaires shall be provided with a die-cast aluminium canopy and heat resistant well glass, fitted with a ring type gasket.
- All well glass luminaires shall be provided with vitreous enamelled reflector.
- Zinc plated MS wire guard shall be provided for protection of well glass.



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- Separate side mounted and top connected control gear box shall be provided for use with HPMV & HPSV lamps.
- Integral control gear box, where applicable, shall be of die cast aluminium material with one piece neoprene gasket between the box and its cover to make it dust and vapour proof.
- Luminaires shall be conduit mounted type for incandescent lamps and surface mounting type for HPMV & HPSV lamps.

g) Flame Proof Well Glass Luminaires

- Housing material shall be cast aluminium alloy LM6. Housing outer surface shall be provided with cooling fins.
- Flame proof luminaires shall be provided with heavy toughened well glass cemented in a retaining ring.
- Zinc-coated / chrome-plated MS chain connected to the main body and glass retaining ring shall be provided.
- A detachable terminal box at the top shall be provided.
- Neoprene gaskets, where needed, shall be provided for weather proof construction and indoor and outdoor application.
- Two cable entries of 20mm ET conduit shall be provided with one flame proof plug.
- Luminaires shall be suitable for the hazardous areas as classified in Data Sheet A. Design of flame proof luminaire shall be supported by the type test report for flame proofness from a government or government approved independent laboratory.

h) Street Lighting Luminaires (Other than Fluorescent Luminaire)

- These luminaires shall be suitable for street lighting and general purpose outdoor area lighting.
- Luminaire housing shall be one piece cast aluminium alloy to accommodate lamp housing and controlgear for lamp wattage upto 150 watts. For lamp wattage above 150 watts, controlgear housing shall be of cast aluminium alloy whereas lamp housing shall be of deep drawn aluminium.
- Inside finish of the lamp housing shall be stove enamelled white. Optical control shall be provided with two high purity, electro brightened and anodised side reflectors.



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- Clear acrylic bowl fitted with a rubber gasket and easily removable type shall be secured to the lamp housing.
- Provision shall be made for adjustment of lamp location for proper focussing.
- Luminaires shall be suitable for mounting with pole bracket arm.

i) Flood Lighting Luminaires

- Flood light lamp housing and reflector shall be separate from controlgear box. Requirements of controlgear box are specified elsewhere.
- Lamp reflectors shall be of high purity spun aluminium attached to the cast aluminium lamp holder housing at the rear. Lamp holder housing shall be provided with cooling fins.
- Reflector shall be closed from the front by heat resistant toughened glass and synthetic "S" type weather proof gasket.
- Luminaire shall be provided with special lamp centering and focussing device ensuring good beam control.
- MS mounting bracket shall allow fixation of the flood light in any position in a horizontal plane and the flood light can be locked in at any set angle in the vertical plane. Cast iron base and / or two protector scales shall also be provided where specified in "Luminaire Details"
- Design shall permit replacement of lamp from the rear without disturbing the previously set aiming angles. Special guide pins shall also be provided for protecting the lamps from damage while replacing.

j) Halogen Flood Lighting Luminaire

- Luminaires shall be compact in design with aluminium alloy housing and three piece highly polished and anodised reflector assembly.
- Toughened glass panel in the front shall be provided with silicon gaskets.
- Lamp replacement from the front is also acceptable.

k) Post Top Lanterns

- Luminaire shall comprise of a spun aluminium canopy, opal acrylic diffuser and a cast aluminium spigot.
- Controlgear shall be integral type and shall be housed in the spigot.
- Luminaire shall be supplied without mounting pole.



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l) Bulk Head (Flame Proof)

- Bulk head luminaires shall be used for the locations where explosion or fire hazard exists.
- Luminaire shall be made of cast iron housing with integral terminal box.
- Front of the luminaire shall be covered with flat toughened glass cemented into a retaining ring.
- Lamp replacement shall be from the front.
- Controlgear box for HPMV lamps shall be integral to the housing.
- MS fixing straps shall be provided for mounting.
- Luminaire shall be stove enameled grey outside and white inside.
- Terminal box shall be provided with 20 mm ET conduit entry.
- Complete luminaire shall be suitable for the hazardous area as classified in Data Sheet A. Type test certificate for flame proofness test from government or government approved independent laboratory shall be submitted.

m) Bulk Head (Weather Proof)

- Luminaire shall be suitable for indoor / outdoor applications having weather proof features.
- The luminaire shall comprise of die cast aluminium alloy body of dish shape.
- Luminaire shall have a heat resistant prismatic cover held in a weather proof gasket.
- Luminaire shall be stove enamelled grey outside and white inside.
- Glass cover shall have a galvanised wire protection.
- Luminaire shall be provided with locking arrangement with Allen key to prevent pilferage.
- Luminaire shall be suitable for use with incandescent lamp upto 100W.
- Provision for 20 mm ET conduit entry shall be provided at the bottom.



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n) LED type Luminaires:

- LED Luminaires shall be used for the lighting if specified in BOQ as part of NIT.
- In false ceiling area LED luminaires shall be recessed mounting type & in non-false ceiling area the LED luminaires shall be surface mounting type.
- The individual lamp wattage for LED shall be upto 3 watt.
- The LED chip efficacy shall be min 120 Lm/W. The luminaire efficacy shall be not less than 70Lm/W.
- The LED used in the luminaires shall have colour rendering index (CRI) of Min 80. Colour designation of LED shall be “cool day light” (min 5700K) type.
- The LED luminaire shall have minimum life of 25,000 burning hours with 80% of lumen maintenance at the end of the life.
- The beam angle for LED chip shall be 120 degrees.
- The max. junction temperature of LED shall be 85 deg C, further the lumen maintenance at this temperature shall be min 90%.
- The THD of LED Luminaires shall be less than 10%. Further the EMC shall be as per IS 14700. The power factor of the luminaire shall not be less than 0.9.
- The marking on luminaire & safety requirements of luminaire shall be as per IS standards.
- Suitable heat sink with proper thermal management shall be designed & provided in the luminaire.
- The connecting wires used inside the system, shall be low smoke halogen free, fire retardant PTFE cable.
- Fuse protection shall be provided in input side specifically for LED luminaires.
- Care shall be taken in the design that there is no water stagnation anywhere. The entire housing shall be dust and water proof protection as per IS 12063.
- Driver Circuit: LED modules and drivers shall be compatible to each other. The LED module driver's ratings and makes shall be as recommended by corresponding LED manufacturer. LED Drivers may have following control & protections:
 - Suitable precision current control of LED.
 - Open Circuit Protection



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- Short Circuit Protection
- Over Temperature Protection
- Overload Protection

o) **Emergency Lighting Luminaires**

- The luminaire shall be automatic having in-built battery.
- Battery shall have integral charging unit.
- Charger shall be suitable for operation as per system design data.
- The battery enclosure shall be suitably painted and ventilated for the performance with sealed lead acid battery, as applicable.

5.3 **CONTROLGEAR BOX (NON-INTEGRAL TYPE)**

- a) Boxes shall have weatherproof construction and shall be provided with one piece neoprene gasket.
- b) Boxes shall be provided with HRC fuse mounted on a removable tray. Boxes shall be provided with all necessary components having a neat layout arrangement such that it is possible to test, inspect or replace any component without difficulty.
- c) Boxes shall be suitable for mounting on structures, walls and columns.
- d) Suitable number of terminals shall be provided for looping-in and looping-out of cable connections and also connections to the luminaire(s).
- e) Cable / conduit knock-outs shall be for each loop-in and loop-out connection and also connection to the luminaire(s).

5.4 **REFLECTORS**

- a) Reflectors shall be made of sheet steel or aluminium as applicable.
- b) The aluminium reflectors shall be made of high purity aluminium sheet. Sheet will be polished, electrochemically brightened and anodised.
- c) Wherever reflectors are separate from housing, they shall be securely attached to the luminaire by means of easily accessible fastening devices such that they are readily removable from the housing for maintenance.



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5.5 LAMP HOLDERS

- a) Holders shall be resistant to wear and shall be smooth in operation.
- b) Contacts shall be of durable quality.
- c) Holders shall hold the lamp under condition of shock and vibration.
- d) Lamp holders for fluorescent lamp shall be spring loaded, bi-pin, rotor type with low contact resistance.
- e) Live parts of the holder shall not be exposed when the lamp is inserted or removed in case of fluorescent luminaires.
- f) Lamp holders for HPMV & HPSV lamps shall be of porcelain material.
- g) Holders shall be screw type for HPSV & HPMV lamps. Holders for incandescent lamps shall be screw type, unless mentioned otherwise in Data sheet A.
- h) Lamp holders for incandescent lamps shall be of brass or porcelain.

5.6 STARTER HOLDERS

- a) Starter holders shall be designed and manufactured as per the applicable standard.

5.7 BALLASTS

- a) Fluorescent fixtures shall have electronic ballasts. Ballasts shall be totally enclosed type.
- b) Ballasts shall be easily removable type.
- c) Core shall be made of low loss, electrical grading stampings.
- d) End connections shall be made available in a terminal block, rigidly fixed to the ballast enclosure.
- e) Ballasts shall be free from humming.
- f) Ballast shall be provided separately for each lamp in a multi-lamp luminaire.
- g) Tappings shall be provided to set the voltage within range for HPMV & HPSV luminaires.

5.8 STARTERS

- a) Starters shall be made of aluminium material. Plastic or any other material if used shall be subject to purchaser's approval.
- b) Starters shall have bi-metal electrodes.



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- c) Starter shall be replaceable without the use of any tool and without disturbing any accessory or lamp.
- d) Starters shall have high mechanical strength.
- e) Starters shall be provided with radio interference suppressing capacitors.
- f) Starters shall have brass contacts.

5.9 CAPACITORS

- a) Capacitors shall have constant value of capacitance, suitable for operation at supply voltage.
- b) Capacitors shall be hermetically sealed, preferably in a metal enclosure to prevent seepage of impregnant and ingress of moisture.

5.10 LAMPS

- a) Lamps shall be suitable for use in any position.
- b) Lamps shall be capable of withstanding small vibrations without breakage to filaments / electrodes and lead-in wire.

5.10.1 Type of Lamps

- a) Fluorescent Lamp
 - i. Anode rings shall be provided to prevent blackening of the ends.
 - ii. Lamp caps shall be two pin type at each end.
- b) Incandescent (GLS) Lamps
 - i. Incandescent lamps shall be "clear" type.
- c) Mercury Vapour Lamps
 - i. Lamp caps shall be screw type.
- d) Sodium Vapour Lamps
 - i. Lamps shall be ovoid shaped with diffusing powder coating.
 - ii. Lamps shall be provided with external igniters and rapid restart facility.
 - iii. Lamp caps shall be screw type.



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e) Halogen Lamps

- i. Lamps shall be double ended linear type.
- ii. Lamps shall be of immediate start type.
- iii. Design of lamps shall ensure high performance and high efficiency.

5.11 JUNCTION BOXES

a) Junction boxes with terminals shall be supplied for branching and terminating lighting wires/cables whenever required, as specified.

b) Construction Features

- i. The junction boxes shall be fabricated out of material & thickness as specified in Datasheet-A and shall be of rectangular shape. The cover shall be hinged or bolted with captive nuts and bolts and shall be provided with neoprene gasket lining all over.
- ii. The junction boxes shall be provided with suitable knock outs/ gland plates for conduit/ cable connection. The conduit connection shall be properly sealed. The junction boxes meant for cable connection shall be complete with removable gland plates, glands and cable lugs, as required. The junction boxes shall be provided with two earthing terminals suitable for GI earthing wires.
- iii. The junction boxes shall be weather proof type conforming to IP-55..
- iv. The boxes and cover shall be hot dip galvanised. Junction boxes for corrosive areas like DM Plant, water treatment plant etc. shall have additional epoxy/acrylic coating of thickness not less than 50microns on outer surface.
- v. The junction boxes shall be suitable for mounting on wall, columns, etc. The brackets, bolts, nuts, screws and any other erection accessories required for erection shall be included.

c) Terminals

- i. Multiway terminal blocks of approved type and make complete with galvanised screws, nuts, washers and marking strips shall be furnished for terminating the lighting wires.
- ii. All the terminals blocks shall be of 650V grade one piece construction with insulating barriers. These terminals shall be made of copper alloy and shall be stud type. Each terminal provided on junction box shall be suitable for terminating two numbers of aluminium conductors of the size as specified without any damage to the conductors or looseness.



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d) The junction boxes shall be of following types:

Type	Description
JB-F	Provided with four (4) way stud type terminals for terminating upto 2 nos. 10 mm ² stranded aluminium conductors on each terminal, suitable for outdoor installations.
JB-FE	Same as above but with an additional epoxy coating of 50 micron thickness.
JB-S	Provided with four (4) way stud type terminals, each terminal suitable for terminating upto two nos. of 3.5Cx50 mm ² stranded aluminium conductors & with one no.6A HRC fuse and link.

5.12 RECEPTACLES

- a) Receptacle unit shall consist of socket outlet with associated switch and plug. The socket outlet and switch shall be flush mounted on a box which shall be suitable for mounting on wall or steel structures.
- b) Receptacle boxes shall be fabricated from material with thickness mentioned in Data Sheet A.
- c) Steel boxes shall be hot dip galvanised/ painted as specified in Datasheet-A and as per the requirements of applicable standard corresponding to the sheet thickness.
- d) The boxes shall have conduit knock-outs and shall be suitable for cable entry of the size to be specified by purchaser during detailed engineering.
- e) The boxes shall be provided with neoprene rubber gaskets to make them moisture and dust proof.
- f) Suitable loop-in and loop-out terminals shall be provided inside the box. Terminals for incoming and outgoing shall be suitable for the size of conductor of cables.
- g) The receptacle units shall be of the following types:
 - I. Type RA: It shall have the following:
 - i. 20A, 240V, 1-phase, 2 pole, 3-pin (third pin scrapping earth) porcelain, metal clad socket with a metallic cover tied to it.
 - ii. Rotary, heavy duty 20A switch conforming to applicable standard.
 - iii. Shrouded, die-cast aluminium plug.
 - iv. It shall be combined interlocked weather proof industrial unit.



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v. Mechanical interlock shall be provided as follows :

- Switch can be put ON only when plug is fully engaged.
- Plug can be withdrawn only when switch is in OFF position.
- Cover can be opened only when switch is in OFF position.

vi. The arrangement should ensure that water does not enter the plug when socket is ON.

vii. Loop-in loop-out terminals shall be provided inside the box suitable for 10 mm² Al conductor.

II. Type RB: It shall have the following:

- i. Combination of 5A & 15A, 240V, 1-phase, 2 pole, 3-pin, third pin grounded socket with integral piano key type 15A switch, flush mounted on decorative bakelite (6 mm thick)/ perspex (3 mm thick) sheet as cover of the boxes.
- ii. Loop-in loop-out terminals similar to type RA shall be provided. These will be located in office areas.

III. Type RC: It shall have the following:

- i. 63A, 415V, 3-phase-neutral earth, metal clad socket with cover
- ii. Rotary, heavy duty 63A switch conforming to applicable standard.
- iii. Shrouded, die-cast aluminium plug
- iv. It shall be combined, interlocked weather proof industrial unit.
- v. Mechanical interlock shall be same as that are applicable for RA type receptacles
- vi. The receptacle boxes shall be suitable for entry and exit of 3.5CX70 mm² Al conductor PVC cable and loop-in loop-out terminals for the same shall be provided such that not more than one core is terminated at one terminal. Removable, undrilled cable gland plate shall be provided. Tinned copper lugs and double compression cable glands shall also be supplied by the bidder.

IV. Type RD: It shall have the following:

- i. 125A, 415V, 3-phase-neutral earth, metal clad socket with cover.
- ii. Rotary, heavy duty 125A switch conforming to applicable standard.
- iii. Shrouded, die-cast aluminium plug



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- iv. It shall be combined, interlocked weather proof industrial unit.
- v. Mechanical interlock shall be same as that are applicable for RC type receptacles
- vi. The receptacle boxes shall be suitable for entry and exit of 3.5CX95 mm² Al conductor PVC cable and loop-in loop-out terminals for the same shall be provided such that not more than one core is terminated at one terminal. Removable, undrilled cable gland plate shall be provided. Tinned copper lugs and double compression cable glands shall also be supplied by the bidder.

V. Type RE: It shall have the following:

- i. 5A, 240V, 1-phase, 2 pole, 3-pin, third pin grounded socket with integral piano key type 5A switch, flush mounted on decorative bakelite (6 mm thick)/ perspex (3 mm thick) sheet as cover of the boxes.
- ii. Loop-in loop-out terminals similar to type RA shall be provided. These will be located in office areas.

5.13 CEILING FAN & REGULATORS

- a) The bidder shall supply the following ceiling fans complete with suspension rod, canopy and accessories and regulators:
 - i. 1200 mm sweep
 - ii. 1400 mm sweep
- b) The fan motor shall be totally enclosed. The motor winding shall be of copper wire provided with double or reinforced class-E insulation.
- c) The fan shall have three (3) well balanced blades. Precaution shall be taken in the manufacture of fan as well as regulators to ensure reasonable degree of silence at all speeds.
- d) The regulator shall be electronic type with stepped/smooth (stepless) control of approved make.

5.14 LIGHTING CONTROL SWITCH-BOXES

- a) The switch-boxes shall be of bent steel construction, fabricated of 1.6 mm thick MS steel with 6 mm thick decorative bakelite or 3 mm thick perspex sheet cover. The boxes shall be hot dip galvanised.
- b) The switch-boxes shall be suitable for surface mounting as well as flush mounting in brick walls. They shall be flush mounted in the walls in the office areas where false ceiling is provided.



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- c) Switch-boxes shall have conduit knock-out on two sides. Adequate provision shall be made for ventilation of these boxes. Conduit knock-out sizes shall be as per conduit layout drgs.
- d) Switches shall be of piano-key type having quick-make, quick-break mechanism, provided with position marking, suitable for mounting on insulating plate. The switches shall be suitable for 1-phase, 240V, 50 Hz supply. They shall conform to relevant standards. The switches shall be supplied loose and shall be fixed at site according to requirement.
- e) All components housed in the switch-boxes shall be wired to an outgoing junction box by 1.5 mm² Cu wire. The junction box shall have adequate nos. of terminals.
- f) The size of switch-boxes shall be adequately chosen to accommodate the no. of switches and fan regulator boxes specified below. Fan regulators shall be supplied separately.
- i. Type SWB1 - Switch board with 1 no. 5A switch, JB type SW1.
- ii. Type SWB2 - 3 nos. 5A switches and 1 no. fan regulator, JB type SW2.
- iii. Type SWB2a - 4 nos. 5A switches, JB type SW2.
- iv. Type SWB3 - 7 nos. 5A switches, 3 nos. fan regulator, JB type SW3.
- v. Type SWB3a - 8 nos. 5A switches, JB type SW3.

JB details for lighting control switch boxes are as below:

JB-SW1 Provided with four (4) way stud type terminals, each terminal suitable for terminating upto two nos. of 10 mm² stranded aluminium conductor.

JB-SW2 Similar to the JB-SW1 but provided with ten (10) way terminals.

JB-SW3 Similar to the JB-SW1 but provided with eighteen (18) way terminals.

5.15 CABLE GLANDS

- a) Whether specifically mentioned or not, cable glands of suitable sizes shall be supplied along with each equipment for power and control cables.
- b) Rubber components used in the gland shall be of neoprene.
- c) Name / trade name of manufacturer, type no. and applicable range of outer diameter of cable shall be engraved / indelibly printed on the cable gland.

5.16 CABLE LUGS

- a) All equipment shall be supplied with the power and control cable lugs of suitable size, whether specifically mentioned or not.



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- b) Name / trade name and size of lug shall be engraved/ indelibly printed on each cable lug.

5.17 FLEXIBLE METALLIC CONDUITS AND FITTINGS

- a) Flexible metallic conduits shall generally conform to the requirements of IS:3480.
- b) Flexible conduits shall be made of strip steel, which shall be of cold rolled mild steel. The strip shall be of uniform width and thickness throughout.
- c) The strip for making flexible conduit shall be wound tightly and so overlapped in subsequent helicals that no openings are seen in normal position.
- d) The surface of the strip shall be thoroughly cleaned before application of protective coating. Pre-treatment, before galvanization, shall conform to IS:6005.
- e) The strip shall be electro-galvanized to a minimum thickness of 25 microns as per IS 3480.
- f) Flexible conduits shall be lead coated for application in high temperature zones if specifically mentioned in Data Sheet A.
- g) The conduit shall have uniform diameter throughout its length. The internal surface of all conduits shall be free from burrs and sharp edges and suitable for pulling insulated cables and wires without damage.

5.18 PVC CONDUITS

- a) PVC conduits shall generally conform to the requirements of IS: 9537(Part I & Part III).

6.0 SURFACE TREATMENT

- 6.1 All metal parts and the surfaces (exterior & interior) of equipment, unless stated otherwise in case of reflectors, shall be degreased by dipping in hot alkaline solution and rubbed with wire brush to remove oil & scale from them & then rinsed in water. Alternatively, they may be shot / sand blasted.
- 6.2 Parts shall be pickled by dipping in hydrochloric acid tank to remove the rust from the surfaces formed during storage of sheets & then rinsed to remove traces of the acid. The cleaning and pretreatment of all metal parts shall be as per applicable standard.
- 6.3 The surfaces to be painted shall then be prepared by phosphatizing to protect them from further rusting & to create a good bond with the paint. The pretreatment shall conform to the applicable standard.
- 6.4 All parts shall then be subjected to a coat of red oxide primer paint.
- 6.5 All inside and outside surfaces of panel shall be spray painted with synthetic enamel of the shade as per Data Sheet A.



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- 6.6 Electrostatic or powder painting shall be acceptable subject to purchaser's approval.
- 6.7 Wherever possible, finished parts shall be coated with peelable compound by spraying method to protect the finished product from scratches, grease, dirty and oily spots during handling and transportation.

7.0 PACKING

- 7.1 Vendor shall furnish packing procedure along with packing drawing at contract stage for applicable items for purchaser approval.
- 7.2 Containers adequate for storing individual P.O. quantity material at site are to be supplied. Vendor shall furnish suitable justification to purchaser during detailed engineering for the number and size of containers being supplied.
- 7.3 Specification for the sea worthy packing, if enclosed, for the export jobs shall form part of the specification.

8.0 GUARANTEED PERFORMANCE REQUIREMENTS

- 8.1 The vendor shall guarantee satisfactory performance of the equipment supplied under all conditions and requirement as laid down by this specification.
- 8.2 Vendor shall ensure satisfactory performance for lighting system designed by them at site.

9.0 INSPECTION & TESTING

- 9.1 Bidder shall confirm compliance with the BHEL Standard Quality Plan (PE-QP-999-558-E006) without any deviations. The equipment which are not covered in the Quality Plan shall be tested as per the QP to be submitted by bidder. In case bidder has reference QP agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ ultimate customer's approval. There shall be no commercial implication to BHEL on account of any changes in QP during contract stage.
- 9.2 All the components and completely assembled equipment shall be tested as per the latest edition of standards. Charges for these tests shall be deemed to be included in equipment price.
- 9.3 All the specified type and routine tests shall be carried out to verify the rating and performance of the equipment. Where valid type test certificates in evidence of equipment performance claimed are available & approved by purchaser, the requirements for conducting type tests may be waived. The general arrangement of object under test shall be to purchaser's approval.
- 9.4 All manufacturing processes viz. machining, sheet forming, electroplating, wire routing, cleating & crimping, assembly, surface preparation shall conform to good manufacturing practices.



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- 9.5 Inspection for dimensional & visual checks especially of the following, with respect to contract drawings, documents & standards shall be conducted:
- a) General sturdiness & rigidity of equipment
 - b) Surface finishing
 - c) Gasketting
 - d) Inter-changeability
 - e) Constructional features viz. location, accessibility & marking of components, segregation, accessibility to live parts (shrouding) etc.
 - f) Completeness of scope
- 9.6 Equipment shall be liable for rejection if tolerances on the values of dimensions, power consumption, impedances, temperature rise etc. exceed the specified values by purchaser and / or standards.

10.0 SPARES

- 10.1 Mandatory spares (if applicable) are indicated in BOQ-cum-price schedule.
- 10.2 Erection & commissioning spares are included in the bidder's scope of supply. BE&C spares are indicated in BOQ-cum-price schedule.
- 10.3 A list of recommended O&M spares quantities for a duration of 3 years A shall be filled up in the applicable schedule / format and submitted by bidder along with offer. However, the acceptance of the same shall not be binding on purchaser.

11.0 TOOLS AND TACKLE

- 11.1 Tools & tackle which are essential to facilitate assembly, adjustments, erection, maintenance & dismantling of equipment shall be provided as part of equipment supplied.
- 11.2 The above tools shall be supplied along with the initial consignment of equipment so as to be available prior to erection but may not be used for erection purposes.
- 11.3 Vendor shall also submit a list of recommended tools and tackle. Acceptance of these tools and tackle shall not be a binding on the purchaser.
- 11.4 Schedule of tools & tackle shall be filled up by bidder.

12.0 DOCUMENTATION

12.1 Documents to be submitted by the vendor immediately after award of contract

- a) Bar chart of activities of manufacture, testing, inspection and despatch.

12.2 Documents to be submitted during detailed engineering of contract

- 12.2.1 Engineering documents (refer clause 4.3) to be generated by the vendor, if applicable.



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- a) Lighting calculations for indoor areas.
- b) Lighting calculations for outdoor areas.
- c) SLD of power distribution upto LPs.
- d) Power load on each LP & LDB
- e) Layout drawings for indoor areas
- f) Layout drawings for outdoor areas.
- g) Conduit layout drawings.
- h) Wiring and load distribution details for outdoor areas.
- i) Master Bill of Material.
- j) Packing Procedure & drawing.
- k) Calculation for selection of no. & size of container.

12.2.2 Other documents :

- a) Final Quality Plans
- b) Technical data sheet
- c) Polar curves, zonal flux diagram and CoU charts of luminaires.
- d) Complete design calculations for arriving at number of luminaires.
- e) Fixing / mounting details of luminaires and other items.
- f) General arrangement drawings of following:
 - i. Luminaires
 - ii. Receptacles
 - iii. 24 V Supply module
- g) Field Quality Plan as per General Technical Conditions.
- h) Control Scheme for fluorescent, HPMV and HPSV luminaires.
- i) Schematic drawings for LDBs / LPs.
- j) Type test certificates.
- k) Catalogues / leaflets

12.3 Operation and Maintenance (O&M) manual :

The document shall comprise of installation, operating and maintenance instructions for various items / components. The O&M manual shall include the following :

- a) Write ups / instructions / procedures for
 - i. Storage at site.
 - ii. Unpacking.
 - iii. Handling at site.



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- iv. Erection.
- v. Pre-commissioning / commissioning tests.
- vi. Operating procedures.
- vii. Maintenance procedures.
- viii. Precautions to be taken during operation and maintenance work.
- ix. Trouble shooting charts covering problems, cause and solution.
- b) Approved Technical Data Sheets.
- c) Technical leaflet of various items / components.
- d) Copies of the type, acceptance and routine test certificates in bound volume.
- e) Details of all components liable to be replaced during the life of the equipment.
- f) List of maintenance tools required.
- g) List of testing equipment required.

12.4 AS BUILT DRAWINGS

- a) Preparation of as-built drawings shall not be in the scope of vendor.

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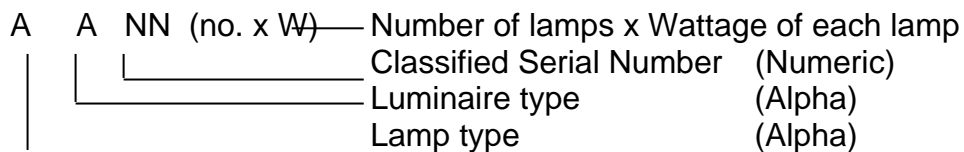
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ANNEXURE-I

LUMINAIRE DETAILS

LUMINAIRE CODING SCHEME

1.0 Code Structure



2.0 Lamp types

- a) F - Fluorescent
- b) M - Mercury Vapour
- c) S - Sodium Vapour
- d) T - Tungsten
- e) H - Halogen

3.0 Luminaire types

- a) C - Channel Mounted (Fluorescent)
- b) B - Bay Mounted
- c) W - Well Glass
- d) S - Street Lighting
- e) F - Flood Lighting
- f) H - Bulk Head
- g) P - Post Top Lantern
- h) E - Emergency Lighting
- i) X - Others

4.0 Serial Numbers

- a) 01 - 20 General Purpose (Industrial)
- b) 21 - 40 Decorative
- c) 41 - 50 Vapour Proof
- d) 51 - 60 Dust Proof
- e) 61 - 70 Drip Proof
- f) 81 - 90 Corrosion Proof
- g) 91 - 99 Flame Proof

NOTES :

1. Flood lighting luminaires to have non-integral control gearbox.
2. All other luminaires shall have integral control gearbox, unless specifically mentioned otherwise in enclosed sheets.
3. For more details of each luminaire, refer specification.



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1.0 Fluorescent Lamp Luminaires

- | | | | |
|------|------|--------|---|
| 1.1 | FC01 | 1 x 28 | Fluorescent, industrial box type base without any cover. |
| 1.2 | FC02 | 2 x 28 | Fluorescent, industrial box type base without any cover. |
| 1.3 | FC03 | 1 x 28 | Fluorescent, industrial box type base and stove enamelled side reflectors. |
| 1.4 | FC04 | 2 x 28 | Fluorescent, industrial box type base and stove enamelled side reflectors. |
| 1.5 | FC05 | 1 x 28 | Fluorescent, industrial box type base and vitreous enamelled side reflectors. |
| 1.6 | FC06 | 2 x 28 | Fluorescent, industrial box type base and vitreous enamelled/ anodized glossy side reflectors. |
| 1.7 | FC07 | 1 x 18 | Fluorescent, industrial box type base and vitreous enamelled side reflectors operating on 220V DC input supply. |
| 1.8 | FC21 | 1 x 28 | Fluorescent, decorative with 3 side perspex acrylic diffuser. |
| 1.9 | FC22 | 2 x 28 | Fluorescent, decorative with 3 side perspex acrylic diffuser. |
| 1.10 | FC23 | 1 x 28 | Fluorescent, decorative, recessed type with perspex acrylic diffuser. |
| 1.11 | FC24 | 2 x 28 | Fluorescent, decorative, recessed type with perspex acrylic diffuser. |
| 1.12 | FC25 | 1 x 28 | Fluorescent, decorative, recessed type with mirror optic reflector. |
| 1.13 | FC26 | 2 x 28 | Fluorescent, decorative, recessed type with mirror optic reflector. |
| 1.14 | FC27 | 2 x 28 | Fluorescent, decorative with opal polystyrene louvers. |
| 1.15 | FC28 | 2 x 28 | Fluorescent, decorative, recessed type with opal polystyrene louvers. |
| 1.16 | FC29 | 2 x 28 | Fluorescent, decorative with vertical metallic louvers. |
| 1.17 | FC30 | 4 x 14 | Fluorescent, decorative, recessed type, 600 x 600 size with perspex acrylic diffuser. |
| 1.18 | FC31 | 4 x 20 | Fluorescent, decorative, recessed type, 600 x 600 size with opal polystyrene louvers. |



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|------|------|--------|---|
| 1.19 | FC32 | 2 x 28 | Fluorescent, decorative, surface mounted with mirror optic reflector. |
| 1.20 | FC33 | 1 x 18 | Fluorescent, decorative, recessed type with mirror optic reflector operating on 220V DC input supply. |
| 1.21 | FC34 | 1 x 18 | Fluorescent, dust proof, totally enclosed type with sheet steel housing operating on 220V DC input supply |
| 1.22 | FC41 | 2 x 28 | Fluorescent, vapour proof with end boxes and controlgear box of cast Al. |
| 1.23 | FC51 | 2 x 28 | Fluorescent, dust proof, totally enclosed type with sheet steel housing. |
| 1.24 | FC61 | 1 x 28 | Fluorescent, street light with sheet aluminium canopy and ribbed acrylic cover. |
| 1.25 | FC62 | 2 x 28 | Fluorescent, street light with sheet aluminium canopy and ribbed acrylic cover. |
| 1.26 | FC81 | 2 x 28 | Fluorescent, corrosion proof, totally enclosed type with sheet aluminium/ polycarbonate housing. |

2.0 High Pressure Mercury Vapour (HPMV) Lamp Luminaire

- | | | | |
|------|------|----------|--|
| 2.1 | MB01 | 1 x 250 | Mercury, high bay, industrial type. |
| 2.2 | MB02 | 1 x 400 | Mercury, high bay, industrial type. |
| 2.3 | MB03 | 1 x 1000 | Mercury, high bay, industrial type. |
| 2.4 | MB04 | 1 x 250 | Mercury, high bay, totally enclosed industrial type. |
| 2.5 | MB05 | 1 x 400 | Mercury, high bay, totally enclosed industrial type. |
| 2.6 | MB06 | 1 x 250 | Mercury, high bay with non-integral controlgear box. |
| 2.7 | MB07 | 1 x 400 | Mercury, high bay with non-integral controlgear box. |
| 2.8 | MB11 | 1 x 250 | Mercury, medium bay, industrial type. |
| 2.9 | MB12 | 1 x 400 | Mercury, medium bay, industrial type. |
| 2.10 | MB13 | 1 x 250 | Mercury, medium bay, totally enclosed industrial type. |
| 2.11 | MB14 | 1 x 400 | Mercury, medium bay, totally enclosed industrial type. |



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2.12	MB17	1 x 80	Mercury, low bay, industrial type.
2.13	MB18	1 x 125	Mercury, low bay, industrial type.
2.14	MB19	1 x 80	Mercury, low bay, totally enclosed industrial type.
2.15	MB20	1 x 125	Mercury, low bay, totally enclosed industrial type.
2.16	MW41	1 x 80	Mercury, well glass, vapour proof with vitreous enamelled reflector.
2.17	MW42	1 x 125	Mercury, well glass, vapour proof with vitreous enamelled reflector.
2.18	MW51	1 x 80	Mercury, well glass, dust proof with vitreous enamelled reflector.
2.19	MW52	1 x 125	Mercury, well glass, dust proof with vitreous enamelled reflector.
2.20	MW91	1 x 80	Mercury, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
2.21	MW92	1 x 125	Mercury, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
2.22	MW93	1 x 80	Mercury, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing
2.23	MW94	1 x 125	Mercury, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
2.24	MW95	1 x 80	Mercury, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing for Div.-2 areas.
2.25	MW96	1 x 125	Mercury, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing for Div. 2 areas.
2.26	MW98	1 x 125	Mercury, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing
2.27	MS61	1 x 125	Mercury, street light with one piece cast aluminium body.
2.28	MS62	1 x 250	Mercury, street light with two piece cast aluminium body.
2.29	MS63	1 x 400	Mercury, street light with two piece cast aluminium body.



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2.30 MF61 1 x 250 Mercury, flood light, general purpose.

2.31 MF62 1 x 400 Mercury, flood light, heavy duty type.

2.32 MF63 2 x 400 Mercury, flood light, heavy duty type.

2.33 MP21 1 x 80 Mercury, post top lantern

2.34 MP22 1 x 125 Mercury, post top lantern

3.0 High Pressure Sodium Vapour (HPSV) Lamp Luminaire

3.1 SB01 1 x 150 Sodium, high bay, industrial type.

3.2 SB02 1 x 250 Sodium, high bay, industrial type.

3.3 SB03 1 x 400 Sodium, high bay, industrial type.

3.4 SB04 1 x 150 Sodium, high bay, totally enclosed industrial type.

3.5 SB05 1 x 250 Sodium, high bay, totally enclosed industrial type.

3.6 SB06 1 x 400 Sodium, high bay, totally enclosed industrial type.

3.7 SB07 1 x 150 Sodium, high bay with non-integral controlgear box.

3.8 SB08 1 x 250 Sodium, high bay with non-integral controlgear box.

3.9 SB09 1 x 400 Sodium, high bay with non-integral controlgear box.

3.10 SB11 1 x 150 Sodium, medium bay, industrial type.

3.11 SB12 1 x 250 Sodium, medium bay, industrial type.

3.12 SB13 1 x 150 Sodium, medium bay, totally enclosed industrial type.

3.13 SB14 1 x 250 Sodium, medium bay, totally enclosed industrial type.

3.14 SB17 1 x 70 Sodium, low bay, industrial type.

3.15 SB18 1 x 150 Sodium, low bay, industrial type.

3.16 SB19 1 x 70 Sodium, low bay, totally enclosed industrial type.

3.17 SB20 1 x 150 Sodium, low bay, totally enclosed industrial type.

3.18 SW41 1 x 70 Sodium, well glass, vapour proof with vitreous enamelled/
powder coated type reflector.



**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS &
MISCELLANEOUS ITEMS**

SPECIFICATION NO. PE-SS-999-558-E006

VOLUME II

SECTION II

REVISION: 0

DATE:

SHEET 36 OF 38

3.19	SW42	1 x 150	Sodium, well glass, vapour proof with vitreous enamelled/ powder coated type reflector.
3.20	SW51	1 x 70	Sodium, well glass, dust proof with vitreous enamelled reflector.
3.21	SW52	1 x 150	Sodium, well glass, dust proof with vitreous enamelled reflector.
3.22	SW91	1 x 70	Sodium, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
3.23	SW92	1 x 150	Sodium, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
3.24	SW93	1 x 70	Sodium, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
3.26	SW95	1 x 70	Sodium, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing for Div. 2 areas.
3.27	SW96	1 x 150	Sodium, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing for Div. 2 areas.
3.28	SS61	1 x 70	Sodium, street light with one piece cast aluminium body.
3.29	SS62	1 x 150	Sodium, street light with one piece cast aluminium body.
3.30	SS63	1 x 250	Sodium, street light with two piece cast aluminium body.
3.31	SS64	1 x 400	Sodium, street light with two piece cast aluminium body.
3.32	SF61	1 x 250	Sodium, flood light, general purpose.
3.33	SF62	1 x 400	Sodium, flood light, general purpose.
3.34	SF63	1 x 250	Sodium, flood light, heavy duty type.
3.35	SF64	1 x 400	Sodium, flood light, heavy duty type.
3.36	SF65	2 x 250	Sodium, flood light, heavy duty type.
3.37	SF66	2 x 400	Sodium, flood light, heavy duty type.
3.38	SP21	1 x 70	Sodium, post top lantern.



**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS &
MISCELLANEOUS ITEMS**

SPECIFICATION NO. PE-SS-999-558-E006

VOLUME II

SECTION II

REVISION: 0

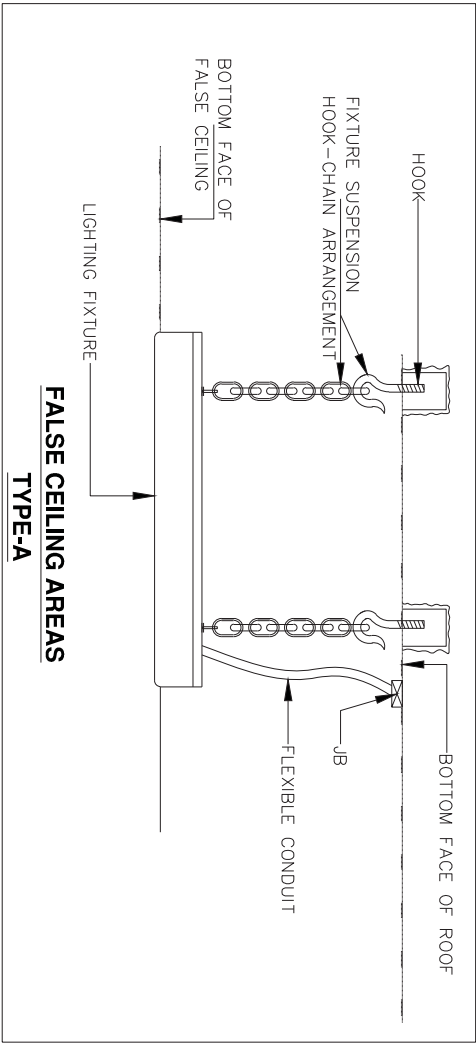
DATE:

SHEET 37 OF 38

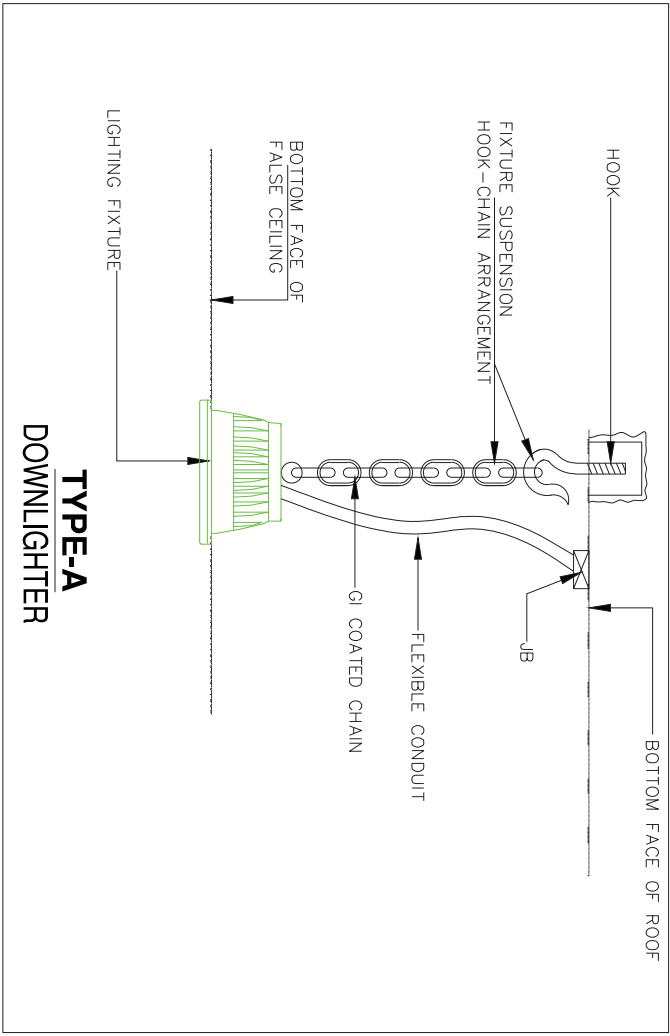
4.0 Tungsten Lamp Luminaires

- | | | | |
|------|------|---------|--|
| 4.1 | TW41 | 1 x 100 | Tungsten, well glass, vapour proof with vitreous enamelled reflector. |
| 4.2 | TW42 | 1 x 200 | Tungsten, well glass, vapour proof with vitreous enamelled reflector. |
| 4.3 | TW51 | 1 x 100 | Tungsten, well glass, dust proof with vitreous enamelled reflector. |
| 4.4 | TW52 | 1 x 200 | Tungsten, well glass, dust proof with vitreous enamelled reflector. |
| 4.5 | TW91 | 1 x 100 | Tungsten, well glass, flame proof with vitreous enamelled reflector. |
| 4.6 | TW92 | 1 x 200 | Tungsten, well glass, flame proof with vitreous enamelled reflector. |
| 4.7 | TW95 | 1 x 100 | Tungsten, well glass, increased safety (Div. 2) with vitreous enamelled reflector. |
| 4.8 | TW96 | 1 x 200 | Tungsten, well glass, increased safety (Div. 2) with vitreous enamelled reflector. |
| 4.9 | TB21 | 1 x 60 | Tungsten, bulk head, weather proof. |
| 4.10 | TB22 | 1 x 100 | Tungsten, bulk head, weather proof. |
| 4.11 | TB91 | 1 x 100 | Tungsten, bulk head, flame proof. |
| 4.12 | TB92 | 1 x 200 | Tungsten, bulk head, flame proof. |
| 4.13 | TP21 | 1 x 200 | Tungsten, post top lantern. |
| 4.14 | TE02 | 1 x 20 | Tungsten, portable emergency unit with rechargeable battery. |
| 4.15 | TE02 | 1 x 40 | Tungsten, portable emergency unit with rechargeable battery. |
| 4.16 | TX01 | 1 x 60 | Tungsten, dispersive vitreous enamelled reflector. |
| 4.17 | TX02 | 1 x 100 | Tungsten, dispersive vitreous enamelled reflector. |
| 4.18 | TX03 | 1 x 75 | Decorative recessed mounting luminaire suitable for comptalux lamp. |
| 4.19 | TX04 | 1 x 100 | Decorative recessed mounting luminaire suitable for comptalux lamp. |

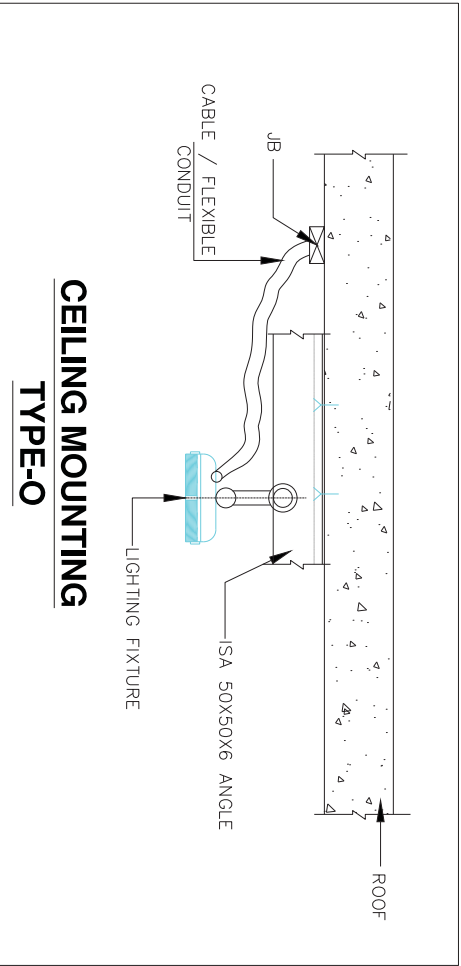
ANNEXURE-1



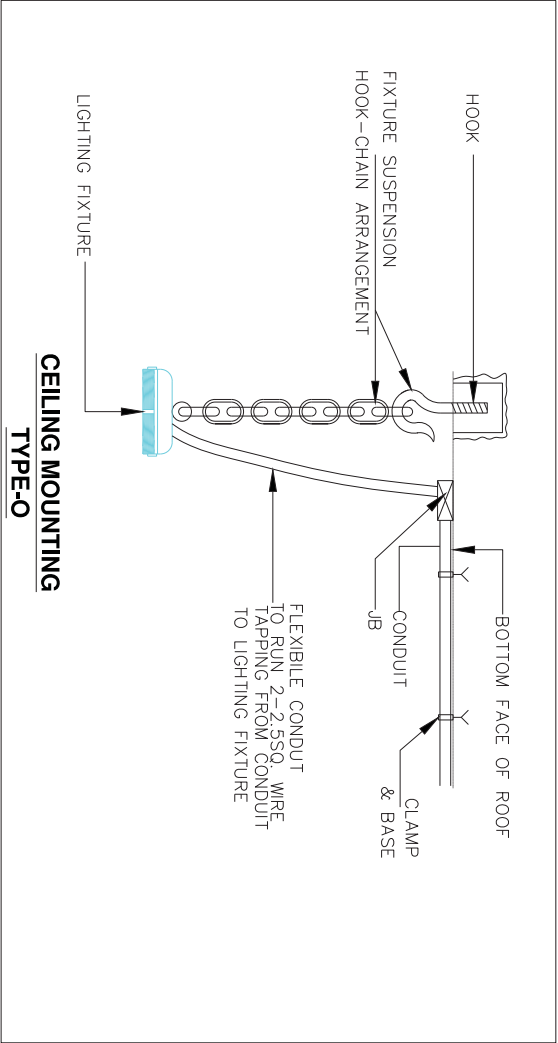
This is a Typical mounting arrangement dwgs/ details for guidance only. Final Mounting arrangement dwg shall be made by the successful bidder during detailed Engineering. It is to be noted that GI Conduit 20mm Dia and Flexible PVC Coated Conduit, Structural Steel shall be provided by BHEL. Balance all other accessories clamps/ chains/ clips/ steel rope/ pins etc required for mounting as per typical mounting arrangement for their fixtures shall be part of fixtures only and shall be provided by the Bidders.



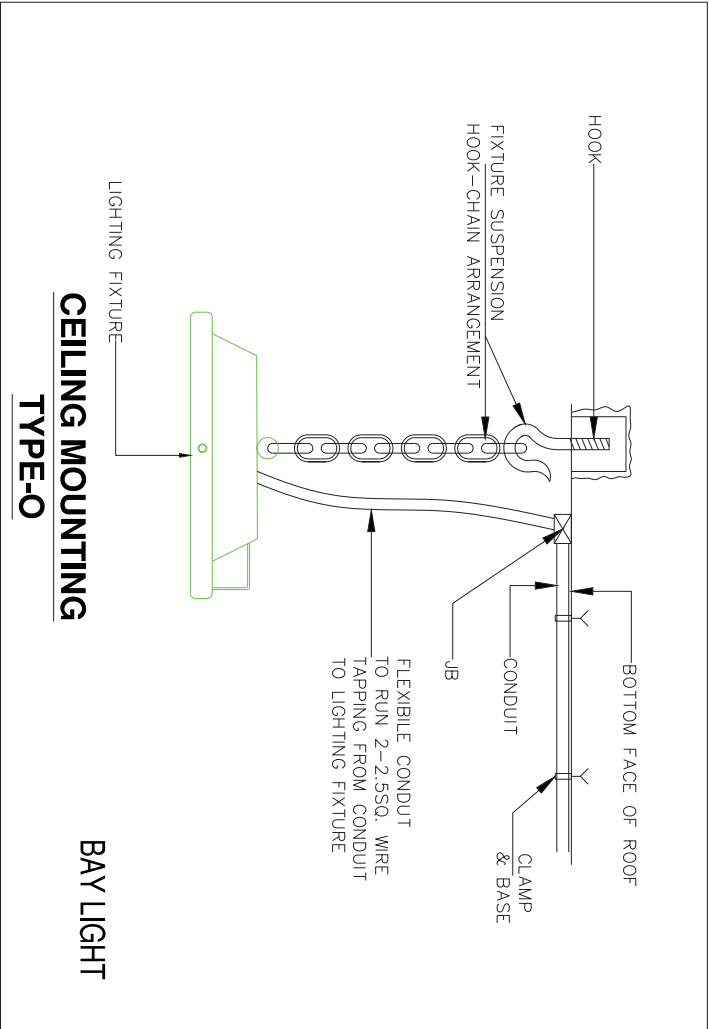
2. In Lighting layout, Mounting arrangement also shown, If any Descrerepency found on both documents then Consult with Design incharge/Site incharge.
3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BHEL site incharge.
5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.



**CEILING MOUNTING
TYPE-O**



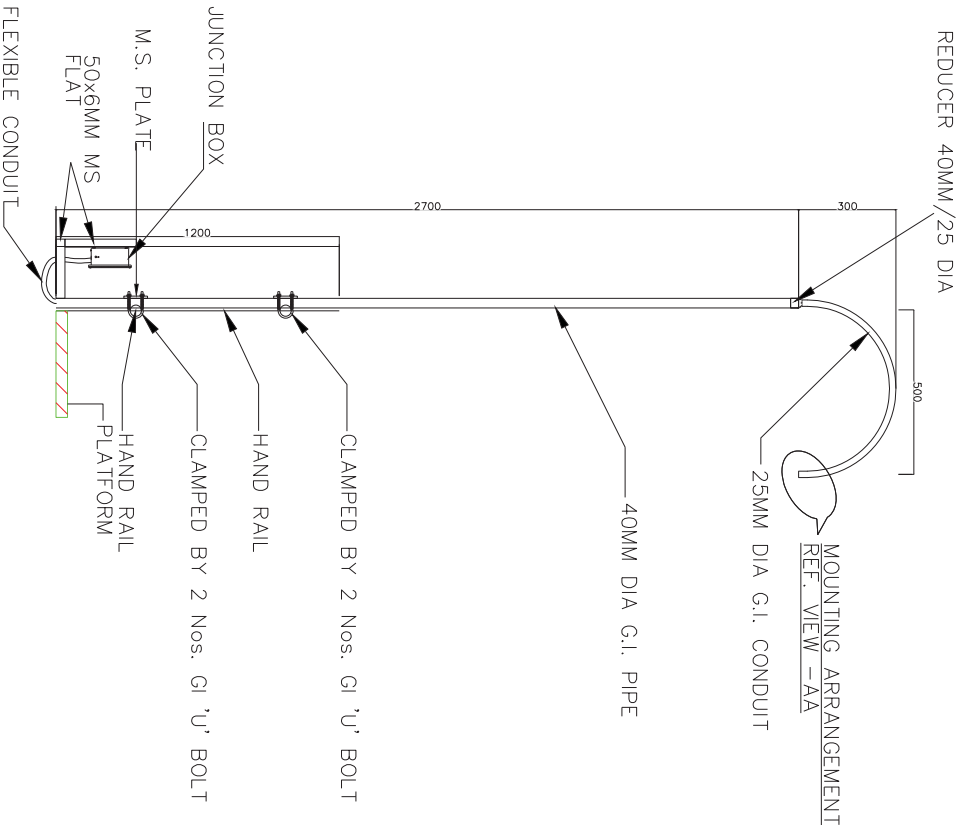
**CEILING MOUNTING
TYPE-O**



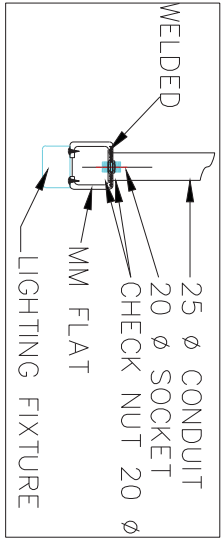
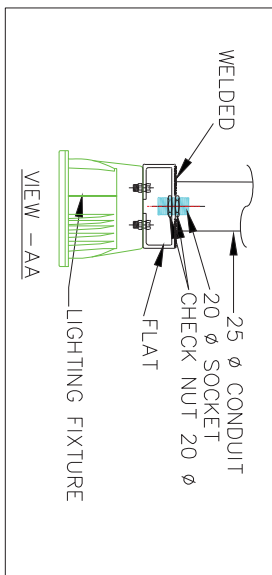
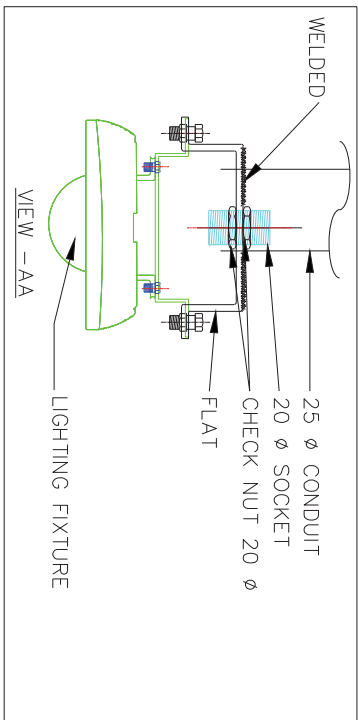
**CEILING MOUNTING
TYPE-O**

BAY LIGHT

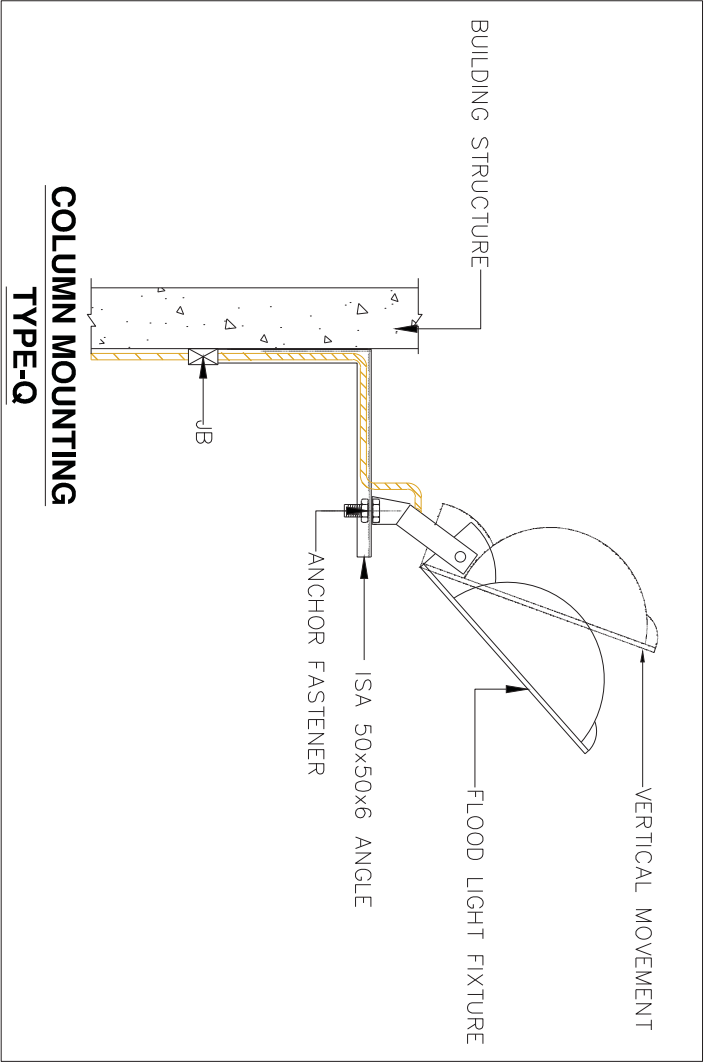
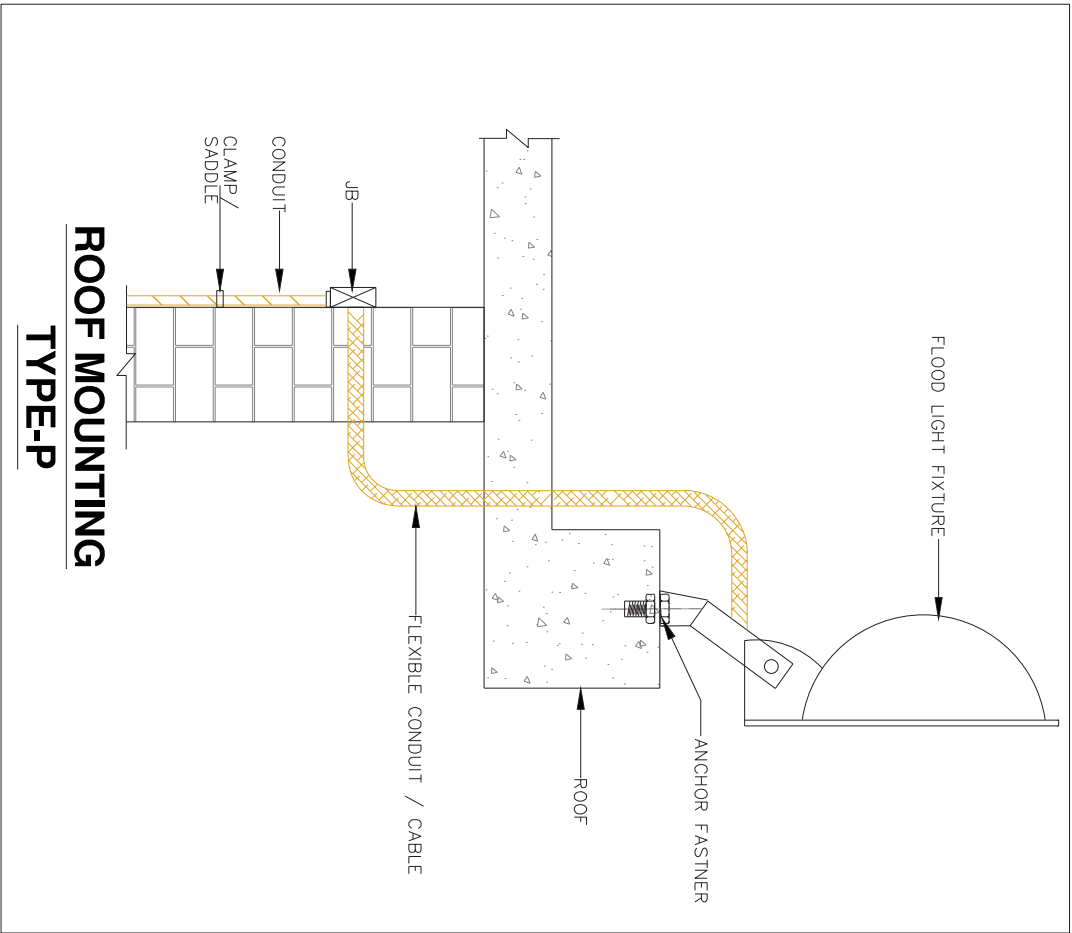
- General Notes:
1. Mounting arrangement can be changed/ modified on site as per site requirements.
 2. In Lighting layout, Mounting arrangement also shown, if any discrepancy found on both documents then Consult with Design Incharge/Site Incharge.
 3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
 4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BHEL site incharge.
 5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.



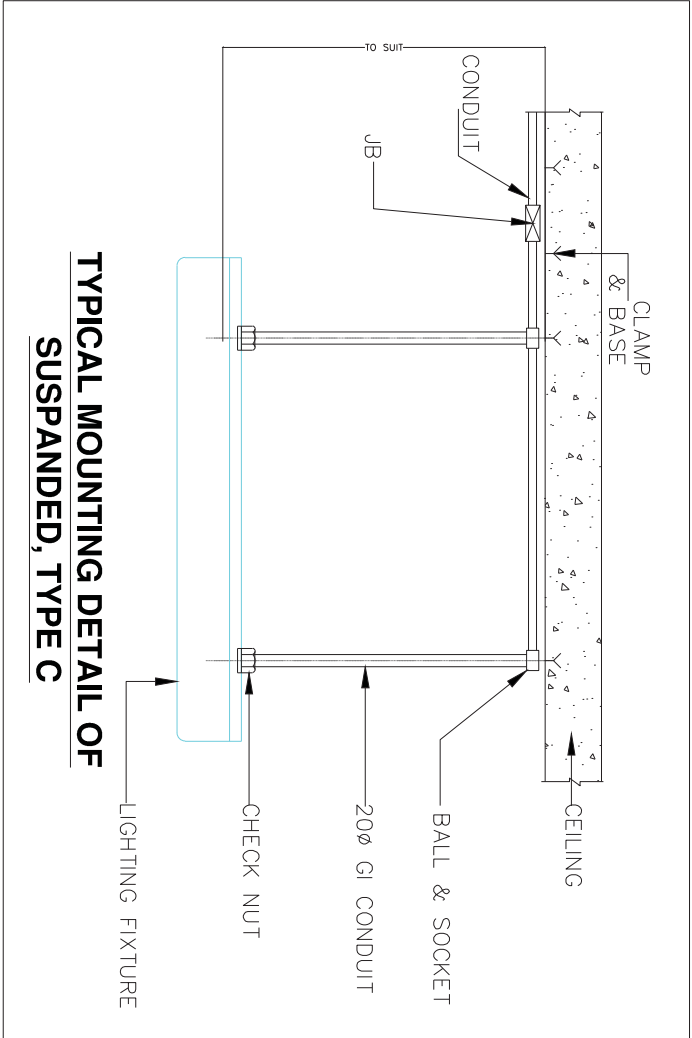
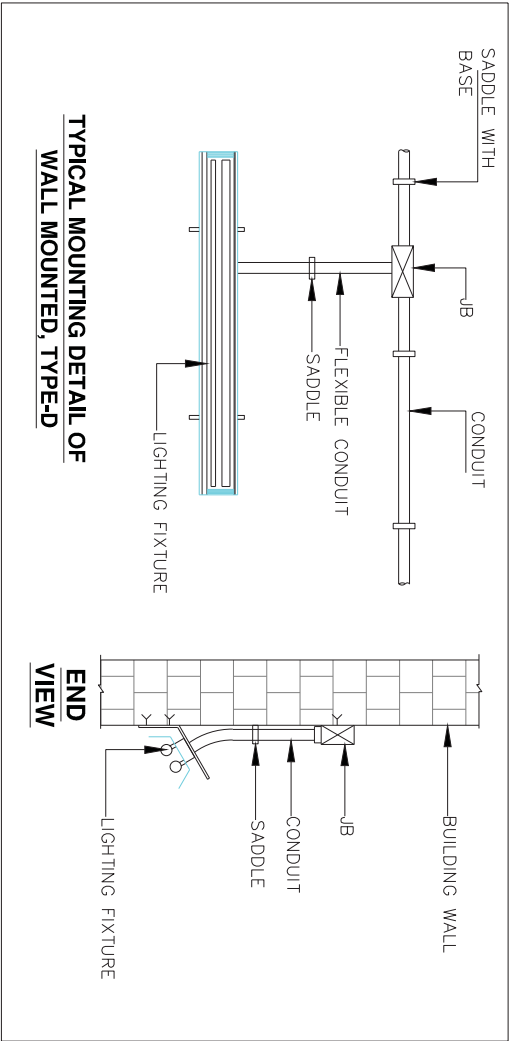
HAND RAIL MOUNTING TYPE-I



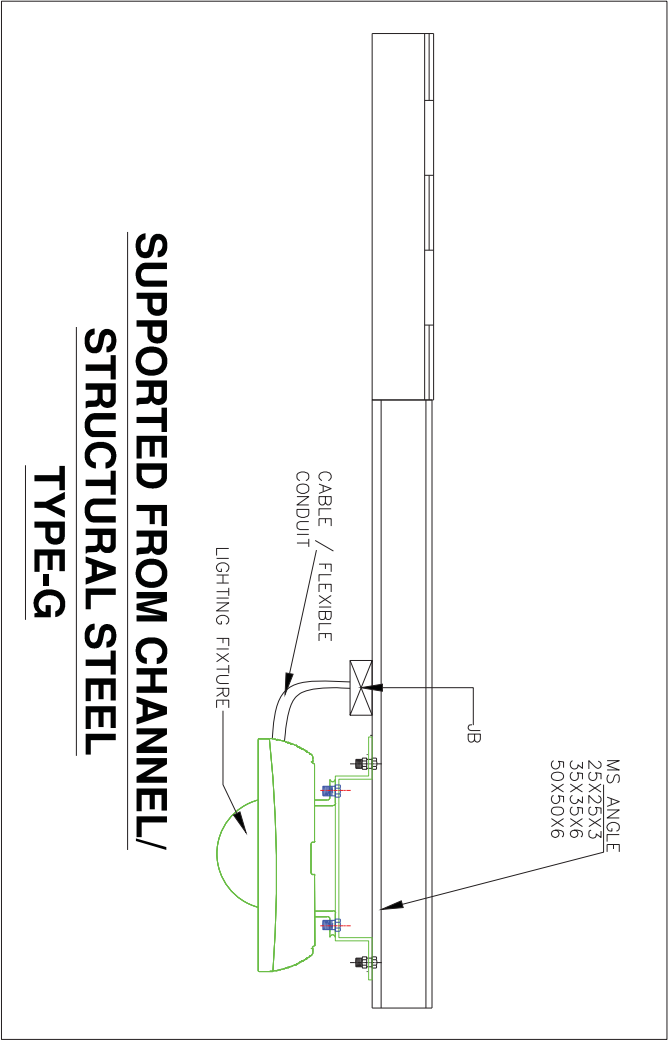
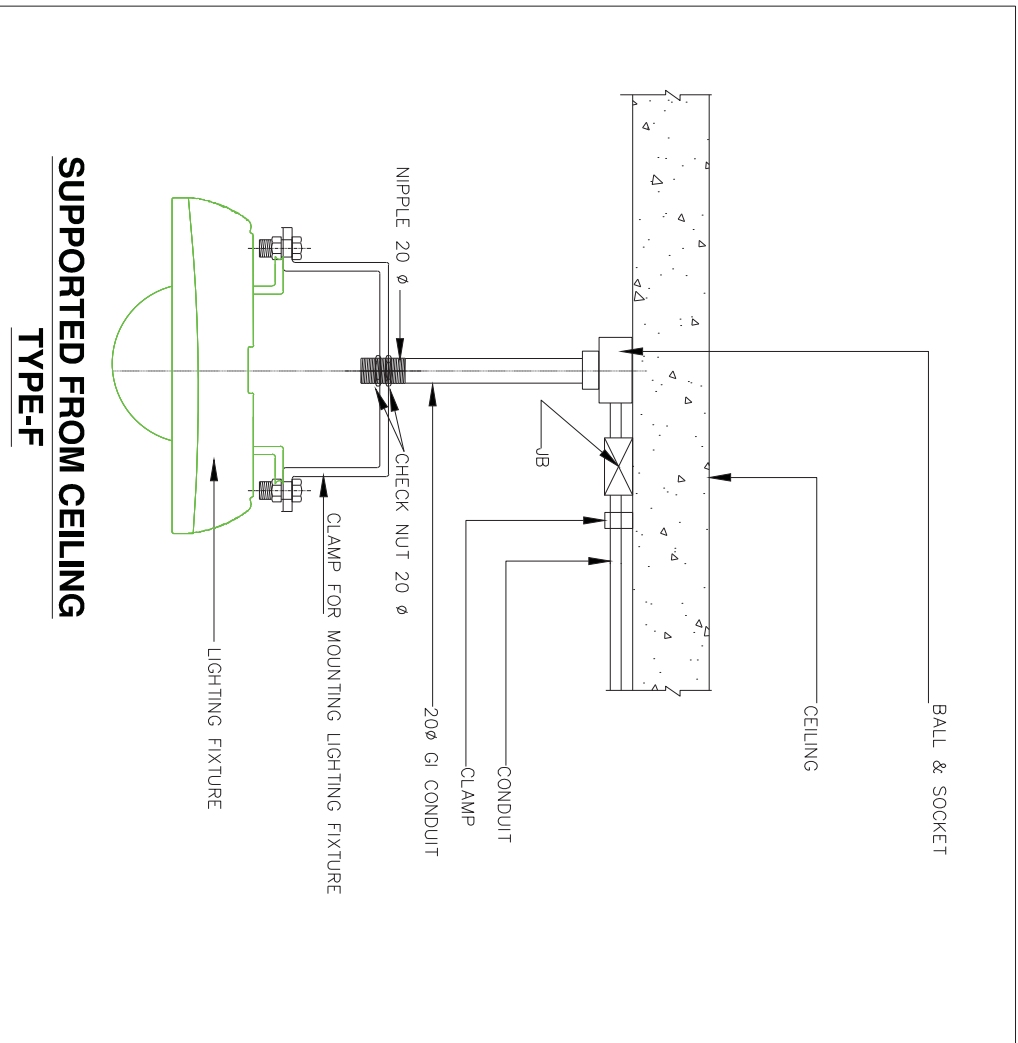
- General Notes:
1. Mounting arrangement can be changed/ modified on site as per site requirements.
 2. In Lighting layout, Mounting arrangement also shown. If any Discrepancy found on both documents then Consult with Design incharge/Site incharge.
 3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
 4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BHEL site incharge.
 5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.



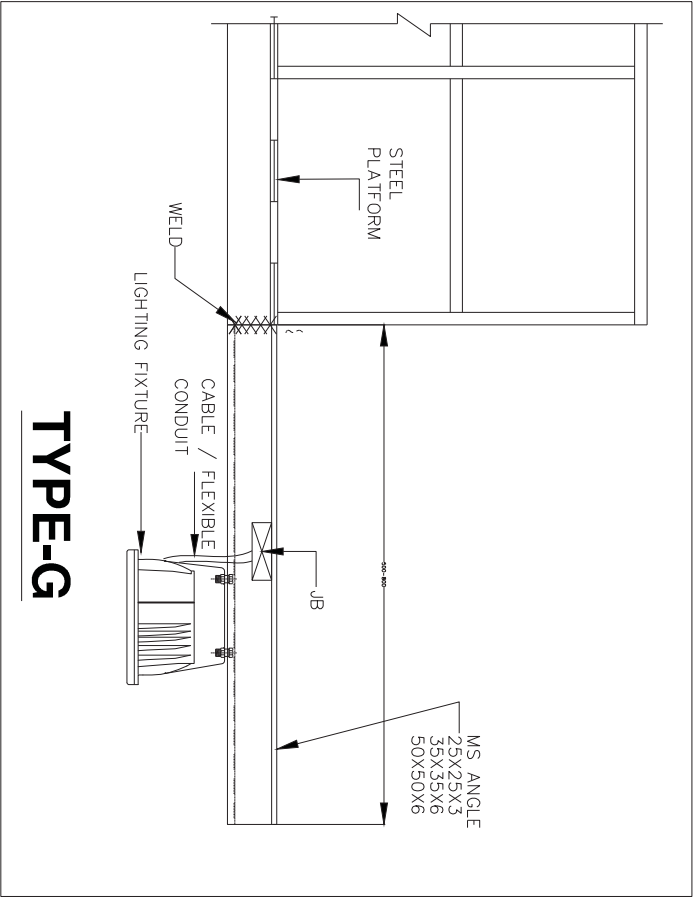
- General Notes:
1. Mounting arrangement can be changed/ modified on site as per site requirements.
 2. In Lighting layout, Mounting arrangement also shown. If any Discrepancy found on both documents then Consult with Design incharge/Site incharge.
 3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
 4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BHEL site incharge.
 5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.



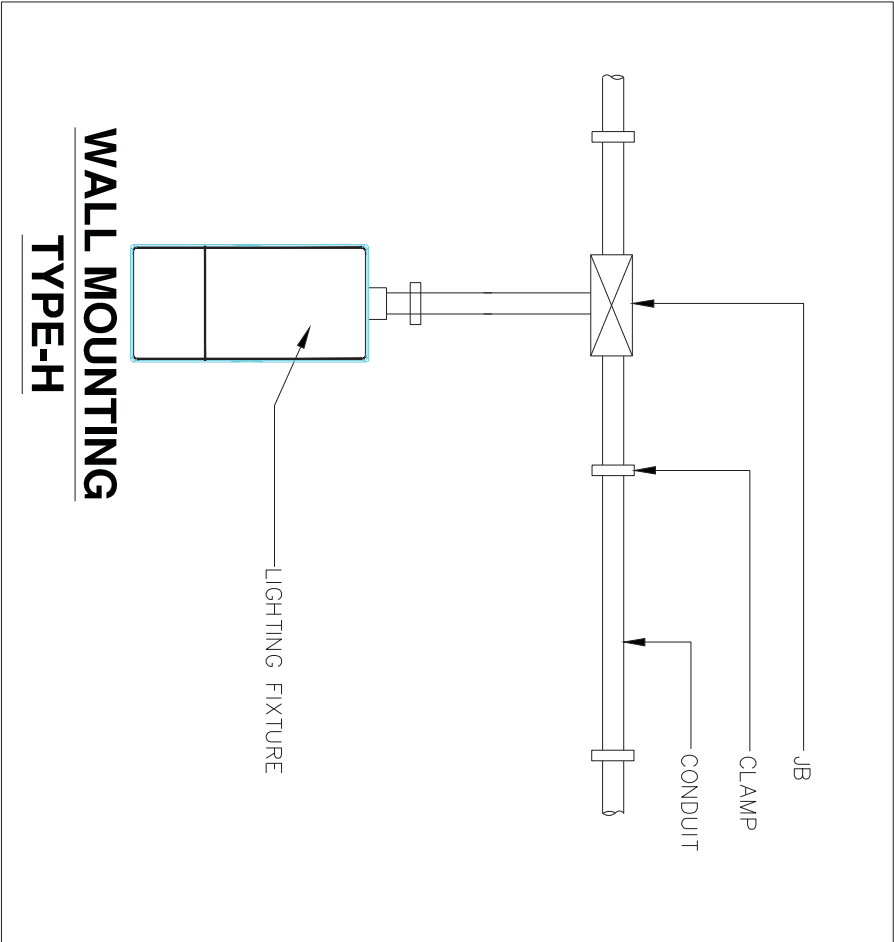
- General Notes:
1. Mounting arrangement can be changed/ modified on site as per site requirements.
 2. In Lighting layout, Mounting arrangement also shown, If any Discrepancy found on both documents then Consult with Design incharge/Site incharge.
 3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
 4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BHEL site incharge.
 5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.



- General Notes:
1. Mounting arrangement can be changed/ modified on site as per site requirements.
 2. In Lighting layout, Mounting arrangement also shown. If any Discrepancy found on both documents then Consult with Design incharge/Site incharge.
 3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
 4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BHEL site incharge.
 5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.



TYPE-G

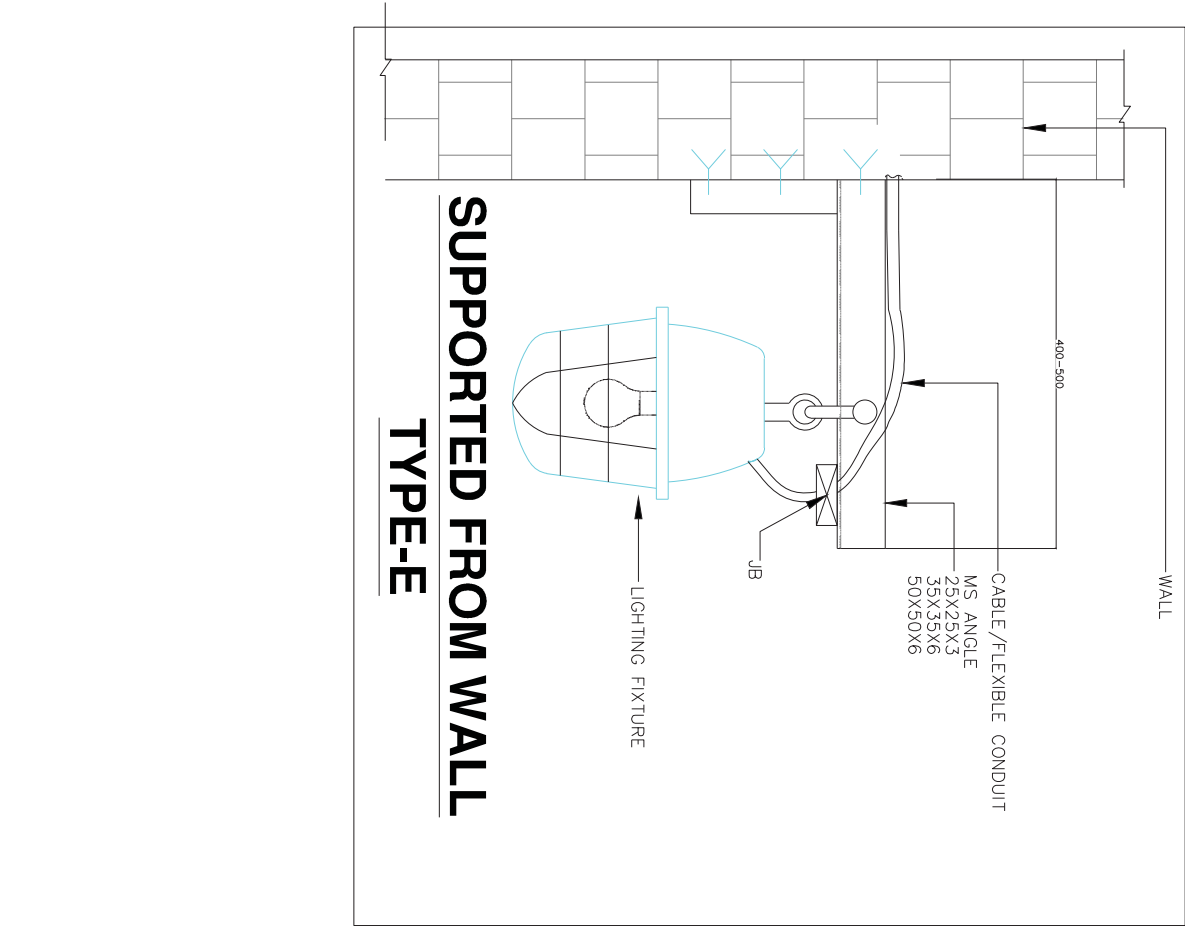
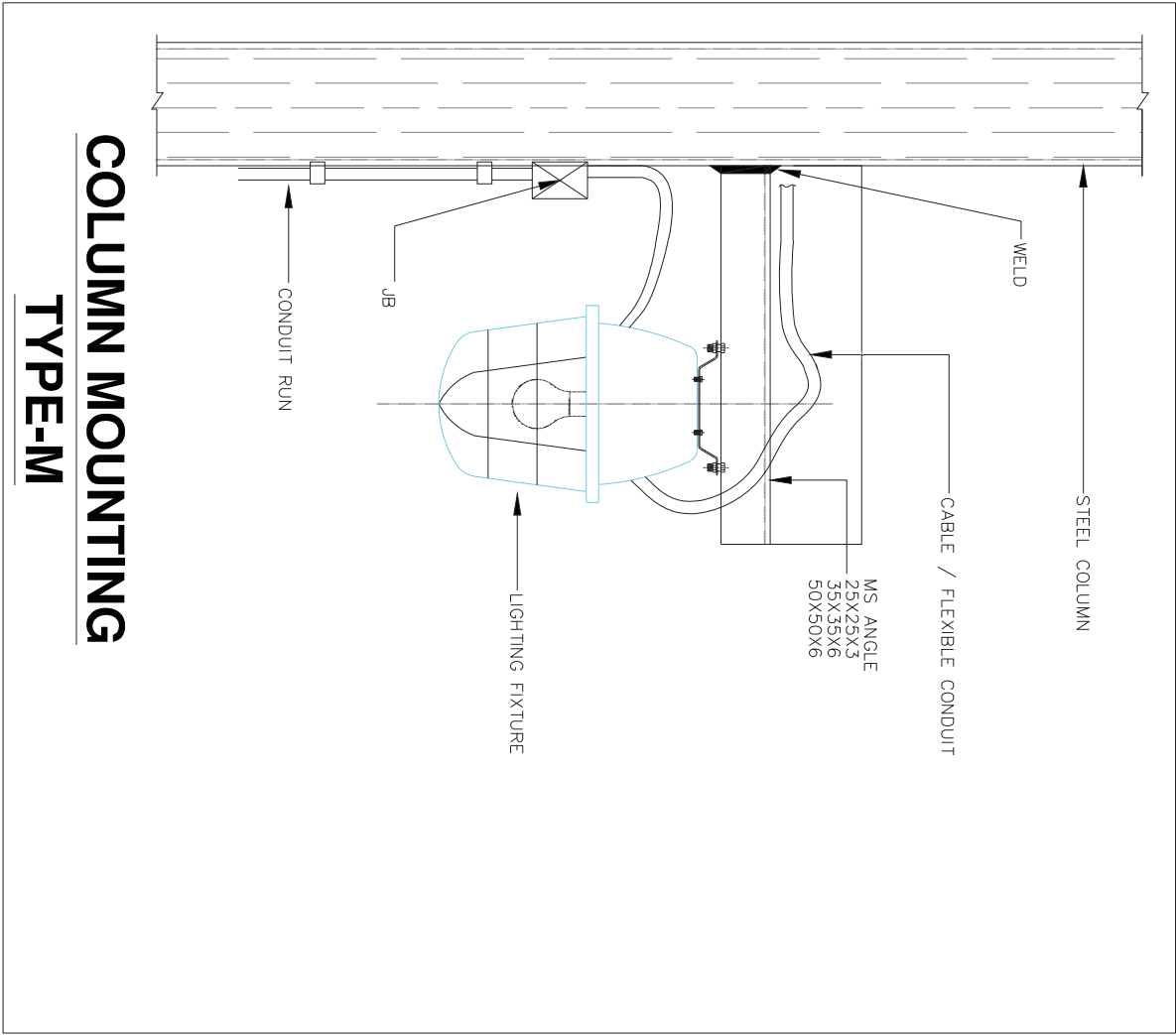


**WALL MOUNTING
TYPE-H**

General Notes:

1. Mounting arrangement can be changed/ modified on site as per site requirements.
2. In Lighting layout, Mounting arrangement also shown. If any Discrepancy found on both documents then Consult with Design incharge/Site incharge.
3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BHEL site incharge.
5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.

SIZE-A4

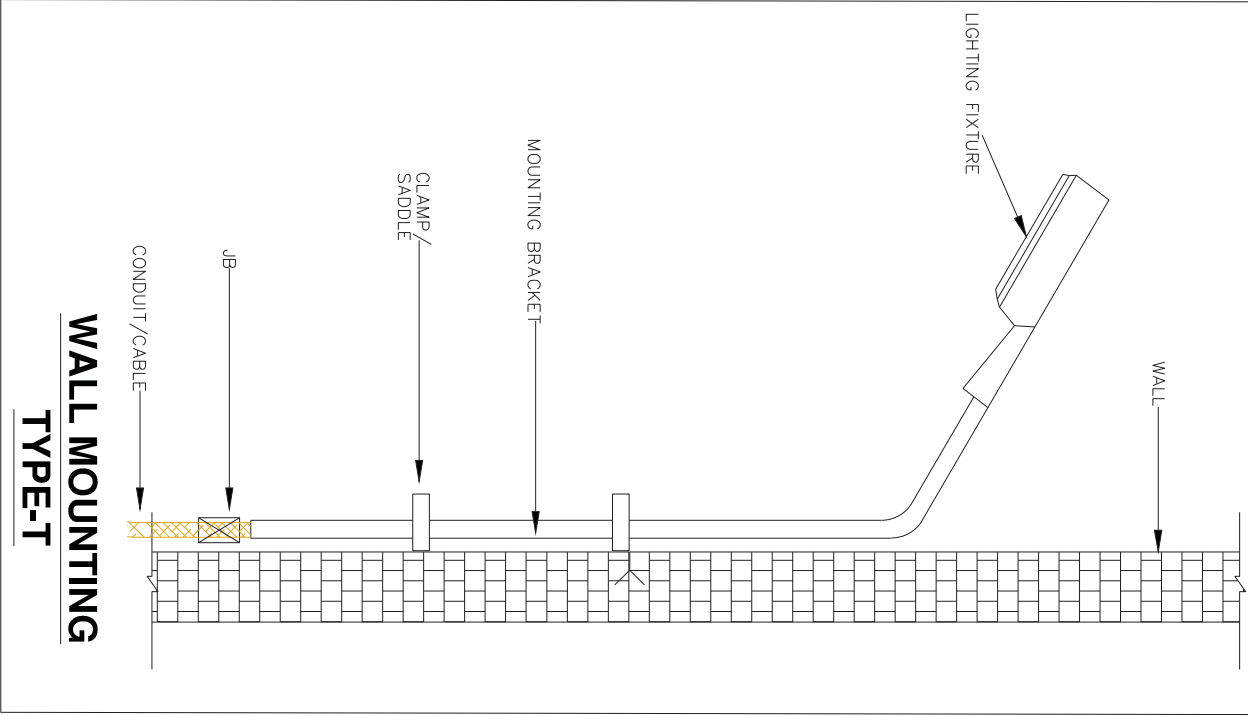


COLUMN MOUNTING
TYPE-M

SUPPORTED FROM WALL
TYPE-E

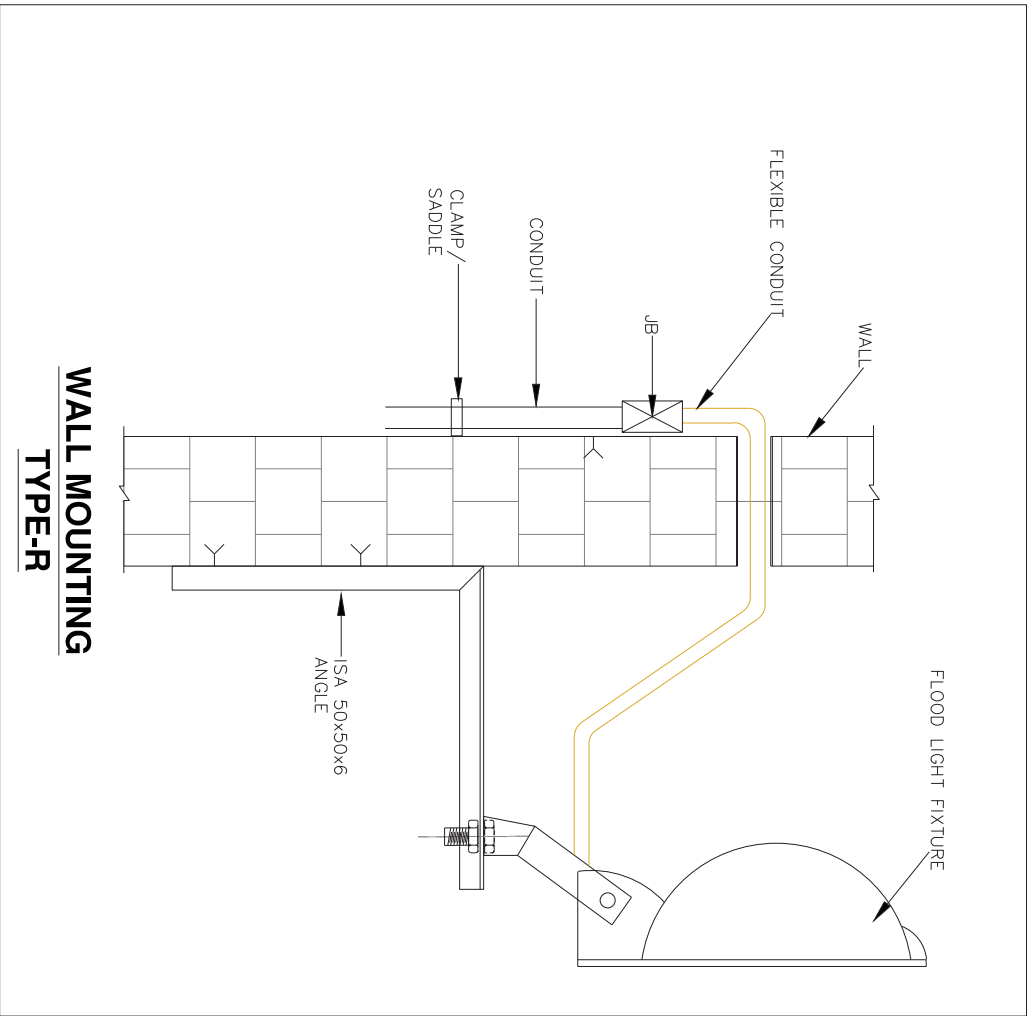
General Notes:

1. Mounting arrangement can be changed/ modified on site as per site requirements.
2. In Lighting layout, Mounting arrangement also shown. If any Descrpecency found on both documents than Consult with Design incharge/Site incharge.
3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
4. If any new type of mounting required at site than we can optimized or change the arrangement with prior inform to BHEL site incharge.
5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.



General Notes:

- 1. Mounting arrangement can be changed/ modified on site as per site requirements.
- 2. In Lighting layout, Mounting arrangement also shown. If any Discrepancy found on both documents than Consult with Design incharge/Site incharge.
- 3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
- 4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BH&L site incharge.
- 5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.



**WALL MOUNTING
TYPE-R**

General Notes:

1. Mounting arrangement can be changed/ modified on site as per site requirements.
2. In Lighting layout, Mounting arrangement also shown. If any Discrepancy found on both documents than Consult with Design incharge/Site incharge.
3. Quantity and Material shown in drawings are indicative only and may be change or vary as per site requirement.
4. If any new type of mounting required at site then we can optimized or change the arrangement with prior inform to BHEL site incharge.
5. All structural steel parts/supporting parts shall be hot dip galvanized as per B00/TS.

SIZE-A4



**TECHNICAL SPECIFICATION FOR
LIGHTING FIXTURES, LAMPS &
MISCELLANEOUS ITEMS**

SPECIFICATION NO. PE-SS-999-558-E006

VOLUME II

SECTION II

REVISION: 0

DATE:

SHEET 38 OF 38

4.20 TX05 2 x 100 Double obstruction aviation light of cast Al. alloy with red glass.

5.0 Halogen

5.1 HF61 1 x 300 Halogen, flood light, drip proof.

5.2 HF62 1 x 500 Halogen, flood light, drip proof.

5.3 HF63 1 x 750 Halogen, flood light, drip proof.

5.4 HF64 1 x 1000 Halogen, flood light, drip proof.

ITEM : LIGHTING FIXTURES (Conventional and LED type)		STANDARD QUALITY PLAN				REVIEWED BY		APPROVED BY	
CONFORMING TO CODE : As applicable		REFERENCE DOCUMENT		ACCEPTANCE NORMS		FORMAT OF RECORD		REMARKS	
Sl No	COMPONENT & OPERATIONS	CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	6 M	6 CN	7	8
1	2	3	4	5	6	7	8	9	10
<p>Note: 1) Lighting fixtures supplier to ensure that constructional features of the lighting fixture (conventional & LED type) are as per NTPC specification requirements</p> <p>2) Lighting fixture supplier to maintain all quality control records identified in this QP whether it is identified for NTPC verification or witness or not.</p>									
Conventional type Lighting Fixture									
A	Bought out items / in-process checks								
1	Lamps	Make, rating & type	Major	Visual	1 sample per type	1 sample per type	NTPC specification requirements for rating & type, Make to be BIS approved with CML number	NTPC specification requirements for rating & type, Make to be BIS approved with CML number	V -
1.1	Electronic Ballast (if applicable)	a Certificate of compliance	Major	Visual	-	-	NTPC specification requirements	Certificate of compliance by ballast manufacturer / lighting fixture supplier that ballast meets all NTPC specification requirements	V -
		b THD and pf check	Major	Electrical	Mnfr std.	-	NTPC specification requirements	THD <= 10%, pf >= 0.9 for FH type and pf >= 0.95 for other type of fluorescent lighting fixtures	P/ V *
1.2	Castings	Freedom from defects	Major	Visual	Mnfr std.	-	NTPC specification requirements	Castings shall be free from any defects such as blow holes, surface blisters, cracks and cavities etc.	P/ V *
1.3	Sheet metal forming and fabrication	Freedom from defects	Major	Visual	Mnfr std.	-	NTPC specification requirements	sheet metal fabrication / forming etc should be as per manufacturer drgs	P/ V *
1.4	Pre-treatment and powder coating	Pre-treatment process checks, Powder coating finish, thickness, uniformity of coating and adhesion	major	Visual, chemical & mech	Mnfr std.	-	Mnfr standard, NTPC specification requirements	Nominal coating thickness 50 microns or more	P/ V *

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (V) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER / SUB-SUPPLIER: C: MAINS SUPPLIER, N: NT
P: PERFORM W: WITNESS AND V: VERIFICATION. CHP: CUSTOMER HOLD POINT BY NTPC SHALL BE IDENTIFIED UNDER AGENCY COLUMN "N" AS "W".
Format No.: QS-01-QAI-P-10/F3-R0
Engg. Div./QA&I

ITEM: LIGHTING FIXTURES (Conventional and LED type)		STANDARD QUALITY PLAN				REVIEWED BY		APPROVED BY	
CONFORMING TO CODE : As applicable		REFERENCE DOCUMENT		ACCEPTANCE NORMS		FORMAT OF RECORD		REMARKS	
COMPONENT & OPERATIONS	CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REVIEWED BY	APPROVED BY
				6 M	6 CN				
2	3	4	5		7	8	9	10	11
LED type Lighting fixture									
Bought out items / in-process checks									
LED Chip	LED chip efficacy	Major	Visual	Mnfr Std.	NTPC Spec/ Appd. Data sheet/ LM 80 report	NTPC Spec/ Appd. Data sheet	LM 80 report	V	At the time of final inspection
	LED chip CRI and CCT	Major	Visual	Mnfr Std.	NTPC Spec/ Appd. Data sheet/ LM 80 report	NTPC Spec/ Appd. Data sheet	LM 80 report	V	At the time of final inspection
	Reported TM21 (L80) lifetime of LED chip	Major	Visual	Mnfr Std.	NTPC Spec/ Appd. Data sheet/ LM 80 report	NTPC Spec/ Appd. Data sheet	LM 80 report	V	At the time of final inspection
1 LED Driver	a Compatibility with LED module/chip, controls & protection features as per NTPC spec	Major	Visual	-	NTPC spec requirements	Certificate of compliance by LED driver manufacturer / lighting fixture supplier that driver meets all NTPC specification requirements	Certificate of compliance	V	
	b THD and pf check	Major	Electrical	Mnfr std.	NTPC specification	THD < 10% and pf >= 0.9	Inspection report	P/ V	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
Castings	Freedom from defects	Major	Visual	Mnfr std.	NTPC specification requirements	Castings shall be free from any defects such as blow holes, surface blisters, cracks and cavities etc.	Inspection report	P/ V	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
Sheet metal forming and fabrication	Freedom from defects	Major	Visual	Mnfr std.	NTPC specification requirements	sheet metal fabrication / forming etc should be as per manufacturer standards and good engg practices	Inspection report	P/ V	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier
Pre-treatment and powder coating	Pre-treatment process checks, Powder coating finish, thickness, uniformity of coating and adhesion	major	Visual, chemical & mech	Mnfr std.	Mnfr standard, NTPC specification requirements	Nominal coating thickness 50 microns or more	Inspection report	P/ V	P/V * - means test will be performed either by lighting fixture supplier or their sub-vendor and Verified by lighting fixture supplier

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P: PERFORM W: WITNESS AND V: VERIFICATION. CHP: CUSTOMER HOLD POINT BY NTPC SHALL BE IDENTIFIED UNDER AGENCY COLUMN "N" AS 'W'.
Format No.: QS-01-QAI-P-10/F3-R0
Engg. Div./QA&I

ITEM : LIGHTING FIXTURES (Conventional and LED type)		STANDARD QUALITY PLAN				REVIEWED BY		APPROVED BY		
CONFORMING TO CODE : As applicable		REFERENCE DOCUMENT		ACCEPTANCE NORMS		FORMAT OF RECORD		REMARKS		
SI No	COMPONENT & OPERATIONS	CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	6.M	6.CN	9	10	
1	2	3	4	5	7	8	9	10	11	
B	Acceptance Tests on LED Lighting fixture	a Details of lot offered and Certificate of compliance that lighting fixture supplier has inspected the offered lot as per their own standard	Major	Visual	-	-	-	List	P	V
		b LED chip make	Major	Visual	-	-	-	Certificate of compliance of	V	V
		c Constructional features including: Internal wiring, terminal block, earthing terminal, safety chain (if applicable)	Major	Visual	1 sample per type	1 sample per type	-	Inspection report	P	W
		e Resistance to moisture test in case of lighting fixtures having IP X4 and above rating	Major	Mechanical	1 sample per type	1 sample per type	-	Inspection report	P	W
		f Resistance to dust (applicable if IP5X and above)	Major	optical	Mnfr std.	Mnfr std.	-	Certificate of compliance	P/V	V
		f Photometry check	Major	optical	Mnfr std.	Mnfr std.	-	Certificate of compliance	P/V	V

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Format No.: QS-01-QAI-P-10/F3-R0

Engg. Div./QA&I

ITEM : LIGHTING FIXTURES (Conventional and LED type)		STANDARD QUALITY PLAN						REVIEWED BY				APPROVED BY		
Sl No	COMPONENT & OPERATIONS	CHARACTERISTICS / INSTRUMENTS	CLASS OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD			REVIEWED BY	APPROVED BY	
					6.M	6.C/N			D**	M	C			N
1	2	3	4	5	6.M	6.C/N	7	8	9	D**	M	C	N	11
		g Dimensions	Major	Visual	1 sample per type	1 sample per type	NTPC specification and approved data sheet/drg.	NTPC specification and approved data sheet/drg.	Inspection report	P	W	W		
		i LED driver: THD and pf check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	THD < 10% and pf >= 0.9	Inspection report	P	W	W		At lighting fixture supplier test lab
		j LED driver: Precision current control check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report	P	W	W		
		k LED driver: Open circuit protection simulation check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report	P	W	W		
		l LED driver: Short circuit protection simulation check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report	P	W	W		
		m LED driver: Over temperature protection simulation check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report	P	W	W		
		n LED driver: Overload protection simulation check	Major	Electrical	1 sample per type	1 sample per type	NTPC specification	NTPC specification and NTPC approved data sheet	Inspection report	P	W	W		
		o LED driver: Surge protection compliance check	Major	Electrical	-	-	NTPC specification	Certificate of compliance that surge protection is provided	Certificate of compliance	V	V	V		

Note : Packing shall be witnessed as per Annexure-D to section-I

LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/ SUB-SUPPLIER: C: MAIN SUPPLIER, N: NTPC
P: PERFORM W: WITNESS AND V: VERIFICATION. CHP: CUSTOMER HOLD POINT BY NTPC SHALL BE IDENTIFIED UNDER AGENCY COLUMN "N" AS "W".

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